

■ Next Generation Critical Cooling
for Room and Row

Liebert PEX

Efficiency And Reliability For High Availability Cooling



Compressor Models User Manual



Liebert PEX Series Air Conditioner

User Manual

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Chapter 1 Overview

The Liebert PEX series air conditioner is professional equipment, which should be placed away from the public.

This chapter introduces the model description, product introduction, features, main components, requirements on transportation and storage environment of Liebert PEX series air conditioner.

1.1 Model Description

The model description of the Liebert PEX series air conditioner is shown in Figure 1-1.

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	5	0	D	A	S	3	J	H	L	1	2	4	1	0	0	0	0	P	0	0	0	0	
Digit1 Model Range													Digit16 Enclosure options												
P PEX													1 Standard Color Charcoal grey												
Digit2 Modules													2 Colour Special color												
2 Number of Modules/Bays													6 Color Charcoal grey w/Double skin												
Digit3 Cooling Capacity kW													Digit17 Mains Switch High Voltage Option												
0-9 Nominal Gross Cooling Capacity - kW													0 None												
Digit4 Cooling Capacity kW													D Main non-Locking Disconnect												
0-9 Nominal Gross Cooling Capacity - kW													Digit18 Lock Out Low Voltage Option												
Digit5 Cooling Capacity kW													0 None												
0-9 Nominal Gross Cooling Capacity - kW													H Reheat & Humidity Lockout												
Digit6 Air Discharge													Digit19 Monitoring												
U Upflow													0 Monitoring - No Card												
D Downflow													1 Monitoring - IS WEB only												
Digit7 System Type													2 Monitoring - Two ISWEB												
A Air cooled													3 Monitoring - IS485 only												
W Water cooled													4 Monitoring - Two IS485												
G Glycol Cooled													5 Monitoring - ISWEB & IS485												
D Dual Cool - chilled water + air cooled													6 Monitoring - iCOM DO												
H Dual Cool - chilled water + water cooled													D Monitoring - ISWEB & iCOM DO												
F Free cool													E Monitoring - Two ISWEB & iCOM DO												
C Chilled Water													F Monitoring - IS485 & iCOM DO												
R Chilled Water - Dual Source													G Monitoring Two IS485 & iCOM DO												
Digit8 Airflow													H Monitoring - ISWEB & IS485 & iCOM DO												
1 EC Plug fan - Standard Static													Digit20 Sensors												
S Forward Curved fan - Standard Static													0 None												
Digit9 Power Supply													S Smoke Sensor												
3 400V / 3ph / 50Hz+N													H High Temperature												
T 380V / 3ph / 60Hz													N Hot and Cold Isle Sensor A & Sensor B (In addition to Standard Sensor)												
A 460V / 3ph / 60Hz													F Smoke & High Temp												
Digit10 Cooling System													Digit21 Packaging												
C Compliant Scroll Single Circuit R407C													P Packaging - Standard												
S Compliant Scroll Dual Circuit R407C													C Packaging - Wooden crate Export												
E Digital Scroll Single Circuit R407C													Digit22 Special Requirements												
D Digital Scroll Dual Circuit R407C													A SFA - none												
J Compliant Scroll Single Circuit R22													Z For Internal Use Only (For Australia and New Zealand)												
F Compliant Scroll Dual Circuit R22													T For Internal Use Only (China Telecom)												
2 CW Two way Valves Standard Pressure													C For Internal Use Only (Chat Union)												
3 CW Three way Valves Standard Pressure													Digit23 Order Identifier												
Digit11 Humidification													0 None												
0 None													1 High ESP 100 Pa												
H Infrared Humidifier													2 High ESP 200 Pa												
S Electrode humidifier													3 High Airflow/ESP other												
Digit12 Display													X SFA Included												
S Small Display 1 TH Sensor													Digit24 Order Identifier												
L Large Display 1 TH sensor													0 None												
Digit13 Re-Heating													L Air Cooled-Long Pipe Run Kit>30 meters												
0 None													X SFA Included												
1 Electric heating Std 1 Stage													Digit25 Order Identifier												
2 Electric heating Opt. 2 Stage Up													0 None												
Digit14 Filtration													X SFA Included												
2 G4 (EU4) gravimetric (ref MERV 8) + Clogged Filter																									
3 F5 (EU5) dust spot + Clogged Filter																									
Digit15 Coil and Valves																									
S Standard DX Air Cooled Coil																									
4 Coil DX - All valves High Pressure MBV,DX - 2 way, CW coil 2 way																									
K Coil DX - All valves High Pressure MBV,DX - 3 way, CW coil 3 way																									
N Coil DX - All valves High Pressure MBV,DX - 2 way, CW coil 3 way																									
P Coil DX - All valves High Pressure MBV, DX - 3 way,CW coil 2 way																									

Figure 1-1 Model description

1.2 Product Introduction

The Liebert PEX series air conditioner is a medium-large sized precision environment control system, which is suitable for the environment control of the equipment room or computer room. It aims to provide a sound operating environment for precision equipment, such as sensitive equipment, industry processing equipment, communication equipment and computers.

The Liebert PEX series air conditioner features high reliability, high sensible heat ratio and large airflow. It is configured with an infrared humidifier adjustable to different water qualities, and is compatible with R407C green refrigerant to meet the international requirement.

The unit is classified into dual cooling system, single source cooling system and free cool system in the light of the function module. All kinds of different function systems can use the forward centrifugal curved fan (FC fan for short) and the speed adjustable DC electronically commutated fan (EC fan for short).

Dual cooling system

The unit contains the compressor refrigerating system and the chilled-water system. The control board can select whether to run under the compressor refrigerating system or the chilled-water system flexibly according to the connected chilled-water condition and the indoor load, so as to achieve the energy-saving operation of the unit.

Single source cooling system

The unit contains the compressor refrigerating system only.

Free cool system

The unit contains the compressor refrigerating system and the free cool system. Free cool system can be connected with the special dry cooler. Under the conditions of the low outdoor temperature, the unit can select whether to run under the compressor refrigerating system or the free cool system flexibly according to the free cool medium condition provided by dry cooler and the indoor load, so as to achieve the energy-saving operation of the unit. According to the cooling mode of the refrigerant side, the unit contains the air-cooled series and the water-cooled series.

Air-cooled series

The Liebert PEX air-cooled series air conditioner comprises indoor unit and outdoor unit. With the standard configuration of Liebert PEX condenser unit, it can reduce noise pollution to the minimum while meeting system cooling requirement through the pressure regulating the fan speed. The Liebert PEX low temperature CS (D) F_S series outdoor unit can also be configured for it, qualifying the system to normally operate in cooling mode at the temperature down to -84.2°F. Please consult Emerson Network Power Co., Ltd. (Emerson for short) if the lower temperature is required.

Water-cooled series

The Liebert PEX water-cooled series air conditioner uses integrated structure and highly effective brazed-plate heat exchanger (BPHE), thus it is compact, efficient and quiet.

1.3 Product Appearance

Taking the two-bay unit of FC fan for example, the appearance of the Liebert PEX series air conditioner is shown in Figure 1-2.

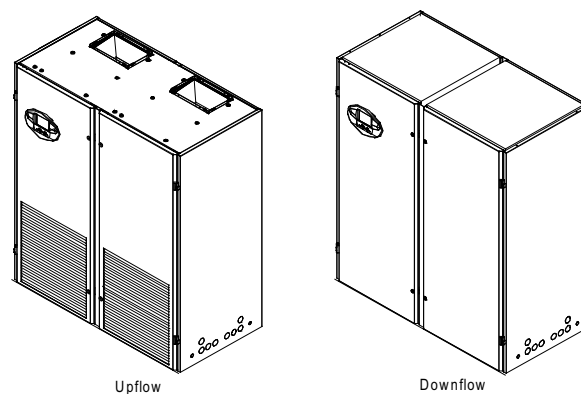


Figure 1-2 Appearance (two-bay unit)

1.4 Main Components

The main components of Liebert PEX air conditioner include indoor unit, outdoor unit and iCOM controller.

1.4.1 Indoor Unit

The indoor unit of the Liebert PEX air conditioner includes compressor, evaporator, thermal expansion valve, infrared humidifier, fan, electric heater, sight glass and filter drier. Besides these components, the water-cooled series indoor unit also includes BPHE and electric valve.

Compressor

The highly effective Copeland scroll compressor is used, featuring low vibration, low noise and high reliability. The Rotalock connection mode makes the maintenance easier.

Evaporator

The finned tube evaporator with high heat dissipation efficiency is used. The distributor is designed and validated according to specific model to ensure that the refrigerant is distributed evenly in each loop, improving the evaporator efficiency to a great extent.

Thermal expansion valve

The external equalizer type thermal expansion valve is used. It can collect temperature and pressure signals at the same time, so that it can regulate the refrigerant flow more accurately.

Infrared humidifier

The infrared humidifier is designed with a simple structure, which is easy for teardown, cleaning and maintenance. Application of the infrared humidifier can reduce the dependence on water quality. It also features fast startup, short humidifying time, large humidifying capacity and high humidifying efficiency.

Fan

The forward centrifugal fan with high efficiency and high reliability can be used. It features large airflow, long blowing distance, belt transmission and convenient maintenance. Users can also select the EC fan, which features high efficiency, energy-saving, space-saving and low noise. EC fan unit uses elaborate structure design, and the downflow unit uses the 'in-floor' design, which positions the fan unit below the floor to further improve the efficiency of air supply.

Electric heater

The spiral fin U-type stainless steel heater is used. It features fast heating speed and even heat.

Sight glass

The sight glass is the window of the system cycle, for observing the refrigerant state, mainly the moisture content of the system. When the moisture content exceeds the standard, the color will be changed.

Filter drier

The filter drier eliminates the moisture effectively in the system, and also filtrates the impurities generated during the long-term system operation so as to ensure normal system operation.

BPHE (for water-cooled series)

The brazed plate auto-cleansing BPHE is used. It features compact structure and high heat exchanging efficiency. Rotalock connections are provided for water and refrigerant sides.

Electric valve (for water-cooled series and chilled water system)

Water-cooled series: The precise electric valve is used. The water flow in the BPHE can be regulated through the intelligent valve position control of the control board, so as to ensure stable system operation.

Chilled water system: The electric valve provides proportional regulation of chilled water flow according to the cooling requirement.

Union mode is used to connect the electric valve to the system pipeline, which is convenient for installation at site and maintenance, reducing the project installation expenses.

1.4.2 Outdoor Unit

The outdoor unit is applicable to the Liebert PEX air-cooled series air conditioner. For details, refer to *Liebert PEX Condenser User Manual*.

1.4.3 iCOM Controller

The iCOM controller of the Liebert PEX series air conditioner uses the LCD screen with blue backlight and 128 × 64 pixels, or selects the large screen with 320 × 240 pixels. The user interface operation is simple. The multi-level password protection can effectively prevent unauthorized operation. It also provides power failure auto-restoration and high & low voltage protection functions. The operation time of components is available through the menus. The expert-level fault diagnosis system can automatically display the current fault information, facilitating the maintenance. It can store up to 400 historical event records. There are two kinds of panels for option: one with common screen and the other with large screen, as shown in Figure 1-3.



Figure 1-3 Panel of iCOM controller

1.4.4 Remote Monitoring Software

Through the configured RS485 port or TCP/IP port, the Liebert PEX air conditioner can communicate with the host computer and receive the control of the host software.

1.5 Environmental Requirements

1.5.1 Operating Environment

See Table 1-1 for operating environment requirement.

Table 1-1 Operating environment requirement

Item	Requirement	
Ambient temperature	Indoor	0°C ~ 40°C
	Outdoor	Water-cooled series: 4°C ~ 45°C; Air-cooled series: -48°C ~ +45°C
Protection level (outdoor unit)	IP55	
Altitude	<1000m. Above that, derating is required	
Operation voltage range	380V (-10% ~ +15%), 3 phase+neutral ~ 50Hz	

1.5.2 Storage Environment

See Table 1-2 for storage environment requirement.

Table 1-2 Storage environment requirement

Item	Requirement
Storage environment	Indoor, clean, no dust
Ambient humidity	5%RH ~ 85%RH (non-condensing)
Ambient temperature	-68°F ~ +129.2°F
Storage time	Total transportation and storage time should not exceed six months. Otherwise, the performance needs to be re-calibrated

Chapter 2 Mechanical Installation

This chapter introduces the mechanical installation of the Liebert PEX series air conditioner, including the transportation, movement, unpacking, inspection, installation notes, system installation arrangement, installing indoor unit, installing outdoor unit, piping for unit, lowering fan, removing fixtures and installation inspection.

2.1 Movement, Unpacking And Inspection

2.1.1 Transportation And Movement

Railroad transportation and shipping are the recommended means of transportation. If truck transportation is unavoidable, choose roads that are less bumpy in order to protect the equipment.

The Liebert PEX series air conditioner is heavy (see Table 2-1 for the weight). It is recommended to use mechanical equipment such as an electric forklift to unload and move the equipment to the place closest to the installation site. If an electric forklift is used, insert the tines of the forklift below the pallet, as shown in Figure 2-1. Align the tines with the center of gravity to prevent the equipment from falling over.



Figure 2-1 Inserting and movement

When moving the indoor unit, keep the obliquity within the range from 75° to 105°, as shown in Figure 2-2.

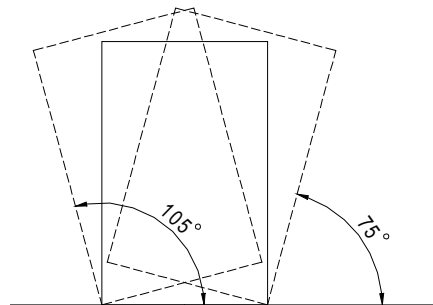


Figure 2-2 Moving obliquity of indoor unit

2.1.2 Unpacking

Move the equipment to the place closest to the final installation site and then unpack it. Follow the procedures below for unpacking:

1. Remove the side panels and top cover

Liebert PEX series air conditioner uses the international packaging. You can use a hammer or straight screwdriver to straighten the connection hook that connects the side panels to the top cover, as shown in Figure 2-3.



Figure 2-3 Straightening the hook

At first, straighten all the hooks that fix side panel I, and remove side panel I. Then straighten all the hooks that fix side panel II, and remove side panel II. At last remove top cover III, as shown in Figure 2-4.

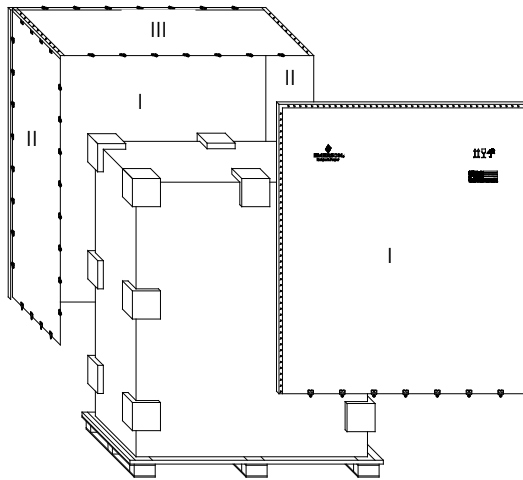


Figure 2-4 Removing side panels and top cover

2. Remove the base pallet.

The unit is fixed onto the base pallet with M8 × 65 fixing bolts, as shown in Figure 2-5. You can use a 17mm open-end spanner, ratchet spanner or sleeve to remove the fixing bolts.

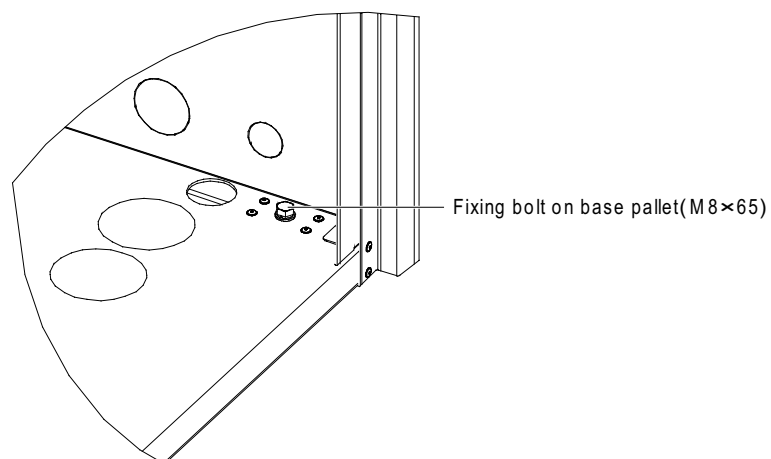


Figure 2-5 Fixing bolt on the base pallet

2.1.3 Inspection

After receiving the product, you should unpack it, and then check against the packing list that the fittings are complete and that the components are intact. If any parts are found missing, or damaged, please report to the carrier immediately. If any defects are found, please report to the local offices of the carrier and the distributor.

2.2 Installation Notes

To achieve the designed performance and maximize the product life, the correct installation is vital. This section should be applied in conjunction with the prevailing industry standards of mechanical and electrical installation.

1. The Liebert PEX air-cooled series air conditioner is designed for split floor installation. The indoor unit must be installed on the floor of the equipment room or computer room, and the outdoor unit can be installed outdoors or on the floor of other rooms. The Liebert PEX water-cooled series air conditioner is designed for integrated floor installation. It should be installed on the floor of the equipment room or computer room.
2. Before installation, make sure that the installation environment meets the requirements (see *1.5 Environmental Requirements*) and confirm whether the building needs to be transformed to accommodate the construction work of piping, wiring layout and ventilation ducts.
3. Follow the design drawings strictly when installing the equipment, and reserve the space for routine maintenance and servicing. The manufacturer's engineering dimension drawings can serve as a reference.

2.3 System Installation Arrangement

2.3.1 Overall System Arrangement

The Liebert PEX series air conditioner includes air-cooled series and water-cooled series, and their overall system arrangements are shown in Figure 2-6 and Figure 2-7 respectively.

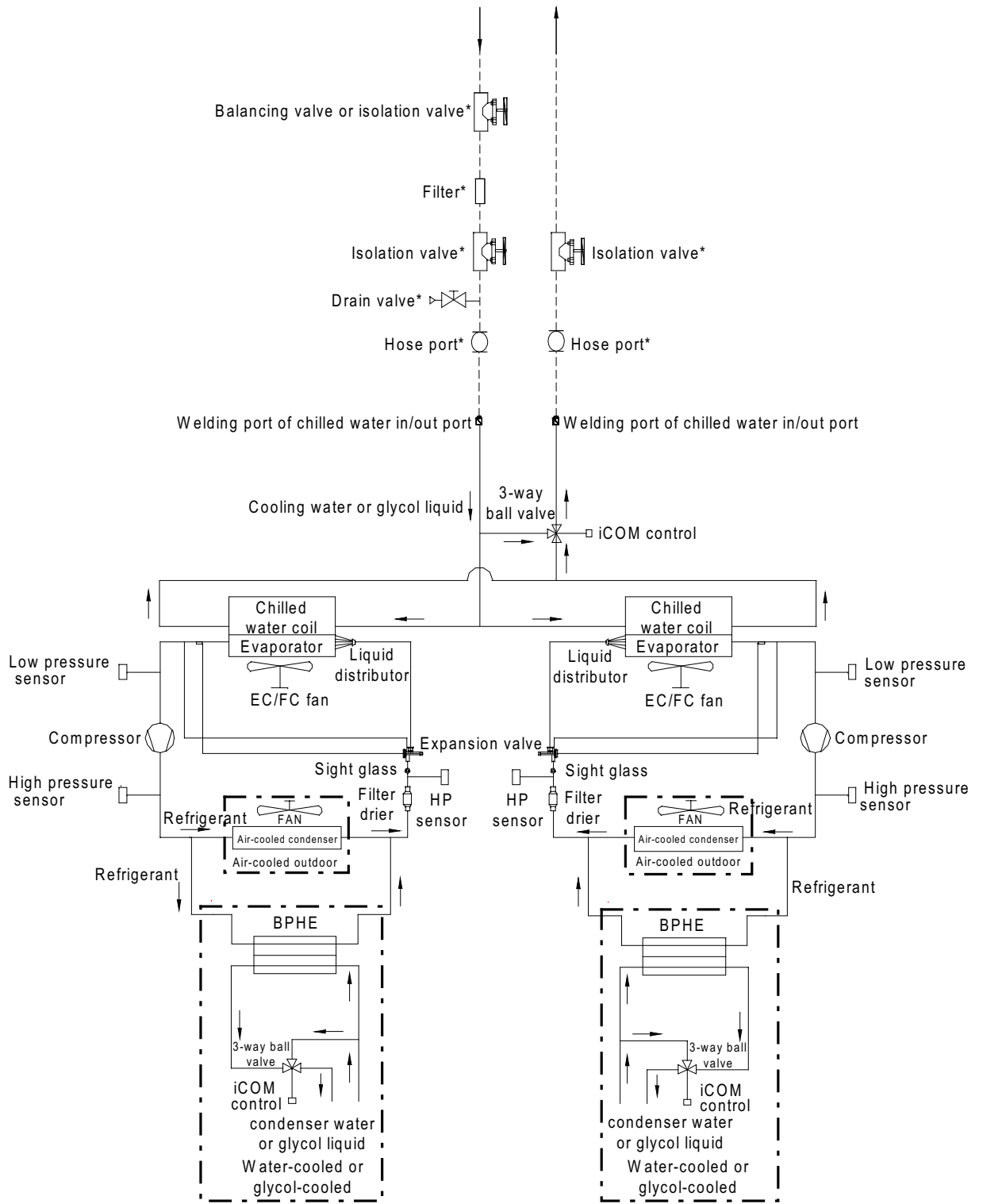


Figure 2-6 Dual system diagram of unit



Note

MUST ENSURE THAT MECHANICAL FILTER/STRAINER IS FITTED TO INLET OF BPHE CIRCUITS BY INSTALLER!

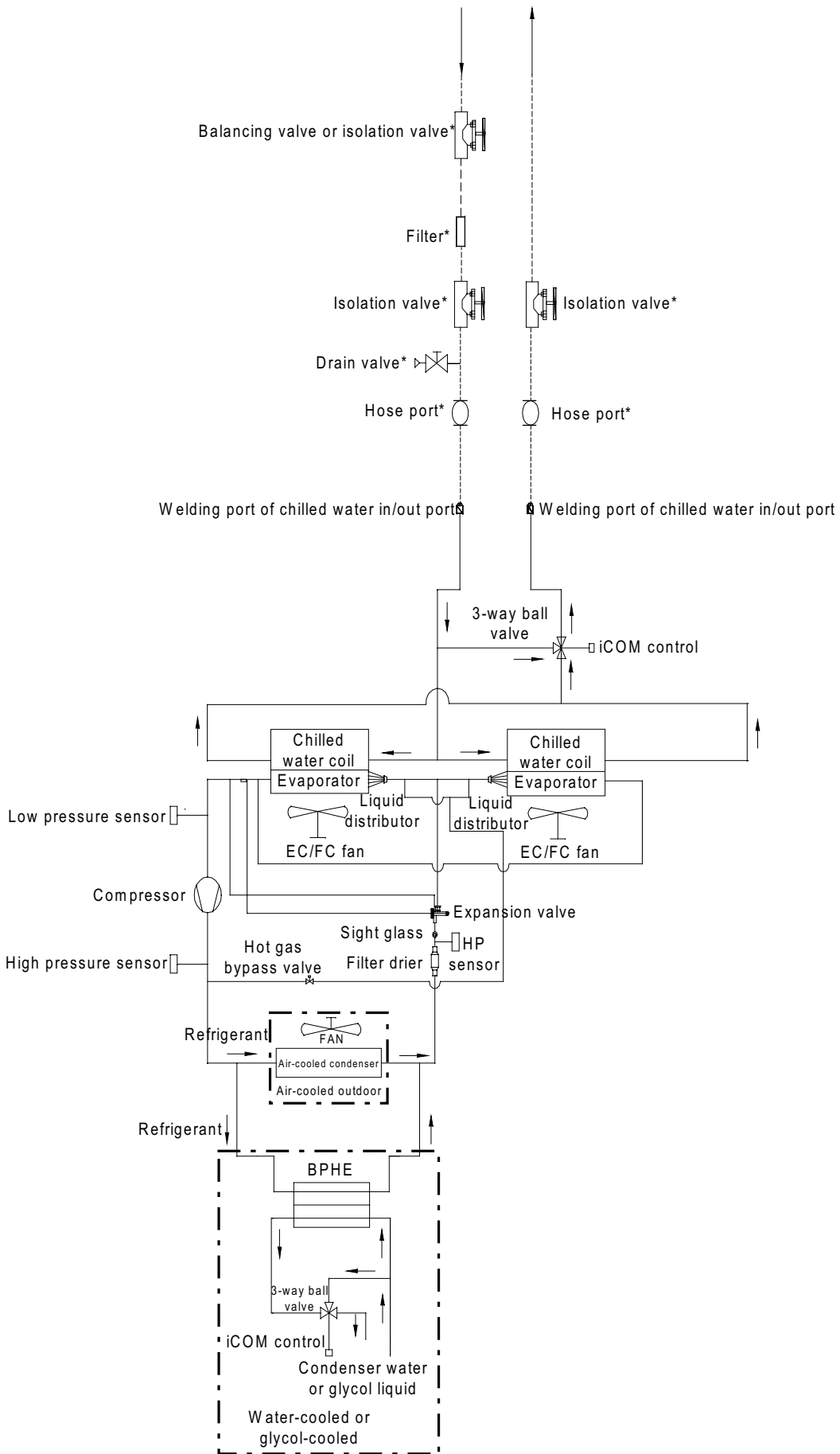



Figure 2-7 Single system diagram of unit

 **Note**

1. The contents in the dotted line boxes are the water-cooled unit and air-cooled unit condenser schematic diagram that divided by the cooling mode of the refrigerant system. Select the corresponding pipe connection according to the actual type in use, the dashed lines are for pipe connection at site, * components can be selected according to the actual requirements.
2. High pressure sensor is used for water-cooled or glycol-cooled unit only.
3. Single source cooling system does not contain the chilled water pipe system, and meanwhile, the low pressure sensor is replaced with the low pressure switch on the side of the refrigerant.

2.3.2 System Installation Illustration

The installation modes of the air-cooled series unit are shown in Figure 2-8 and Figure 2-9.

 **Note**

1. If the condenser is installed higher than the compressor (see Figure 2-8), a back bend should be fitted to the discharge line and liquid line of the condenser, so as to prevent the liquid refrigerant from flowing back when the condenser stops.
2. The top end of the back bend must be installed higher than the highest copper pipe of the condenser.

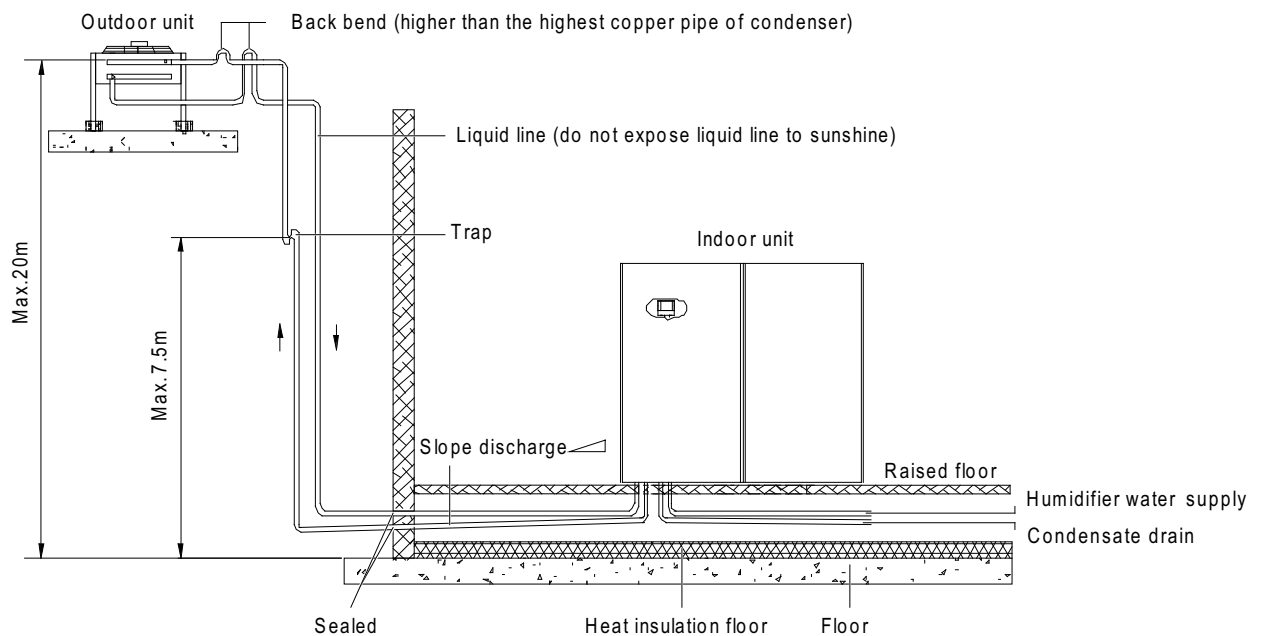


Figure 2-8 Condenser installed higher than compressor

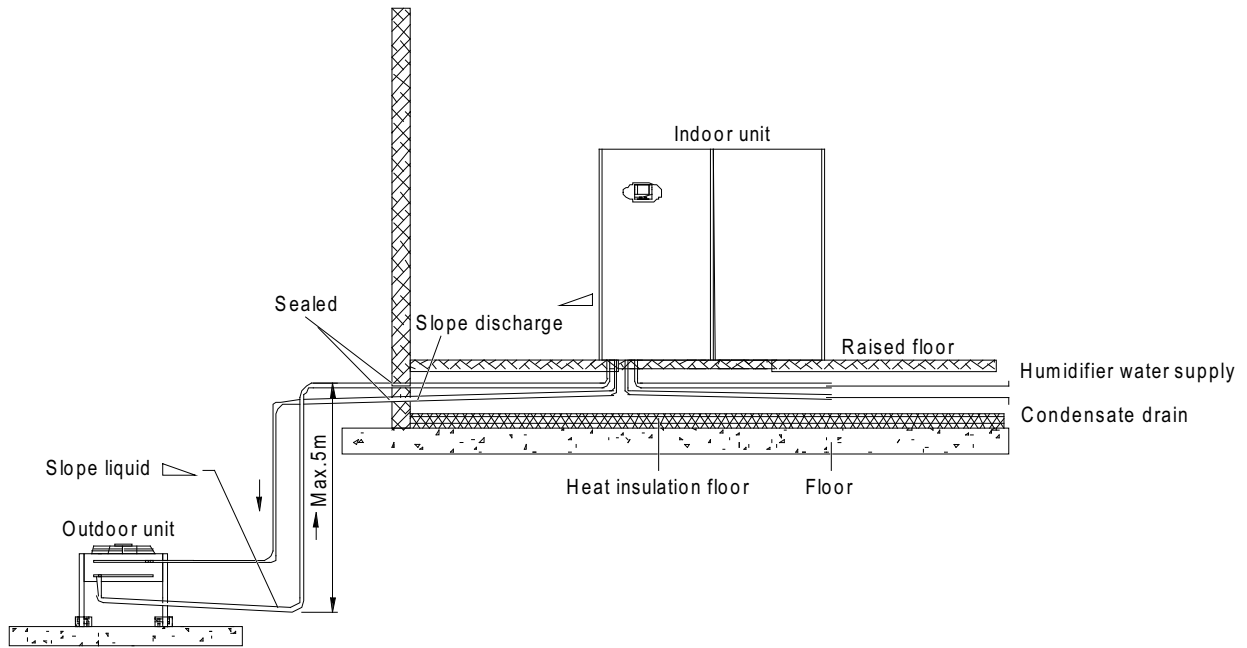


Figure 2-9 Compressor installed higher than condenser

Figure 2-10 shows the arrangement of the cooling water system, which requires the water hotter than 4°C. Use heaters if the water source in site cannot meet this requirement. The cooling tower should be a closed loop system.

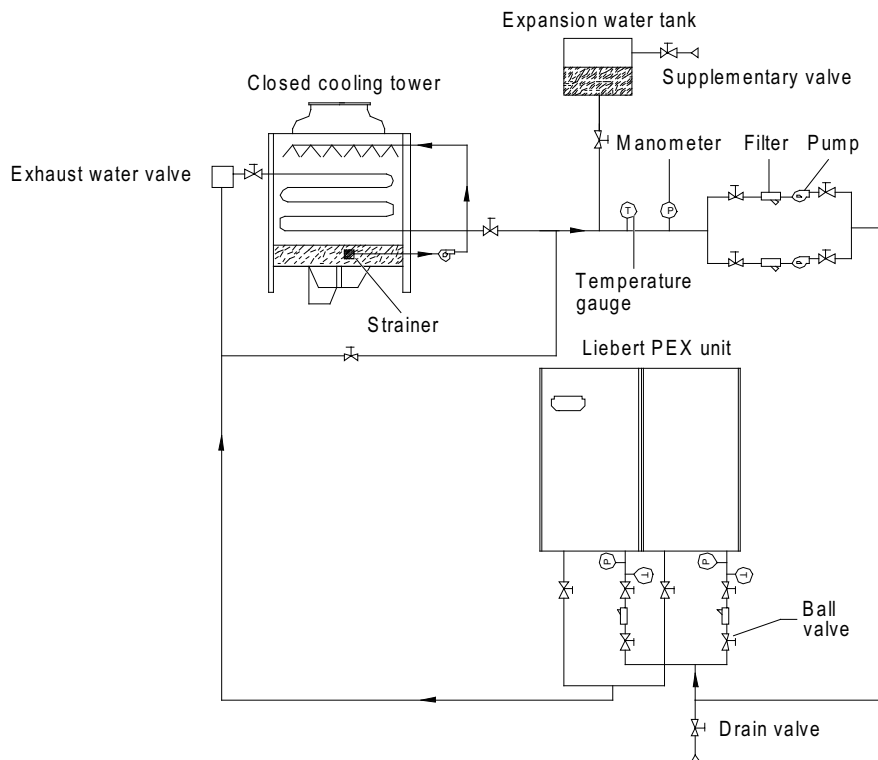


Figure 2-10 Arrangement of cooling water system

2.3.3 Mechanical Parameters

Indoor unit mechanical parameters

The mechanical parameters of the indoor unit are shown in Figure 2-11, Figure 2-12, Figure 2-13 and Table 2-1.

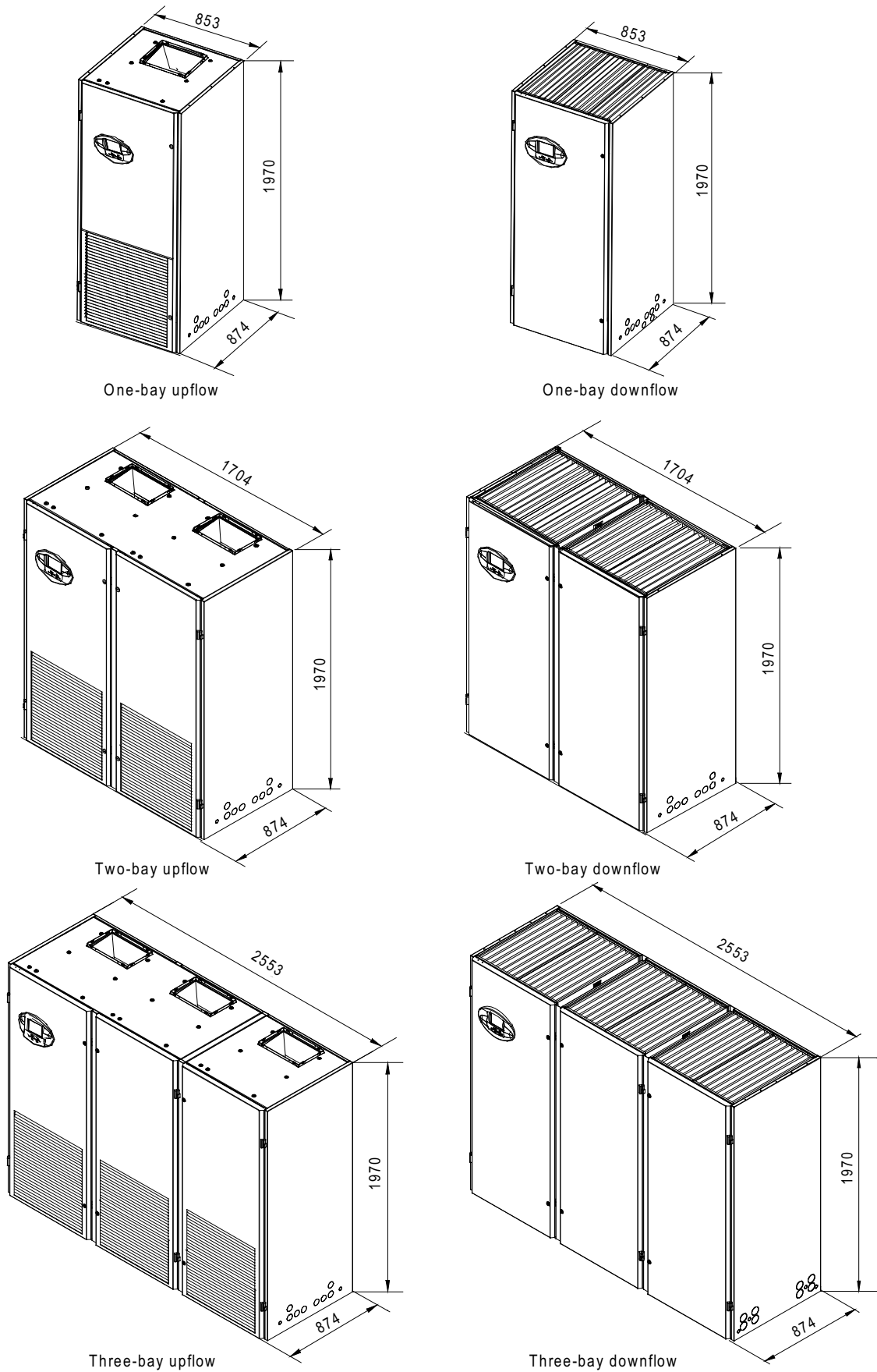


Figure 2-11 Mechanical parameters of the indoor FC fan unit (unit: mm)

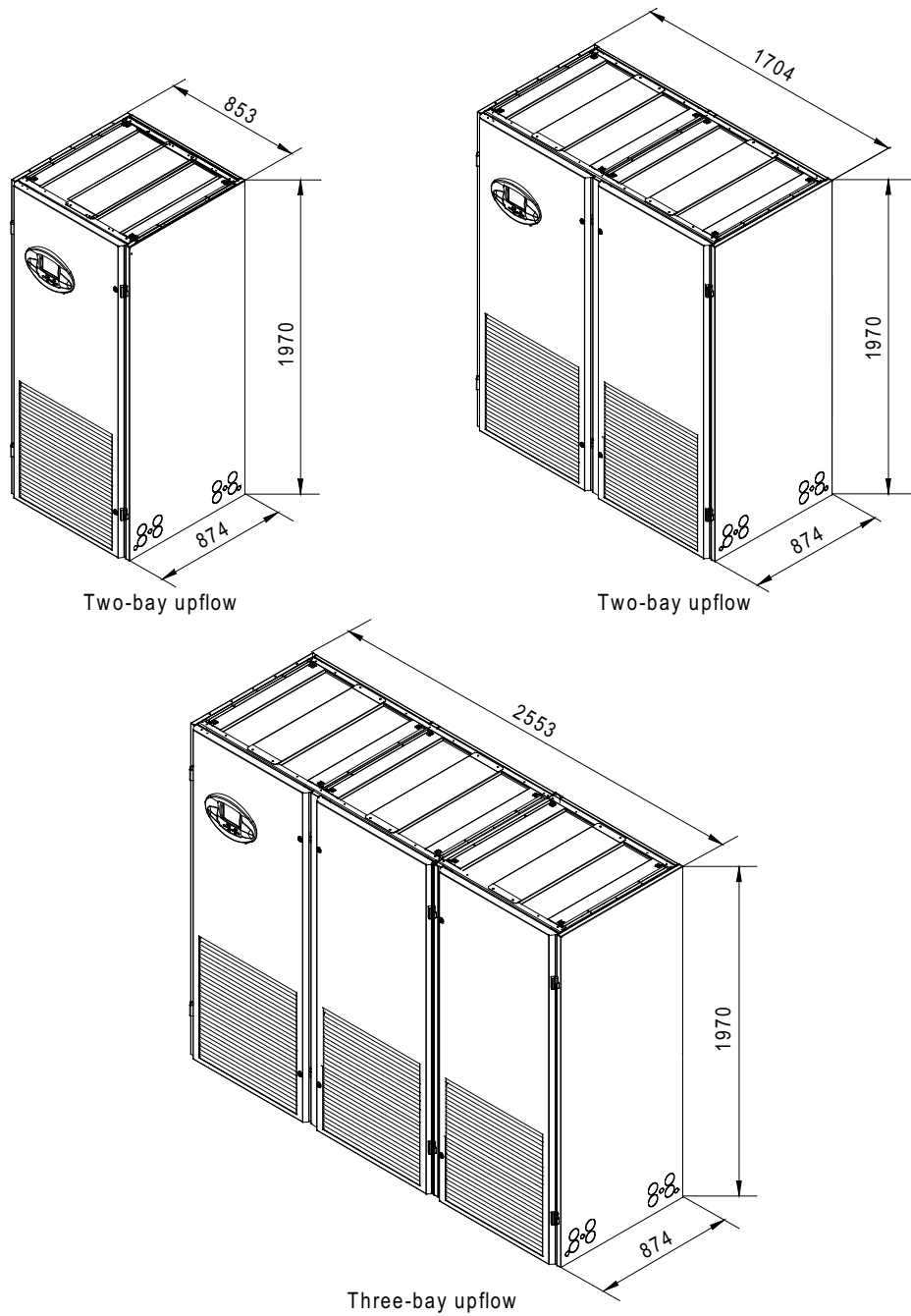


Figure 2-12 Mechanical parameters of the indoor EC fan upflow unit (unit: mm)



Note

The indoor unit mechanical parameters of EC fan downflow unit are the same as those of FC fan unit (except for P3100 and P2070 downflow dual cooling units, see Figure 2-13 for its mechanical parameters).

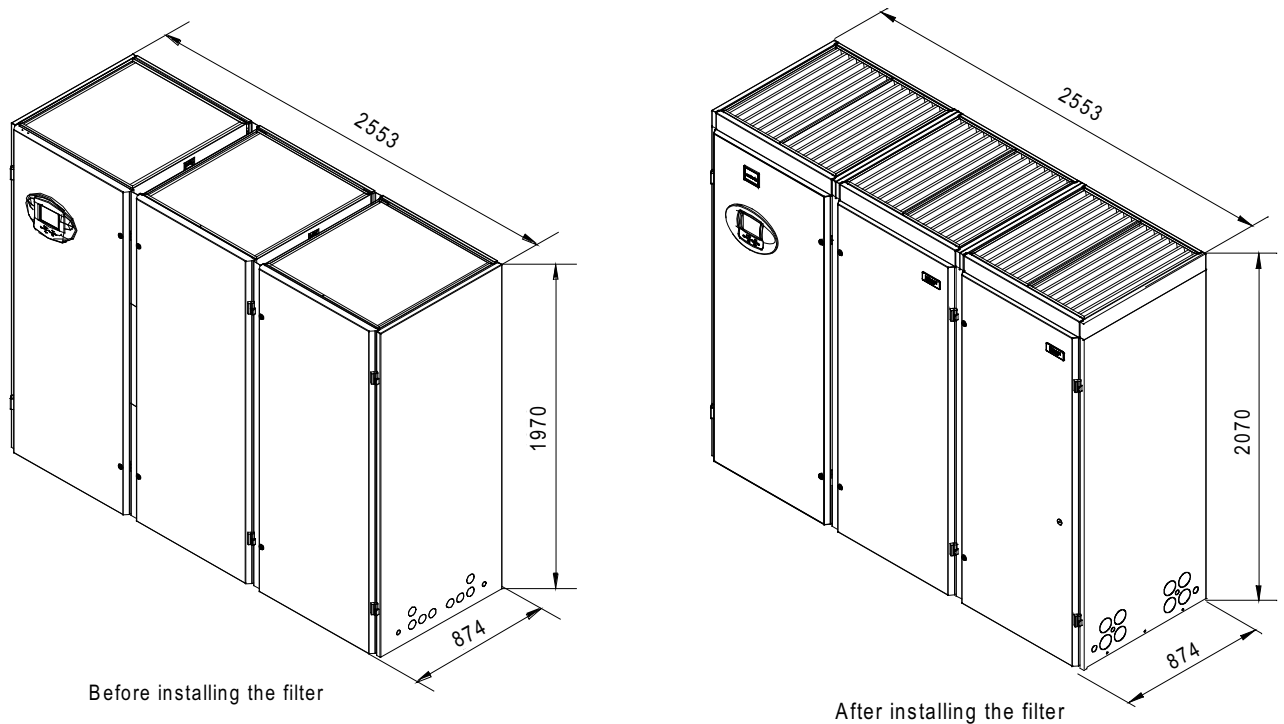


Figure 2-13 Mechanical parameters of P3100 downflow dual cooling indoor unit (unit: mm)

Note

For P3100 and P2070 downflow dual cooling series units, the filter is delivered along with the unit accessory, therefore, the unit integral height can be increased to 100mm after installation. Taking P3100 for example, you can see the left figure of Figure 2-13 for dimensions of the filter before the installation and see the right figure of Figure 2-13 for dimensions of the filter after the installation.

Table 2-1 Mechanical parameters of indoor unit

Model	Dimensions (W × D × H) (mm)	Net weight (kg)			
		Air-cooled series		Water-cooled series	
		Single source cooling system	Dual cooling system	Single source cooling system	Dual cooling system
P1020	853 × 874 × 1970	320	420	320	420
P1025	853 × 874 × 1970	330	430	330	430
P1030	853 × 874 × 1970	340	440	340	440
P1035	853 × 874 × 1970	350	450	350	450
P2035	1704 × 874 × 1970	550	700	550	700
P2040	1704 × 874 × 1970	590	740	590	740
P2045	1704 × 874 × 1970	560	710	560	710
P2050	1704 × 874 × 1970	610	760	610	760
P2055	1704 × 874 × 1970	570	720	570	720
P2060	1704 × 874 × 1970	640	790	640	790
P2070*	1704 × 874 × 1970	650	800	650	800
P3070	2553 × 874 × 1970	890	1090	890	1090
P3080	2553 × 874 × 1970	910	1110	910	1110
P3090	2553 × 874 × 1970	930	1130	930	1130
P3100*	2553 × 874 × 1970	950	1150	950	1150

Note:
The model with * means that the downflow dual cooling series units will be increased to 100mm after installation

Note

The weight of free cool system unit is the same as that of the dual cooling system unit.

Plenum dimensions

You can select the air supply plenum with grids for the upflow system according to the requirement. The appearance of the plenum is shown in Figure 2-14, Figure 2-15 and Figure 2-16. The dimensions are listed in Table 2-2.

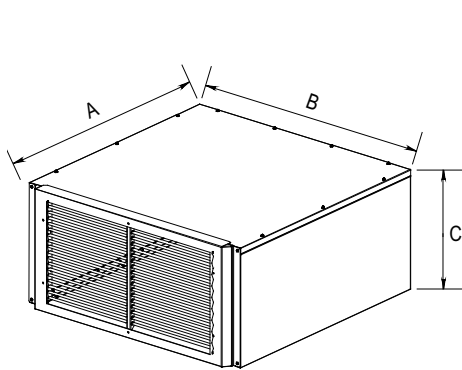


Figure 2-14 One-bay plenum

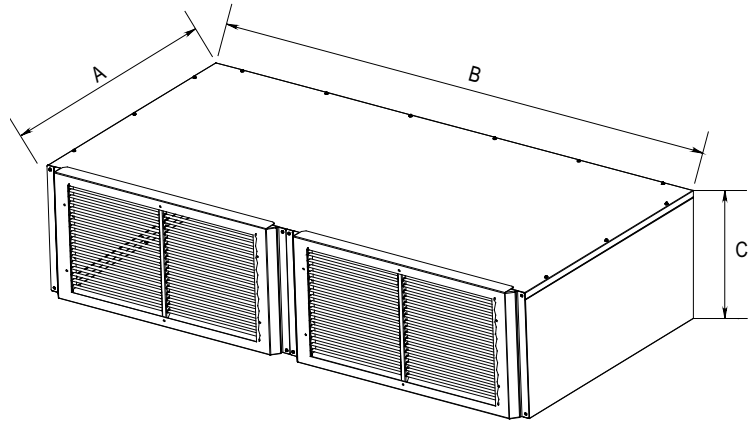


Figure 2-15 Two-bay plenum

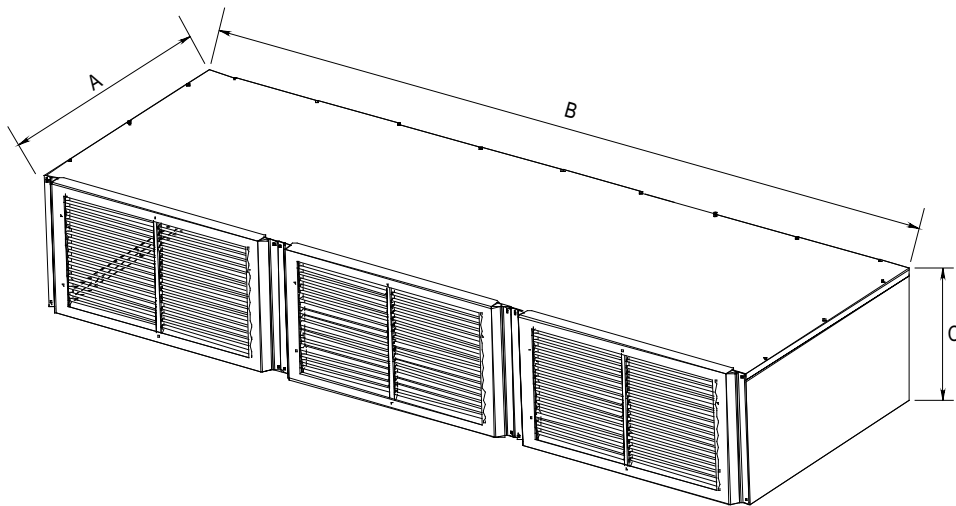


Figure 2-16 Three-bay plenum

Table 2-2 Plenum dimensions

Type	A	B	C
One-bay plenum	867	853	400 (600, optional)
Two-bay plenum	867	1704	400 (600, optional)
Three-bay plenum	867	2553	400 (600, optional)

Note

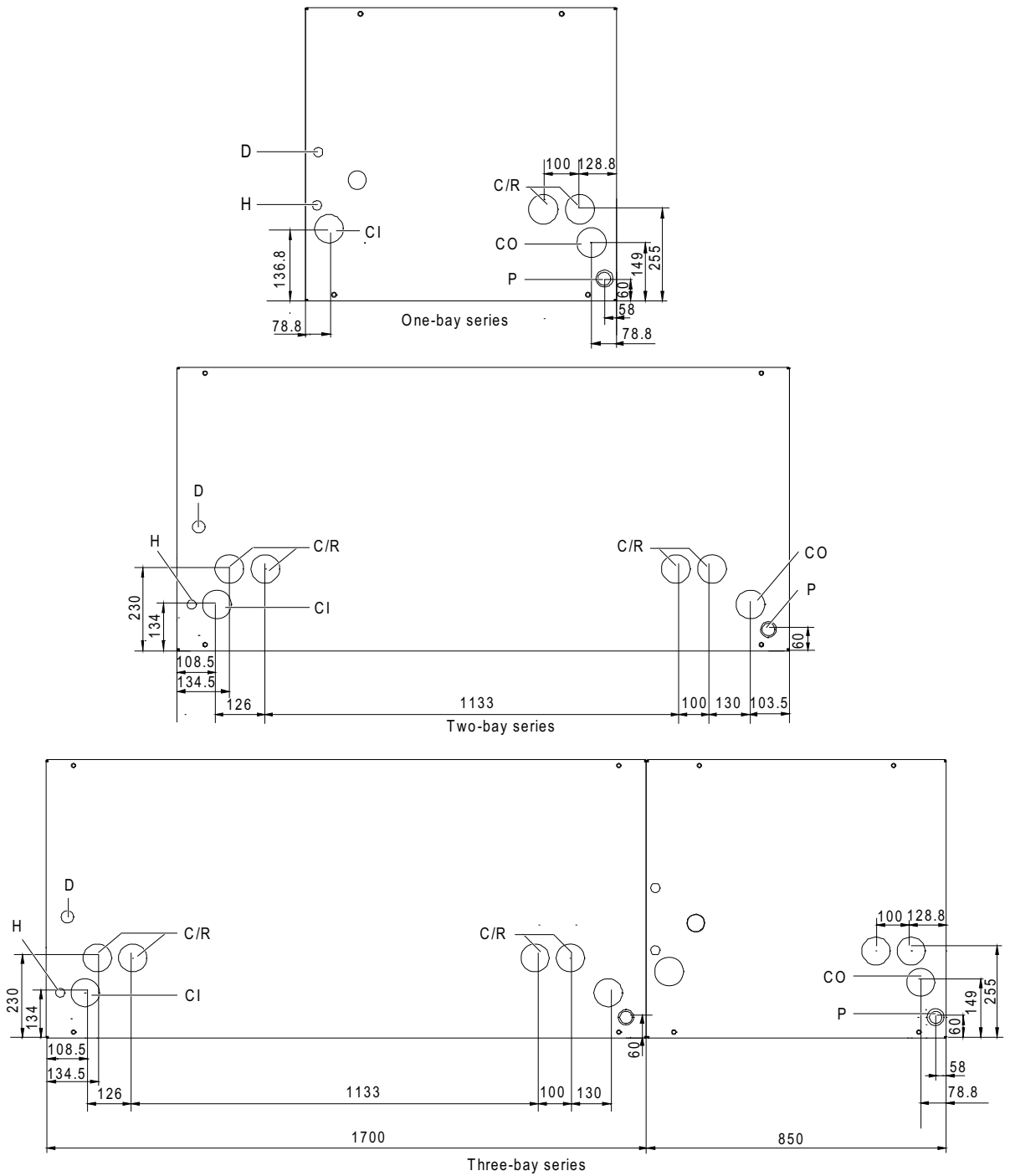
If the height of the plenum selected for air conditioner unit exceeds 600mm, consult Emerson for non-standard production.

Outdoor unit mechanical parameters

See *Liebert PEX Condenser User Manual* for the dimensions and mechanical parameters of the outdoor unit.

Base pallet cutout locations & dimensions

Figure 2-17 and Figure 2-18 show the bases with the side panel removed.



P: Power cable entry hole

H: Humidifier water in

CO: Chilled water out

D: Drain

CI: Chilled water in

C/R: Cooling water in or out/Refrigerant in or out

Figure 2-17 Base cutout location of upflow models (unit: mm)

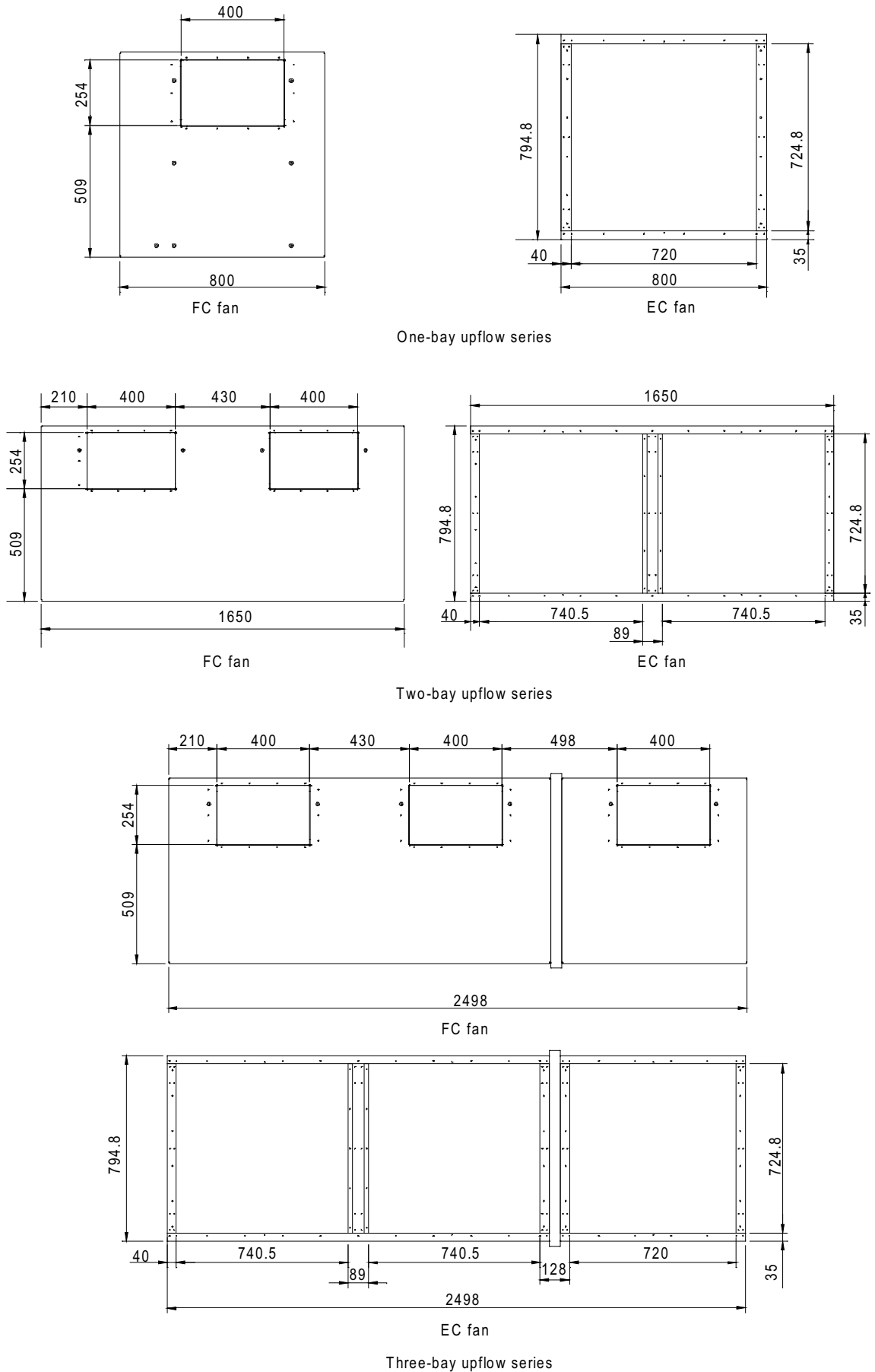


Figure 2-19 Top cover fan aperture locations of upflow series (unit: mm)

Side panel cutout locations & dimensions

If piping and wiring from the base are difficult, connection from the side panel can be selected. The locations and dimensions of the knock-out holes are shown in Figure 2-20. You can select the in and out holes according to the actual needs, but must confirm that any two of the pipe, power cable and signal cable cannot use the same hole.

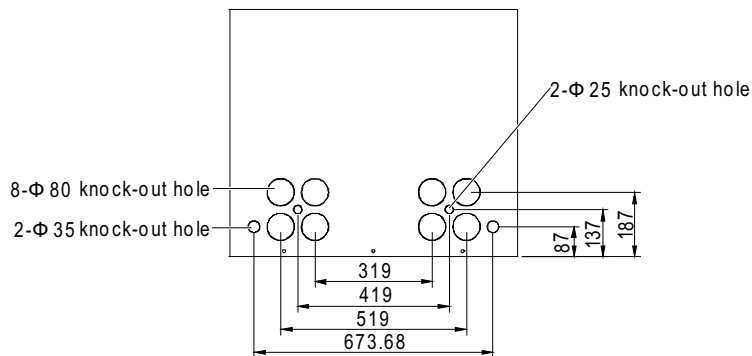


Figure 2-20 Cutout positions of side panel (unit: mm)

2.4 Installing Indoor Unit

2.4.1 Equipment Room Requirement

The requirements of the equipment room are as follows:

1. Damp proof and heat preservation work must be well done to make sure that the environment control system in the air conditioner room can operate normally.
2. The equipment room should have good heat insulation and sealed damp proof layer. The damp proof layer of the ceiling and walls must use polyethylene film, and the coating of the concrete wall and the floor must be damp proof.
3. The outdoor air that enters the equipment room should be reduced to a minimum, better below 5% of the total indoor airflow, as it may increase the load of heating, cooling, humidifying and dehumidification of the system.
4. All the doors and windows should be closed and the openings should be as narrow as possible.

2.4.2 Installation Space

Note

The air conditioner can generate condensate, which may be leakage due to the incorrect installation or use. Do not install it in the vicinity of any precision equipment so as to maintain the normal operation, and the installation site must provide drain pipes.

1. To ensure normal operation, adequate installation space for the indoor unit must be provided.
2. Avoid locating the indoor unit in confined areas, which can baffle the airflow, shorten the cooling cycle and result in down-draft and air noise.
3. Avoid locating the indoor unit in a concave or at the end of a long and narrow room.
4. Avoid locating multiple indoor units close to each other. That can result in crossing air patterns, unbalanced load and competitive operation.
5. For the convenience of daily maintenance, do not install other devices (such as smoke detector) over the cabinet.

2.4.3 Requirement Of Maintenance Space

Leave a maintenance space of 850mm in front of the air conditioner unit normally, as shown in Figure 2-21.

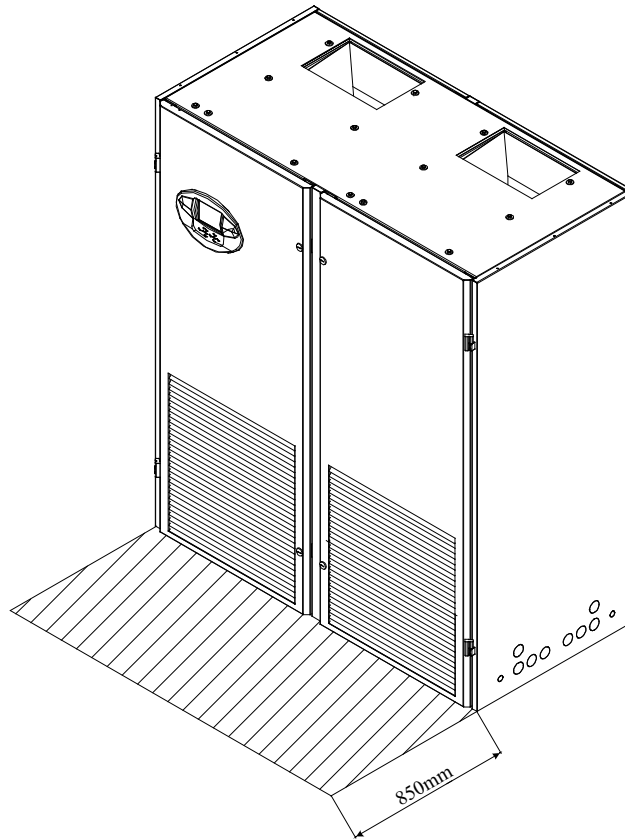


Figure 2-21 Maintenance space

The minimal maintenance space is required as listed in Table 2-3.

Table 2-3 Minimal maintenance space (unit: mm)

Position	Air-cooled	Water-cooled
Front	600	600
Left	600*	600*
Right	600*	600*
Back	0	0

Note :

1. The space is provided for regular maintenance, such as replacing strainer, adjusting fan, cleaning infrared humidifier.
- 2 *. They are the maintenance space when the water-cooled unit connects water pipes on side or when the air-cooled unit connects the refrigerant pipes on side. If the water pipes or refrigerant pipes are laid on the bottom of the unit, no maintenance space is required

Note

For special applications, please consult Emerson.

2.4.4 Installation Procedures

The installation procedures of the indoor unit are as follows:

1. Make a mounting base according to the dimensions in Figure 2-22, Figure 2-23 and Figure 2-24, and the requirements in Table 2-4. Emerson can supply a range of mounting bases to suit the required height.
2. Lay a layer of rubber cushion on the top, lateral of the mounting base and on the bottom of the steel plate respectively. See Figure 2-22, Figure 2-23 and Figure 2-24 for their positions and see Table 2-4 for the thickness.
3. Determine the installation position. Fix the mounting base onto the mounting position according to the site conditions and user's requirement.
4. Fix the air conditioner cabinet onto the mounting base with nuts, spring washers, flat washers and bolts.

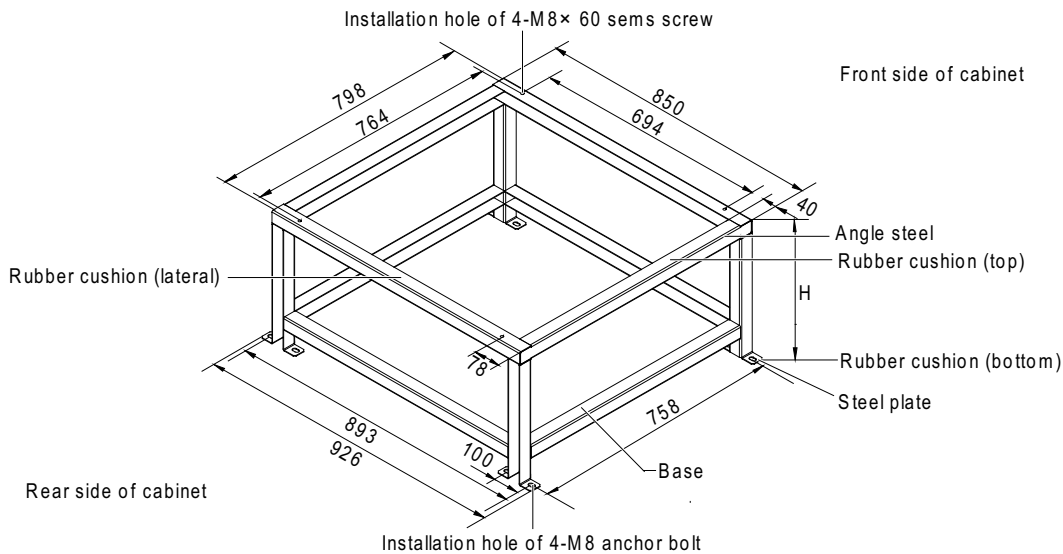


Figure 2-22 Mounting base appearance and dimensions of one-bay series (unit: mm)

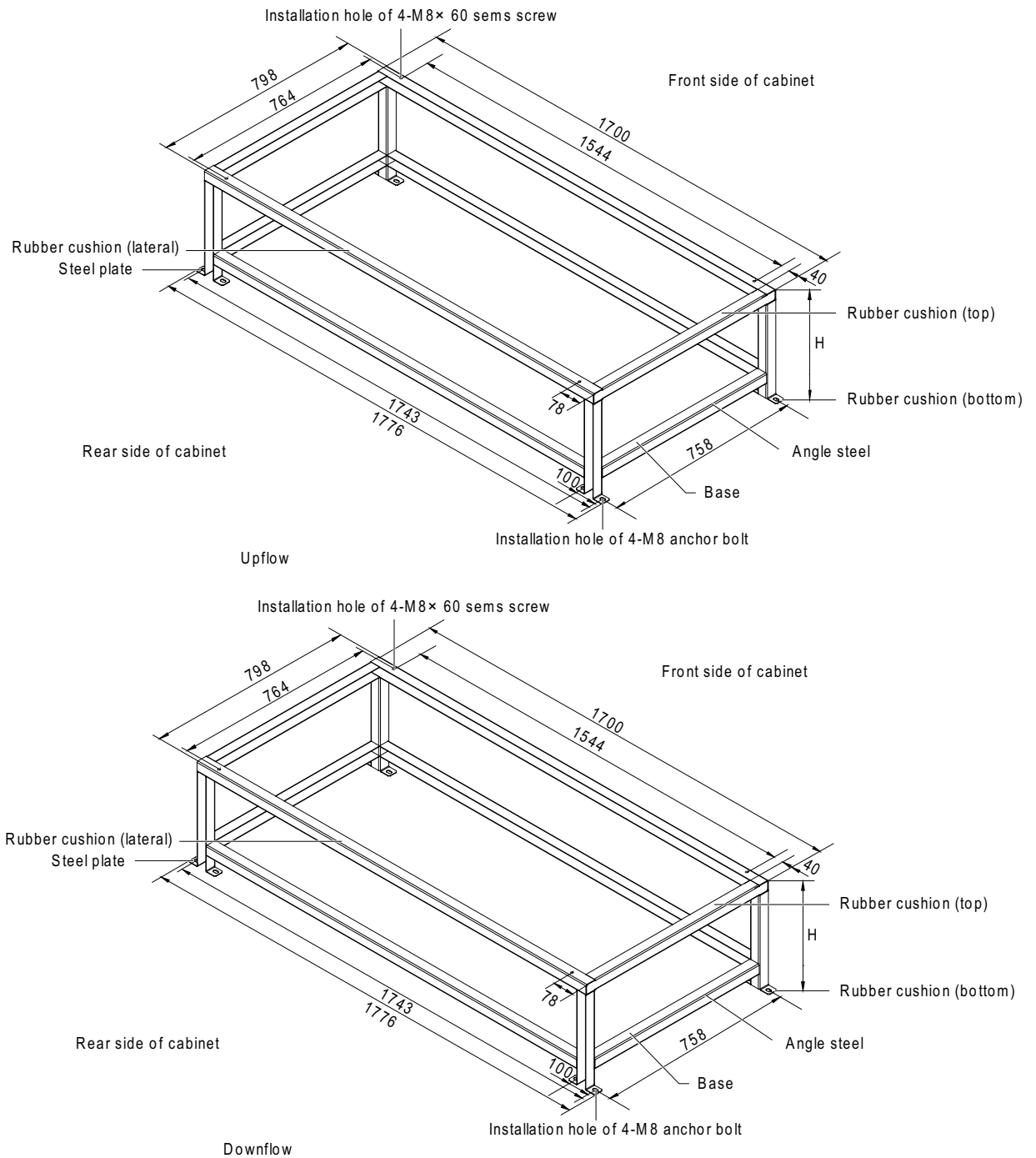


Figure 2-23 Mounting base appearance and dimensions of two-bay series (unit: mm)

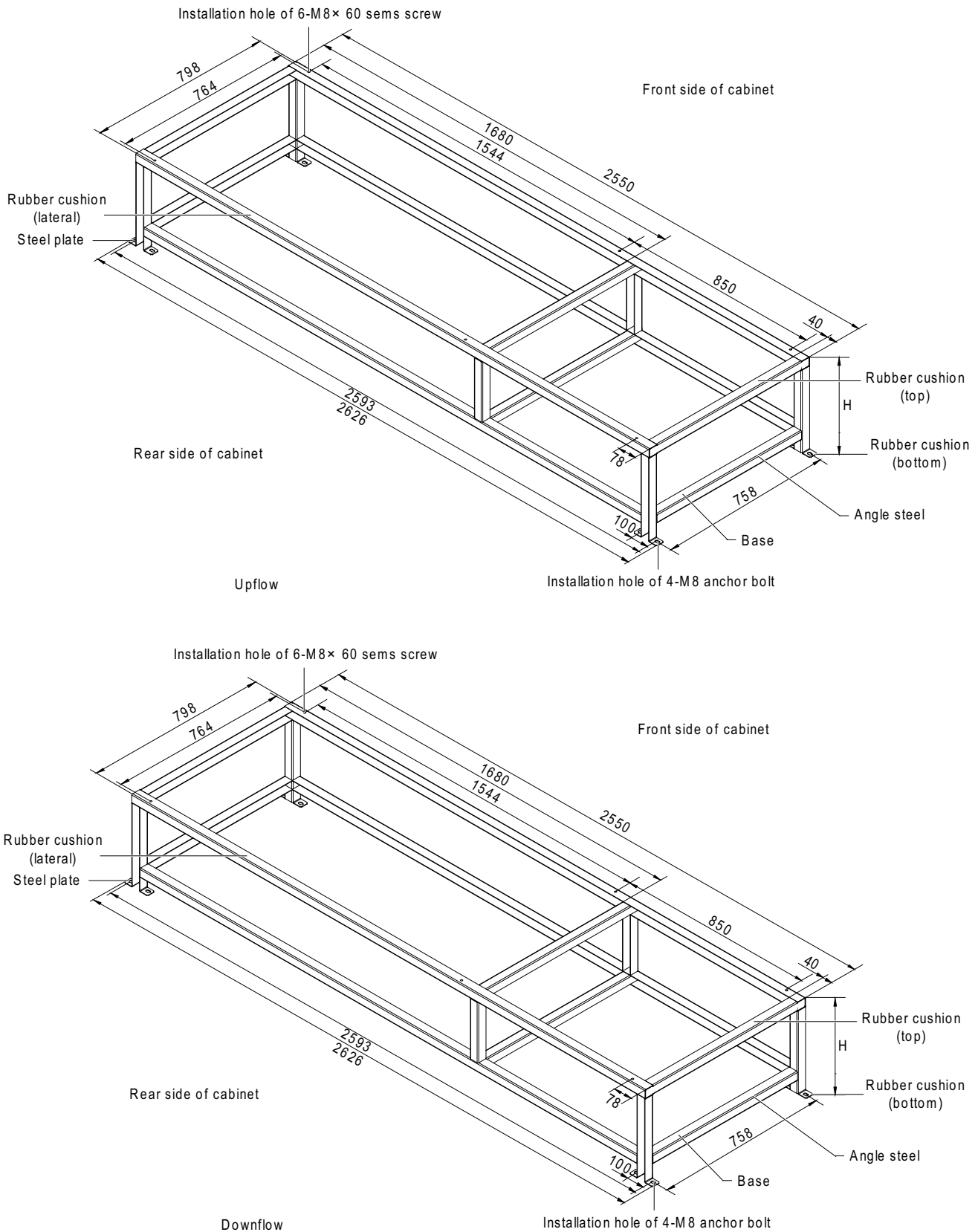


Figure 2-24 Mounting base appearance and dimensions of three-bay series (unit: mm)

Table 2-4 Specifications of indoor unit mounting base

Item	Specification	Remark
Steel plate	100mm × 100mm × (5 ~ 6.5)mm	-
Angle steel	40mm × 40mm × 3mm	-
Rubber cushion	Top	Thickness: 3mm ~ 5mm Supplied by others
	Lateral	Thickness: 2mm ~ 3mm Supplied by others
	Bottom	Thickness: 10mm ~ 12mm Supplied by others
Installation hole of anchor bolt	-	Install the bolts according to your requirement
H	One-bay	H = 200mm (upflow unit) H ≥ 300mm (downflow unit of forward curved fan)
	Two-bay	H ≥ 325mm (downflow unit of EC fan)
	Three-bay	H ≥ 325mm (downflow unit of EC fan)
Note: The external side boards of the unit cannot bear weight. Take the mounting base into consideration while selecting angle steels and fixing holes. For the downflow unit used EC fan, the minimum floor height requirement must be met		

2.5 Installing Outdoor Unit

This outdoor unit is only applicable to the air-cooled series air conditioner. For detailed installation, refer to *Liebert PEX Condenser User Manual*.

2.6 Piping

2.6.1 Piping For Air-Cooled Unit

All joints of the cooling pipes must be silver-brazed. Standard industry procedures must be followed in selecting, laying, and fixing the pipes, and evacuating the system and charging refrigerant. Take pipeline pressure drop, oil return to the compressor and minimization of noise and vibration into consideration during design and construction.

General

The recommended pipe sizes are 'equivalent lengths' (see Table 2-6 for equivalent lengths of partial components), with the resistance caused by bends taken into account. The installer should confirm that the sizes are appropriate for the site conditions.

1. If the one-way equivalent length exceeds 30m, or if the vertical distance between indoor unit and outdoor unit exceeds the values in Table 2-5, consult Emerson before installation to confirm whether a pipe extension kit is needed.

Table 2-5 Vertical distance between indoor unit and outdoor unit

Relative position	altitude difference
Outdoor unit higher than indoor unit	Max.: +20m
Outdoor unit lower than indoor unit	Max.: -5m

2. The pipe sizes recommended in Table 2-6 are 'equivalent lengths', with the resistance caused by bends and valves taken into account. The installer should confirm that the sizes are appropriate for the site conditions.

Table 2-6 Equivalent lengths of partial components

Outer Diameter (OD) of liquid pipe (inch)	Equivalent length (m)		
	90° bend	45° bend	T type three-way
3/8	0.21	0.10	0.76
1/2	0.24	0.12	0.76
5/8	0.27	0.15	0.76
3/4	0.3	0.18	0.76
7/8	0.44	0.24	1.1
1-1/8	0.56	0.3	1.4

 **Note**

A trap should be installed for every 7.5m of vertical distance. Please consult Emerson for details.

Connecting pipes

The pipes to be connected include:

1. Condensate drain pipe of indoor unit
2. Water inlet pipe for infrared humidifier
3. Connection copper pipe (discharge pipe and liquid pipe for air-cooled system) between indoor unit and outdoor unit
4. Water inlet and outlet pipe of the chilled water (dual cooling unit)
5. Pipe extension kit (optional)

● **Connecting condensate drain pipe of indoor unit**

The condensate of infrared humidifier and evaporator is converged by a cross connector and drained through the drain pipe, as shown in Figure 2-25. The pipe OD is 25mm. If the drain pipe is used by three or more units, the minimal pipe OD should be 40mm.

 **Note**

Because the infrared humidifier contains flowing hot water, the water pipe must be resistant to heat higher than 90°C.

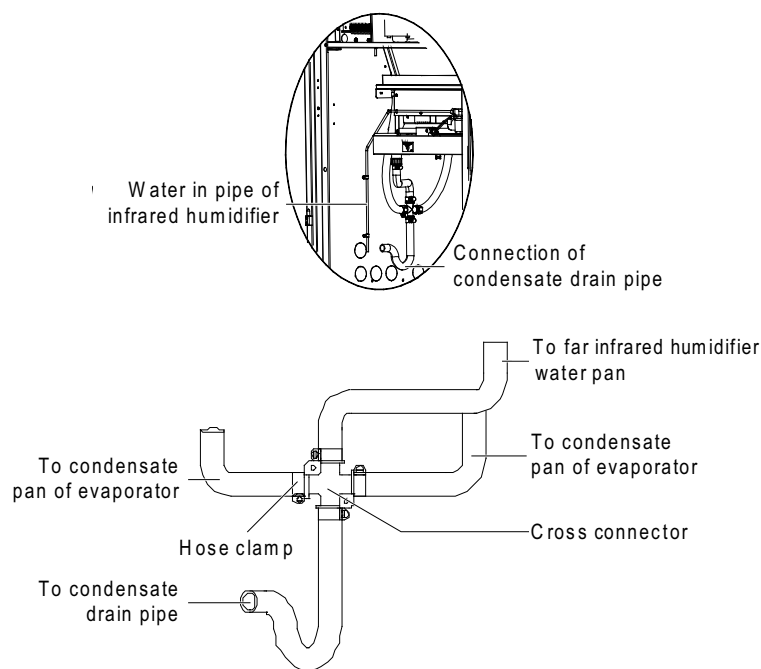



Figure 2-25 Connection of drain pipe

 **Note**

1. A $\Phi 25$ hose clamp is delivered as an accessory to connect the drain pipe.
2. When connecting the drain pipe, you must make sure that the U bend is installed vertically and the 'U' shape is not distorted, so as to ensure that the condensate can be drained immediately and effectively.

● **Connecting water inlet pipe of infrared humidifier**

Water pipes should be connected for the infrared humidifier. To facilitate maintenance, an isolation valve should be fitted to the water inlet pipe. The infrared humidifier reserves a copper pipe (OD: 6.35mm), as shown in Figure 2-26. There is a 1/4" copper nut at the end of the copper pipe. Take out the 1/4" x 1/2" conversion copper thread connector from the accessory bag and connect it to the copper nut. You can also choose the connection method to connect pipes according to the site condition. Make sure that the connection is well sealed to prevent leakage. The main pipe pressure should be between 100kPa ~ 700kPa.

Where the main pipe pressure may rise above 700kPa, a pressure reducer should be fitted. Where the main pipe pressure falls below 100kPa, a water tank and pump system should be used.

Note

Some product may include components required by local codes.

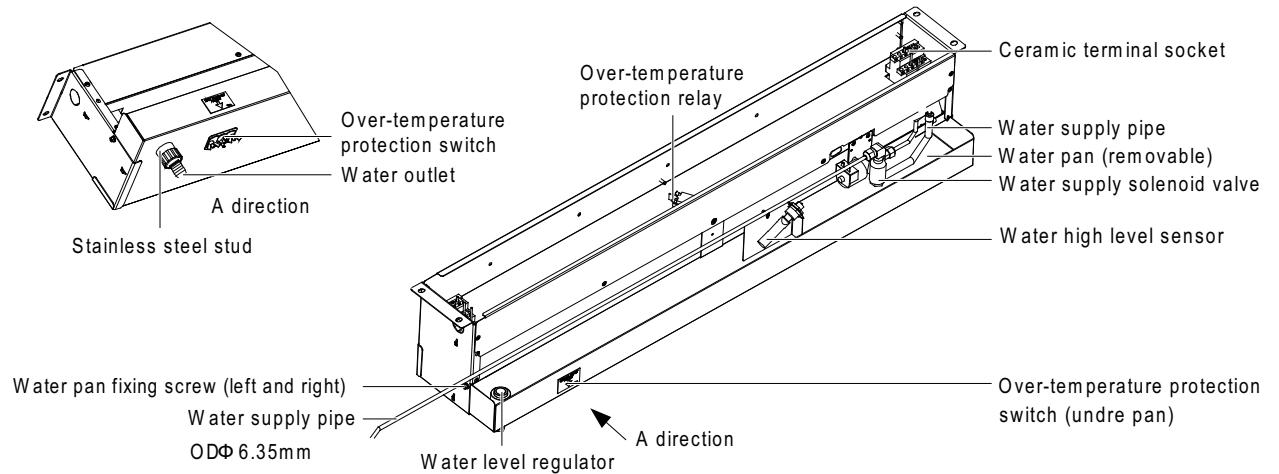


Figure 2-26 Infrared humidifier

- **Connecting connection copper pipes (discharge pipe and liquid pipe) between indoor unit and outdoor unit**

The indoor unit and outdoor unit are connected through welded copper pipes. The connection ball valves of the discharge pipe/liquid pipe of indoor unit are shown in Figure 2-27 and Figure 2-28. Note that the ball valve must be wrapped with a wet cloth before welding. In addition, many notes and instruction labels are pasted onto the base and side panel close to the ball valve. Protect them from heat burned during the welding operation.

Note

The exposure time of system pipes do not exceed 15min. Longer exposure will lead to the POE refrigeration oil being affected with moisture, which can affect the life of the key components and the stability of the system operation. Especially note that the compressor and the corresponding expansion valve of the dual refrigerant system unit should be located at both sides of the unit. For example, you face the unit front door, No.1 system compressor is on the left hand side, while the expansion valve that corresponds to No.1 compressor is on the right hand side. Similarly No.2 system compressor is on the right hand side, while the expansion valve that corresponds to the No.2 compressor is on the left hand side.

Horizontal sections of the discharge pipes should be sloped downward from the compressor, with a slope of at least 1:200 (5mm down for each 1m run). The discharge pipes should be insulated where they are routed in the conditioned space (including under a raised floor).

The pressure drop should not exceed 40kPa (5psi ~6psi), provided that there is no loss of refrigeration in the liquid return pipe. The pressure drop of the liquid return pipe is the sum of liquid flow resistance from the tubing and fitting (including filter drier), plus the loss of head pressure due to elevation above the condenser. If the liquid temperature is 38°C, the static pressure loss is 11kPa (1.6 psi) per meter of lift.

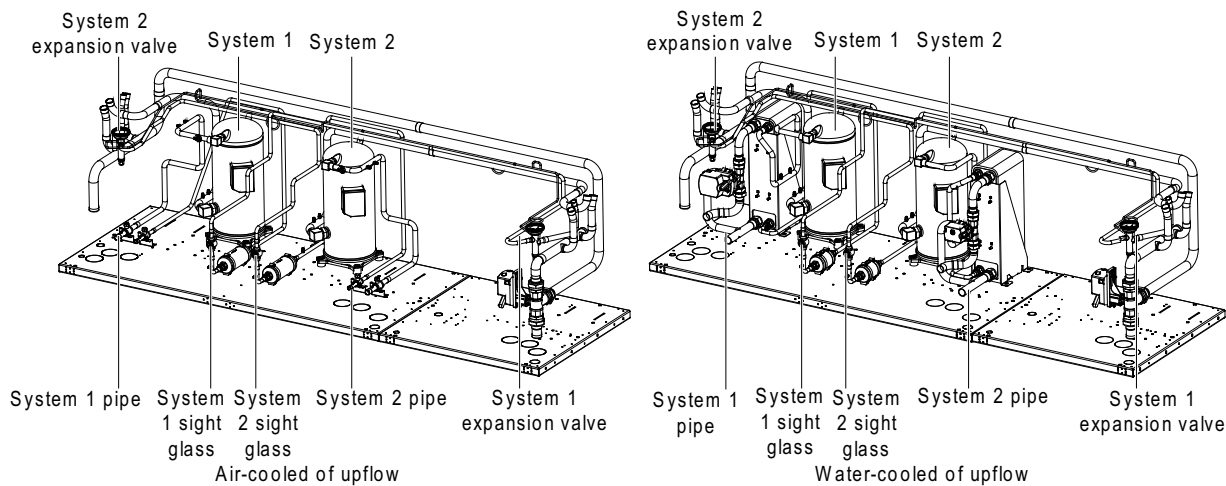


Figure 2-27 Pipe connection of upflow unit

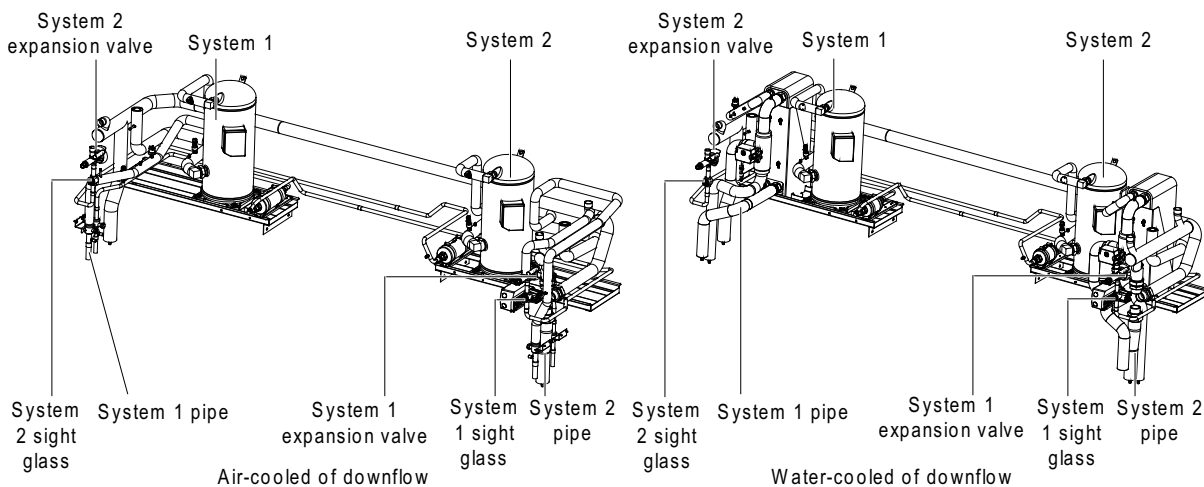


Figure 2-28 Pipe connection of downflow unit

Considering the effect of the pipe diameter on the system pressure drop, the pipe diameter of the indoor unit and outdoor unit should be determined according to the specifications listed in Table 2-7.

Table 2-7 Recommended pipe sizes

Recommended pipe sizes (unit: mm)																
Model	P1020		P1025		P1030		P1035		P2035		P2040		P2045		P2050	
Eq.Lgth	D	L	D	L	D	L	D	L	D	L	D	L	D	L	D	L
10m	22	13	22	13	22	13	22	13	22	13	22	13	22	13	22	13
20m	22	13	22	13	22	13	22	16	22	16	22	13	22	16	22	13
30m	22	13	22	13	22	16	25	16	25	16	22	13	25	16	22	13
40m*	22	13	22	13	22	16	25	16	25	16	22	13	25	16	22	13
50m*	22	13	22	16	25	16	25	16	25	16	22	13	28	19	22	16
60m*	22	16	22	16	25	16	25	19	25	19	22	16	28	19	22	16
Model	P2055		P2060		P2070		P3070		P3080		P3090		P3100			
Eq.Lgth	D	L	D	L	D	L	D	L	D	L	D	L	D	L		
10m	22	16	22	13	22	13	22	13	22	13	22	13	22	16		
20m	25	16	22	13	22	16	22	16	22	16	25	16	25	16		
30m	28	19	22	16	25	16	25	16	25	16	25	16	28	19		
40m*	28	19	22	16	25	16	25	16	25	16	25	16	28	19		
50m*	28	19	25	16	25	16	25	16	28	19	28	19	28	19		
60m*	32	19	25	16	25	19	25	19	28	19	28	19	32	19		

Note :

1. A pipe extension kit is required for 'Eq.Lgth' marked with *.

Recommended pipe sizes (unit: mm)
2. D: discharge line, L: liquid line.
3. Consult Emerson if the pipe length exceeds 60m

● Connecting water inlet and outlet pipe of the chilled water (dual cooling unit)

The water inlet and outlet pipe of the chilled water is connected to the chilled water unit through welding. The inlet and outlet pipe of the chilled water should be welded according to the unit rack labelling, do not reverse the connection. The water inlet and outlet pipe of the chilled water can be connected from the base pallet or side panel, see the cutout positions schematic diagram of the base pallet and side panel for pipe entry position (see Figure 2-17, Figure 2-18, Figure 2-20). There should be a flexible connector for water inlet and outlet pipe and unit connection. The water inlet pipe must be installed with a strainer more than 60 mesh. The water inlet and outlet pipe of the chilled water should be installed more than one isolation valve, so as to cut off the power upon repair. One of the isolation valves can be a balancing valve. The chilled water system with a balancing valve has higher efficiency, and can control the water distribution more accurately.

● Installing pipe extension kit (for site installation)

When the equivalent length of the one-way pipe exceeds 30m, the pipe extension kit should be installed. During the installation of the pipe extension kit, to avoid the pipe opening, it is recommended to install the solenoid valve of the pipe extension kit onto the outside project pipe of the ball valve on the liquid pipe. The outer side or the bottom of the unit is allowable.

So, during installing the solenoid valve, you do not need to cut the indoor unit pipes. After the whole system is installed, you can open the ball valve to keep pressure and carry out the vacuum operation, avoiding the moisture absorption of the compressor refrigeration oil and ensuring the operation safety and life of the compressor. For the installation position of the check valve, refer to Figure 2-6.

For the electrical connections of the pipe extension kit, refer to 3.2.4 *Connecting Solenoid Valve Of Pipe Extension Kit (Options, For Site Installation)*.

Charging refrigerant and adding refrigerant oil

1. Charging refrigerant

The Liebert PEX air-cooled series air conditioner has been charged in the factory with 2bar nitrogen. If the connection pipe between the indoor unit and the outdoor unit is longer than 10m, refill the refrigerant to the system to ensure normal system operation.

The refilling amount of the refrigerant is calculated through the following formula:

$$\text{Refrigerant refilling amount (kg)} = \text{refrigerant refilling amount per unit length of liquid pipe (kg/m)} \times \text{total length of extended liquid pipe (m)}$$

See Table 2-8 for refrigerant refilling amount of per meter liquid pipe.

$$\text{Total length of extended liquid pipe (m)} = \text{Total length of liquid pipe (m)} - 10\text{m}$$

Table 2-8 Refrigerant refilling amount per unit length of liquid pipe with different ODs

Liquid pipe OD (mm)	Refrigerant refilling amount of per meter liquid pipe (kg/m)	Liquid pipe OD (mm)	Refrigerant refilling amount of per meter liquid pipe (kg/m)
9.52	0.060	19	0.261
12.7	0.112	22	0.362
16	0.181	28.6	0.618

For the refrigerant charge quantity, refer to step 5 in 4.2.2 *Commissioning Procedures*.

2. Adding POE refrigerant oil

The refilled refrigerant will dilute the POE refrigerant oil in the system and affect the lubricating and cooling effects of the POE refrigerant oil. Therefore, the POE refrigerant oil should be added. See the formula below:

$$\text{Amount of refrigerant oil (ml) to be added} = \text{refrigerant refilling amount (kg)} \times 22.6$$

2.6.2 Piping For Water-Cooled Unit

Each cooling system uses a BPHE (or condenser) and an electric valve. The water supply (inlet) pipe and water return (outlet) pipe of the cooling water should be connected for the system. See Figure 2-29.

A filter (filter mesh: 1mm) and multiple isolation valves should be mounted one side of the water supply pipe of the cooling water. One of the valves can be a balancing valve.

The cooling water system with a balancing valve can control the water distribution more accurately and its pump has higher efficiency. On the other hand, the electric valve can keep the optimal condensing temperature by regulating the internal water flow.

The electric actuator of the regulating valve features a manual override to allow water side balancing by the installer.

It is recommended to arrange the cooling water pipes separately for different systems, so that repairing one pipe will not affect the operation of the other one.

The water pressure should be high enough to counteract the pressure drops brought about by all the components of the water system. In addition, because the sediments and impurities cause more pressure drop after long term operation, you should arrange a redundancy of 20% ~ 25% when selecting the lifting part (such as pump).

See Figure 2-6 and Figure 2-7 for the system arrangement of the water-cooled unit.

Connecting pipes

The pipes to be connected include:

1. Condensate drain pipe of indoor unit
2. Water inlet pipe of infrared humidifier
3. Water inlet and outlet pipe of cooling water
4. Water inlet and outlet pipe of chilled water (dual cooling unit)

- Connecting condensate drain pipe of indoor unit

Refer to the corresponding content in 2.6.1 *Piping For Air-Cooled Unit*.

- Connecting water inlet pipe of infrared humidifier

Refer to the corresponding content in 2.6.1 *Piping For Air-Cooled Unit*.

- Connecting water inlet and outlet pipe of cooling water

The water inlet and outlet pipe of cooling water of the indoor unit are copper pipes with 35mm outer diameter, as shown in Figure 2-29. Connect the pipes through direct welding at the site and make sure that the junction is well-sealed.

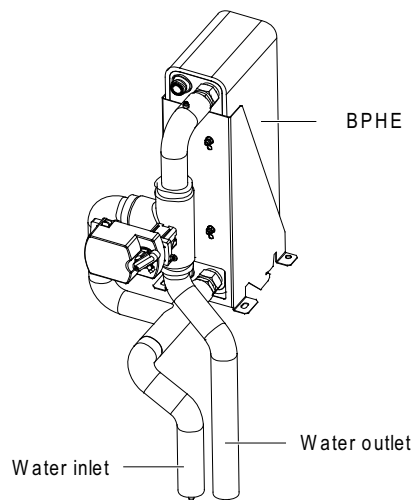


Figure 2-29 Unit connections (water-cooled)

- Connecting water inlet and outlet pipe of chilled water (dual cooling unit)

Refer to the corresponding content in 2.6.1 *Piping For Air-Cooled Unit*.

2.7 Lowering Fan And Removing Fixtures (Downflow EC Fan System)

2.7.1 Downflow Unit EC Fan Lowering

After installation, you must lower all fans of the EC downflow unit before commissioning. You lower the fan using the supplied hand winch. Each EC downflow unit is only equipped with one lowering tool, so you should select the lowering mode according to the equipped lowering tool.

 **Note**

Be careful when lowering the fan, avoid trapping your fingers and fan cables, and avoid foreign matter falling into the inlet ring of the fan.

Lowering Fan Through Hand Winch Mode

The downflow unit has been equipped with a set of fan elevator assembly before delivery, including a hand winch, a winch bracket, a hook, a sling, a winch limit and a handle in Figure 2-30, and also an L shaped lifting component in Figure 2-31.

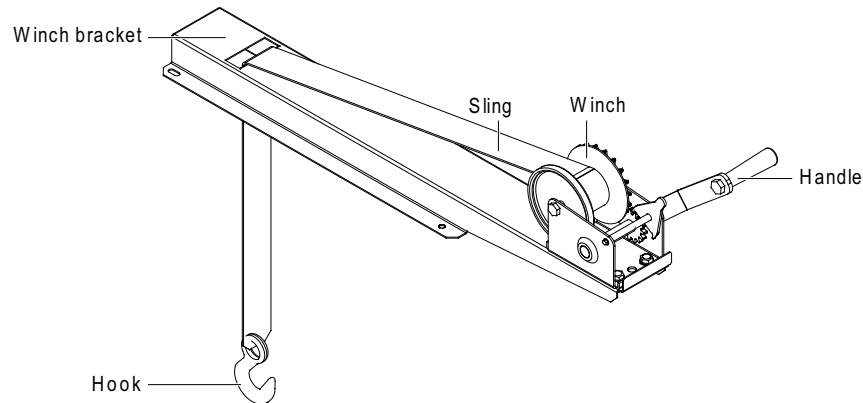


Figure 2-30 Fan elevator assembly (winch mode)

Lower the fan with the fan elevator assembly installed according to the following procedures:

1. Open the unit maintenance cover, check the fixing bolts and washers II (see Figure 2-31, totally 2 pcs) of the L shaped lifting component to make sure that it is fixed properly, and then install the fixing bolts and washers IV (totally 4 pcs) of the winch bracket, as shown in Figure 2-31.

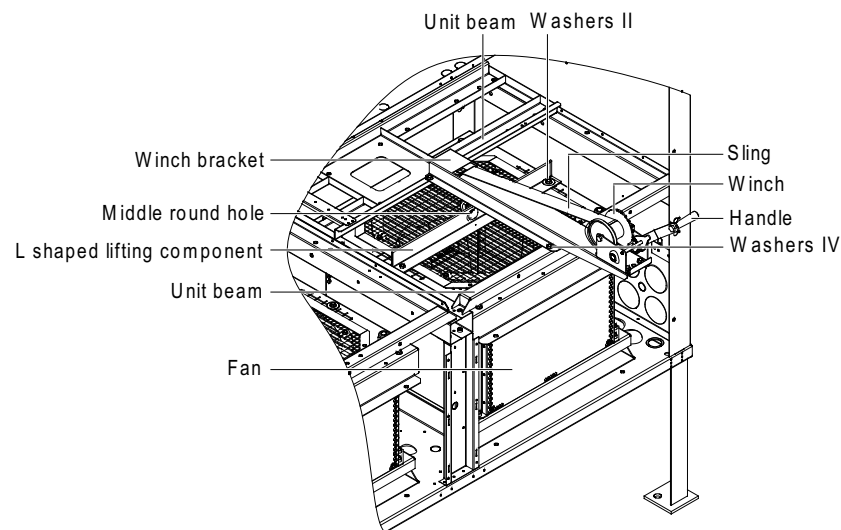


Figure 2-31 Installing winch bracket

2. Turn the handle and use the hook of the winch to hook the middle round hole (see Figure 2-31) of the L shaped lifting component. Adjust the handle until the sling is completely tight.

3. Cut off the cable tie binding the fan cables to make the cables length satisfy fan lowering requirements, and then remove the fixing bolts and washers I (see Figure 2-32, totally 4 pcs) for fan transportation.

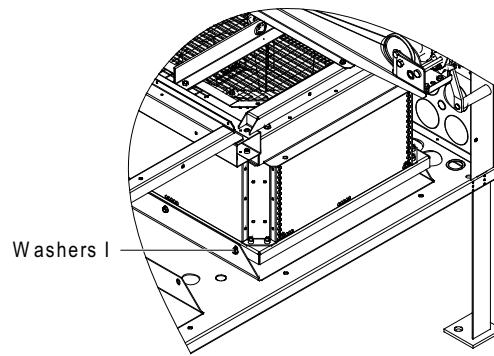


Figure 2-32 *Position of fixing bolt and washer I*

4. Hold the handle of the winch firmly, and then turn the handle counter-clockwise to lower the fan. After the fan is sunk, the status is shown in Figure 2-33.

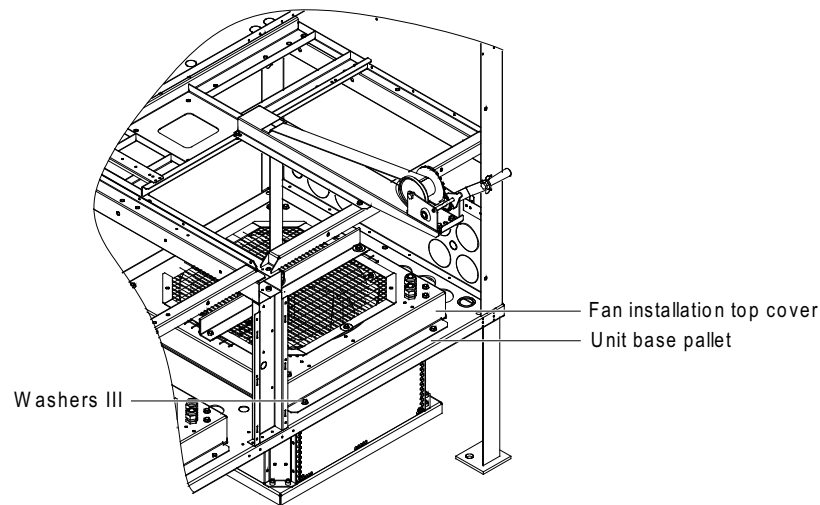


Figure 2-33 Lowering the fan

5. Install the fixing bolts and washers III (see Figure 2-33, totally 4 pcs) of the fan.

6. Remove the hook from the L shaped lifting component, turn the handle clockwise, tidy the sling and remove the fixing bolts and washers IV (see Figure 2-31, totally 4 pcs) of the winch bracket, and take out the winch and the bracket assembly.

7. Remove the fixing bolts and washers II (see Figure 2-31, totally 2 pcs) of the L shaped lifting component, and take out the L shaped lifting component.

At this point, the operation of lowering the fan of one-bay unit is completed.

For the two-bay unit and three-bay unit, you should also lower other fans using the fan elevator assembly. The detailed procedures are given as follows:

1. Install the fixing bolts and washers II (see Figure 2-31, totally 2 pcs) to fix the L shaped lifting component and the fan installation top cover.
2. Install the fixing bolts and washers IV (see Figure 2-31, totally 4 pcs) to fix the winch and its bracket onto the unit beams.
3. Repeat the step 1 to step 7 of the one-bay unit to lower all fans.
4. After lowering all fans, tidy the fan cables and fix them using a cable tie.

2.7.2 Removing Transport Fastener And Vibration Absorber

To protect partial components from damaging and distorting due to bumping, impact and resonation, fasteners and vibration absorbers are mounted at certain locations before delivery. Remove the fasteners and vibration absorbers before installation and commissioning.

Removing transportation fixing plate of compressor

To reduce the compressor operation vibration and noise, the vibration absorbing cushions are added to the compressor base. However, such method cannot best restrain the equipment vibration during transportation, and may result in loosened connections and wearing of certain parts. To prevent this, three L shaped fixing plates are added to the compressor base, as shown in Figure 2-34.

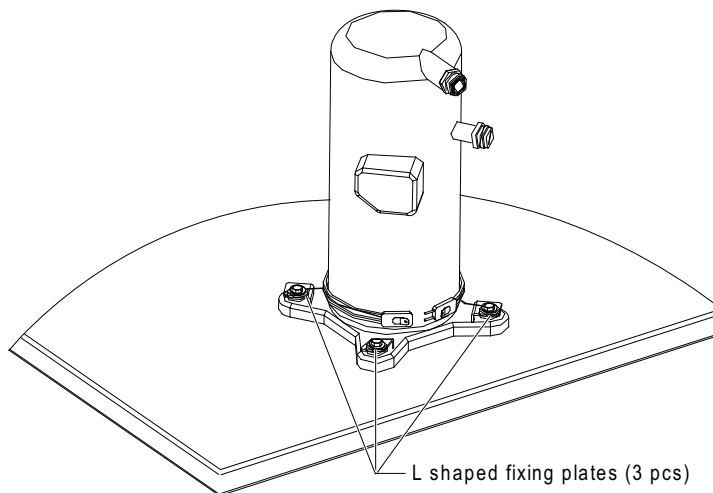


Figure 2-34 Positions of fixing plates


After the installation and before the commissioning, remove the three L shaped fixing plates, and then restore the bolts and washers. The fastening torque of the bolts is (12 ± 1) N·m.

Removing transportation fastener of fan

1. FC upflow unit

The motor base of the fan is designed with a semi-free self-tension structure to minimize the fan operation noise and prolong the belt life. During the transportation, to protect the semi-free structure from failing or collapsing due to resonation, the upflow unit is especially fastened with bolts (left and right symmetrical, one at each side), as shown in Figure 2-35. You should cut the binding string on the belt and remove the four fixing bolts before the power-on operation; otherwise, the fan could be damaged and even cause personal injury. It is necessary to hold the motor firmly while you remove the fixing bolts.

Cut the binding string on the belt.

 Note

When you open the front door of unit, you will see a warning label concerning bolt removal on the sealing panel of the fan. Remove the bolts by following the preceding instructions.

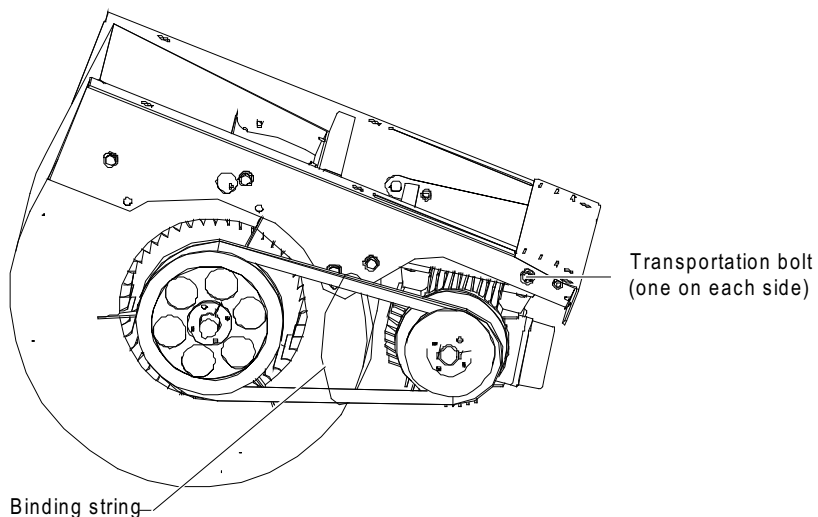


Figure 2-35 Fixed bolts and binding string of transport fan components

2. FC downflow unit

During the transportation, some cushion foam is inserted into the triangle formed by the motor base and the fan. Remove the foam before the power-on operation.

Note

Never put hands into the triangle gap between the motor base and fan.

Removing transportation fastener of infrared humidifier

Note

1. Not removing the transport protection foam may cause fire.
2. Do not touch the lamps with bare fingers.

To protect the infrared humidifier lamps from rupturing during transportation, protection foam is fitted to the infrared humidifier components before delivery. Before the unit operation, remove the protection foam and connect the cable of the high water-level switch. Otherwise, the infrared humidifier will not work normally and may result in fire.

The detailed operation procedures are as follows:

1. Cut the cable tie and remove the protection foam fixed under the lamp, as shown in Figure 2-36 and Figure 2-37.

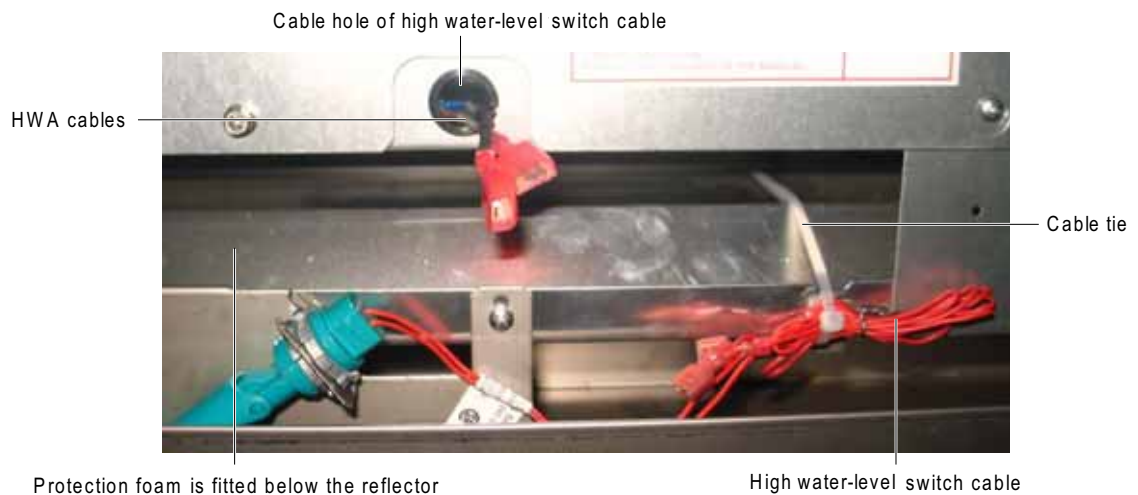


Figure 2-36 Removing protection foam 1

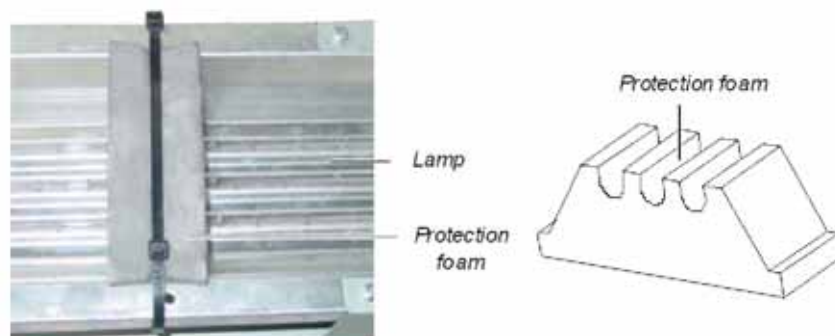


Figure 2-37 Removing protection foam 2

2. Connect the cable of high water-level switch with the two HWA cables that through the cable hole of high water-level test switch.

3. The floating pole and the infrared humidifier high water-level switch are tightly bound together with a rubber string before delivery, as shown in Figure 2-38. Remove the rubber string before unit operation. Otherwise, the unit cannot detect the high water-level alarm.

Removing rubber string



Figure 2-38 Floating pole of high water-level switch

Removing pipe fasteners

To prevent the long copper pipes from scratching the metal plate and being damaged, the pipes are cushioned with foam or bound up before delivery. Remove those materials before power-on commissioning.

2.8 Installation Inspection

After the mechanical installation is completed, you should check and confirm it according to Table 2-8.

Table 2-9 Installation Inspection

Items	Results
Sufficient space is left around the unit for maintenance	
The equipment is installed vertically and the installation fasteners have been fixed	
The pipes between the indoor unit and outdoor unit have been connected, and the ball valves of the indoor unit and outdoor unit have been opened completely	
The condensate pump (if needed) has been installed	
The drain pipe has been connected	
The water supply pipe for the infrared humidifier has been connected	
All pipe joints have been made correctly/tested	
The transportation fasteners have been removed	
Irrelevant things (such as transportation material, structure material and tools) inside or around the equipment have been cleared after the equipment is installed	
The air distribution system is installed as per room design (for example, raised floor/grilles, ductwork, etc)	

After confirming the preceding points, you can start the electrical installation.

Chapter 3 Electrical Installation

This chapter introduces the electrical installation of the Liebert PEX series air conditioner, including work introduction and installation notes, wiring of indoor unit, wiring of outdoor unit and installation inspection.

3.1 Work Introduction And Installation Notes

Wires to connect at site

1. Power cable and control cable of indoor unit.
2. Solenoid valve of pipe extension kit (field installed option).
3. Outdoor unit (air-cooled series): signal control cable and power cable.
4. Input and output control cables of the unit.

Installation notes

1. The connection of all power cables, control cables and ground cables should comply with the local and national electrician regulations.
2. See the unit nameplate for the full load current. The cable sizes should meet the local wiring rules.
3. Mains supply requirement: 400Vac, 50Hz.
4. The electrical installation must be performed by qualified professional installation personnel.
5. Before the wiring, use a voltmeter to measure the power supply voltage and make sure that the power supply has been switched off.

3.2 Wiring Of Indoor Unit

3.2.1 Locating Electrical Interface Of Indoor Unit

Open the front door of the indoor unit to reveal the interfaces of the electrical control box, as shown in Figure 3-1, Figure 3-2 and Figure 3-3.

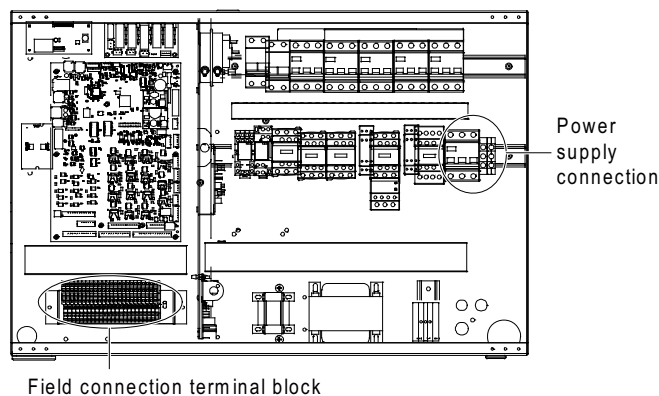


Figure 3-1 Electrical control box interfaces of one-bay unit

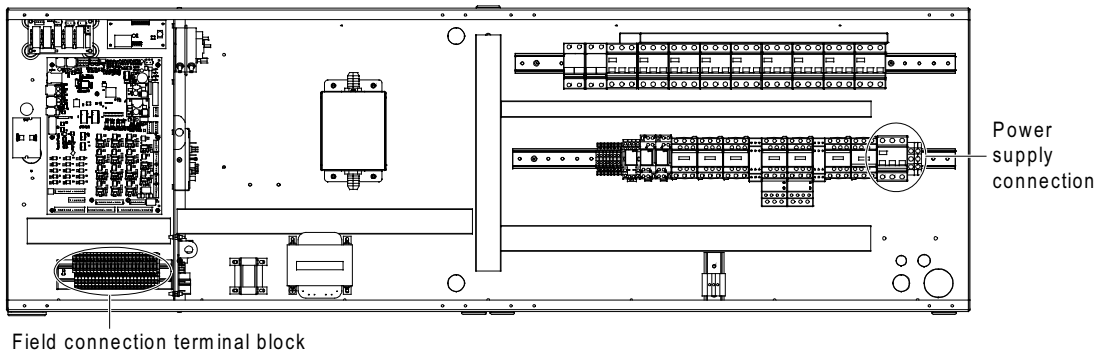


Figure 3-2 Electrical control box interfaces of two-bay unit

Note

The two-bay series with single compressor has only one compressor MCB and a contactor.

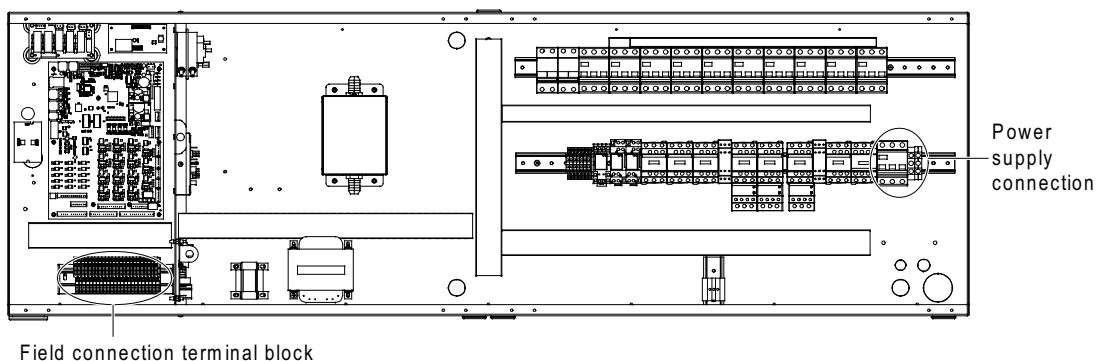


Figure 3-3 Electrical control box interfaces of three-bay unit

3.2.2 Connecting Power Cable Of Indoor Unit

The power interfaces are located as shown in Figure 3-1, Figure 3-2 and Figure 3-3. The amplified figure of the power interface is shown in Figure 3-4. Connect terminals L1 ~ L3, N, and PE to their counterparts of external power supply.

Fix the input cables to the cable clamp, note that the cable clamp is located on the inner side panel of the unit, see Figure 3-5 for its position. For the cable specification, see the rated full load ampere (FLA) listed in Table 3-1.

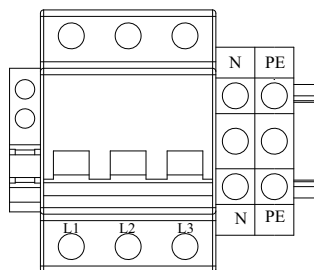


Figure 3-4 Amplified figure of main input isolation switch and terminals

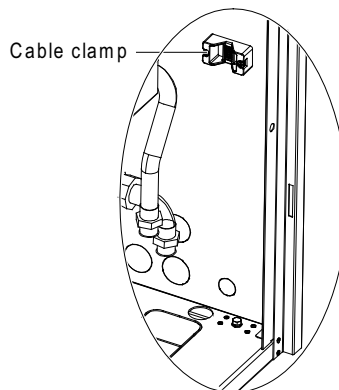


Figure 3-5 Cable clamp

Note

The cable sizes should meet the local wiring regulations.

Table 3-1 Rated full load ampere (FLA) (unit: A)

Model	Standard model	Standard model with level 2 electric heating	No humidifying, level 1 electrical heating	No humidifying, level 2 electric heating	Humidifying without heating	No humidifying or heating
P1020	24	33.1	24	33.1	21	14.9
P1025	26.1	35.2	26.1	35.2	23.1	17
P1030	33.1	42.2	33.1	42.2	30.1	24
P1035	35	44.1	35	44.1	32	25.9
P2035	42.6	56.2	42.6	56.2	41.2	29
P2040	42	47	33.4	47	42	29.8
P2045	48.4	62	48.4	62	47	34.8
P2050	46.2	49.1	35.5	49.1	46.2	34
P2055	53.4	67	53.4	67	52	39.8
P2060	60.2	60.2	48	57.9	60.2	48
P2070	64	64	51.8	59.8	64	51.8
P3070	65.3	70.3	53.1	70.3	65.3	53.1
P3080	71.1	73.2	58.9	73.2	71.1	58.9
P3090	82.3	81.5	70.1	82.3	82.3	70.1
P3100	92.3	92.3	80.1	86.5	92.3	80.1

Note:
The standard model is configured with the humidifier and the level 1 electric heating. Air-cooled unit FLA excludes the current of the outdoor unit

3.2.3 Connecting Control Cables

The field connection terminals are located as shown in Figure 3-1, Figure 3-2 and Figure 3-3. The amplified figure is shown in Figure 3-6. The upper part of the terminal block is connected to the unit, while the lower part serves as user control signal interfaces.

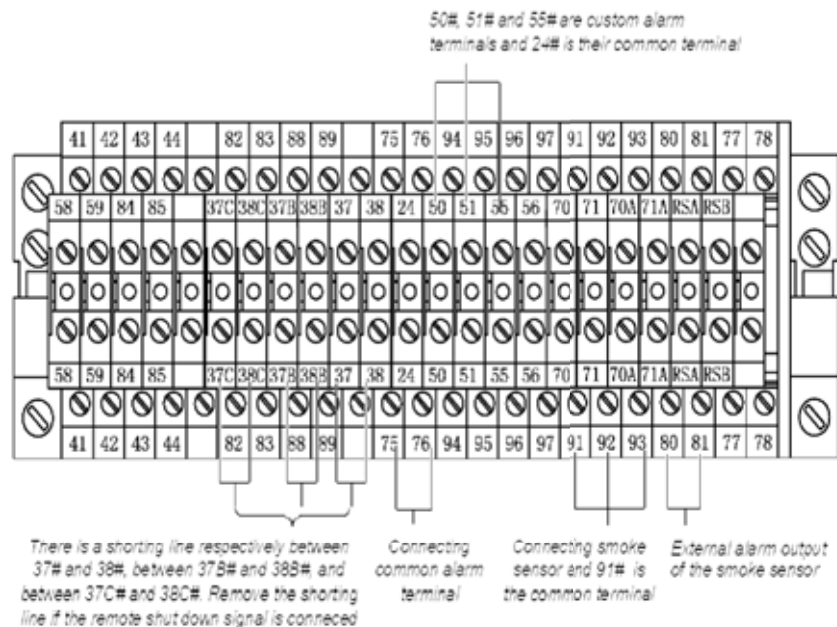


Figure 3-6 Field connection terminals

Note

The connection personnel must take anti-static measures before connecting the control cables.

Water-under-floor sensor

Each unit is equipped with one water-under-floor sensor. You should connect one end of the sensor to terminal 51#, and the other end to the common terminal 24#.

The number of the sensors in parallel connection is not limited, but each unit has only one water-under-floor alarm.

Remote shutdown

Three remote shutdown interfaces are provided in the unit and they are shorted in the factory.

Remove the shorting line between 37# and 38# and connect them to the first remote shutdown switch.

Remove the shorting line between 37B# and 38B# and connect them to the second remote shutdown switch.

Remove the shorting line between 37C# and 38C# and connect them to the third remote shutdown switch.

Smoke detecting

Terminals 91#, 92# and 93# can be connected to the optional smoke sensor. The terminal 91# is a common terminal, the terminal 92# is a normally open (NO) contact and the terminal 93# is a normally closed (NC) contact. You can select NO or NC contact according to the configured smoke sensor logic.

Terminals 80# and 81# are used to connect the external alarm output of the smoke sensor.

Control signals of outdoor unit

Terminals 70 & 71 and terminals 70A & 71A are two pairs of control signal input terminals of the outdoor unit. Their on and off state is the same as that of the compressor.

Customized alarm

Terminals 50#, 51# and 55# can be connected to three kinds of sensors, including smoke sensor and water-under-floor sensor. Terminal 24# is their common terminal. After the customized terminals are connected with external alarm signals, you should set the corresponding customized alarm through the iCOM controller. See 5.7.6 *SET ALARMS* for details.

When the contact is open and no external alarm is generated, the input state of the customized terminal is open. But when the contact is closed and the external alarm is generated, the input state of the customized terminal will be shorted. At this point, the air conditioner system will generate an audible alarm, and the LCD of the iCOM controller will display the alarm information.

The terminals can be defined as follows:

Terminals 50# and 24#: remote alarm.

Terminals 51# and 24#: water-under-floor sensor (in factory).

Terminals 55# and 24#: safe switch for condensate pump (optional).

External common alarm

Terminals 75# and 76# can be connected to the external common alarms. They are controlled by the external alarm relay K3 on the circuit board. They output signals to external alarm devices, such as alarm indicator. When critical alarm occurs, the contact will be closed to trigger remote alarms, send signals to the building management system or dial the paging system automatically. The power supply of the external common alarm system is user-prepared.

For the detailed definition of other terminals, refer to *Appendix 2 Circuit Diagram*.

3.2.4 Connecting Solenoid Valve Of Pipe Extension Kit (Options, For Site Installation)

The solenoid valve of the pipe extension kit has two connection cables. The two cables are control cables, which are used to connect with the corresponding terminals of the control board. Note that the solenoid valve cables of 1# system and 2# system in double system unit should be remarked separately to avoid wrong connection. For detailed connection terminals, refer to LLSV1 and LLSV2 connection terminal No. in *Appendix 2 Circuit Diagram*.

3.3 Wiring Of Outdoor Unit (For Air-Cooled Series)

3.3.1 Connecting Control Signal Cables Of Outdoor Unit

Open the sealed panel of the electric control box reveals the fan speed controller board (board for short), according to the cable connection instructions in *Liebert PEX Condenser User Manual*.

When a condenser with single system is used to match an indoor unit with single system, the digital signal of dry contact J6 on the board (see 3.1 *Work Introduction And Installation Notes*) is connected with the control terminals 70#/71# (see Figure 3-6) of the indoor unit.

When two condensers with single system are used to match an indoor unit with double system, the digital signals of dry contacts J6 on the board corresponding to compressor systems 1# and 2# are respectively connected with the control terminals 70#/71# and 70A#/71A# of the indoor unit.

When a condenser with double system is used to match an indoor unit with double system, you should short the terminals 70# & 70A# and 71# & 71A#. The digital signal of dry contact J6 on the board can be connected with the control terminals 70#/71# or 70A#/71A#.

For the detailed connection, refer to *Appendix 2 Circuit Diagram*.

3.3.2 Connecting Power Cables Of Outdoor Unit

The power cables of the outdoor unit are connected with the miniature circuit breakers (MCBs) reserved in the indoor unit (see Figure 4-1, Figure 4-2 and Figure 4-3).

3.4 Installation Inspection

After the electrical installation is completed, you should confirm it according to Table 3-2.

Table 3-2 Installation Inspection

Items	Results
The power supply voltage meets the rated voltage on the unit nameplate	
The system electric loop has no open circuit or short circuit	
Power cables and ground cables to the circuit breakers, indoor unit and outdoor unit are well connected	
The ratings of the circuit breakers and fuses are correct	
The control cables are well connected	
All the cables connections are fastened, with no loose screws	

After confirming the preceding points, you can start the commissioning.

Chapter 4 System Power-On Commissioning

This chapter introduces the system power-on commissioning, including location of MCBs, and power-on commissioning of air-cooled series unit and water-cooled series unit.

4.1 Location Of MCBs

The MCBs are located as shown in Figure 4-1, Figure 4-2 and Figure 4-3. The numbers in Figure 4-1 ~ Figure 4-3 have the following definitions:

- | | | | |
|-------------------|----------------------------|------------------------------------|----------------------|
| 1: Compressor MCB | 3: Electric heater MCB | 5: Condenser MCB | 7: Control board MCB |
| 2: Fan MCB | 4: Infrared humidifier MCB | 6: Compressor crankcase heater MCB | |

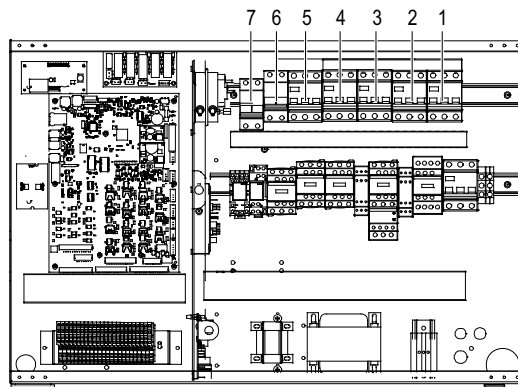


Figure 4-1 MCBs location of one-bay unit

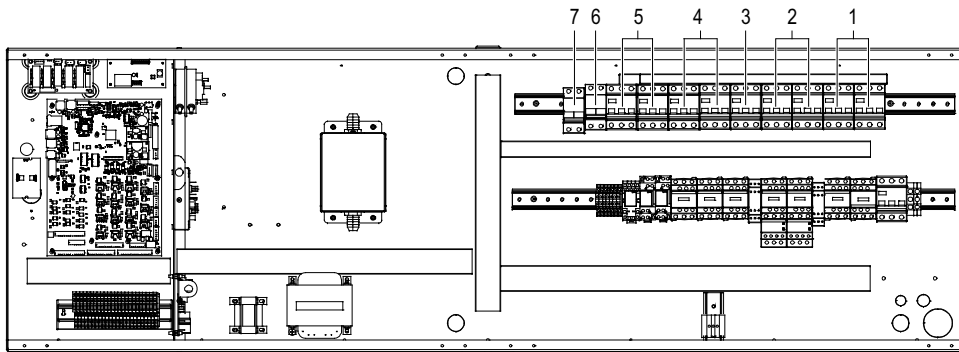


Figure 4-2 MCBs location of two-bay unit

Note

The two-bay series with single system has only one compressor MCB and a compressor contactor.

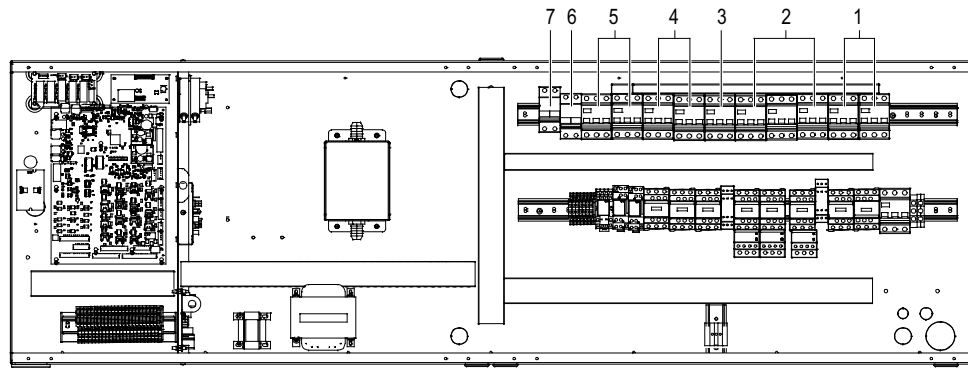


Figure 4-3 MCBs location of three-bay unit

4.2 Power-On Commissioning Of Air-Cooled Series

4.2.1 Preparation Before Commissioning

Mechanical part

1. The protection materials for transportation have been removed. Check that the motor pulley and the fan pulley of the FC fan model are fixed, the motor bearing and fan bearing are parallel, the belt is perpendicular to the two bearings and the tension of the belt is correct. For the upflow unit, especially note that the transportation fixing bolts of the fan have been removed. For the downflow unit of EC fan, make sure that that fan has been lowered into position, no foreign matter inside the air channel, and the protective guards are installed correctly.
2. The cooling pipe system has passed the pressure leakage test.
3. The total charge quantity has been roughly calculated. If the charge exceeds the base charge allowed, additional refrigerant oil should have been added into the system.
4. The water supply and drain pipes of the humidification system have been connected, the material requirement is met and the leakage detection has been installed.
5. The crankcase heater of the compressor has been preheated for over 12hr.
6. The chilled water system has passed the pressure leakage test, and is qualified.
7. The chilled water system has been cleaned and discharged (air bleed valve is on top of the cooling coil header).
8. The chilled water system has been confirmed ready for operation.
9. The equipment room is above 20°C with certain heat load. Otherwise, pre-heat the equipment room with any heating device, or by manual running the heaters of the unit (in this case, go through the following procedures till the third entry of 4.2.2 *Commissioning Procedures* first) and of other equipment in the room. Ensure sufficient heat load for the commissioning.
10. During low ambient conditions, it may be necessary to manually raise the condensing pressure up to 16bar by manually shielding some condensing area to limit condensing air volume.

Electric part

1. Check that the voltage of the main power supply is within $\pm 10\%$ of the rating, and the isolation switch of the air-cooled condenser of the outdoor unit has been closed.
2. Check that all power and control circuits are properly connected. Fasten all connection connectors.
3. Separate any power cables and the low voltage control cables from each other.
4. Check that the transportation foam block of the infrared humidifier has been removed, and the high water level cables have been connected and its float mechanism operates correctly.
5. Check the phase sequence:
 - 1) For the FC fan model, the phase sequences of all three-phase devices have been adjusted consistent before delivery. During commissioning, you only need to ensure that the phase sequence of a random three-phase device is correct. In step two of 4.2.2 *Commissioning Procedures*, if you run the fan by clicking on the fan contactor in the electric control box with a straight screwdriver, you can judge the phase sequence

by observing the wind direction. If the phase sequence is wrong, exchange any two phases of the L line of the power supply.

2) For the EC fan model, the fan itself does not require phase sequence; therefore, the phase sequence needs to be checked through compressor. After step five static charging refrigerant of 4.2.2 *Commissioning Procedures* is completed, you should first close the connection pipe in the pressure gauge with the refrigerant filling tank, and then use the straight screwdriver to press, so as to make one compressor contactor in the electric control box contact in short time and start the compressor. Determine the system phase sequence through observing the high/low value in pressure gauge that connected to the system, if the system is unable to quickly build high and low pressure, it means the phase sequence is wrong, you should exchange any two phases of the L line of the power supply.

4.2.2 Commissioning Procedures

1. Switch off the MCBs of all components. Switch on the main isolation switch and control board MCBs.

Check that the control voltage is $24V_{ac} \pm 10\%$.

2. Switch on the fan MCB. Press the fan contactor to start the fan and make sure the fan blowing direction is correct. Start the unit and measure all the operation phase currents of the fan.

3. Switch on the electric heater MCB and change the temperature setpoint to start the electric heater, or start it manually. Measure all the operation phase currents of the electric heater.

To trigger the electric heater, you should:

Enter the 'USER MENUS' -> 'SETPOINTS' -> 'TEMP SET' to adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} + 5$, ' $T_{\text{return air temp}}$ ' is the present ambient temperature on the LCD). Wait for 1min, and the electric heater contactor will be closed and the LCD will display 100% output of the electric heater. Adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} - 5$). Wait for 1min, and then the electric heater will stop working. It indicates that the heating function is normal. Keep this temperature value and no heating requirement is needed. Then continue with the following procedures.

Note

Do not manually press the infrared humidifier contactor unless there is water in the humidifier pan.

4. Switch on the infrared humidifier MCB and change the humidity setpoint to start the infrared humidifier, or start it manually. Measure all the operation phase currents of the infrared humidifier. In addition, inject water manually to check that the charging pipe and drain pipe do not leak, and that the drain pipe is clear.

To trigger the infrared humidifier, you should:

Enter the 'USER MENUS' -> 'SETPOINTS' -> 'HUM SET' to adjust the humidity setting value to ' $T_{\text{setting hum}}$ ' ($T_{\text{setting hum}} = T_{\text{ambient hum}} + 10\%$, ' $T_{\text{ambient hum}}$ ' is the present ambient humidity on the LCD). Wait for 1min, and the humidifier contactor will be closed and the LCD will display 100% humidifying output. Adjust the temperature setting value to ' $T_{\text{setting hum}}$ ' ($T_{\text{setting hum}} = T_{\text{ambient hum}} - 10\%$). Wait for 1min, and then the humidifier will stop working. It indicates that the humidifying function is normal. Keep this humidity value and no humidifier requirement is needed. Then continue with the following procedures.

Note

After commissioning, restore the temperature and humidity setpoints to the default values or original setpoints.

5. Connect the compound pressure gauge to the corresponding high and low pressure schrader valves.

Evacuate the cooling system vacuum to -30in.Hg (pumping time: >3hr), and hold the state for 4hr. The pressure should not rise, and the color of the sight glass is normal (to ensure the cooling system vacuum and dry effect, evacuate the cooling system repeatedly at least three times).

After checking the vacuum state of the cooling system, charge with liquid refrigerant (usually charge until the pressures inside the refrigerant container equalizes with that in the cooling system).

Connect the pressure gauge to the refrigerant cylinder.

Switch on the compressor MCB and condenser MCB.

1) Change the temperature setpoint to start cooling, or start cooling manually. Make sure that the dehumidification and HGBP are in closed states. Measure all the operation phase currents of the compressor in real time.

To start cooling (start the compressor), you should:

Make sure that the unit chilled water is in closed state, and enter 'SERVICE MENU' -> 'SETPOINTS' to set S138 to '20K'.

Enter 'USER MENUS' -> 'SETPOINTS' -> 'TEMP SET' to adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} - 5$, ' $T_{\text{return air temp}}$ ' is the present ambient temperature on the LCD). Wait for 1min, and the compressor contactor will be closed and the LCD will display 100% cooling requirement. After at least 3min operation, change the temperature setting value to ' $T_{\text{return air temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} + 5$). Wait for 30s, and then the compressor will stop working. It indicates that the cooling function is normal.

 **Note**

After commissioning, restore the temperature setpoint to the default or original setpoint.

2) Check the operation current of the condenser fan, and check that the fan runs stably.

3) Start the compressor, and charge refrigerant gas (R22) or refrigerant liquid (R407C) slowly to the compressor inlet until the subcooling degree reaches 8°C ~ 10°C and the sight glass is clear. The condensing temperature should be kept at 45°C.

Keep charging and adjust the thermostatic expansion valve to 41°F ~ 46.4°F superheat degree. The adjustment step of the valve should be smaller than 1/4 round, and the interval between two steps should be at least 15min.

Observe the compressor suction pipes and make sure that there is no water condensing on the surface of the compressor and the pipes, so as to avoid the risk of liquid slugging the compressor.

At the condition of 22°C/50% return air state and 16bar ~ 17bar condensing pressure, the compressor suction pressure should be above 5bar.

At the condition of 24°C/50% return air state and 16br ~ 17br condensing pressure, the compressor suction pressure should be above 5.5bar.

4) Check the dehumidification function


To trigger dehumidification, you should:

Change the humidify setting (see 5.7 SERVICE MENUS) to 10% lower than the indoor RH. The control system should then trigger the call for dehumidification, the dehumidification solenoid valve switches on the dehumidification indicator Q3 on the control board turns on. Then change the humidity setting higher than the indoor RH. If the dehumidification solenoid valve of the FC fan unit switches off, and the airflow of the EC fan unit drops while the dehumidification indicator Q3 turns off, it means the dehumidification function is normal. Note that during the commissioning process, if the indoor temperature is 3°C higher than the temperature setting, the system may enter the forced cooling mode, and the dehumidification demand will not be responded.

6. Commission the chilled water function: Make sure that the chilled water source is supplied normally. The temperature of the chilled water ranges from 7.6°C to 9°C. Set the temperature point to trigger FC demand, and the chilled water valve is opened.

To trigger the chilled water demand, you should:

Enter 'SERVICE MENUS' -> 'SETPOINTS' to set S138 to '8K'. Enter the 'SERVICE MENUS' -> 'SETPOINTS' to set S138 to '8K'; enter 'USER MENUS' -> 'SETPOINTS' -> 'HUM SET' to adjust the humidity setting value to ' $T_{\text{setting hum}}$ ' ($T_{\text{setting hum}} = T_{\text{ambient hum}}$) and then enter 'TEMP SET' to adjust the temperature setting value ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} - 2$). Wait for 30s, and the FC requirement will be triggered and the chilled water valve will be open.

 **Note**

After commissioning, restore the temperature setpoint to the default or original setpoint.

4.2.3 Inspection After Commissioning

After commissioning, check and confirm it according to Table 4-1.

Table 4-1 Inspection after commissioning

Items	Results
Check that all output functions are automatic	

Check that the temperature & humidity setpoints and control precisions are set correctly	
Check that other functions are set correctly	

4.3 Power-On Commissioning Of Water-Cooled Series

4.3.1 Preparation Before Commissioning

Mechanical and system part

1. The protection materials for transportation have been removed. Check that the motor pulley and the fan pulley of the FC fan model are fixed, the motor bearing and fan bearing are parallel, the belt is perpendicular to the two bearings and the tension of the belt is correct. For the upflow unit, especially note that the transportation fixing bolts of the fan have been removed. For the downflow unit of EC fan, make sure that that fan has been lowered into position, no foreign matter inside the air channel, and the protective guards are installed correctly.
2. The pressure test and leakage test of the cooling water system have been completed.
3. The cooling water system has been cleaned and drained.
4. The cooling water system has been confirmed ready for operation.
5. The chilled water system has past the pressure leakage test, and is qualified.
6. The chilled water system has been cleaned and discharged (air valve is on top of the heater exchanger pipe coil).
7. The chilled water system has been confirmed ready for operation.
8. The water supply and drain pipes of the humidification system have been reliably connected, the material requirement is met and the leak detection has been done.
9. The compressor crankcase heater has been preheated for over 12hr.
10. The equipment room temperature is above 68°F with sufficient heat load. If the heat load is insufficient, heat the equipment room with heating devices, or by manually running other heat generating equipment to make sure that the heat load is sufficient for the commissioning.

Electric part


1. Check that the voltage of the main power supply is within $\pm 10\%$ of the rating, and the isolation switch of the air-cooled condenser of the outdoor unit has been closed.
2. Check that all the power and control cables are properly connected. Fasten all the electric and control connection connectors.
3. Lay the power cables and the control cables away from each other.
4. Check that the transportation foam block of the infrared humidifier has been removed, and the high water level cables have been connected and its float mechanism operates correctly.
5. Check the phase sequence:
 - 1) For the FC fan model, the phase sequences of all three-phase devices have been adjusted consistent before delivery. During commissioning, you only need to ensure that the phase sequence of a random three-phase device is correct. In step three of 4.2.2 *Commissioning Procedures*, if you run the fan by clicking on the fan contactor in the electric control box with a straight screwdriver, you can judge the phase sequence by observing the wind direction. If the phase sequence is wrong, exchange any two phases of the L line of the power supply.
 - 2) For the EC fan model, the fan itself does not require phase sequence; therefore, the phase sequence needs to be checked through compressor. After the step six static charging refrigerant of 4.2.2 *Commissioning Procedures* is completed, you should first close the connection pipe in the pressure gauge with the refrigerant filling tank, and then use the straight screwdriver to press, so as to make one compressor contactor in the electric control box contact in short time and start the compressor. Determine the system phase sequence through observing the high and low value in pressure gauge that connected to the system, if the system is unable to quickly build high and low pressure, it means the phase sequence is wrong, you should exchange any two phases of the L line of the power supply.

4.3.2 Commissioning Procedures

1. Switch off the MCBs of various components. Switch on the main isolation switch and control board MCBs. Check the control voltage.
2. Check that the motor pulley and the fan pulley are fixed, the motor bearing and fan bearing are parallel, the belt is perpendicular to the two bearings and the tension of the belt is proper.
3. Switch on the fan MCB and click on the contactor of the indoor fan to confirm the fan blowing direction is correct. Start the unit and measure all the operation phase currents of the fan.
4. Switch on the electric heater MCB and change the temperature setpoint to start the electric heater, or start it manually. Measure all the operation phase currents of the electric heater.

To trigger the electric heater, you should:

Enter the 'USER MENUS' -> 'SETPOINTS' -> 'TEMP SET' to adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} + 5$, ' $T_{\text{return air temp}}$ ' is the present ambient temperature on the LCD). Wait for 1min, and the electric heater contactor will be closed and the LCD will display 100% output of the electric heater. Adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} - 5$). Wait for 1min, and then the electric heater will stop working. It indicates that the heating function is normal. Keep this temperature value and no heating requirement is needed. Then continue with the following procedures.

 **Note**


After commissioning, restore the temperature setpoint to the default or original setpoint.

5. Switch on the infrared humidifier MCB and change the humidity setpoint to start the infrared humidifier, or start it manually. Measure all the operation phase currents of the infrared humidifier. Manually inject water inlet to the cooling system to check that the charging pipe and drain pipe do not leak and that the drain pipe is clear.

To trigger the infrared humidifier, you should:

To trigger the humidifier, you should:

Enter the 'USER MENUS' -> 'SETPOINTS' -> 'HUM SET' to adjust the humidity setting value to ' $T_{\text{setting hum}}$ ' ($T_{\text{setting hum}} = T_{\text{ambient hum}} + 10\%$, ' $T_{\text{ambient hum}}$ ' is the present ambient humidity on the LCD). Wait for 1min, and the electric heater contactor will be closed and the LCD will display 100% humidifying output. Adjust the temperature setting value to ' $T_{\text{setting hum}}$ ' ($T_{\text{setting hum}} = T_{\text{ambient hum}} - 10\%$). Wait for 1min, and then the humidifier will stop working. It indicates that the humidifying function is normal. Keep this humidity value and no heating requirement is needed. Then continue with the following procedures.

 **Note**


After commissioning, restore the humidity setpoint to the default or original setpoint.

6. Make sure that the chilled water source is supplied normally. Change the temperature setpoint to start cooling, or start cooling manually. Measure all the operation phase currents of the compressor in real time. Check the condensation subcooling degree, suction superheating and air bulbs of the sight glass to make sure that the compressor works normally, and add refrigerant if necessary.

To start cooling (start the compressor), you should:

Make sure that the unit chilled water is in closed state, and enter 'SERVICE MENU' -> 'SETPOINTS' to set S138 to '20K'.

Enter 'USER MENUS' -> 'SETPOINTS' -> 'TEMP SET' to adjust the temperature setting value to ' $T_{\text{setting temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} - 5$, ' $T_{\text{return air temp}}$ ' is the present ambient temperature on the LCD). Wait for 1min, and the compressor contactor will be closed and the LCD will display 100% cooling requirement. After at least 3min of running, change the temperature setting value to ' $T_{\text{return air temp}}$ ' ($T_{\text{setting temp}} = T_{\text{return air temp}} + 5$). Wait for 30s, and then the compressor will stop working. It indicates that the cooling function is normal.

 **Note**

After commissioning, restore the temperature setpoint to the default or original setpoint.

7 Check the dehumidification function

To trigger dehumidification, you should:

Change the humidify setting (see 5.7 SERVICE MENUS) to 10% lower than the indoor RH. The control system should then trigger the call for dehumidification, the dehumidification solenoid valve switches on, and the dehumidification indicator Q3 on the control board turns on. Then change the humidity setting higher than the indoor RH. If the dehumidification solenoid valve switches off, and the dehumidification indicator Q3 turns off, it means the dehumidification function is normal. Note that during the commissioning process, if the indoor temperature is 37.4°F higher than the temperature setting, the system may enter the forced cooling mode, and the dehumidification demand will not be responded.

8. Commission the FC function: Make sure that the chilled water source is supplied normally. The temperature of the chilled water ranges from 45.6°F to 48.2°F. Set the temperature point to trigger FC demand, and the chilled water valve is opened.

To trigger FC demand, you should:

Enter the 'SERVICE MENUS' -> 'SETPOINTS' to set S138 to '8K'; enter 'USER MENUS' -> 'SETPOINTS' -> 'HUM SET' to adjust the humidity setting value to 'T_{setting hum}' (T_{setting hum} = T_{ambient hum}) and then enter 'TEMP SET' to adjust the temperature setting value 'T_{setting temp}' (T_{setting temp} = T_{return air temp} -2). Wait for 30s, and the FC requirement will be triggered and the chilled water valve will be open.

 **Note**

After commissioning, restore the temperature setpoint to the default or original setpoint.

4.3.3 Inspection After Commissioning

After commissioning, check and confirm it according to Table 4-2.

Table 4-2 Inspection after commissioning

Items	Results
Check that all output functions are automatic	
Check that the temperature & humidity setpoints and control precisions are set correctly	
Check that other functions are set correctly	

Chapter 5 iCOM Controller

The iCOM controller uses menu operation. It can monitor, display and operate the precision cooling air conditioner and control the environment within a set range. This chapter expounds the LCD, button and indicator panel, structure chart of control menu, startup interface, main interface, USER MENUS, SERVICE MENUS, ADVANCED MENUS and EVENT NAME AND DIFINITION of the iCOM controller.

5.1 LCD

An LCD is located on the front panel of the Liebert PEX series air conditioner. The LCD can display the current state of the equipment room, such as temperature and humidity, and so on. You can also read and modify the equipment configuration through the LCD.

The LCD uses blue backlight. If no button is pressed within a certain period of time (settable; default: 5min), the backlight will be off, until the next time any button is pressed.

5.2 Button And Indicator Panel

Nine buttons and two indicators are located on the button and indicator panel, 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.

The button and indicator panel is shown in Figure 5-1.

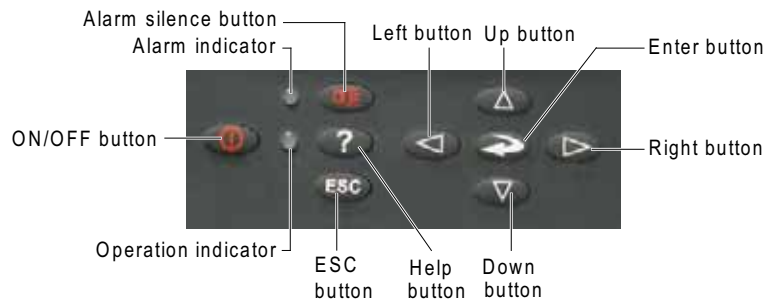


Figure 5-1 Button and indicator panel

The indicators are described in Table 5-1.


Table 5-1 Indicator description

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

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

Table 5-2 Function description of buttons

Button	Function description
ON/OFF button	<ol style="list-style-type: none"> 1. Switch on/off the system. Press the ON/OFF button to shut down an operating system, or to start an idle system. 2. Test the display state of the backlight of the LCD and the operation indicator. After powering-on, when the system is in the standby state (defined as test state in this manual), pressing the ON/OFF button will switch between the operation indicator (green then) and the LCD backlight. This function is used to test whether the LCD backlight and the operation indicator are normal
Enter button	<ol style="list-style-type: none"> 1. Enter the selected menu, or save the setting after parameters are changed. When you are entering a menu or changing a parameter, the menu and the parameter will be high lighted. 2. Test the display of characters. When the system is in the test state, pressing the enter button will display the ASCII code. This function is used to test whether the characters are displayed normally on the LCD
ESC button	<ol style="list-style-type: none"> 1. Quit the current menu. 2. Abolish the current change of parameter. 3. Test the LCD high light. Pressing 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	<ol style="list-style-type: none"> 1. Increase the value of the displayed parameter during parameter setting. 2. Scroll a row or a screen up in the query state. 3. Test the buzzer. Pressing the up button when the system is in the test state will 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	<ol style="list-style-type: none"> 1. Decrease the value of the displayed parameter during parameter setting. 2. Scroll a row or a screen down in the query state. 3. Test the buzzer. If the buzzer frequency is not 0%, pressing the down button when the system is in the test state will decrease the buzzing frequency. Meanwhile the buzzer will sound at the set frequency. This function is used to test whether the buzzer is normal
Left button	<ol style="list-style-type: none"> 1. Select the left bit during the parameter setting operation. 2. Test the LCD contrast. Pressing the left button when the system is in the test state will decrease the LCD contrast (by default: 100%). This function is used to test whether the LCD contrast is normal
Right button	<ol style="list-style-type: none"> 1. Select the right bit during the parameter setting operation. 2. Test the LCD contrast. If the LCD contrast is not 100%, pressing the right button when the system is in the test state will increase the LCD contrast. This function is used to test whether the LCD contrast is normal
Alarm silence button	<ol style="list-style-type: none"> 1. The system will issue an alarm sound upon alarms. If you press the alarm silence button, the alarm sound will be eliminated. 2. Clear the current alarm after the alarm sound is silenced. 3. Test the alarm indicator, and reset the LCD contrast and buzzer frequency. Pressing the alarm silence button when the system is in the test state will 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	<ol style="list-style-type: none"> 1. Display the online help. 2. Test the yellow display of the LCD operation indicator. When the system is in the test state, pressing the help button will 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

 **Note**

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

5.3 Structure Chart Of Control Menu

Please refer to *Appendix 3 Menu Structure Of iCOM Controller*.

5.4 Startup Interface

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

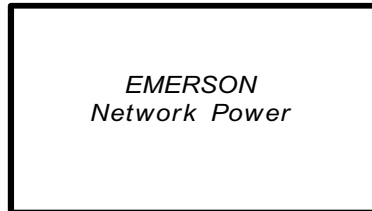


Figure 5-2 Startup interface

5.5 Main Interface

After power-on, the LCD will enter the main interface after 20s. The main interface provides the general information of the relative equipment status, including current temperature and humidity, temperature and humidity setpoints, equipment output status (fan, compressor, cooling, heating, dehumidifying, humidifying), alarm and maintenance status.

The main interface has two display modes: graphical and simple. The difference between the two display modes is that the graphic interface (see Figure 5-3) displays the percentage output chart of the function components while the simple interface (see Figure 5-4) displays the icons of current operation mode only. The switching of two modes can be realized by operating the menu. For details, refer to 5.6.7 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 255s on other menu display screen, the LCD screen will return to the main interface.

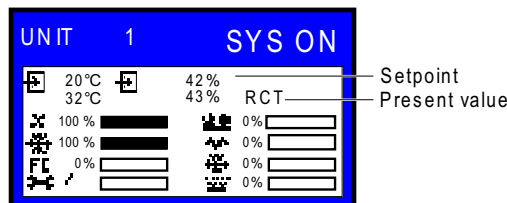


Figure 5-3 Graphical mode of main interface

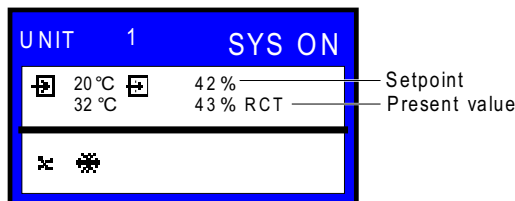


Figure 5-4 Simple mode of main interface

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

Table 5-3 Definition of icons

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

5.6 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.

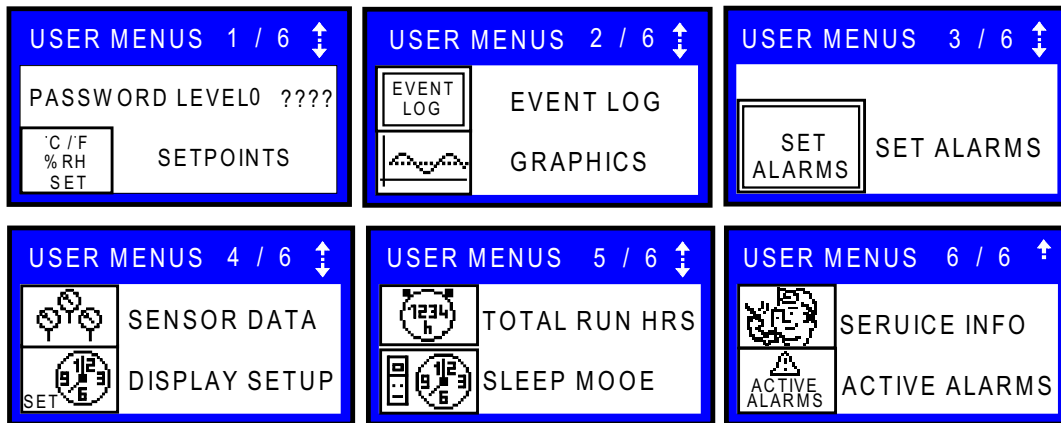


Figure 5-5 USER MENUS

5.6.1 PASSWORD

The password is necessary for some setpoints. After inputting the password (user password: 149), use the up button and down button to browse all the options, and then press the enter button to enter the selected one.

5.6.2 SETPOINTS

The setpoints will not be lost when the power fails. You can enter to browse and set the parameters in the SETPOINTS submenu through the USER MENUS. The left row displays the parameter codes; the middle row, the parameter name; the right row, the setpoints, as shown in Table 5-4.

Table 5-4 Descriptions of SETPOINTS parameters

Parameters	Default	Setting range	Description	
U102	TEMP SET	23°C	5°C ~ 40°C	Temperature setpoint
U103	HUM SET	50%	1% ~ 80%	Humidity setpoint
U104	HUM CTRL	Rel	Pred (predictive), Comp (compensable), Rel (relative)	Humidity control type
U105	SUP SENS	No	No, Lim, Ctrl, Cool	Supply air type
U106	SUP TEMP	15°C	5°C ~ 25°C	Air temperature limit setpoint
U107	BACK TSP	15°C	5°C ~ 40°C	Backup temperature setpoints

If you want to modify the preceding setpoints, you should input the password before entering the SETPOINTS menu. Then press the enter button to highlight it 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.

5.6.3 EVENT LOG

You can enter the EVENT LOG menu without a password, as shown in Figure 5-6.

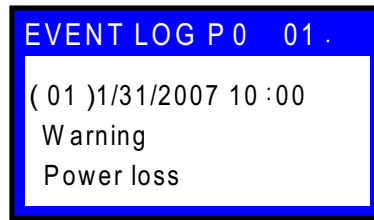


Figure 5-6 EVENT LOG menu

The EVENT LOG menu saves the last 400 system records. The event types include message, warning and alarm.

- When the event type is message, the LCD will display the event name only.
- When the event type is warning, the LCD will display the event name and the alarm indicator will turn on in red.
- When the event type is alarm, the LCD will display the event name, the alarm indicator will turn on in red, and an audible alarm will be raised.

5.6.4 GRAPHICS

The GRAPHICS menu provides two kinds of graphs: RETURN TEMP and RETURN HUMIDITY. These graphs reflect the temperature and humidity changes over a period of time in the past.

In the graphs, the current temperature or humidity is the origin, the time is the horizontal axis, and the temperature or humidity is the vertical axis, as shown in Figure 5-7.

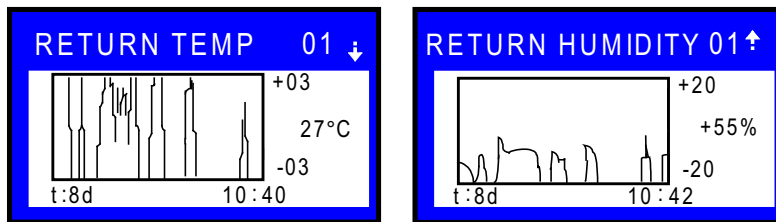


Figure 5-7 The graph of return temperature and return humidity

As the horizontal axis, the time range can be set into eight kinds. Each pixel indicates different time in different time ranges. See Table 5-5 for the detailed time range.

Table 5-5 Time range


Time range	Time indicated by each pixel	Time range	Time indicated by each pixel
8min	6s	2d	36min
32min	24s	4d	72min
1hr	45s	8d	144min
12hr	9min	16d	288min
24hr	18min		

The scaling of the vertical axis can also be set. For the RETURN TEMP, the scaling range is $\pm 3 \sim \pm 20$; for the RETURN HUMIDITY, the scaling range is $\pm 10 \sim \pm 30$. The bigger the scaling range is, the bigger the value each pixel indicates will be, and the more centered the curves will be.

You can set the parameters without inputting the password. Press the enter button to highlight the parameters, use the up or down button to select one parameter. Then press the enter button again to enter the parameter, and use the up or down button to set the value. Press the enter button to save the change at last.

5.6.5 SET ALARMS

The SET ALARMS menu is used to set the upper and lower limits of temperature and humidity alarms. The settings will not be lost when the power fails. You can select the 'SET ALARMS' submenu to browse and set the parameters through the USER MENU. The parameters are described in Table 5-6.

 **Note**

It is recommended not to change the system defaults. If you consider it necessary to change the defaults, consult professionals first and set the alarm settings under the guidance of them.

Table 5-6 Descriptions of SET ALARMS parameters

Parameters		Default	Setting range	Description
U202	RTN SNSR	Yes	Yes, No	Return air alarm enable
U203	HI TEMP	27°C	1°C ~ 99°C	High return air temperature alarm setpoint
U204	LO TEMP	18°C	1°C ~ 99°C	Low return air temperature alarm setpoint
U205	HI HUM	60%	1% ~ 99%	High return air humidity alarm setpoint
U206	LOW HUM	40%	1% ~ 99%	Low return air humidity alarm setpoint
U207	SENSOR A	No	Yes, No	Sensor A alarm enable
U208	HI TEMPA	50°C	1°C ~ 99°C	High temperature alarm setpoint of sensor A
U209	LO TEMPA	25°C	1°C ~ 99°C	Low temperature alarm setpoint of sensor A
U210	HI HUM A	70%	1% ~ 99%	High humidity alarm setpoint of sensor A
U211	LO HUM A	30%	1% ~ 99%	Low humidity alarm setpoint of sensor A
U213	SUP SNSR	No	Yes, No	Supply air alarm enable
U214	HI SUP T	24°C	1°C ~ 99°C	High supply air temperature alarm setting value
U215	LO SUP T	10°C	1°C ~ 99°C	Low supply air temperature alarm setting value

To browse through the menu, press the enter button to highlight the option, and use the up or down button to scroll.

Password is required for changing the setpoints. Then, enter the SET ALARMS menu, press the enter button to highlight the option, use the up or down button to browse the submenu. Press the enter button to enter the selected parameter. Use the up or down button to change the setpoints, and press the enter button to save the change, or press the ESC button to quit the change.

5.6.6 SENSOR DATA

You can monitor the data acquired by the sensors through the SENSOR DATA menu. The values are read only, no setting or change is allowed. The parameters are described in Table 5-7.

Table 5-7 Descriptions of SENSOR DATA parameters

Parameters		Unit	Description	Parameters		Unit	Description
U301	TEMP A	°C	Temperature of sensor A	U313	Hi Temp	°C	Daily high temperature
U302	HUM A	%	Relative humidity of sensor A	U314	Lo Te H	h	Daily low temperature (hour)
U303	TEMP B	°F	Temperature of sensor B	U314	Lo Te M	m	Daily low temperature (minute)
U304	HUM B	%	Relative humidity of sensor B	U314	Lo Te S	s	Daily low temperature (second)
U305	TEMP C	°C	Temperature of sensor C	U314	Lo Temp	°C	Daily low temperature
U306	HUM C	%	Relative humidity of sensor C	U315	Hi Hu H	h	Daily high humidity (hour)
U307	FC TEMP	°C	Free cooling temperature	U315	Hi Hu M	m	Daily high humidity (minute)
U308	AMB TEMP	°C	Outdoor temperature	U315	Hi Hu S	s	Daily high humidity (second)
U309	FC STATE	-	Free cooling status	U315	Hi Humi	%	Daily high humidity
U310	DS1 TEMP	°C	Temperature of digital scroll 1	U316	Lo Hu H	h	Daily low humidity (hour)
U311	DS2 TEMP	°C	Temperature of digital scroll 2	U316	Lo Hu M	m	Daily low humidity (minute)
U313	Hi Te H	hr	Daily high temperature (hour)	U316	Lo Hu S	s	Daily low humidity (second)
U313	Hi Te M	m	Daily high temperature (minute)	U316	Lo Humi	%	Daily low humidity
U313	Hi Te S	s	Daily high temperature (second)				

5.6.7 DISPLAY SETUP

The DISPLAY SETUP menu is used to set the LCD display attributes. Password is not required for changing the setpoints. The parameters are described in Table 5-8.

Table 5-8 Descriptions of DISPLAY SETUP parameters

Parameters		Default	Setting range	Description
U401	LANGUAG	EN	RUS, CZE, CHI, ESP, FRE, ITA, DEU, EN, POR	Language options
U402	YEAR	2005	-	Current year
U402	MONTH	04	01 ~ 12	Current month
U402	DAY	19	01 ~ 31	Current day
U403	HOUR	19h	-	Current hour
U403	MINUTE	8min	-	Current minute
U403	SECOND	17s	-	Current second
U404	TEMP F/C	°C	°F, °C	Temperature indication
U405	CONTRAST	50%	0% ~ 100%	Display contract
U406	BUZ FREQ	50%	0% ~ 100%	Buzzer frequency. 0% means buzzer silenced
U406	BUZ TEST	Off	On, Off	Buzzer frequency test switch. It determines whether or not there will be sound accompanying the adjustment of BUZ FREQ through the setting
U407	BACKLITE	5min	5min, 10min, 30min, 1hr, 12hr	Backlight time, or the backlight time when there is no button operation
U408	SCREEN	Graph	Graph, Simple, SimCo, GraCo	Main interface display mode
U409	SHOWS	A + S	SET, ACT, A + S	Main interface display mode of setpoints and actual values. Range: SET: only setpoints of the temperature and humidity are displayed. ACT: only actual temperature and humidity are displayed. A + S: both setpoints and actual values of the temperature and humidity are displayed
U410	DISPLAY	Norm	Norm (normal), Inv	Display color
U411	DATE	m/d/y	m/d/y, d.m.y, y-m-d	Date display format

5.6.8 TOTAL RUN HRS

The TOTAL RUN HRS menu records the total run time (unit: hr) of the system components. You can also set the run time limits of the system components through this menu. If the actual component run time exceeds the set limit, alarms will be raised.

This menu requires password. You can reset the total run time to zero in order to restart timing.

Note

Resetting the timers is not needed unless the components are replaced.

The parameters on this menu are described in Table 5-9. Each component has a LIMIT option to set the run time limit of the corresponding component.

Table 5-9 Descriptions of TOTAL RUN HRS parameters

Parameters		Default	Related component	Parameters		Default	Related component
U502	MOTOR(S)	1000hr	Fan motor	U507	EL HEAT1	34hr	Electric heater 1
U502	LIMIT	32000hr		U507	LIMIT	32000hr	
U503	COMP1	500hr	Compressor 1	U508	EL HEAT2	45hr	Electric heater 2
U503	LIMIT	32000hr		U508	LIMIT	32000hr	
U504	COMP2	500hr	Compressor 2	U509	EL HEAT3	0hr	Electric heater 3
U504	LIMIT	32000hr		U509	LIMIT	32000hr	
U505	CW/FC	1000hr	Chilled water/free cooling	U510	HUM	7hr	Humidifier
U505	LIMIT	32000hr		U510	LIMIT	32000hr	
U506	HG/HW	23hr	Hot gas/hot water	U511	DEHUM	1hr	Dehumidification
U506	LIMIT	32000hr		U511	LIMIT	32000hr	

5.6.9 SLEEP MODE

In the sleep mode, the air conditioner unit can realize auto-on/off. Through the SLEEP MODE menu, you can set two time zones of the sleep mode, and select the sleep timing mode. The parameters on this menu are described in Table 5-10.

Table 5-10 Descriptions of SLEEP MODE parameters

Parameters		Default	Setting range	Description
U602	MON	No	Yes, No	Sleep mode day, including Monday ~ Sunday. Set the value of any day to 'Yes', and the system will enter sleep mode on that day every week. This parameter works together with the following hour and minute settings to designate an exact time
U602	TUE	No		
U602	WED	No		
U602	THU	No		
U602	FRI	No		
U602	SAT	No		
U602	SUN	No		
U605	START 1	0hr	-	Sleep mode start time 1. The first parameter is used to set the hour of time, and the second one is used to set the minute of time
U605	START 1	0m		Sleep mode end time 1. The first parameter is used to set the hour of time, and the second one is used to set the minute of time
U605	STOP 1	0hr		Sleep mode start time 2. The first parameter is used to set the hour of time, and the second one is used to set the minute of time
U605	STOP 1	0m		Sleep mode end time 2. The first parameter is used to set the hour of time, and the second one is used to set the minute of time
U607	START 2	0hr		Timing mode setting. Range: Auto: during the system sleep time, if high/low temperature occurs, the system will resume operation and mask the alarm for 15min. The system will re-enter the sleep mode after the alarm is cleared Yes: start sleep mode No: no sleep mode
U607	START 2	0m		Timing mode selection
U607	STOP 2	0hr		Used to set the deadband temperature setting range
U607	STOP 2	0m		
U609	TIME MOD	Auto	Auto, Yes, No	
U610	TIME TYP	S.OFF	S.OFF, DEADB	
U611	DEADBAND	K	2K ~ 15K	

5.6.10 SERVICE INFO

The SERVICE INFO menu provides the contact information of customer service personnel. The information is read only.

5.6.11 ACTIVE ALARMS

The ACTIVE ALARMS menu displays the active alarms of the system. No password is required to query this menu.

5.7 SERVICE MENUS

Press the right button at the first page of the USER MENU, and you can enter the SERVICE MENUS, as shown in Figure 5-8.

The SERVICE MENUS are displayed in five pages. Each page displays one or two submenus. Press the enter button to highlight the submenus, and use the up or down button to scroll up or down. Press the enter button to enter the selected submenu.

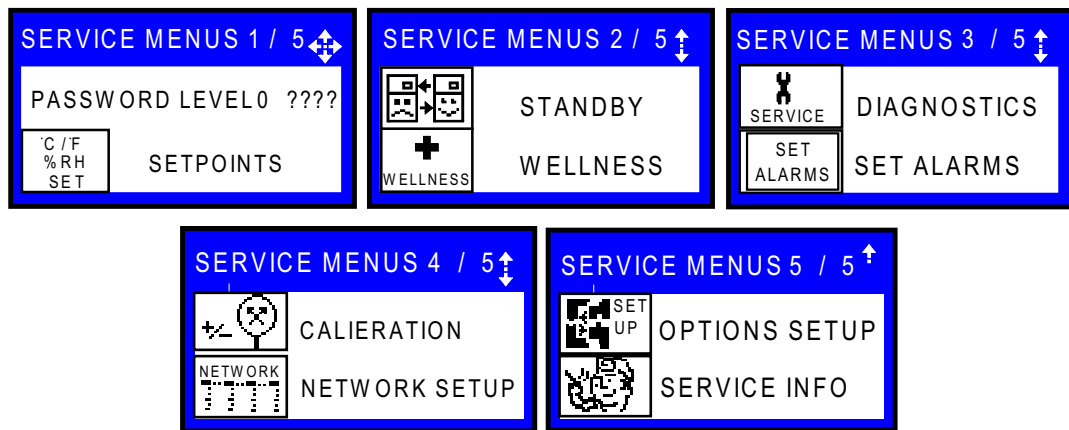


Figure 5-8 SERVICE MENU

5.7.1 PASSWORD LEVEL

It is operated by Emerson service personnel.

5.7.2 SETPOINTS

Different from the SETPOINTS in the USER MENU, the SETPOINTS in SERVICE MENU has many more parameters. See Table 5-11 for the parameter descriptions.

Table 5-11 Descriptions of SETPOINTS parameters

Parameters		Default	Setting range	Description
S102	TEMP SET	23°C	5°C ~ 40°C	Temperature setpoint
S103	CTRL TYPE	PI	Prop, PI, Intel, No	Control type selection
S104	TEMP PB	7K	2.2K ~ 30K	Temperature proportional band setpoint, or the P in PID control
S105	TEMP INT	min	-	Temperature integration time setpoint, or the I in PID control
S107	AUTOSET	Yes	Yes, No	Autoset enable
S108	TEMP DB	0K	0K~20K	Temperature deadband setting range
S109	2ND SETP	23°C	5°C ~ 40°C	-
S110	BACK TSP	23°C	5°C ~ 40°C	Backup temperature setpoint
S111	HEAT DB	0K	0K~20K	Heaters deadband setting range
S113	HUM SET	50%	1% ~ 80%	Humidity setpoint
S114	HUM CTRL	Pred	Comp, Rel, Pred	Humidity control type
S115	HUM PB	10%	1% ~ 20%	Humidity proportional band
S116	HUM INT	5min	-	Humidity integration time
S117	HUM DB	0%	1% ~ 50%	Humidity deadband setting range
S118	LO LIM 1	k	-	Dehum/Heat low limit 1
S119	LO LIM 2	-1.7K	-5.5K ~ -1.1K	Dehum/Heat low limit 2
S124	SUP SENS	No	No, Lim, Ctrl, Cool	Supply air type
S125	SUP TEMP	5°C	5°C ~ 27°C	Air supply limit temperature setpoint
S126	SUP TYPE	PI	Prop, PI, PID, Intel	Supply control type
S127	SUP PB	12K	2K ~ 30K	Supply proportional band
S128	SUINT	0min	0 ~ 15min	Supply integration
S130	SUP DB	-	0K~20K	Supply deadband
S131	VPULS	5%	0 ~ 10%	Valve Pulse
S132	CF0	-	0.01 ~ 100%	Cooling filter at 0%
S132	CF100	-	0.01 ~ 100%	Cooling filter at 100%
S133	RET CO	0K	0 ~ 10K	Return Compensation
S135	AMB TYPE	No	CONT, EFC, VAL, No	DT between Room/Outdoor Type
S136	AMB DT	5°C	0 ~ 20°C	DT between Room Air/Outdoor
S137	FC TYPE	No	No, CONT, VAL	DT between Room/FC Type
S138	FC DT	4.5°C	0 ~ 20°C	DT between Room Air/FC Fluid
S139	MIN CW	No	Yes, No	Minimum CW temperature protection selection

Parameters		Default	Setting range	Description
S140	MIN CW	7°C	0 ~ 20°C	Minimum CW temperature value
S141	LOCK FC	0°C	0 ~ 9°C	Lockout FC at FC Fluid below
S142	TRANS CH	2%	0.1 ~ 100%	Transition Change
S146	FANSPEED	Auto	Auto, Man, ECO, SUP, DELT	VSD Fanspeed
S147	VSD SET	100%	0 ~ 100%	Standard speed of the unit
S148	VSD MIN	60%	0 ~ 100%	Minimum speed of the unit
S149	VSD DEH	60%	0 ~ 100%	Speed used during dehum
S150	VSD NOP	100%	0 ~ 100%	Speed used when CI is active
S151	FF0%	0.2%/s	0 ~ 100%/s	Fanspeed Change (at 0%)
S151	FF100%	1%/s	0 ~ 100%/s	Fanspeed Change (at 100%)
S152	FRD	0s	0 ~ 300s	Fanspeed Reposition Delay
S153	HAD	-	-	-
S154	HAP	6°C	2 ~ 30°C	Fanspeed P-Band
S155	HAI	5min	0 ~ 15min	Fanspeed Integration
S157	SCR TYPE	-	-	-
S158	CO1 ON	-	-	-
S159	CO1 OFF	-	-	-
S160	CO1 TD	-	-	-
S161	CO2 ON	-	-	-
S162	CO2 OFF	-	-	-
S163	CO2 TD	-	-	-
S164	CYCLET	-	-	-
S165	SCR FACT	-	-	-
S166	ACT SCR	-	-	-

5.7.3 STANDBY

The parameters of the STANDBY menu are described in Table 5-12.

Table 5-12 Descriptions of STANDBY parameters

Parameters		Default	Setting range	Description
S502	#STANDBY	1	0 ~ 32	Number of standby units
S503	ROTATION	Daily	No, Daily, MON ~ SUN, M - MON ~ M - SUN	Rotation frequency setting of the running and standby units. Range: Daily: rotate once a day. MON ~ SUN: rotate once a week. The rotation occurs on Monday ~ Sunday of the week. For example, MON means rotation occurs on Monday of every week. M - MON ~ M - SUN: rotate once a month. The rotation occurs on Monday ~ Sunday of the first week of the month. For example, M - MON means rotation occurs on Monday of the first week of every month
S504	ROT HOUR	hr	-	Used to set the hour of the detailed time while rotation
S505	ROT MIN	min	-	Used to set the minute of the detailed time while rotation
S506	ROT BY	1	1 ~ 8	The unit number for a rotation
S507	DO ROT	No	Yes, No	Perform one rotation
S508	CASCADE	No	CO/HE, Cool, Yes, No	Cascade function selection. 'Yes' corresponds to temperature and humidity control and 'no' corresponds to closing the cascade
S509	STBY HT	No	Yes, No	Whether to start all standby units upon high temperature alarm

5.7.4 WELLNESS

The iCOM controller calculates the bonus and penalty over the equipment maintenance based on the parameters in the WELLNESS menu and the equipment operation historical data, so as to find out the next system maintenance time.

Informing the maintenance personnel of the maintenance time makes the air conditioner run in the optimal mode, which reduces the chances of faults and raises the system reliability.

The WELLNESS menu includes nine groups of parameters, including WELLNESS BASICs, and WELLNESS MOTOR, WELLNESS COMPs, WELLNESS HEATs and WELLNESS HUM. See Table 5-13 ~ Table 5-21 for detailed parameter descriptions.

WELLNESS BASIC1

Table 5-13 Descriptions of WELLNESS BASIC1 parameters

Parameters		Default	Setting range	Description
S002	FREQ/YR	1pY	0pY ~ 12pY	Maintenance frequency every year
S003	BONUS	MM	0MM ~ 12MM	Bonus setting
S004	PENALTY	MM	0MM ~ 12MM	Penalty setting
S005	LAST PM	YY	-	Last maintenance. Year (YY), month (MM) and day (DD). This parameter is read only
S005	LAST PM	MM		
S005	LAST PM	DD		

WELLNESS BASIC2

Table 5-14 Descriptions of WELLNESS BASIC2 parameters

Parameters		Default	Setting range	Description
S006	NAME	-	-	Service personnel setting
S007	CONFIRM	No	Yes, No	Maintenance confirmation selection
S008	NEXT PM	-	-	Calculated next maintenance. This parameter is read only

WELLNESS MOTOR

Table 5-15 Descriptions of WELLNESS MOTOR parameters

Parameters		Default	Description
S013	STARTS	-	Number of fan starts since the last maintenance
S014	RUN HRS	hr	Fan run hours since the last maintenance
S015	AVG RUN	min	Average fan run time calculated through number of fan starts and run hours
S016	BEST	1	Starts per day best
S017	WORST	24	Starts per day worst
S018	ALARMS	0	Number of alarms since the last maintenance
S019	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS COMP1

Table 5-16 Descriptions of WELLNESS COMP1 parameters

Parameters		Default	Description
S024	STARTS	-	Number of compressor 1 starts since the last maintenance
S025	RUN HRS	hr	Compressor 1 run hours since the last maintenance
S026	AVG RUN	min	Average compressor 1 run time calculated through the number of starts and run hours
S027	BEST	12	Starts per day best
S028	WORST	240	Starts per day worst
S029	HP AL	0	Number of high pressure alarms occurred to compressor 1 since the last maintenance
S030	LP AL	0	Number of low pressure alarms occurred to compressor 1 since the last maintenance
S031	OL AL	0	Number of overload alarms occurred to compressor 1 since the last maintenance
S032	DS HT AL	0	Number of digital scroll high temperature alarms occurred to compressor 1 since the last maintenance
S033	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS COMP2

Table 5-17 Descriptions of WELLNESS COMP2 parameters

Parameters		Default	Description
S035	STARTS	-	Number of compressor 2 starts since the last maintenance
S036	RUN HRS	hr	Compressor 2 run hours since the last maintenance

Parameters		Default	Description
S037	AVG RUN	min	Average compressor 2 run time calculated through the number of starts and run hours
S038	BEST	12	Starts per day best
S039	WORST	240	Starts per day worst
S040	HP AL	0	Number of high pressure alarms occurred to compressor 2 since the last maintenance
S041	LP AL	0	Number of low pressure alarms occurred to compressor 2 since the last maintenance
S042	OL AL	0	Number of overload alarms occurred to compressor 2 since the last maintenance
S043	DS HT AL	0	Number of digital scroll high temperature alarms occurred to compressor 2 since the last maintenance
S044	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS HEAT1

Table 5-18 Descriptions of WELLNESS HEAT1 parameters

Parameters		Default	Description
S046	STARTS	-	Number of electric heater 1 starts since the last maintenance
S047	RUN HRS	hr	Electric heater 1 run hours since the last maintenance
S048	AVG RUN	min	Average electric heater 1 run time calculated through the number of starts and run hours
S049	BEST	24	Starts per day best
S050	WORST	240	Starts per day worst
S051	ALARMS	0	Number of high pressure alarms since the last maintenance
S052	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS HEAT2

Table 5-19 Descriptions of WELLNESS HEAT2 parameters

Parameters		Default	Description
S057	STARTS	-	Number of electric heater 2 starts since the last maintenance
S058	RUN HRS	hr	Electric heater 2 run hours since the last maintenance
S059	AVG RUN	min	Average electric heater 2 run time calculated through the number of starts and run hours
S060	BEST	24	Starts per day best
S061	WORST	240	Starts per day worst
S062	ALARMS	0	Number of high pressure alarms since the last maintenance
S063	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS HEAT3

Table 5-20 Descriptions of WELLNESS HEAT3 parameters

Parameters		Default	Description
S068	STARTS	-	Number of electric heater 3 starts since the last maintenance
S069	RUN HRS	hr	Electric heater 3 run hours since the last maintenance
S070	AVG RUN	min	Average electric heater 3 run time calculated through the number of starts and run hours
S071	BEST	24	Starts per day best
S072	WORST	240	Starts per day worst
S073	ALARMS	0	Number of high pressure alarms since the last maintenance
S074	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

WELLNESS HUM

Table 5-21 Descriptions of WELLNESS HUM parameters

Parameters		Default	Description
S079	STARTS	-	Number of humidifier starts since the last maintenance
S080	RUN HRS	hr	Humidifier run hours since the last maintenance

Parameters		Default	Description
S081	AVG RUN	min	Average humidifier run time calculated through the number of starts and run hours
S082	BEST	24	Starts per day best
S083	WORST	240	Starts per day worst
S084	ALARMS	0	Number of high pressure alarms since the last maintenance
S085	BONUS	0MM	Bonus amount. Actual bonus calculated through the number of starts and average run time. This value determines the time for the next maintenance

5.7.5 DIAGNOSTICS

The DIAGNOSTICS menu is classified into two groups. After entering the menu, pressing the up button and down button can switch between two groups and pressing the enter button can enter the parameters of the corresponding group. The parameters of group 1 are settable and used to help the maintenance personnel start and cut off devices by hand in site, so as to realize the diagnosis for devices. The parameters of group 2 are read only and reflect the fault condition of the devices. See Table 5-22 for detailed descriptions.

Table 5-22 Descriptions of DIAGNOSTICS parameters

Parameters		Default	Setting range	Description	
Group 1	S302	HP1 CODE	0	-	HP 1 alarm counting. The counter can be reset to 0 through the parameter
	S303	HP2 CODE	0	-	HP 2 alarm counting. The counter can be reset to 0 through the parameter
	S304	HT1 CNT	0	-	HT 1 alarm counting. The counter can be reset to 0 through the parameter
	S305	HT2 CNT	0	-	HT 2 alarm counting. The counter can be reset to 0 through the parameter
	S306	LP1 CODE	0	-	LP 1 alarm counting. The counter can be reset to 0 through the parameter
	S307	LP2 CODE	0	-	LP 2 alarm counting. The counter can be reset to 0 through the parameter
	S308	LP1 ACT	bar	-	Actual LP 1
	S309	LP2 ACT	bar	-	Actual LP 2
	S310	LP1 ACT	bar	-	Actual LP 1
	S311	LP2 ACT	bar	-	Actual LP 2
	S313	MANUAL	No	Yes, No	Selecting 'Yes' can turn on or off the components; selecting 'No' can prohibit manual setting
	S314	MOTOR(S)	On	On, Off	Diagnosis switch of fan motor. The settings 'On' and 'Off' are used to manually start and shut down the fan respectively
	S315	COMP1	Off	On, Off	Diagnosis switch of compressor 1. The 'On' setting of this parameter can start compressor 1 only when the fan has been started
	S315	C1 MODE	Run	Run, Evac, Charg	Compressor 1 operation mode selection
	S316	C1 CAP	Off	On, Off	Refrigeration capacity output of digital scroll compressor 1
	S317	C1 CYCLE	0%	-	-
	S318	LLSV 1	Off	On, Off	Diagnostic of liquid line solenoid valve of compressor 1
	S319	COMP2	Off	On, Off	Diagnostic switch of compressor 2. Note that the On setting of this parameter can start compressor 2 only when the fan has been started
	S319	C2 MODE	Run	Run, Evac, Charg	Compressor 2 operation mode selection
	S320	C2 CAP	Off	-	Refrigeration capacity output of digital scroll compressor 2
S321	C2 CYCLE	0%	-	-	
S322	LLSV2	Off	On, Off	Diagnosis switch of liquid line solenoid valve of compressor 2	
S324	EL HEAT1	Off	On, Off.	Diagnosis switch of electric heater 1. The 'On' setting of this parameter can start electric heater 1 only when the	

Parameters		Default	Setting range	Description
				air loss is normal
	S325 EL HEAT2	Off	On, Off.	Diagnosis switch of electric heater 2. The 'On' setting of this parameter can start electric heater 2 only when the air loss is normal
	S326 EL HEAT3	Off	On, Off.	Diagnosis switch of electric heater 3. The 'On' setting of this parameter can start electric heater 3 only when the air loss is normal
	S327 SCR HEAT	-	0 ~ 100 %	SCR Heat
	S328 DEHUMI	Off	On, Off	Diagnostic switch of Dehumidification solenoid valve
	S329 HUM FILL	Off	On, Off	Diagnosis switch of solenoid valve of water supply to the humidifier
	S330 HUM	Off	On, Off	Diagnosis switch of humidifier. The 'On' setting of this parameter can start the humidifier only when the air loss is normal
Group 1	S331 H DRAIN	-	On, Off	Humidifier drain
	S332 HUM.C.	0.00A	-	Electric current of humidifier
	S335 ALM REL	Off	On, Off	Diagnostic switch of alarm relay.
	S336 K11 REL	-	On, Off	Diagnostic switch of free cooling relay.
	S337 3P1 OPEN	Off	On, Off	Diagnostic switch of 3-phase electric regulator.
	S337 3P2 OPEN	Off	On, Off	
	S338 3P1 CLOSE	Off	On, Off	
	S338 3P2 CLOSE	Off	On, Off	
	S339 BV CTRL	-	Man, Auto	Ball valve control type
	S340 MBV1 POS	-	0 ~ 100%	MBV1 position, MBV2 position
	S340 MBV2 POS	-	0 ~ 100%	
	S341 ANALOG1	0%	0 ~ 100%	Diagnostic output of analog variable 1 ~ 4. They can be set to be percentage of desired output
	S342 ANALOG2	0%	0 ~ 100%	
	S343 ANALOG3	0%	0 ~ 100%	
S344 ANALOG4	0%	0 ~ 100%		
Group 2	S345 RSD	On	On, Off	Remote shut down. Range: On, Off
	S346 AIR LOSS	OK	OK, ACT	Air loss alarm. OK means the system is normal. ACT means the air loss is active, and abnormality occurred
	S347 MOTOR OL	ACT	OK, ACT	Fan motor overload alarm. OK means the fan is normal. ACT means the fan is overloaded, and abnormality occurred
	S348 FILTER	OK	OK, ACT	Filter clogging situation. OK means normal; ACT means the filter is clogged
	S349 CUSTOM1	OK	OK, ACT	States of customized alarms 1 ~ 4. 'OK' means normality; 'ACT' means that the alarm is active and that abnormality occurs
	S350 CUSTOM2	OK	OK, ACT	
	S351 CUSTOM3	Ok	OK, ACT	
	S352 CUSTOM4	OK	OK, ACT	
	S353 HEAT SAF	OK	OK, ACT	Status heaters safety
	S354 FLOW AT	%	-	-
	S355 FLOW ACT	%	-	-
	S356 HP1	OK	OK, ACT	State of high pressure switch 1. OK means normal. ACT means abnormal
	S357 LP1	OK	OK, ACT	State of low pressure switch 1. OK means normal. ACT means abnormal
	S358 C1 OL	OK	OK, ACT	Overload state of compressor 1. OK means normal. ACT means abnormal
	S359 HP2	OK	OK, ACT	State of high pressure switch 2. OK means normal. ACT means abnormal
	S360 LP2	OK	OK, ACT	State of low pressure switch 2. OK means normal. ACT means abnormal
	S361 C2 OL	OK	OK, ACT	Overload state of compressor 2. OK means normal. ACT means abnormal
	S367 HUM PROB	OK	OK, ACT	Humidifier fault state. OK means normal. ACT means abnormal
	S368 DT1	-	OK, ACT	Status DT1 (Outdoor/Glycol)
	S369 DT2	-	OK, ACT	Status DT2 (Glycol/Room)

Parameters		Default	Setting range	Description
S370	DT3	On	On, Off	Status DT3 (Room/Setpoint)
S371	MIN CW	-	OK, ACT	Status Min CW
S372	LWD Val	-	-	-
S374	LSI	-	-	-
S375	COND 2	-	-	-
S376	COND 1	-	-	-
S379	V_CTRL	Time	Time, Feedb	Valve Control
S380	V_CAL	No	Yes, No	Start Valve Calibration
S381	CAL_STAT	Idle	-	-
S382	CLSD 1	-	-	-
S383	OPEN 1	-	-	-
S384	V1FDB	-	-	-
S385	CLSD 2	-	-	-
S386	OPEN 2	-	-	-
S387	V2FDB	-	-	-

5.7.6 SET ALARMS

The SET ALARMS menu is displayed in nine pages. The first page provides the settings of alarm upper/lower limits and customized alarms. The other eight pages provide the settings of alarm delay.

Alarm upper/lower limits setting

The alarm upper/lower limits in the SERVICE MENUS are set the same as those in the USER MENUS. For details, see Table 5-6.

Customized alarms setting

See Table 5-23 for the descriptions of customized alarms setting.

Table 5-23 Descriptions of customized alarms setting

Parameters		Default	Parameters		Default
S202	RTN SNSR	Yes	S215	LO SUP	10°C
S203	HI TEMP	°C	S224	CUST IN1	WATER
S204	LO TEMP	°C	S225	C1 ACT	CLOSE
S205	HI HUM	60%	S226	CUST IN2	WATER
S206	LOW HUM	40%	S227	C2 ACT	CLOSE
S207	SENSOR A	No	S228	CUST IN3	WATER
S208	HI TEMP A	°C	S229	C3 ACT	CLOSE
S209	LO TEMP A	°C	S230	CUST IN4	HEAT A
S210	HI HUM A	%	S231	C4 ACT	OPEN
S211	LO HUM A	%	S232	WA AC AL	No
S213	SUP SNSR	No	S233	WAT OFF	No
S214	HI SUP T	24°C			

CUST IN1, CUST IN2, CUST IN3 and CUST IN4 can be set to 21 types of input. See Table 5-24 for details.

Table 5-24 Descriptions of types

Types	Description	Types	Description	Types	Description
SMOKE	Smoke alarm	RH+HU	Rht + Hum lockout	RJTVS	HTRJ TVSS
WATER	Water leakage alarm	COMP	Compressor lockout	Fire	Fire Alarm
C PMP	Cooling pump alarm	Call	Call for service	2.Set	2nd Setpoint
FLOW	Insufficient water alarm	Temp	High temperature alarm	NoP	No Power
G PMP	Standby pump alarm	Air	Air loss alarm	LSI	LSI
STBY	Standby unit alarm	FC L.	FC lockout	Cnd 1	Condensor 1 Fail
C-In1	Customized alarm 1	HeatA	Heater alarm	Cnd 2	Condensor 2 Fail
C-In2	Customized alarm 2	FLOSD	Flow AL SD	ScRed	D-Scroll Red
C-In3	Customized alarm 3	FLOLC	Flow AL LC	Swap V	Swap Valve
C-In4	Customized alarm 4	CompPD	Comp Lock PD	ECFan	EC Fan Fail
RHT	Reheater lockout	En FC	Enable FC,		
HUM	Humidifier lockout	RJVFD	HTRJ VFD		

C1 ACT, C2 ACT, C3 ACT and C4 ACT correspond to the customer alarms. 'OPEN' means normally open, 'CLOSE' means normally closed.

Alarm delays setting

The alarm delays are the time after faults occur and before the alarms are triggered. See Figure 5-9 for the menu format.

SET ALARMS 2/10 01				
		DEL	EN	T
S236	FOL	5	Yes	ALM
S237	LOA	3	Yes	ALM
S238	CF	2	Yes	WRN
S239	HRT	30	Yes	WRN
S240	LRT	30	Yes	WRN
S241	HRH	30	Yes	WRN

Figure 5-9 Alarm delay

The alarm name, delay time, delay enabling and alarm type are displayed from left to right in the list.

The alarm delay can be set to 0 ~ 9999. Unit: second.

The delay enabling determines whether the alarm will be displayed and the alarm menu is entered, Options include 'Yes' and 'No'.

The alarm type can be set to 'ALM' (alarm), 'WRN' (warning) and 'MSG' (message). They determine the alarm degree of the corresponding event.

The alarm names are listed in Table 5-25.

Table 5-25 Alarm name description

SN	Alarm/event name	Description	SN	Alarm/event name	Description
S236	FOL	Fan overload	S266	LOF	Loss of flow
S237	LOA	Loss of airflow	S267	SGP	Standby glycol pump on
S238	CF	Filter clogged	S268	STB	Standby unit on
S239	HRT	High room temp.	S269	HUP	Humidifier problem
S240	LRT	Low room temp.	S270	NOC	No connection w/Unit1
S241	HRH	High room hum.	S271	-	No connection w/UnitX
S242	LRH	Low room hum.	S272	LOP	LOSS OF POWER
S243	HTA	High temperature of sensor A	S275	C11	Customized input 1
S244	LTA	Low temperature of sensor A	S276	C12	Customized input 2
S245	HHA	High humidity of sensor A	S277	C13	Customized input 3
S246	LHA	Low humidity of sensor A	S278	C14	Customized input 4
S249	OL1	Compressor 1 overload	S279	CS	Call for service
S250	OL2	Compressor 2 overload	S280	HTD	High temperature
S251	HP1	Compressor 1 high pressure	S281	LB1	Loss of air blower 2
S252	HP2	Compressor 2 high pressure	S282	RL	Reheat lockout
S253	LP1	Compressor 1 low pressure	S283	HL	Humidifier lockout
S254	LP2	Compressor 2 low pressure	S284	FCL	FC lockout
S255	PD1	Compressor 1 pumpdown fails	S285	CL	Compressor(s) lockout
S256	PD2	Compressor 2 pumpdown fails	S288	SC1	Short cycle 1
S257	HT1	Digital scroll 1 high temperature	S289	SC2	Short cycle 2
S258	HT2	Digital scroll 2 high temperature	S290	NOP	NO power
S259	EHO	EL HEAT HIGH TEMP	S291	CN1	Condensor 1 Fail
S262	WHE	Working hours exceeded	S292	CN2	Condensor 2 Fail
S263	SMO	Smoke detected	S293	EFF	EC Fan fail
S264	WUF	Water under floor	S294	HST	High supply air temperature
S265	CPH	Condenser pump high water	S295	LST	Low supply air temperature

5.7.7 CALIBRATION

The CALIBRATION menu can calibrate sensors by setting offsets. The parameters are listed in Table 5-26. The parameters are in pairs: the former is the calibrated value and the latter is the calculated value, or the sum of the measured value and the calibrated value. This value is engaged in the calculation of control need.

Table 5-26 Descriptions of CALIBRATION parameters

Parameters		Default	Description
S602	RTN TEMP	K	Calibrated return air temperature. It can be set as a positive or negative value. Use the up and down buttons to change the setting value, 0.1K at each step
S603	CAL TEMP	25°C	Sum of the calibrated value and measured return air temperature. This value is compared with the setting value as the system actual temperature and is engaged in the calculation
S604	RTN HUM	+0.0%	Calibrated return air humidity. It can be set as a positive or negative value. Use the up and down buttons to change the setting value, 1% at each step
S605	CAL HUM	44.0%	Sum of the calibrated value and measured return air humidity. This value is compared with the setting value as the system actual humidity and is engaged in the calculation
S606	DS1 NTC	+0.0K	Calibrated digital scroll 1NTC. It can be set as a positive or negative or positive value. Use the up and down buttons to change the setting value, 0.1K at each step
S607	CAL DS1	29°C	Sum of the calibrated value and return air humidity measured by digital scroll 1NTC sensor. This value is engaged in the calculation
S608	DS2 NTC	+0.0K	Calibrated digital scroll 2NTC. It can be set as a positive or negative value. Use the up and down buttons to change the setting value, 0.1K at each step
S609	CAL DS2	29°C	Sum of the calibrated value and return air humidity measured by digital scroll 2NTC sensor. This value is engaged in the calculation
S610	OUT SNS	°C	Outdoor Sensor
S611	CAL OUT	+0.0K	Calibrated Outdoor Sensor
S613	TEMP A	+0.0K	Calibrated value of temperature sensor A
S614	CAL A	°C	Calculated value corresponding to temperature sensor A
S615	HUM A	+0.0%	Calibrated value of humidity sensor A
S616	CAL A	44.0%	Calculated value corresponding to humidity sensor A
S617	TEMP B	TH	Calibrated value of temperature sensor B
S618	TYPE B	+0.0K	Type of temperature sensor B
S619	CAL B	°C	Calculated value corresponding to temperature sensor B
S620	HUM B	+0.0%	Calibrated value of humidity sensor B
S621	CAL B	44.0%	Calculated value corresponding to humidity sensor B
S622	TYPE C	TH	Type of temperature sensor C
S624	FC SNSR	-	Free cooling temperature sensor. PTC or NTC sensor can be configured according to the actual configuration
S625	FC SNSR	+0°C	Calibrated value of free cooling temperature sensor
S626	CAL FC	°C	Calculated value of free cooling temperature sensor
S627	SUP SNSR	NTC	Air supply temperature sensor. PTC or NTC sensor can be configured
S628	SUP TEMP	+0.0K	Calibrated value of air supply temperature sensor
S629	CAL SUP	°C	Calculated value of air supply temperature sensor
S630	TEMP C	+0.0K	Calibrated value of temperature sensor C
S631	CAL C	°C	Calculated value of temperature sensor C
S632	HUM C	+0.0%	Calibrated value of humidity sensor C
S633	CAL C	%	Calculated value of humidity sensor C

5.7.8 NETWORK SETUP

The NETWORK SETUP menu is used to set the parameters when the system is in a network subject to the monitoring of a host. See Table 5-27 for parameter descriptions.

Table 5-27 Descriptions of NETWORK SETUP parameters

Parameters		Default	Setting range	Description
S802	#UNITS	1	1 ~ 32	Range: 1 ~ 32
S803	TEAMWORK	No	No, 1, 2	Range: No, 1, 2

Parameters		Default	Setting range	Description
S824	MON ADD	3	1 ~ 99	Monitoring address No. of the unit
S825	MON T.O.	No	No, 1, 2	Monitoring Timeout
S825	MON H.S.	3	1 ~ 99	Monitoring Handshake
S831	CS CTRL	No	Save, Load, No	Save the parameter set through MON ADD to the iCOM controller. 'No' means not saved
S831	CS STAT	Change	Change, Valid	Indication of the saving state of the parameter set through MON ADD. 'Change' means that the parameter is changed but not saved. 'Valid' means that the setting is valid and saved
S832	NW CTRL	No	Save, Load, No	Save the parameter set through U2U GRP to the iCOM controller. 'No' means not saved
S832	NW STAT	Valid	Change, Valid	Indication of the saving state of the parameter set through U2U GRP. 'Change' means that the parameter is changed but not saved. 'Valid' means that the setting is valid and saved
S835	MON PROT	Vlcty	Vlcty, HN, IGM, No	Host monitoring protocol setting. Range: Vlcty (Velocity uses intelligent card), HN (Hironet), IGM (ECA2), No
S836	IP #1	192	-	Set IP address
S836	IP #2	168		
S836	IP #3	254		
S836	IP #4	1		
S837	NM #1	255	-	Set subnet mask
S837	NM #2	255		
S837	NM #3	255		
S837	NM #4	0		
S838	GW #1	0	-	Set gateway address
S838	GW #2	0		
S838	GW #3	0		
S838	GW #4	0		
S840	U2U PROT	GBP	-	-
S841	U2U ADD	3	-	Group address No. of this unit
S842	U2U GRP	1	-	-
S843	BL CTRL	No	S + R, No	Boot program variant load. Saving the change of S835 ~ S841 needs the S + R command of this parameter. The system will reset after the saving, and configure according to the new parameters
S843	BL STAT	Change	Change, Valid	Indication of whether or not the parameters set through S835 ~ S841 are saved. 'Change' means that the parameter is changed but not saved. 'Valid' means that the setting is valid and saved
S844	SR CTRL	No	C + R, No	Static RAM data reset control. If the change of S835 ~ S841 are not saved, using the C + R command in this parameter can restore S835 ~ S841 to their original settings, and the system will reset afterwards
S844	SR STAT	Valid	-	STD
SW#		-	-	Version No. of the control software
MAC		00:00:68:19:31:70	00:00:68:19:31:70	MAC address of the network card of the iCOM controller
NAME		UNIT	UNIT	Name of the unit. By default: UNIT. You can change the name as you need

5.7.9 OPTIONS SETUP

The OPTIONS SETUP menu is used to set the parameters according to the equipment-specific demands. See Table 5-28 for detailed descriptions.

Table 5-28 Descriptions of OPTIONS SETUP parameters

Parameters		Default	Setting range	Description
S402	COMP SEQ	Auto	Auto, 1 (compressor 1 being the	Compressor sequence. Range: Auto, 1 (compressor 1 being the primary one), 2 (compressor 2 being the primary one)

Parameters		Default	Setting range	Description
			primary one), 2 (compressor 2 being the primary one)	
S403	LP DELAY	1min	-	Low pressure alarm delay
S405	EL HEAT	1	0 ~ 3	Electric heating stages
S406	EL HEAT C	-	-	-
S407	HW HEAT	No	Yes, No	Hot water heating enabled
S408	ALL HEAT	3	0 ~ 3	heating stages.
S409	LWDconn	No	Yes, No	LWD connected. Range: Yes (water low sensor connected), No (water low sensor not connected)
S409	V_CTRL	Time	Time, Feedback	-
S410	3P RUN	165s	-	3P actuator runtime
S411	3P DIR	DIR	DIR, REV	3P actuator direction
S413	HUM ENAB	Yes	Yes, No	Humidification enabled
S414	IR FLUSH	150%	-	Infrared flush rate
S415	HUMSTEAM	%	-	-
S416	HUM CONT	On, Off	On, Off, Prop	Humidifier control mode
S417	HUM.TIME	s	-	Humidifier bottle flush time
S418	HUM.MAN	Yes	Yes, No	Humidifier bottle manual flush enabled
S419	DEHUM EN	Yes	Yes, No	Dehumidification enabled.
S420	REST EN	Yes	Yes, No	Auto restart enabled
S421	RESTART	s	-	Unit auto restart time
S422	ONOFF EN	Yes	Yes, No	On-off key enabled. If “no” is selected, the ON/OFF key cannot be used to perform on/off operation on the machine.
S424	CW FLUSH	0hr	-	Cooling water auto flush time, unit: hr (hour)
S425	FC FLUSH	0hr	-	Free cooling auto flush time, unit: hr (hour)
S426	HT FLUSH	0hr	-	Hot water auto flush time, unit: hr (hour)
S427	BALL OFF	+0.0bar	-	-
S428	HEAT AS	-	-	-
S429	CW_CTRL	-	-	-
S430	MAIN V	-	-	-
S431	VALV ROT	-	-	-
S432	VALV TIM	-	-	-
S433	DEHUM OP	-	-	-

5.7.10 SERVICE INFO

The SERVICE INFO menu provides the contact information of maintenance personnel. The maintenance personnel can input and save their contact information through this submenu.

5.8 ADVANCED MENUS

The ADVANCED MENUS include PASSWORD LEVEL, FACTORY SETUP and PASSWORDS, as shown in Figure 5-10.

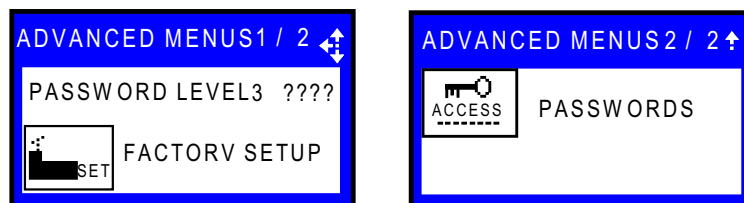


Figure 5-10 ADVANCED MENUS

5.8.1 PASSWORD LEVEL

It is operated by Emerson service personnel.

5.8.2 FACTORY SETUP

The FACTORY SETUP menu is displayed in nine pages. The parameters are described in Table 5-29 ~ Table 5-38.

Unit code related settings

Table 5-29 Descriptions of unit code related settings

Parameters (1/9)		Default	Setting range	Description
A003	UC 01	0	-	Unit code setting. The code has 18 bits. Each bit can be set as 0 ~ 20
...		
A003	UC 06	0		
A005	UC 07	0		
...		
A005	UC 12	0		
A007	UC 13	0		
A007	UC 18	0		
A008	UC CTRL	No	Save, Load, Compare, No	Options include: Save: after UC01 ~ UC18 are changed, the changed can be saved through the save command. Load: load parameters to the unit code directly. Compare: compare the present parameters and the parameters to be loaded. No: All changes are cancelled. Keep the old parameters
A009	UC STAT	OK	Not available, Invalid, OK, Changed, Updating	Unit code status. Range: Not available: parameters set through UC01 ~ UC18 are unavailable. Invalid: parameters set through UC01 ~ UC18 are invalid. OK: parameters set through UC01 ~ UC18 are effective. Changed: parameters UC01 ~ UC18 are changed, but not saved. Updating: parameters are updating
A010	EL CTRL	Load	-	External data can be loaded through the load command
A011	EL STAT	OK	Not available, Invalid, OK, Changed, Updating	Exception list status. Range: Not available: parameters set through UC01 ~ UC18 are unavailable. Invalid: parameters set through UC01 ~ UC18 are invalid. OK: parameters set through UC01 ~ UC18 are effective. Changed: parameters UC01 ~ UC18 are changed, but not saved. Updating: parameters are updating

System related settings

Table 5-30 Descriptions of system related settings

Parameters (2/9)		Default	Setting range	Description
A102	REFRIG	R22	R407C, R22, R410A	Refrigerant type selection
A103	MOTOR OL	SHUTD	SHUTD, DISAB	Main fan overload. The action to take after the fan overload. Range: SHUTD (fan shuts down), DISAB (shut down humidifier, dehumidifier and heater, only keep the cooling unit running)
A104	AIR LOSS	SHUTD	SHUTD, DISAB	The action to take after the loss of airflow. Range: SHUTD (fan shuts down), DISAB (shut down humidifier, dehumidifier and heater, only keep the cooling unit running)
A105	# COMP	0	0 ~ 2	Number of compressors
A106	COMP DLY	s	-	Compressor delay time
A107	COMP ON	min	0 ~ 5min	Compressor minimum on time
A108	COMP OFF	3min	0 ~ 5min	Compressor minimum off time
A109	PUMPDOWN	Yes	Yes, No	Pump down enable

A110	CAP TYPE	No	4step, HGBP, DS, DS + TH, No	Capacity control type. 4step: four steps. HGBP: hot gas bypass. DS: digital scroll. DS + TH: digital scroll and temperature switch. No: with no need for capacity control type
A111	FLOCT	0s	0 ~ 180s	Shutdown time of airflow loss

Other settings

Table 5-31 Descriptions of other settings

Parameters (3/9)		Default	Setting range	Description
A113	DS CYCLE	s	-	Digital scroll cycle
A114	DS HT	°C	-	Digital scroll high temperature
A115	DS SWB	°C	-	Digital scroll switchback
A116	LP TYPE	Analog	Analog, Digital	Low pressure device type
A117	LP PH1	ps	-	Low pressure threshold phase 1
A118	LP PH2	ps	-	Low pressure threshold phase 2
A119	LC PRE	0.0s	-	Liquid control pre-time
A120	LC POST	0.0s	-	Liquid control post-time
A121	CHARGE P	bar	-	Loss of Charge Protection

LP sensor related settings

Table 5-32 Descriptions of LP sensor related settings

Parameters (4/9)		Default	Setting range	Description
A124	LP1 LOW	10%	0 ~ 100%	LP1 sensor lower threshold (percentage)
A124	LP1 LOW	0bbar	10 ~ 50bar	LP1 sensor lower threshold
A125	LP1 HIGH	90%	0 ~ 100%	HP1 sensor lower threshold (percentage)
A125	LP1 HIGH	10.3bar	10 ~ 50bar	HP1 sensor lower threshold
A126	LP1 ACT	-	-	Actual LP1 signal. Read only
A127	LP2 LOW	10%	0 ~ 100%	LP2 sensor lower threshold (percentage)
A127	LP2 LOW	0bar	10 ~ 50bar	LP2 sensor lower threshold
A128	LP2 HIGH	90%	0 ~ 100%	HP2 sensor lower threshold (percentage)
A128	LP2 HIGH	10.3bar	10 ~ 50bar	HP2 sensor lower threshold
A129	LP2 ACT	-	-	Actual LP2 signal. Read only
A130	PD CUT	bar	-	Pumpdown cutout
A131	PD RECYC	bar	-	Pumpdown recycle
A132	HEAT REJ	W/G	FSC, L-T, W/G	Heat rejection control. Range: FSC: fan speed control; L-T: Lee-Temp; W/G: water/glycol cooling

Free-cooling, HG and HW related settings

Table 5-33 Descriptions of free-cooling, HG and HW related settings

Parameters (5/9)		Default	Setting range	Description
A135	K11 ACT	DEH	WNG, DEH, NOP, FC	-
A136	C/W F DUR	3min	1min ~ 3min	Cooling water flush duration
A137	COOL TYP	SINGL	Singl, FC, DC	Three cooling type
A138	STOP FC+	°C	-	Stop FC at setpoint + or value
A139	FC F DUR	0min	1min ~ 3min	Freecooling flush duration
A140	FC F K11	Yes	Yes, No	Freecooling flush starts R5
A141	COMP + FC	No	Yes, No	Compressor plus FC simultaneously
A142	HW F DUR	3min	0 ~ 3min	Hot water flush duration
A143	HG HEAT	No	Comp.1, Comp.2, No	Hot gas heating enabled
A144	HEAT OP	STAGE	Stage, Delay, No	Electric heater operation mode

Humidification and dehumidification related settings

Table 5-34 Descriptions of humidification and dehumidification related settings

Factory 6/9		Default	Setting range	Description
A146	HUM TYPE	IFS	External, IFS, IFL, PEX6, PEX9, PEX12, 21LLA, 53LLC, 53HLB, 93LLE, 93HLD, d3H, HT2, HT5, HT9, SGH, No	Humidifier model
A147	HUM VOLT	V	-	-
A148	HUM LAST	15hr	-	Detect whether the last operation time exceeds this cycle setting during the startup of the humidifier. Unit: hr
A149	PREFILL	30s or 57s	-	Prefill time. Unit: second
A150	FILL	57s	-	Fill time. Unit: second
A151	HUM ON	584s	-	Humidifier on time. Unit: second
A152	DEH COMP	1	1, 2, both	Dehumidification with compressor. When 1 or 2 is selected, compressor 1 or 2 is used for dehumidification. When Both is selected, the two compressors are both used for dehumidification

Analog output related settings

Table 5-35 Descriptions of analog output related settings

Factory 7/9		Default	Setting range	Description
A157	ANOUT1LO	0%	0 ~ 100%	-
A157	ANOUT1HI	100%	0 ~ 100%	
A158	ANOUT2LO	0%	0 ~ 100%	
A158	ANOUT2HI	100%	0 ~ 100%	
A159	ANOUT3LO	0%	0 ~ 100%	
A159	ANOUT3HI	100%	0 ~ 100%	
A160	ANOUT4LO	0%	0 ~ 100%	
A160	ANOUT4HI	100%	0 ~ 100%	
A161	FS HE/HU	100%	0 ~ 100%	
A163	ANOUT1	No	-	
A164	ANOUT2	No	-	
A165	ANOUT3	No	-	
A166	ANOUT4	No	-	

Table 5-36 Descriptions of analog output options

Options	Description	Options	Description
CW010	CW/FC 0 ~ 10V	ALBD2	AlarmBoard 2
HW	Hot water	ALBD3	AlarmBoard 3
HW175	Hot water 1.75	IVAR	I-Variex 1
VSD	Variable fan speed drive	HUM%	HT HUM
COOL	Cooling	SUP	Supply Temperature
CV175	CW/FC 1.75	RET	Return Temperature
COOL1	Cooling 1	HUMI	Humidifier
COOL2	Cooling 2	SUPSA	Supersaver
HEAT	Heater	INVCO	Inverted Cool
No	No use	HEAT3	Heating 33%
MBV1	Motorized ball vavle1	CW210	CW/FC 2 ~ 10V
MBV2	Motorized ball vavle 2	C2010	CW2 0 ~ 10V
SCR	Silicon controlled rectifier	C2175	CW2 1.75
CONF	Configurable	C2210	CW2 2 ~ 10V
ALBD1	AlarmBoard 1		

Analog action related settings

Table 5-37 Descriptions of analog action related settings

Parameters (8/9)	Default	Setting range	Description	
A168	AO1 STA	0%	0% ~ 100%	Analog output 1 start percentage
A168	AO1 STA	0V	0V ~ 10V	Analog output 1 start voltage
A169	AO1 END	100%	0% ~ 100%	Analog output 1 end percentage
A169	AO1 END	10V	0V ~ 10V	Analog output 1 end voltage
A170	AO2 STA	0%	0% ~ 100%	Analog output 2 start percentage
A170	AO2 STA	0V	0V ~ 10V	Analog output 2 start voltage
A171	AO2 END	100%	0% ~ 100%	Analog output 2 end percentage
A171	AO2 END	10V	0V ~ 10V	Analog output 2 end voltage
A172	AO3 STA	0%	0% ~ 100%	Analog output 3 start percentage
A172	AO3 STA	0V	0V ~ 10V	Analog output 3 start voltage
A173	AO3 END	100%	0% ~ 100%	Analog output 3 end percentage
A173	AO3 END	10V	0V ~ 10V	Analog output 3 end voltage
A174	AO4 STA	0%	0% ~ 100%	Analog output 4 start percentage
A174	AO4 STA	0V	0V ~ 10V	Analog output 4 start voltage
A175	AO4 END	100%	0% ~ 100%	Analog output 4 end percentage
A175	AO4 END	10V	0V ~ 10V	Analog output 4 end voltage

LL related settings

Table 5-38 Descriptions of LL related settings

Parameters (9/9)		Default	Setting range	Description
A179	LL1 LOW	%	0 ~ 100%	HPT1 low limit percentage setting
A179	LL1 LOW	bar	10.0 ~ 50.0bar	HPT1 low limit setpoint
A180	LL1 HIGH	%	0 ~ 100%	HPT1 high limit percentage setting
A180	LL1 HIGH	bar	10.0 ~ 50.0bar	HPT1 high limit setpoint
A181	LL1 ACT	%	-	HPT1 actual percentage, read only
A182	LL1 ACT	bar	-	HPT1 actual value, read only
A183	LL2 LOW	%	0 ~ 100%	HPT2 low limit percentage setting
A183	LL2 LOW	bar	10.0 ~ 50.0bar	HPT2 low limit setpoint
A184	LL2 HIGH	%	0 ~ 100%	HPT2 high limit percentage setting
A184	LL2 HIGH	bar	10.0 ~ 50.0bar	HPT2 high limit setpoint
A185	LL2 ACT	%	-	HPT2 actual percentage, read only
A186	LL2 ACT	bar	-	HPT2 actual value, read only

5.9 MBV Settings

Through the ADVANCED MENUS screen (see Figure 5-11), you can view the current status of the cooled valve. MBV menu is displayed in six pages, and the description of the menus is listed in Table 5-39.

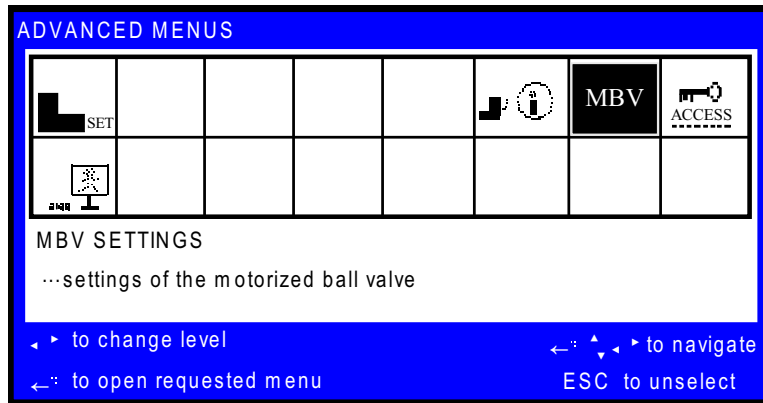


Figure 5-11 ADVANCED MENU screen

Table 5-39 MBV settings

Parameters	Default	Range	Description
A403	UNIT HI PRESS	-	Unit high pressure
A404	MBV OP PRESS	-	MBV control available pressure
A405	MBV POSITION	-	MBV position
A406	ACTIVE OFFSET	-	Active offset
A408	MBV PHASE	-	-
A409	COMPR LP PHASE	-	-
A410	MBV PRESS READ	-	-
A411	MBV POSITION SET	-	-
A414	START OFFSET	-	-
A415	MAX OFFSET STEP	-	-
A416	SERVICE OFFSET	-	-
A417	START DELAY	-	-
A418	STOP DELAY	-	-
A419	4ST OPEN PRESET	-	-
A420	4ST CLOSE PRESET	-	-
A424	MBV REINT	-	-
A425	READ INTERVAL	-	-
A426	DIG SCROLL FILTER	-	-
A427	4ST-30SEC LOADING	-	-
A428	PUMPDOWN PRESS	-	-

Parameters		Default	Range	Description
A431	REPOSITION COUNTER	-	-	MBV reposition counter
A432	REPOSITION COUNTER RESET	-	-	Reposition counter reset
A436	U4	-	-	U4 proportional band
A437	U3A	-	-	U3A proportional band
A438	U2A	-	-	U2A proportional band
A439	U1	-	-	U1 proportional band
A440	L1	-	-	L1 proportional band
A441	L2A	-	-	L2A proportional band
A442	L3	-	-	L3 default proportional band
A443	ACTIVE OFFSET	-	-	ACTIVE OFFSET
A444	4ST PHASHE	-	-	4ST PHASHE
A447	MAX	-	-	Max proportional band
A448	U4	-	-	U4 default proportional band
A449	U3A	-	-	U3A default proportional band
A450	U3B	-	-	U3B default proportional band
A451	U2A	-	-	U2A default proportional band
A452	U2B	-	-	U2B default proportional band
A453	U1	-	-	U1 default proportional band
A458	L1	-	-	L1 default proportional band
A459	L2A	-	-	L2A default proportional band
A460	L2B	-	-	L2B default proportional band
A461	L3	-	-	L3 default proportional band
A462	MIN	-	-	Min proportional band

5.10 EVENT NAME AND DEFINITION

See Table 5-40 for event name and definition.

Table 5-40 List of event name and definition

Event	Definition
General Alarm	General Alarm
COMP 1 HIGH PRESSURE	Compressor 1 high pressure
COMP 1 LOW PRESSURE	Compressor 1 low pressure
HIGH CW TEMP	Chilled water high temperature
LOSS OF CW FLOW	Loss of chilled water
EL HEAT HIGH TEMP	Electric heater high temperature
MAIN FAN OVERLOAD	Main fan overload
LOSS OF AIRFLOW	Loss of air flow
CLOGGED FILTERS	Clogged filters
CUSTOMER INPUT n (n = 1 ~ 4)	Customer input n (n = 1 ~ 4)
FC LOCKOUT	Free cooling lockout
LP Transducer 1 Fail	Low pressure transducer 1 fails
CALL SERVICE	Call for service
HIGH TEMPERATURE	High temperature alarm
LOSS OF AIR BLOWER 1	Loss of air blower 1
HIGH ROOM TEMP	High room temperature
LOW ROOM TEMP	Low room temperature
HIGH ROOM HUM	High room humidity
LOW ROOM HUM	Low room humidity
HIGH TEMP SENSOR A	High temperature of sensor A
LOW TEMP SENSOR A	Low temperature of sensor A
HIGH HUM SENSOR A	High humidity of sensor A
LOW HUM SENSOR A	Low humidity of sensor A
UNIT HRS EXCEEDED	Unit has exceeded operating time
COMP 1 HRS EXCEEDED	Compressor 1 has exceeded operating time limit
HUM HRS EXCEEDED	Humidifier has exceeded operating time limit
SUPPLY SENSOR FAILURE	Supply sensor failure

Event	Definition
DSCROLL 2 SENSOR FAIL	Digital scroll 2 sensor fails
ROOM SENSOR FAILURE	Room sensor failure
SENSOR A FAILURE	Sensor A failure
LP Transducer 2 Fail	Low pressure transducer 2 fails
NETWORK FAILURE	Network failure
Low Start Pressure 1	Alarm of low start pressure 1
UNIT ON	Unit on
UNIT OFF	Unit off
SLEEP MODE	Sleep mode
STANDBY MODE	Standby mode
POWER ON	Power on
POWER OFF	Power off
Unit n disconnected (n = 1 ~ 32)	Unit n disconnected (n = 1 ~ 32)
COMP 2 HIGH PRESSURE	Compressor 2 high pressure
COMP 2 LOW PRESSURE	Compressor 2 low pressure
COMP 2 HRS EXCEEDED	Compressor 2 has exceeded operating time limit
DSCROLL 1 SENSOR FAIL	digital scroll 1 sensor fails
FREECOOL TEMP SENSOR	Free cooling source sensor failure
Low Start Pressure 2	Alarm of low Start Pressure 2
ON-OFF KEY DISABLED	ON-OFFkey disabled
LWD SENSOR FAIL	Low water level sensor fails
WATER LEAKAGE	Water leakage alarm
Dummy 67	Dummy alarm 067
RAM / Battery Failure	RAM/battery failure
Low Memory 1	Low memory 1
NO CONNECTION w/Unit1	No connection with unit 1
COMP 1 OVERLOAD	Compressor 1 overload
COMP 2 OVERLOAD	Compressor 2 overload
WRONG DAMPER POSITION	Wrong damper position
Dummy 074	Dummy alarm 074
HP 1 SENSOR FAIL	High pressure sensor 1 fails
HP 2 SENSOR FAIL	High pressure sensor 2 fails
COMP POWER REDUCTION ACTIVE	Compressor power reduction active
NO POWER	No power
UNIT DISABLED	Humidification/heating disabled due to unit failure
UNIT SHUT DOWN	Unit shutdown due to failure
Low Coil Pressure 1	Low coil pressure 1
Low Coil Pressure 2	Low coil pressure 2
Low OP Pressure 1	Low op pressure 1
Low OP Pressure 2	Low op pressure 2
UNIT SYNCHRONISATION	Unit recovers online
HUMIDIFIER PROBLEM	Humidifier failure
REMOTE SHUTDOWN	Remote shutdown
DEHUM HRS EXCEEDED	Dehumidifier has exceeded operating time limit
FC HRS EXCEEDED	Free cooling source has exceeded operating time limit
C1 FREEZE PROTECTION	Compressor 1 freeze protection
COMP 1 PUMPDOWN FAIL	Compressor 1 pumpdown fails
MEMORY 1 FAIL	Memory 1 fail
MEMORY 2 FAIL	Memory 2 fail
HCB not connected	Humidifier control board not connected
BMS Disconnected	Battery management system disconnected
COMP 2 PUMPDOWN FAIL	Compressor 2 pumpdown fails
DIG SCROLL1 HIGH TEMP	Digital scroll 1 high temperature
DIG SCROLL2 HIGH TEMP	Digital scroll 2 high temperature
Dummy 099	Dummy alarm 099
RESERVED 100	Reserved 100
RESERVED 101	Reserved 101
RESERVED 102	Reserved 102

Event	Definition
Dummy 103	Dummy alarm 103
SMOKE DETECTED	Smoke detected
WATER UNDER FLOOR	Water leakage under floor
COND PUMP-HIGH WATER	Condensing pump high water level
LOSS OF FLOW	Loss of water flow
STBY GLYCOL PUMP ON	Standby glycol pump on
STANDBY UNIT ON	Standby unit on
HW/HG HRS EXCEEDED	Hot water/hot gas has exceeded operating time limit
EL HEAT1 HRS EXCEEDED	Electric heater 1 has exceeded operating time limit
EL HEAT2 HRS EXCEEDED	Electric heater 2 has exceeded operating time limit
EL HEAT3 HRS EXCEEDED	Electric heater 3 has exceeded operating time limit
UNIT CODE MISSING	Unit code missing
UNIT CODE n MISMATCH (n = 01 ~ 18)	Unit code n mismatch (n = 01 ~ 18)
FRONT DOOR OPEN	Front door not closed
REAR DOOR POEN	Rear door not closed
LOSS COMPRESSOR POWER	Loss of compressor power
CABINET SENSOR FAIL	Cabinet sensor fail
CABINET H-SENSOR FAIL	Cabinet H-sensor fail
EMERGENCY DAMPER FAIL	Emergency damper fails
HIGH CABINET TEMP	High cabinet temperature
LOW CABINET TEMP	Low cabinet temperature
HIGH EXT DEWPOINT	High external dewpoint
LOSS OF POWER	Loss of power
REHEAT LOCKOUT	Reheater lockout
HEAT REJ VFD	HEAT REJ VFD
HUMIDIFIER LOCKOUT	Humidifier lockout
HEAT REJ TVSS	HEAT REJ TVSS
COMPRESSOR (S) LOCKOUT	Compressor lockout
AMBIENT SENSOR FAIL	Ambient sensor fail
HUMIDIFIER LOW AMPS	Humidifier low current
COMP 1 SHORT CYCLE	Compressor 1 short cycle
COMP 2 SHORT CYCLE	Compressor 2 short cycle
HUMIDIFIER HIGH AMPS	Humidifier high current
HUMIDIFIER LOW WATER	Humidifier low water level
SYSTEM OFF REQUESTED	System off requested
SYSTEM OFF CONFIRMED	System off confirmed
C2 FREEZE PROTECTION	Compressor 2 freeze protection
FIRE ALARM	Fire alarm
HEATERS OVERHEATED	Heaters overreheated
CONDENSER 1 FAILURE	Condenser 1 failure
CONDENSER 2 FAILURE	Condenser 2 failure
HUM CYLINDER WORN	Humidifier cylinder worn
FC STOPPED FOR 1 HOUR	Free cooling stopped for 1 hour
MAINTENANCE DONE	Maintenance done
MAINTENANCE NEEDED	Maintenance needed
REDUCED ECO AIRFLOW	Reduced eco airflow
LOSS OF FLOW PUMP 1	Loss of flow pump 1
LOSS OF FLOW PUMP 2	Loss of flow pump 2
COMP 3 HIGH PRESSURE	Compressor 3 high pressure
COMP 4 HIGH PRESSURE	Compressor 4 high pressure
CONDENSATION DETECTED	Condensation detected
COMP 1 LOW PRESSURE	Compressor 1 low pressure
HIGH REF TEMPERATURE	High refrigerant temperature
LOW REF TEMPERATURE	Low refrigerant temperature
REFRIGERANT SENSOR FAIL	Refrigerant sensor fail
HIGH TEMP SENSOR B	High temperature sensor B
LOW TEMP SENSOR B	Low temperature sensor B
COMP 2 LOW PRESSURE	Compressor 2 low pressure

Event	Definition
SENSOR B FAILURE	Sensor B failure
COMP 3 SHORT CYCLE	Compressor 3 short cycle
COMP 4 SHORT CYCLE	Compressor 4 short cycle
HIGH DEWPOINT	High dewpoint
PUMP SHORT CYCLE	Pump short cycle
Top Fan Failure	Top fan failure
CONTROL VALVE FAILURE	Control valve failure
PUMP 1 HRS EXCEEDED	Pump 1 has exceeded operating time limit
PUMP 2 HRS EXCEEDED	Pump 2 has exceeded operating time limit
COMP 3 HRS EXCEEDED	Compressor 3 has exceeded operating time limit
COMP 4 HRS EXCEEDED	Compressor 4 has exceeded operating time limit
TANDEM 1 PUMPDOWN FAIL	Tandem 1 pumpdown fail
TANDEM 2 PUMPDOWN FAIL	Tandem 2 pumpdown fail
TANDEM 1 LOW PRESSURE	Tandem 1 low pressure
TANDEM 2 LOW PRESSURE	Tandem 2 low pressure
HIGH FLUID TEMPERATURE	High fluid temperature
LOW FLUID TEMPERATURE	Low fluid temperature
FLUID SENSOR FAILURE	Fluid sensor failure
FAN FAILURE	Fan failure
FEEDBACK SIGNAL 1 FAILURE	Feedback signal 1 failure
SUPPLY CW SENSOR FAILURE	Supply chilled water sensor failure
RETURN CW SENSOR FAILURE	Return chilled water sensor failure
SUPPLY REF SENSOR FAILURE	Supply refrigerant sensor failure
RETURN REF SENSOR FAILURE	Return refrigerant sensor failure
VALVE HRS EXCEEDED	Valve has exceeded operating time limit
COMP 1A HIGH PRESSURE	Compressor 1A high pressure
COMP 1B HIGH PRESSURE	Compressor 1B high pressure
COMP 2A HIGH PRESSURE	Compressor 2A high pressure
COMP 2B HIGH PRESSURE	Compressor 2B high pressure
COMP 1A HRS EXCEEDED	Compressor 1A has exceeded operating time limit
COMP 1B HRS EXCEEDED	Compressor 1B has exceeded operating time limit
COMP 2A HRS EXCEEDED	Compressor 2A has exceeded operating time limit
COMP 2B HRS EXCEEDED	Compressor 2B has exceeded operating time limit
COMP 1A SHORT CYCLE	Compressor 1A short cycle
COMP 1B SHORT CYCLE	Compressor 1B short cycle
COMP 2A SHORT CYCLE	Compressor 2A short cycle
COMP 2B SHORT CYCLE	Compressor 2B short cycle
HIGH SUPPLY TEMPERATURE	High supply temperature
LOW SUPPLY TEMPERATURE	Low supply temperature
HIGH RETURN HUMIDITY	High return humidity
LOW RETURN HUMIDITY	Low return humidity
NOISE RED MODE STARTED	Noise reduced mode started
NOISE RED MODE STOPPED	Noise reduced mode stopped
RACK SENSOR 1~10 FAILURE	Rack sensor 1 ~ 10 failure
HIGH RETURN TEMPERATURE	High return temperature
ROOM HUMIDITY PROBLEM	Room humidity problem
iCOM-DO #0 ~ #2 DISCONNECTED	iCOM-do #0 ~ #2 disconnected
FEEDBACK SIGNAL 2 FAILURE	Feedback signal 2 failure
BOTTOM FAN FAILURE	Bottom fan failure
EC FAN FAULT	EC fan fault

Chapter 6 Application Of INTELLISLOT

This chapter introduces the application of the host communication component INTELLISLOT, including introduction and installation of the host communication cards, commissioning of the host communication component and host communication networking diagram.

6.1 Introduction Of Host Communication Cards

The host communication configuration of the Liebert PEX series air conditioner supports the following two communication cards:

1. TCP/IP communication card

The TCP/IP communication card is shown in Figure 6-1. This card can provide a network port and MIB library, and you can browse the data through IE.

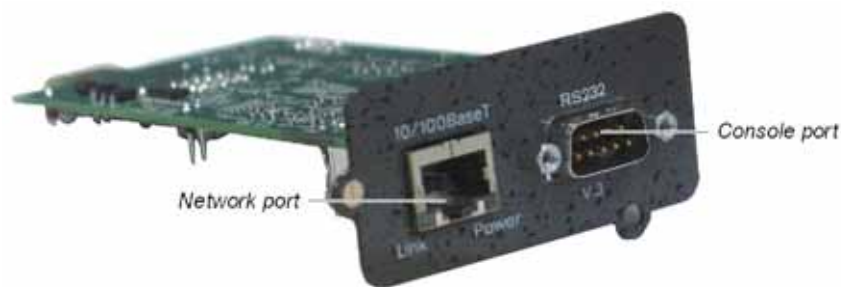


Figure 6-1 TCP/IP communication card

2. 485 communication card

The 485 communication card is shown in Figure 6-2. This card can provide the Modbus protocol of the RS485 port to the host.



Figure 6-2 485 communication card

6.2 Installation Of Host Communication Cards

Installing host communication card

The installation boxes 1 and 2 have been installed on the Liebert PEX series air conditioner unit. If the host communication configuration is needed, insert the host communication card into the installation box 1 and tighten the screws, as shown in Figure 6-3.

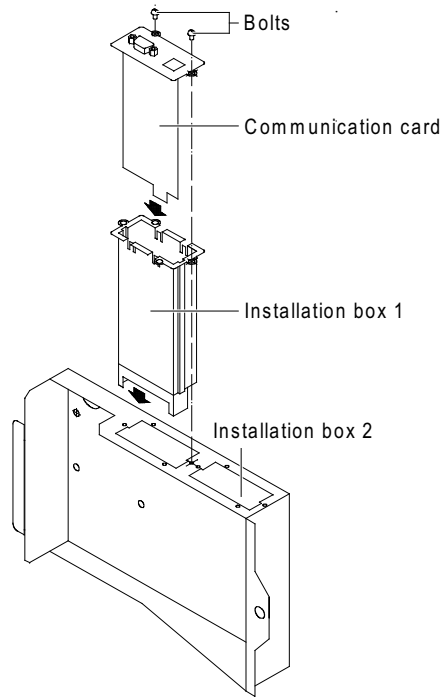


Figure 6-3 Installing communication card

Connecting cables

The electrical schematic diagram of the host communication configuration is shown in Figure 6-4. Cables P61, P65 and P67 have been connected in factory. So you should only connect the host communication card to the monitoring center.

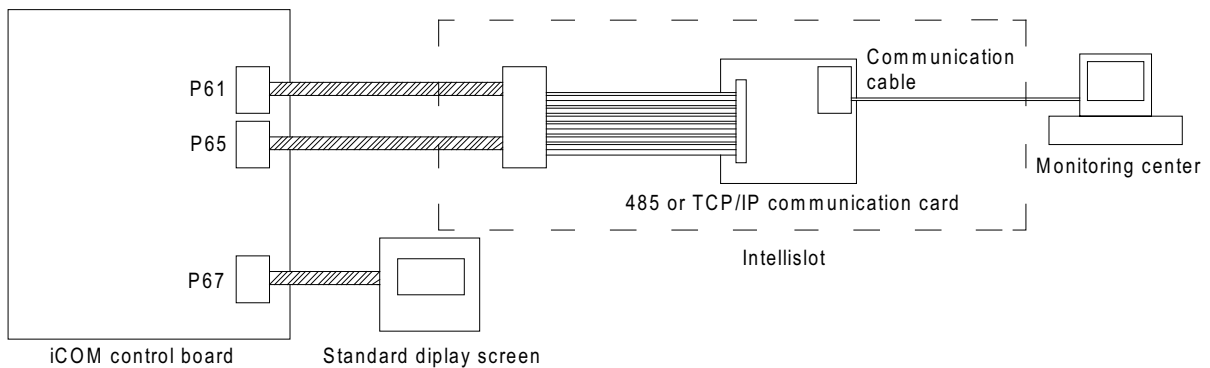


Figure 6-4 Electrical schematic diagram of host communication configuration

6.3 Commission Of Host Communication Component

After the communication cable is connected, you can start to set the HyperTerminal and communication card parameters.

Note

Before commissioning, you must enter 'SERVICE MEMUS' of the iCOM controller to set **S824 MON ADD** to '3', **S835 MON PORT** to 'Vlcty' and **S843 BL CTRL** to 'S+R'.

6.3.1 Setting HyperTerminal

After the 485 communication card and TCP/IP communication card are set, they can communicate with the host monitoring system. Use the communication cable provided with the communication card to connect the serial port of the computer and the console port of the communication card, and then set the parameters using the HyperTerminal of Windows. The detailed setting procedures are as follows:

1. Click Start-> Programs -> Accessories -> Communications -> HyperTerminal to start the HyperTerminal, as shown in Figure 6-5.



Figure 6-5 Typing the name

2. Type the name 'tt' in the Name field, and click OK, as shown in Figure 6-6.



Figure 6-6 Choosing serial port

3. In the Connect To interface, choose the serial port being used (such as 'COM1'), and click OK, as shown in Figure 6-7.

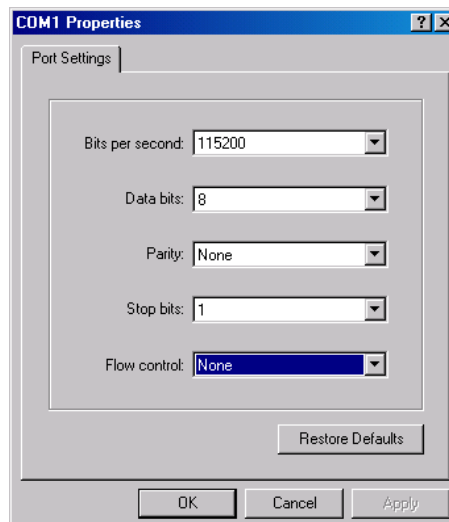


Figure 6-7 Setting port property

4. Set the communication parameters as shown in Figure 6-7 and click OK.

6.3.2 Setting 485 Communication Card

Set the parameters of the 485 communication card according to the following procedures:

1. After the HyperTerminal is set, you can click OK to display the following HyperTerminal interface.

```
Emerson Network Power OpenComms 485
Discovering Device...

Main Menu
-----
1: 485 Network Settings
2: Factory Settings
3: Firmware Updates
4: Device Connection State

q: Quit and abort changes
x: Exit and save

Please select a key ?>
```

2. Type '1' and the following figure will appear.

```
Emerson Network Power OpenComms 485
Discovering Device...

485 Network Settings Menu
-----
1: Enabled Application      Modbus Server
2: Control                 enabled
3: Server ID               1
4: Communications Rate     9600

<ESC>: Cancel menu level

Please select a key ?> _
```

3. Type '1' and the following figure will appear.

```
Valid Selections:
-----
1. Modbus Server
2. IGMNet Server

Select Auxiliary Com Port Application: ( <Esc> - Cancel ) ?>
```

4. Type '1' and select the Modbus protocol, and the following figure will appear.

```
Emerson Network Power OpenComms 485
Discovering Device...

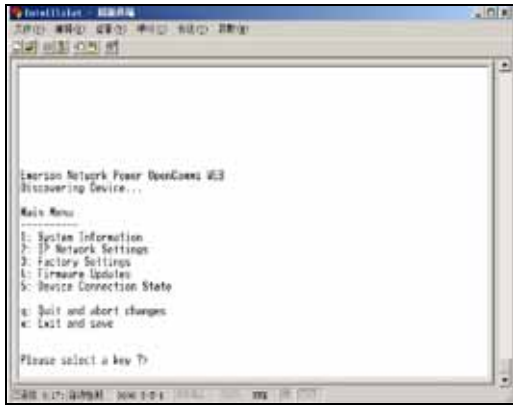
485 Network Settings Menu
-----
1: Enabled Application      Modbus Server
2: Control                 enabled
3: Server ID               2
4: Communications Rate     9600

<ESC>: Cancel menu level

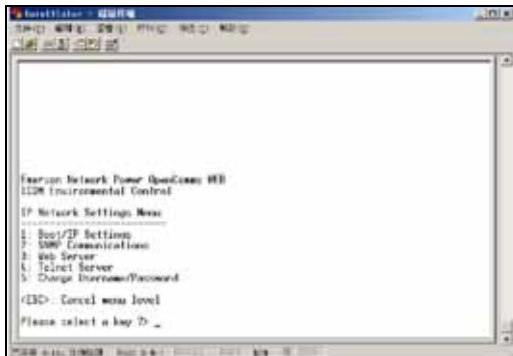
Please select a key ?> 3
```

5. Type '3' and select the ID used to communicate between the communication card and the host, and the following figure will appear.

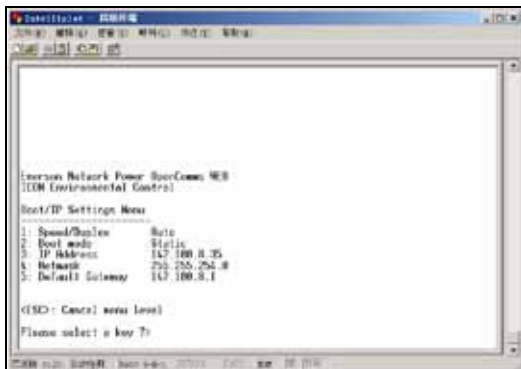
```
Enter the server ID (1 - 255) ?>
```

2. Type '2' and the following figure will appear.

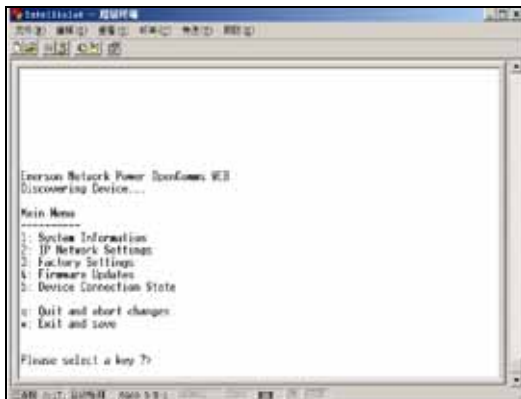


3. Type '1' and the following figure will appear.

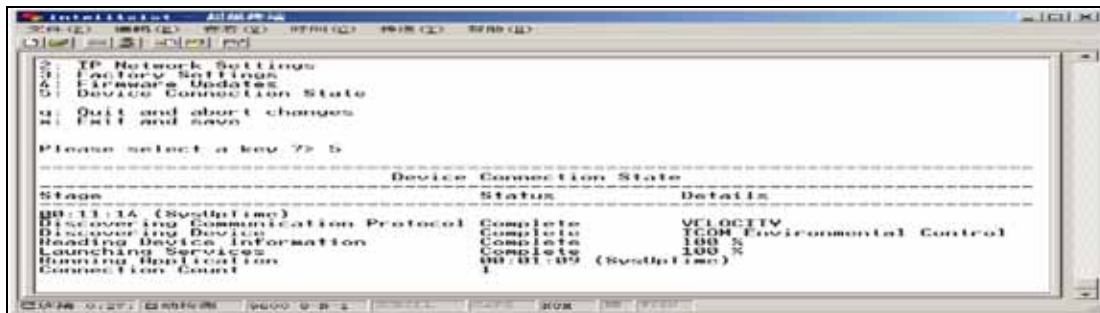


Normally, Boot mode should be set to Static. If the user network can automatically distribute the address, select DHCP, and the IP Address, Netmask and Default Gateway do not need to be set. If the boot mode is static, Type '3', '4' and '5', and then respectively type the corresponding IP address, Netmask and Default Gateway according to the prompt. These three parameters should be given by the user.

4. Press the ESC button to return to the main interface, as shown in the following figure. If you type 'x', the setting can be saved. After the setting is saved, the TCP/IP communication card will be restarted.



5. On the main interface, typing '5' can view whether the communication status between the communication card and the Liebert PEX series air conditioner is normal, as shown in the following figure.



6.3.4 Setting SNMP Parameters Of TCP/IP Communication Card

After the HyperTerminal of the TCP/IP communication card is set, you can set the parameters of this communication card. The detailed setting procedures are as follows:

1. Type the IP address of the TCP/IP communication card in the address bar of the IE browser. If the interface shown in Figure 6-8 appears, it indicates that the communication between the communication card and the iCOM controller is abnormal. If the State shows Completing or In Process, it indicates that the communication card is communicating with the iCOM controller.



Figure 6-8 Initial interface (1)

After the communication becomes normal, the interface shown in Figure 6-9 will appear.



Figure 6-9 Initial interface (2)

2. Click the configure tab to enter the configuration interface, as shown in Figure 6-10.

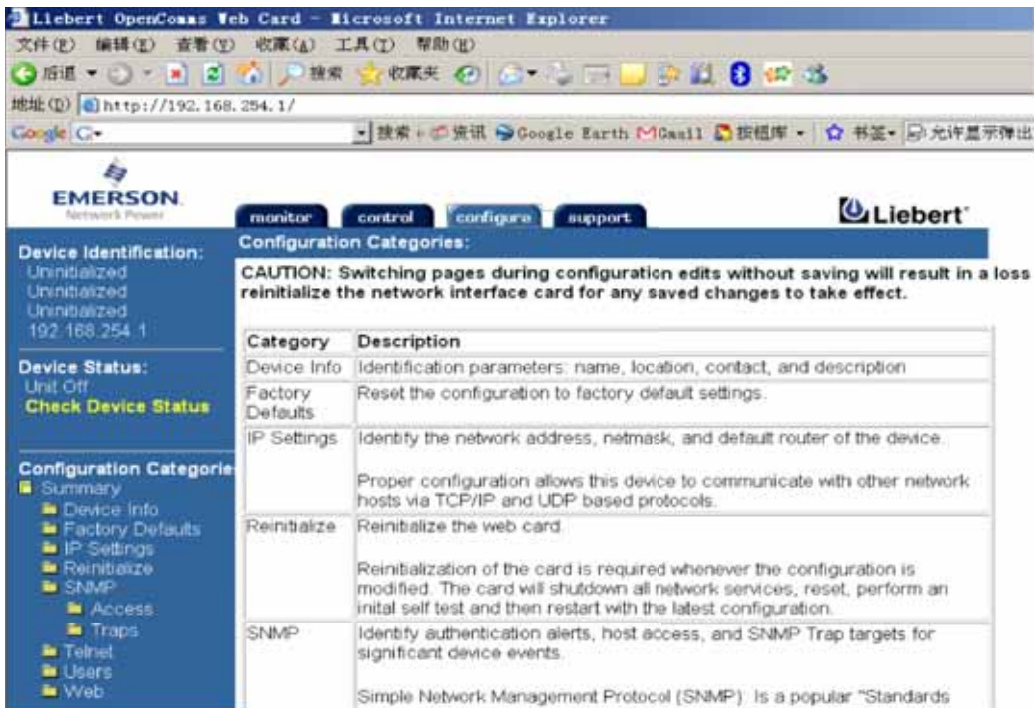


Figure 6-10 Configuration interface

3. Click Access under SNMP at the left side of the interface, as shown in Figure 6-11. Type the user name 'Liebert' and the password 'Liebert', and click OK to enter the configuration interface.

Note

The user name and password are case-sensitive.



Figure 6-11 Typing user name and password

4. Configure the Network Management System (NMS) of the host monitoring center in Figure 6-12. Click Edit and type the IP address of the NMS in IP Address. Select read or write, type 'Public' in Community and then click Save.

Note

1. Before setting the NMS, the **Edit** button is displayed on the interface. After the configuration is edited, the **Edit** button will become the **Save** button.
2. After the NMS is configured, you must click **Save** to save the configuration.

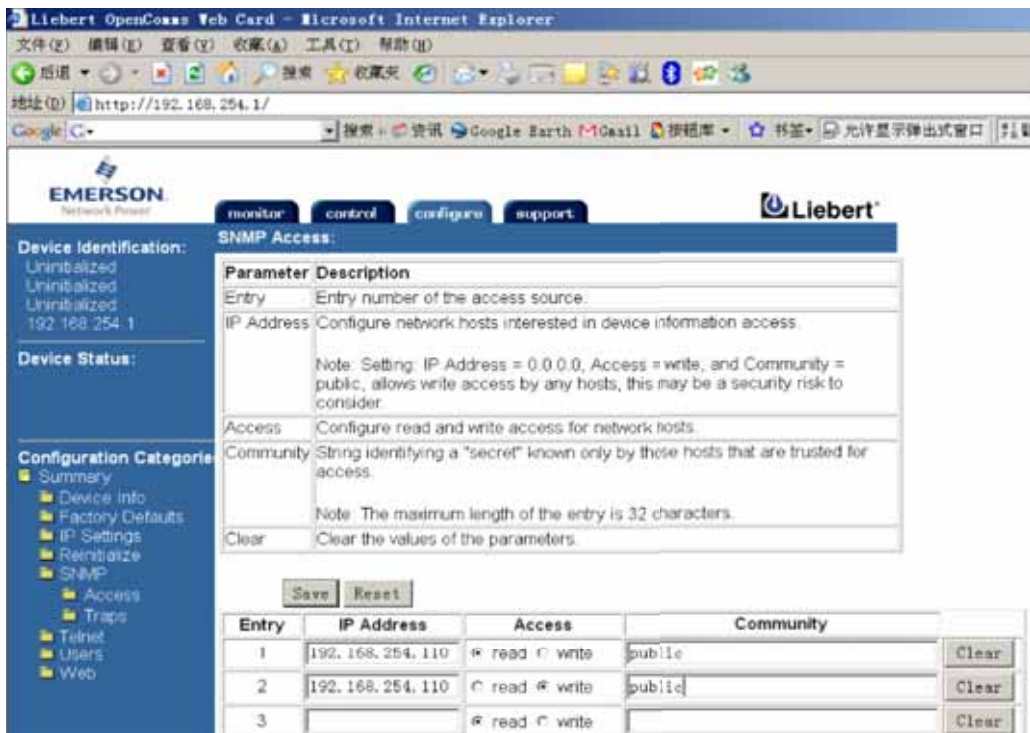


Figure 6-12 NMS configuration interface of SNMP host monitoring center (1)

5. Expand the SNMP node at the left side of the interface shown in Figure 6-13 and click Traps to set IP Address, Port and Community of the NMS used for receiving Traps. After modifying, you must click Save to save the setting.



Figure 6-13 NMS configuration interface of SNMP host monitoring center (2)

6.4 Host Communication Networking Diagram

The networking diagram of the TCP/IP communication card (SNMP protocol) is shown in Figure 6-14. The connection number of air conditioner is not limited.

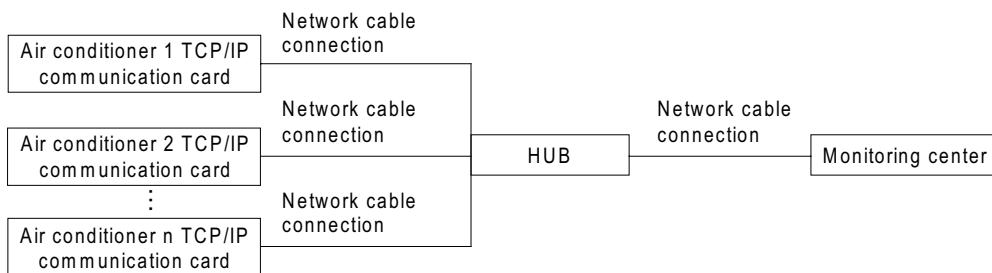


Figure 6-14 Networking diagram of TCP/IP communication card

Note

The single air conditioner unit does not need HUB.

The networking diagram of the 485 communication card (Modbus protocol) is shown in Figure 6-15. Up to 32 air conditioner units can be connected.

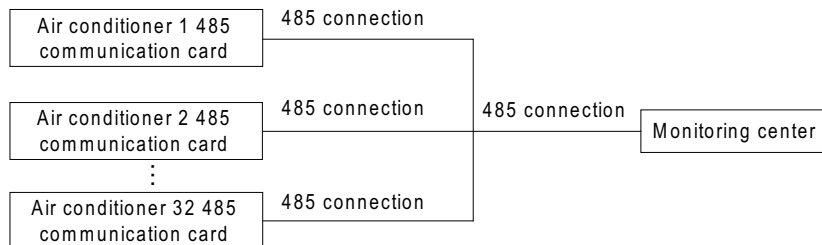


Figure 6-15 Networking diagram of 485 communication card

Chapter 7 System Operation And Maintenance

This chapter introduces the operation and maintenance of the Liebert PEX series air conditioner.

7.1 System Diagnosing Test

7.1.1 Self-diagnosis Function

Regular system maintenance is vital to ensure product reliability and availabilities.

The iCOM controller features a diagnostic function that enables you to turn on/off the components in site manually so as to check their functionality. For the operation instruction, see 5.7.5 *DIAGNOSTICS*.

Warning

1. During the operation of the Liebert PEX air conditioner system, lethal voltage may be present in the internal components. It is a must to obey all the notes and warnings marked on the equipment or contained in this manual, otherwise injury or fatality may occur.
 2. Only qualified maintenance personnel can operate and handle the components.
-

7.1.2 Electric Control Part

Maintenance of electric part

Carry out visual inspection and handle the electric connection by referring to the following items.

1. Conduct overall electrical insulation test: find out the unqualified contacts and handle them. Note to disconnect the fuses or MCBs of the control part during the test lest the high voltage should damage the control components.
2. Check the contactors before power-on and make sure the contactors can act freely without obstruction.
3. Clean the electric and control elements of dust with brush or dry compressed air.
4. Check the closing of contactors for arcs or signs of burning. Replace the contactor if necessary.
5. Fasten all the electric connection terminals.
6. Check that the sockets and plugs are in good condition. Replace those loosened ones.

Maintenance of control part

Carry out visual inspection, simple function test and handle the control parts by referring to the following items.

1. Visually inspect the power transformers and isolation transformers, and test the output voltage (of the indoor unit and outdoor condenser).
2. Check that there is no signs of aging on the control interface board, display control board, sensor board and fuse board.
3. Clean the electric control elements and control board of dust and dirt with brush and electronic dust removing agent.
4. Check and fasten the I/O ports at the control interface board, including the connection between display control board and control interface board, as well as between the temperature/humidity sensor board and the interface board.
5. Check the connection between the user terminals (70#, 71#, 70A#, 71A#, 37#, 38#, 77#, 78#) and the control interface board.
6. Check the output connection between the control interface board and various components, including various contactors, solenoid valves for liquid pipes and bypass solenoid valves (liquid bypass), and the input connection between control interface board and various components, including fan overload protector, high pressure and low pressure switches, heating over-temperature safties, humidifier safties, filter clogging switch, pressure difference switch, high/low pressure sensor and chilled water temperature sensor. In particular, check the connection parts such as HP/LP switches and solenoid valves, and replace the component if in poor connection or faulty.

7. Check and replace electrical components that are faulty, such as control fuses (or MCBs) and control boards.
8. Check the specification and condition of the control cable and power cable between the indoor unit and the condenser, and replace the cable when necessary.
9. Use temperature and humidity measuring meters with higher precision to measure and calibrate the temperature and humidity sensors.

 **Note**

Set the humidity control mode to 'relative humidity control' during calibration process.

10. Adjust the setpoints. Check the action of the functional parts and the auto-flush control logic of water pan of the infrared humidifier according to control logic.
11. For dual cooling unit, use the gauge with higher temperature and precision to check and calibrate the sensor temperature of the free cool system.
12. Simulate and check the operation of the protection devices including high and low pressure alarm, high and low temperature alarm, high water level alarm and over-temperature protection.
13. Check the following external sensors.

1) Smoke sensor (optional).

The power supply of the smoke sensor is located at the bottom (or top) of the upflow (or downflow) unit. It constantly samples the air, analyzes the samples and makes judgment. It requires no calibration.

2) Water detection sensor.

Bridge the water detection sensor probes and confirm the alarm through the iCOM controller.

The sensor should be placed away from any water pool or drainage trench on the floor, 2m ~ 2.5m away from the unit. Do not place it directly under the unit. The recommended installation location of the water detection sensor is shown in Figure 7-1.

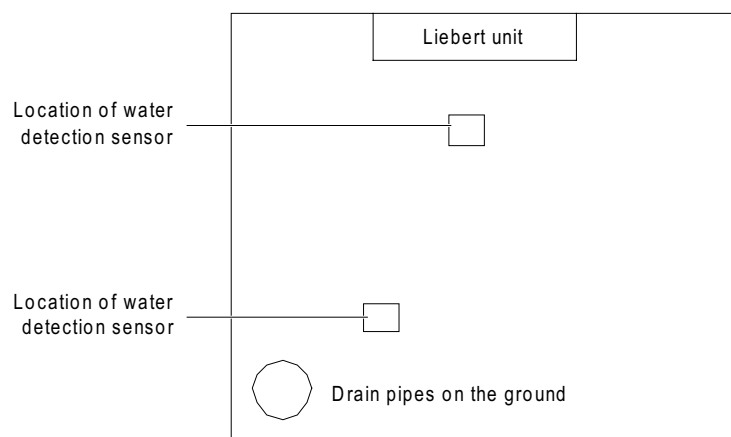



Figure 7-1 Recommended location for the water detection sensor

 **Note**

1. Before fastening the connection of any mechanical parts or cables, make sure that the power supply of the control unit has been disconnected.
2. Do not use the water detection sensor adjacent to flammable liquid or use it to detect flammable liquid.

7.2 Filter

To ensure efficient operation, the filter must be checked once a month, and be replaced as required.

Switch off the power before replacing the filter. You do not need to adjust the setpoint of the filter clog switch if the new filter is of the same model. Otherwise, you need to adjust the setpoint. The filter clog switch is located in the electric control box. It compares the air pressures before and after the filter through a black hose.

To adjust the setpoint of the filter clog switch, you should:

1. After replacing the filter, restore and seal all the panels, so that the alarm point can be found precisely.
2. With the fan running, rotate the rotary switch of the filter clogging switch counter clockwise to trigger the filter alarm.
3. Rotate the rotary switch clockwise for 1 rotation, or rotate it to the required filter replacing point.

Note

1. Set the setpoint properly. Otherwise, the filter alarm may be triggered too frequently; or, in the opposite case, the dust accumulation on the filter could not trigger the alarm, resulting in low system airflow and endangering the system operation.
 2. If you are unsure about the setpoint, consult Emerson before using a filter of a different model to replace the old one.
-

7.3 Fan Components

7.3.1 FC Fan

The fan components that require regular checking include belt, motor bracket, fan bearing and blades.

The fan and the installation board are designed in consistency. The belt tension is regulated automatically under the force of gravity to reduce the fan vibration and protect the belt.

Fan bearing and blades

Check the fan regularly to make sure the bearing is secure. Rotate the blades and make sure that they do not contact the housing. Because the bearing is permanently sealed and self-lubricated, check for signs of wearing when adjusting the belt. Roll the belt and observe the motion of the fan bearing. If any abnormal displacement is observed, replace the bearing.

Belt

Measure the belt tension with a tension meter. You can also press down the belt at the middle point between the two pulleys. The displacement should be 12mm ~ 25mm (1/2" ~ 1").

If the belt is found worn or distorted, replace it with a new belt. The new belt should be of the same model as the old one.

Motor

To replace the failed motor, you need to be very careful, especially with the upflow unit. Use a dedicated fixture to hold the motor before removing the fixing bolts at the bottom of the motor.

7.3.2 EC Fan

The EC fan needs main power supply with 380Vac input, meanwhile, it exercises the speed regulation according to the 0 ~ 10Vdc analog signals output from the control board. If the EC fan is in abnormal state, please check the analog signals and main power supply carefully.

Besides, the main fan overload alarm of the control board is series connected with the alarms of the EC fan. When the EC fan is over hot, loss of main power supply and clogging, the unit will generate EC fan fault alarm.

7.4 Infrared Humidifier

During the normal operation of the infrared humidifier, sediment will accumulate on its water pan. To ensure efficient operation of the infrared humidifier, you need to clean the sediment regularly. However, the cleansing

cycle varies because the water is different in different regions. It is recommended to check, and cleanse (when necessary) the water pan, once a month.

Remove the water level standpipe to drain the water pan. Disconnect the drainage pipe, remove the safety switch of the water pan, remove the fixing screws at the two ends of the pan, and pull out the water pan. Cleanse the water pan with water and hard brush, and restore the water pan by reversing the preceding procedures.

 **Note**

Before exercising the corresponding operation, make sure that the power has been cut off so as to avoid the personal injury; and also ensure that the water in the water pan is close to the room temperature before pouring away the water from the infrared humidifier water pan.

The autoflush function of the infrared humidifier can prolong the cleansing cycle. However, regular checks and maintenance are necessary.

Replacing the lamps of the infrared humidifier

The lamp of the infrared humidifier is shown in Figure 7-2.

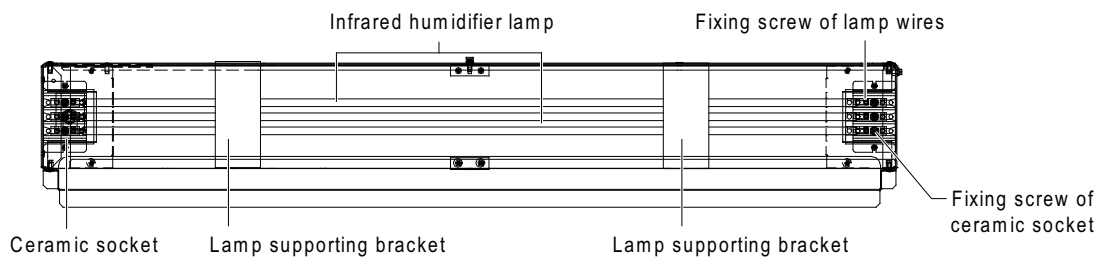



Figure 7-2 Lamps of infrared humidifier

Follow the following procedures to replace it:

1. Turn off the power to the main isolation switch.
2. Unplug all the control cables of the infrared humidifier and cut the fixing cable tie binding the infrared humidifier power cable. In the one-bay system, the plugs of the infrared humidifier are sealed in the niche above the lamp, and you need to open the cover plate in front of the infrared humidifier before you can reach the plugs. The plugs of the two-bay system and three-bay system are located at the left side of the infrared humidifier and are accessible directly.
3. After draining the water in the water pan, remove the drain pipe, remove the two fixing screws on both sides of the infrared humidifier, and then pull out the infrared humidifier.
4. Open the cover plate (for one-bay system, this cover plate has been opened in step 2) to reveal the ceramic socket. Use a multi-meter to locate the burned lamp.
5. Remove the water pan of the infrared humidifier.
6. Remove the brackets in the middle that support the lamps.
7. Remove the screws that fix the cables of the lamp to be replaced from the ceramic sockets (note to hold the lamp with hand).
8. Remove the faulty lamp.
9. Install a new lamp.

 **Note**

Do not touch the quartz lamp with bare hands! Greasy sediment and finger prints can seriously shorten the life span of quartz lamps. Therefore, wear clean cotton gloves during the operation.

10. Restore the infrared humidifier by reversing step 3 ~ step 7.

Autoflush system of the infrared humidifier

Note

The normal operation of the autoflush system, the humidifier demands a water source with minimum water flow of 1gpm (0.063 l/s) and minimum pressure of 20PSIG (138kPa).

The autoflush control program is an integral part of the infrared humidifier system. The program automatically controls a water makeup valve to maintain the proper water level in the water pan of the infrared humidifier during the humidification operation. When a call for humidification exists, the program checks how long the infrared humidifier has been off.

1. If the humidifier off time is equal to or greater than the programmed value (factory default is 15hr), the iCOM controller assumes that the pan is dry and a program called pre-fill is initiated to add water to the water pan. The pre-fill time is different according to the different water pan size. During the pre-fill operation, the infrared lamps of the infrared humidifier are inactive.

2. If the off time of infrared humidifier is less than the programmed value, the pre-fill program will be ignored, and the humidification status will be appeared. At this point, the infrared lamps are energized and the water makeup valve is opened to fill water in the water pan.

During normal infrared humidification operation, the water makeup valve will operate the periodically based on the evaporation of water from the pan. Water is added after eight minutes humidification of the small water pan and ten minutes humidification of the large water pan, so as to complement the water volume due to humidified consumption, and clear the mineral floating on the water pan surface. According to the different parts of the water quality, you can set the water volume yourself. In general, the water volume can be adjusted from 110% to 500% in 1% increments (default: 150%).

The automatic flushing system washes the water pan of the infrared humidifier to prevent erosion caused by sediment minerals produced in the water. As the water source regulation is different, the water volume flowing through the system can be set by using the program to meet local needs. The selectable range of water volume is the water flush rate of between 110% ~ 500%. After the selection of water volume, the flushing system will run automatically, without the need for any further adjustment. See Figure 7-3 for humidification logic.

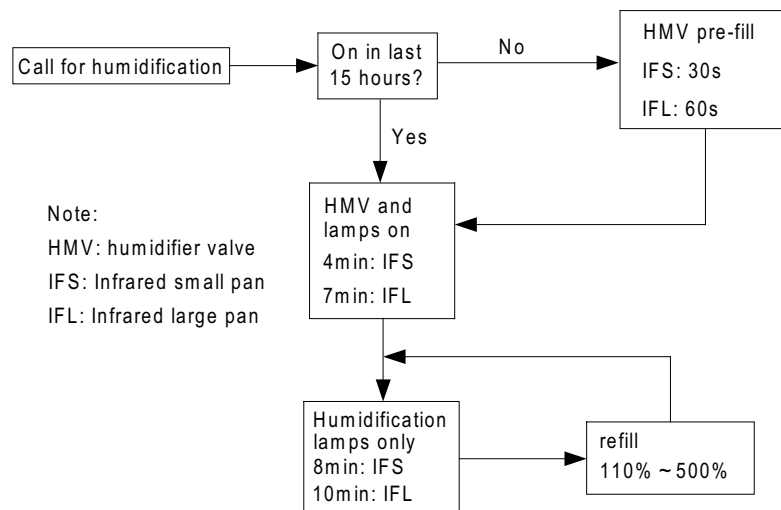


Figure 7-3 Humidification logic

7.5 Electric Heater

Check the rustiness condition of the electric heater; if possible, use the iron brush to get rid of the rust, or replace it. The electric heater includes two types: upflow and downflow, as shown in Figure 7-4. Three temperature switches are series connected to the control loop inside the electric heater, including two automatic reset switches and one manual reset switch. When there is heating requirement, but no heating effect, you should use a multimeter to check whether the cable used to temperature switch is in action, so as to ensure the three temperature switches are in normal state. If the cable is not in action, you should remove

the electric heater to check whether the manual reset switch is disconnected, the automatic reset switch or the electric heater pipe is damaged.

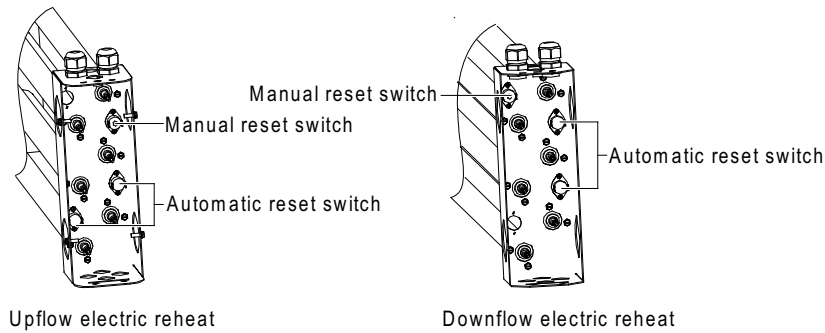


Figure 7-4 Upflow electric reheat and downflow electric reheat

7.6 Cooling System

Check the cooling system components once a month to make sure the system function is normal and that there are no signs of wearing. Because the failure or damage of components is usually accompanied by corresponding faults, regular check is a major means to prevent most system faults. The refrigerant pipes must be supported by properly set brackets, and be laid away from the ceiling, floor or anywhere that vibrates. Check the refrigerant pipes and fixing brackets every six months.

Each system has a sight glass to facilitate the observation of refrigerant flow and the system moisture content. When the system moisture content is too high, the sight glass color will be changed. ‘Bubbles’ can indicate a shortage of refrigerant subcooling.

When the cooling system is faulty, you can locate the fault by referring to certain parameters of system operation.

7.6.1 Suction Pressure

The compressor may stop when the suction pressure drops below the setpoint of the low pressure switch. On the other hand, too high suction pressure will undermine the cooling effect of the refrigerant on the compressor motor, leading to the damage of the compressor. The minimum (pressure switch action setpoint) and the maximum (design operation value) suction pressures are listed in Table 7-1.

Table 7-1 Suction pressure

System	Minimum pressure kPa (PSIG), R22	Maximum pressure kPa (PSIG), R22
Air-cooled (stepless fan speed controller)	138 (20)	620 (90)
Water-cooled	138 (20)	620 (90)

7.6.2 Discharge Pressure

The discharge pressure may change with the load or the condenser efficiency. When the discharge pressure rises to the setpoint of the pressure switch, the high pressure switch will act to stop the compressor. See Table 7-2 for details.

Table 7-2 Discharge pressure

System design		kPa (PSIG)
Air-cooled		1750 (251)
Water-cooled	Water at 65°F ~ 75°F	1400 (203)
	Water at 85°F	1450 (210)
Maximum pressure		2275 (330)
High pressure switch action point		2760 (400)

7.6.3 Suction Superheat Degree

The thermal expansion valve (TXV) can regulate the suction superheat degree. Follow the following procedures to determine the system suction superheat degree.

1. Measure the temperature of the suction pipe at the TXV sensing bulb.
2. Sample the compressor suction pressure at the schrader valve of the suction pipe.
3. Evaluate the pressure difference between the sensing bulb and schrader valve of the suction pipe.
4. Add the sum of the preceding two pressures to find out the saturation temperature corresponding to the saturation pressure.

The difference between the suction temperature at the sensing bulb and the saturation temperature is the suction superheat degree. Try to achieve suction superheat between 5k ~ 8k.



Note

The suction superheat degree is critical to the compressor lifespan. If the compressor runs with little or no suction superheat degree for a long time, slugging may occur to the compressor, damaging the scroll plate of the scroll compressor.

7.6.4 Thermal Expansion Valve

Operation

The auto-regulation of the thermal expansion valve guarantees sufficient refrigerant for the evaporator in order to meet the needs of the load. The superheat degree is an indicator of the operation state of thermal expansion valve. If the refrigerant to the evaporator is insufficient, the superheat degree will be high; and if the refrigerant to the evaporator is too much, the superheat degree will be low. The proper superheat degree is 5k ~ 8k.

Regulation

Follow the following procedures to regulate the superheat degree setting.

1. Unscrew the bonnet at the bottom of the expansion valve.
2. Rotate the rotary switch counter clockwise to reduce the superheat degree.
3. Rotate the rotary switch clockwise to raise the superheat degree.



Note

1. Every time you rotate the rotary switch, do not rotate it for more than one round, and it may take up to 30mins to reach a new balance.
 2. Before delivery, the refrigerant of water-cooled unit has been charged, and the thermal expansion valve position has been adjusted, so it is recommended not to adjust it on site. If you need to adjust the thermal expansion valve position, please contact the technical support.
-

7.6.5 Hot Gas Bypass Valve (For Single Compressor System)

When the heat load in the room is not high, the single compressor system can regulate the indoor temperature by using the hot gas bypass valve. In this way, the frequent use of the compressor is avoided, and energy saving effect is realized. The hot gas bypass is shown in Figure 7-5.

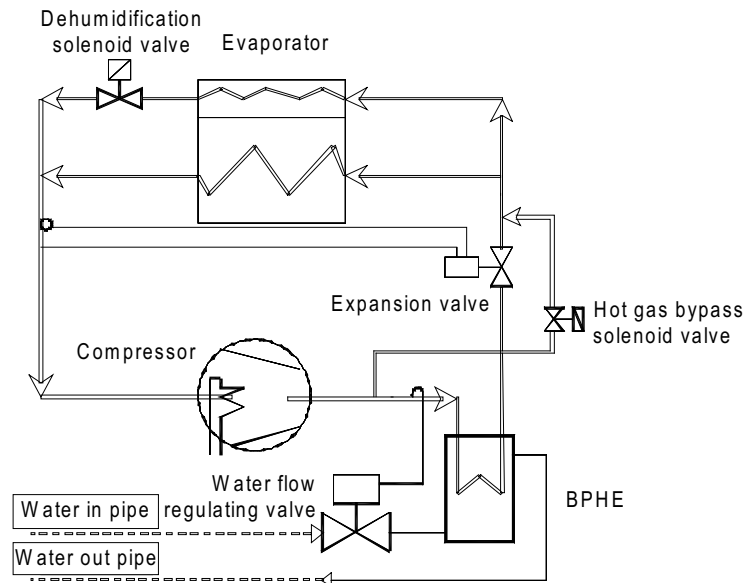


Figure 7-5 Hot gas bypass solenoid valve

7.6.6 Air-Cooled Condenser

Refer to 4.1 *Maintenance in Liebert PEX Condenser User Manual.*

7.6.7 Water-Cooled Condenser

BPHE

The turbulence generated in the ducts of soldered BPHE can clean the ducts. However, on occasions when scaling is serious, like when hot hard water is used, it is necessary to use cyclic rinsing device to clean the BPHE. Put weak acid (like 5% phosphoric acid) into a jar and use a pump to inject the fluid into the BPHE to clean it. If the BPHE is often cleaned, use 5% oxalic acid.

The cleaning of the BPHE is not covered by Emerson maintenance service. If necessary, you can consult Emerson service personnel.

Electronic ball valve

The iCOM controller controls the electronic ball valve position by collecting the refrigerant pressure of the BPHE outlet from the pressure sensor, so as to control the water flow through the BPHE for system stable operation. The higher the load is, the more water flow is allowed to flow through the BPHE. The lower the load is, the less water flow is allowed to flow through the BPHE.

Test function

If the electronic ball valve is in abnormal regulation state, please consult Emerson service personnel.

7.6.8 Compressor

Warning

No direct contact between the refrigerant or lubricant and the skin when replacing the compressor, or serious burning or frostbite may occur. Put on gloves with long sleeves when processing polluted parts.

The Liebert PEX air conditioner system uses the Copeland scroll compressor with high efficiency and high reliability. It is rare for the motor of the compressor to get burned due to short circuit. In the few cases that the motor does get burned, the cause is usually mechanical problem or poor lubrication, in other words, due to over-temperature.

If the causes that lead to the compressor failure could be discovered and corrected in time, most failures are avoidable. The maintenance personnel should check the operation situation periodically and take necessary measures to ensure the system normal operation. This practice is both easy and cost saving, when you compare it with replacing the compressor upon faults that result from negligence or inadequate maintenance.

When diagnosing the compressor, check the operation situation of all the electric parts of the compressor.

1. Check all the fuses and circuit breakers.
2. Check the operation of high pressure and low pressure switches.
3. When the compressor is faulty, find out the nature of the cause: is it an electrical fault or a mechanical fault?

Mechanical faults

It is impossible to diagnose a mechanical fault of the compressor by smelling the burning. You should try spinning the motor. If the fault is proved to be mechanical, the compressor has to be replaced. If the motor is burned, you should remove the fault that leads to the burning of the motor and clean the system. It must be pointed out that the compressor motor is usually burned because the system is not cleaned properly.

Electric faults

You can tell an electric fault by the unpleasant smell. If serious burning occurred, the lubricant will appear black and become acidic. When electric fault occurs and the compressor motor is entirely burned, the system must be cleaned to remove the acid material from the system and to avoid such faults in the future.

Note

The damage to the compressor components due to improper cleaning is classified in the warranty agreement as improper use of the product, thus is not covered by the warranty.

When the compressor is entirely burned, you need to replace the filter drier together with the compressor. In addition, check the expansion valve. If the valve is faulty, replace it too. Before the replacement, you must clean the system. If you are unsure about the cleaning method, please consult Emerson service personnel.

Compressor replacing procedures

1. Cut off the power supply.
2. Connect the LP and HP tubes of the pressure gauge to the schrader valves of the suction and exhaustion pipes respectively to recycle the refrigerant.

Note

The refrigerant must be recycled or disposed in accordance with the local regulations. Discharging the refrigerant into the air is harmful to the environment and illegal.

3. Disconnect all the electric connection to the compressor.
4. Disconnect the Rotalocks from the discharge and suction openings on the compressor.
5. Remove the faulty compressor (The compressor of the downflow fan unit has a higher location, so each unit is configured with compressor replacement frock. For details, see label indication pasted behind the left front door of the unit).
6. If the compressor has been entirely burned, you need to clean the pipes of the cooling system and replace the filter drier.

Note

Do not remove the rubber bungs from the suction opening and exhaust opening of the new compressor too early. The time that the openings are exposed to the air should not exceed 15mins so as to prevent the compressor refrigeration oil from absorbing water and bringing the water inlet to the system.

7. Install the new compressor, and connect the pipes and electric cables.
8. Evacuate the system and add refrigerant in accordance with the commissioning regulations.
9. Power on the system by following the ordinary startup commissioning procedures and check the system operation parameters. Observe the refrigerant state through the sight glass, determine the amount of refrigerant to be added by considering the system pressure and temperature, and stop adding refrigerant until the system enters normal operation.

Chapter 8 Troubleshooting

This chapter introduces the troubleshooting. You can read this chapter by referring to the part related to the alarms.

Warning

Certain circuits carry lethal voltages. Only professional technicians are allowed to maintain the unit. Extra care should be taken when troubleshooting online.

Note

If jumpers are used for troubleshooting, remember to remove the jumpers after the troubleshooting, or the connected jumpers may bypass certain control function and damage the equipment.

The troubleshooting of components is listed in Table 8-1 ~ Table 8-4.

Table 8-1 Fan fault removal

Symptom	Potential causes	Items to be examined or handled
FC fan cannot be started	No main power supply	Examine the rated voltage of L1, L2 and L3 of the fan
	Circuit breaker disconnection	Examine the circuit breaker of main fan
	Overload, circuit breaker disconnection	Manual reset. Examine the current value
	Contacting not pulling on	Examine whether there is 24Vac voltage between P36-3 and E1. If there is, but the contactor cannot pull on, then the contactor has failures. Please replace the contactor
	Control board failure	Examine whether there is 24Vac voltage between P36-3 and E1. If there is not, then the control panel has failures. Please check whether the green LED beside silicon control Q5 on the control panel is on or not
	Fuse panel failure	Examine whether there is 24Vac voltage between P36-3 and E1. If there is not, and the green LED beside Q5 is not on, please check further whether LED DS4 beside F4 on the fuse panel is on, or take down F4 to test whether it is burnt out
	Air flow loss switch alarm (action)	1) Check that the belt is firm and the fan motor is normal; 2) Check whether the external static pressure (ESP) is too high, if so, fix it by optimizing the air channel and adjusting the belt setting value properly
	The fan is ineffective	Replace the fan
EC fan cannot be started	Circuit breaker disconnection	Examine the circuit breaker of main fan
	Contacting cannot close	Examine whether there is 24Vac voltage between P36-3 and E1. If there is, but the contactor cannot close, then the contactor has failures. Please replace the contactor
	Control board failure	Examine whether there is 24Vac voltage between P36-3 and E1. If there is not, then the control panel has failures. Please check whether the green LED beside silicon control Q5 on the control panel is on or not
	Fuse panel failure	Examine whether there is 24Vac voltage between P36-3 and E1. If there is not, and the green LED beside Q5 is not on, please check further whether LED DS4 beside F4 on the fuse panel is on, or take down F4 to test whether it is burnt out
	Contacting closed, air flow lose switch alarm	1) Check whether there is 0 ~ 10Vdc analog signals output from P51, if not, check the control board carefully; 2) Check whether the values of S147 and S149 are set too low, if so, fix it by increasing the setting value properly; 3) Check whether the external static pressure (ESP) is too high, if so, fix it by optimizing the air channel and increasing the setting value properly

Symptom	Potential causes	Items to be examined or handled
EC fan cannot be started	EC fan failure	1) Check whether the fans L1, L2 and L3 are power-off, phase failure or undervoltage; 2) Check whether the analog signals output from P51 meet 0 ~ 10Vac requirements; 3) Check whether the motor is clogged (overcurrent); 4) Check whether the motor is over temperature; 5) Hall failure; If the problem is related to the first three points, the motor will run automatically after fixing the problem; If the motor is over temperature, switch off the fan till the motor cools down, and recover it by switching on; If the problem is Hall failure, contact the manufacturer for maintenance

Table 8-2 Troubleshooting of compressor and cooling system

Symptom	Potential causes	Items to be examined or handled
Compressor cannot start	Power is not on (shutdown)	Check the main power switch, fuse or circuit breaker and the connection cable
	Power overloaded and MCB tripped	Manual reset and check the average current
	Circuit connection loosened	Fasten the connections
	Compressor coils shorted	Check the motor winding and replace it if defects are found
Contactor cannot close, compressor cannot start	No demand for cooling output	Check the iCOM controller state
	High voltage switch action	Check the high voltage switch
Contactor closed, but compressor cannot start	Contactor failure	Check the contactor, and check whether the 24Vac voltage is between E1 and P32-10 (compressor 1) and P32-12 (compressor 2) terminals
	Circuit breaker disconnected	Check the circuit breaker and the contactor, and measure the circuit voltage
Compressor stops after running for 5min (1min ~ 5min settable). Or contactor opens	Compressor internal circuit breaker open	Check the compressor coils. If the coils are open, they will reset automatically after they cool down
	Refrigerant leaked, the LP switch cannot close, or the pressure reading from the LP sensor of the dual cooling unit is lower; the reading is incorrect from the LP sensor of the dual cooling unit	1) Check the suction pressure; 2) Check the cable containing LP switch; 3) Check whether the LP sensor reading and actual pressure meet $\pm 0.3\text{bar}$ requirement (the HP sensor value can be read from the SERVICE MENU/DIAGNOSTICS, which displays the absolute pressure)
Dual cooling/free cool unit. When the room/setting temperature checked to display refrigeration requirement, but without refrigeration output within 10min, the compressor will stop running	In compressor operation, the antifreezing protection will be generated for shutdown	Check the system and air channel to find out the reason why LP is too low
HP protection	Condenser clogged Temperature of input water is too high or the water flow is too small (water-cooled)	Clean the condenser or BPHE; Check the water system
	Condenser system does not start	For air-cooled series, check the condensing fan; for water-cooled series, check water system. Check the operation procedures
	Too much refrigerant charging	Check whether the subcooling degree is too high

Symptom	Potential causes	Items to be examined or handled
	Electric valve improperly set (water-cooled)	Check whether the LP sensor reading and actual pressure meet $\pm 0.6\text{bar}$ requirement (the HP sensor value can be read from the SERVICE MENUS/DIAGNOSTICS, which displays the absolute pressure) Check whether the BPHE electric ball valve is normal
Low discharge pressure	Water flow too big or temperature of input water too low (water-cooled)	Check the water system
	Refrigerant leaked	Locate the leakage point, repair it and add refrigerant
	Fan speed controller of outdoor unit is faulty, while the output voltage remains 100%, regardless of the change of condensing pressure (air-cooled)	If the fan speed controller is found faulty, replace it
The suction and discharge pressures do not change after startup	Compressor reversed or compressor internal air tightness failed	If compressor is reversed, exchange any two L lines of the compressor. If the compressor internal air tightness is failed to recover, replace the compressor
Low suction pressure or liquid returned	Insufficient refrigerant in the system	Check for leakage. Seal the leaking point and add refrigerant
	Filter too dirty	Replace the filter
	Filter drier clogged	Replace the filter drier
	Improper superheating degree	Regulate by strictly following the adjusting procedures of the thermal expansion valve
	Defective element of the thermal expansion valve faulty	Replace the thermal expansion valve
	Improper air flow distribution	Check the air supply and return system
	Low condensing pressure	Check the condenser
	Belt slipped	Check the belt and make necessary adjustment or replacement
	The single source cooling unit configured with FC fan, its dehumidification electromagnetic valve is closed	Check the status of the dehumidification electromagnetic valve when the system has no dehumidification requirement. Examine whether there is 24Vac voltage between P34-8 and E1, if there is not, it indicates that the dehumidification electromagnetic valve is closed, you should check the relevant cables of the electromagnetic valve; Check whether the air flow lose switch connection is normal. Examine whether there is 24Vac voltage between P36-7 and E1 after power-on, if there is not, you should check whether the air flow lose switch is damaged
ESP is too large, air flow reduction	Check the ventilation duct or air channel, evaluate the unit ESP again	
Compressor too noisy	Liquid returned	Refer to the handling methods of <i>Low suction pressure or liquid returned</i>
	Lubricant loss	Add lubricant
	Fixture of compressor is not removed	Remove the transportation fixture
Compressor over-temperature	Too high compression ratio	Check the settings of the HP switch and LP switch, and make sure whether the condenser is clogged; Check that the fans of the evaporator and condenser are normal
	Too high suction temperature	Regulate the expansion valve or add proper amount of refrigerant

Symptom	Potential causes	Items to be examined or handled
Dual cooling /free cool unit, FC (free cooling) fan cannot start when there is chilled water provided	The difference between room air return temperature and setting temperature is too high (more than A138 setting value),and the alarm record can display the FC fan off time for one hour	Set the preset temperature after the first startup, the unit will power off, restart the system can run the FC system; when the unit is in normal state, but the FC fan stops for one hour, it means that the present refrigeration requirement is higher, at this point, you should start the compressor refrigeration
	Under the chilled water inlet normal temperature, FC will not start, and FC stop for one hour is impossible, it means the difference between unit air return temperature and water inlet temperature is lower	1) Examine the chilled water inlet temperature, and compare it with the free cool temperature (the free cool temperature can be gained from the temperature sensor installed on the chilled water inlet pipe, ans be read from User Menu/SENSOR DATA). If the difference is larger, check whether the sensor installation as well as the sensor is damaged; 2) To start FC, you should ensure the difference between the unit air return temperature and water inlet temperature exceed S138. Maybe the reason is that the water inlet temperature is too high or the unit preset temperature is too low, you can properly reduce S138 preset value to start FC. Note that too low S138 preset value may result in the larger temperature change in equipment room
Note: The refrigerant requirement is the precondition for judging the potential causes listed in this Table		

Table 8-3 Troubleshooting of infrared humidifier

Symptom	Potential causes	Items to be examined or handled
Humidiifcation ineffective	No water in the water pan	Check the water supply
		Check that the water supply solenoid valve is working
		Check the state of the high water-level switch and water level regulator
		Check that the water supply pipe is not clogged
	The humidification contactor does not close	Check the contactor, and check the circuit voltage of the contactor
		Check the opened safety devices of the infrared humidifier: water pan over-temperature protection switch and lamp over-temperature protection switch. Use a jumper to shot terminals P35-6 and P35-5. If the contactor closes, replace the series-connected safety device, and remove the jumper
	Air flow lose switch failure	Check that the air flow lose switch connection is normal. Examine whether there is24Vac voltage between P36-7 and E1 after startup, if there is not, you should check whether the air flow lose switch is damaged
Humidifier main power failure	Check that the humidifier MCB is closed; In humidifier contactor closed state, check that L1, L2 and L3 voltages are normal	
Infrared humidifier lamp burned	Replace the lamp	

Table 8-4 Troubleshooting of heating system

Symptom	Potential causes	Items to be examined or handled
Heating system cannot start, the contactor cannot close	No heating demand	Check the state of the iCOM controller, and verify whether there is a humidifying demand
	Heating auxiliary relay failure	Check the heating auxiliary relay and its cable
	Safety device of the heating system is open	In the case of two-stage heating, check terminals P34-1 and P34-2. If the heating system then starts to work, it means that the safety device is open. Remove the jumper and the electric heater, and check that the manual reset switch is open, meanwhile, check that the automatic reset switch is damaged. To judge whether the electric heater is damaged, you can use an Ohm meter to check the resistance status of the electric heater
	Air flow lose switch failure	Check that the air flow lose switch connection is correct. Examine whether there is 24Vac voltage between P36-7 and E1 after startup, if there is not, you should check whether the air flow lose switch is damaged
Contactor closes, but heating is ineffective	Electric heater main power failure	Check that the electric heater MCB is closed; In humidifier contactor closed state, check that L1, L2 and L3 voltages are normal
	Electric heater burned	Cut off the power supply and measure the resistance of the heater with an Ohm meter

Affiliated table 1: Monthly maintenance table

Inspection date: _____
 Unit model: _____

Prepared by: _____
 Unit SN: _____

Filters:

- ___ 1. Check for clogging or damage
- ___ 2. Check the filter clog switch
- ___ 3. Clean the filter

- ___ 4. The SPD board should be effective (in the storming seasons, the SPD board should be check once a week)
- ___ 5. The refrigerant pipes are properly supported

Fan

- ___ 1. Fan blades are not distorted
- ___ 2. Whether there is bearing wear
- ___ 3. Belt tightness and its state

Refrigeration cycling system

- ___ 1. Check the suction pressure
- ___ 2. Check the discharge pressure
- ___ 3. Check the refrigerant pipes
- ___ 4. Check the moisture content (through the sight glass)
- ___ 5. Check the hot gas bypass valve
- ___ 6. Check the thermal expansion valve
- ___ 7. Check the dual cooling/free cool unit water inlet temperature

Compressor

- ___ 1. Check for leakage
- ___ 2. Listen to the operation sound, observe the operation vibration

Air-cooled condenser (if used)

- ___ 1. Check the fins clean
- ___ 2. The fan base should be firm
- ___ 3. The fan vibration absorber is not deteriorated or damaged

Heating system

- ___ 1. Check the re-heater operation
- ___ 2. Check the erosion situation of the components

Infrared humidifier

- ___ 1. Check clogging of the drain pipes
- ___ 2. Check the lamps of the humidifier

- ___ 3. Check the mineral sediments on the water pan

Signature: _____

Note: copy this table for filing.

Affiliated table 2: maintenance table (six-month)

Inspection _____
 date: _____
 Unit model: _____

Prepared by: _____
 Unit SN: _____

Filters

- ___ 1. Check for clogging or damage
- ___ 2. Check the filter clog switch
- ___ 3. Clean the filter

- ___ 3. Check for leakage

Fan

- ___ 1. Fan blades are not distorted
- ___ 2. Whether there is bearing wear
- ___ 3. Belt tightness and its state
- ___ 4. Check and fasten the circuit connector

Refrigeration cycling system

- ___ 1. Check the suction pressure and suction superheat degree
- ___ 2. Check the discharge pressure and condensing subcooling degree
- ___ 3. Check the refrigerant pipes
- ___ 4. Check the moisture content (through the sight glass)
- ___ 5. Check the hot gas bypass valve
- ___ 6. Check the thermal expansion valve
- ___ 7. Check whether or not refrigerant should be added through the sight glass

Compressor

- ___ 1. Check for leakage
- ___ 2. Listen to the operation sound, observe the operation vibration
- ___ 3. Check and fasten the circuit connections

Heating system

- ___ 1. Check the re-heater operation
- ___ 2. Check the erosion situation of the components
- ___ 3. Check and fasten the circuit connections

Air-cooled condenser (if used)

- ___ 1. Check the fins clean
- ___ 2. The fan base should be firm
- ___ 3. The fan vibration absorber is not deteriorated or damaged
- ___ 4. The SPD board should be effective (in the storming seasons, the SPD board should be check once a week)
- ___ 5. Check the voltage regulating function of the rotation speed controller
- ___ 6. The temperature switch is set at the required position
- ___ 7. The refrigerant pipes are properly supported
- ___ 8. Check and fasten the circuit connections

Infrared humidifier

- ___ 1. Check clogging of the drain pipes
- ___ 2. Check the lamps of the infrared humidifier
- ___ 3. Check the mineral sediments on the water pan
- ___ 4. Check and fasten the circuit connections

Water-cooled condenser (if used)

- ___ 1. Clean the water pipe system
- ___ 2. Check the electric valve

Electric control part

- ___ 1. Check the fuses and MCB
- ___ 2. Check and fasten the circuit connections
- ___ 3. Check the control program
- ___ 4. Check the contactor suction

Signature _____

Note: copy this table for filing.

Appendix 1 Composition Of Electrical Control Box

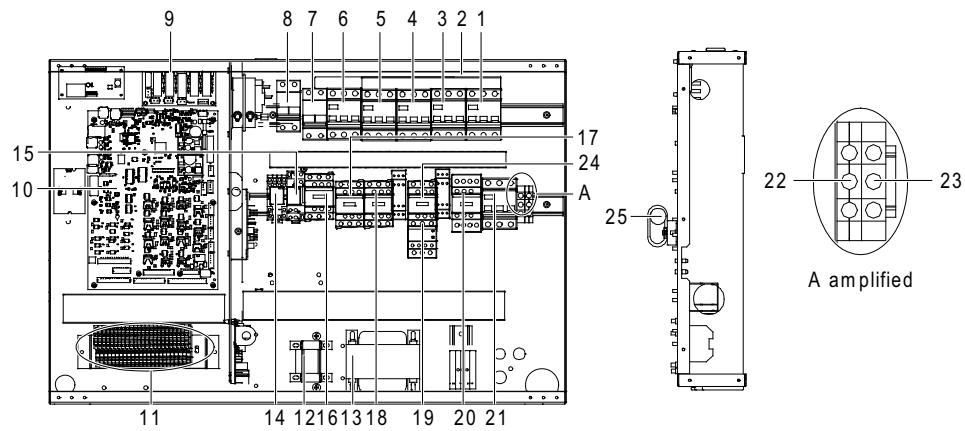


Figure 1 Internal composition of electric control box of one-bay series

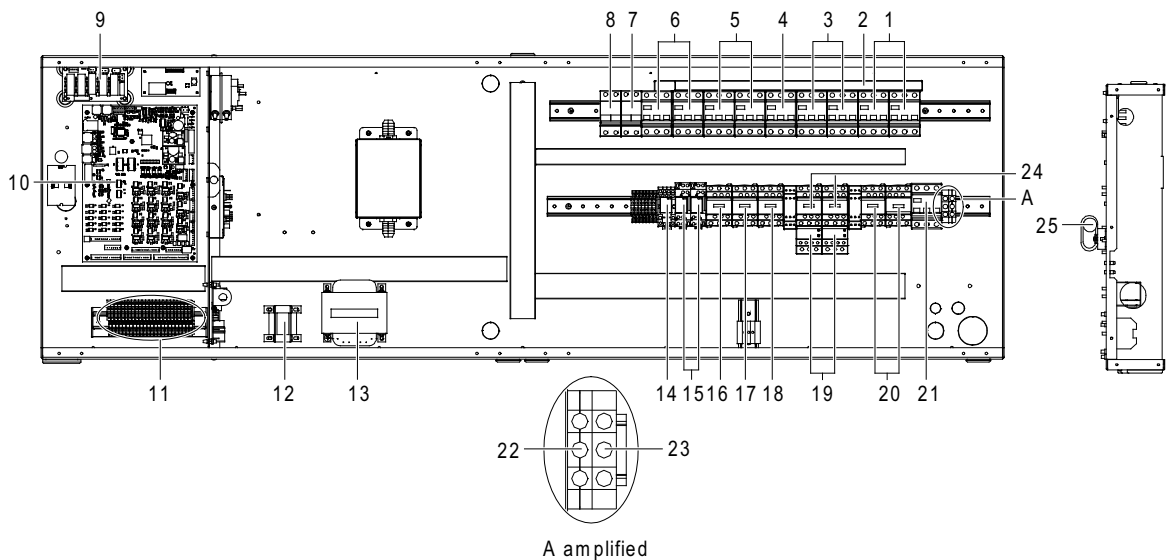


Figure 2 Internal composition of electric control box of two-bay series

1: Compressor MCB	8: Control board MCB	15: Control board contactor	22: Main N terminal
2: Busbar	9: Fuse board	16: Condenser contactor	23: Main grounding terminal
3: Fan MCB	10: Control board	17: Humidification contactor	24: Fan contactor
4: Electric heater MCB	11: Field connection terminal block	18: Electric heater contactor	25: Temp. & hum. sensor board
5: Infrared humidifier MCB	12: Isolation transformer	19: Fan over-current protector	
6: Condenser MCB	13: Power transformer	20: Compressor contactor	
7: Crankcase heater MCB	14: Crankcase heater contactor	21: Main isolation switch	

Note

The two-bay series with single system has only one compressor MCB and contactor.

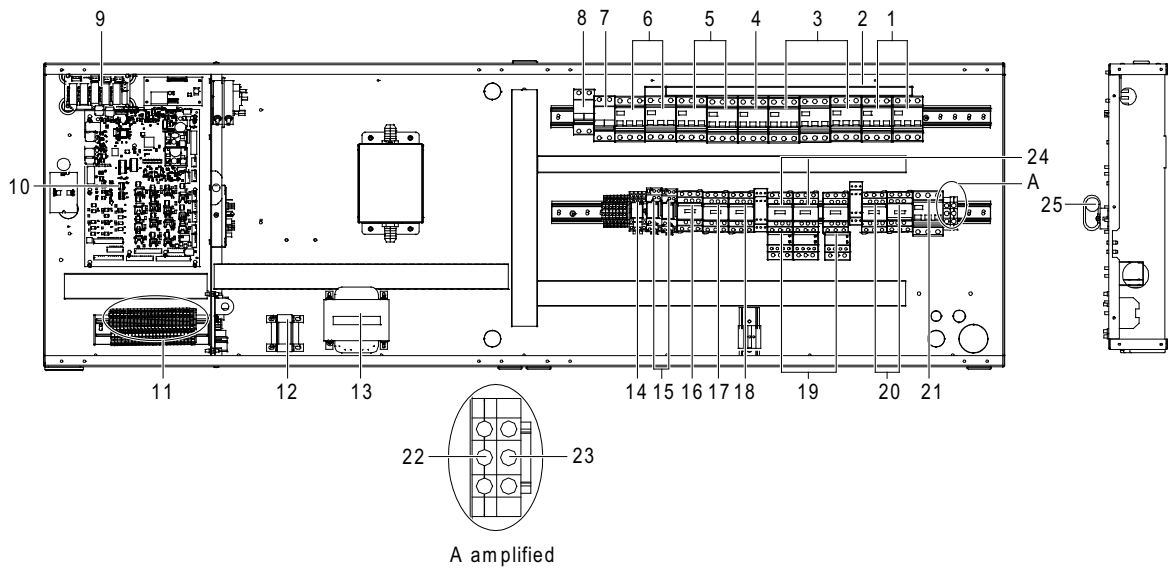


Figure 3 Internal composition of electric control box of three-bay series

- | | | | |
|-----------------------------------|--------------------------------------------|---------------------------------------|------------------------------------------|
| 1: Compressor MCB | 8: Control board MCB | 15: Control board contactor | 22: Main N terminal |
| 2: Busbar | 9: Fuse board | 16: Condenser contactor | 23: Main grounding terminal |
| 3: Fan MCB | 10: Control board | 17: Humidification contactor | 24: Fan contactor |
| 4: Electric heater MCB | 11: Field connection terminal block | 18: Electric heater contactor | 25: Temp. & hum. sensor board |
| 5: Infrared humidifier MCB | 12: Isolation transformer | 19: Fan over-current protector | |
| 6: Condenser MCB | 13: Power transformer | 20: Compressor contactor | |
| 7: Crankcase heater MCB | 14: Crankcase heater contactor | 21: Main isolation switch | |

Appendix 2 Circuits

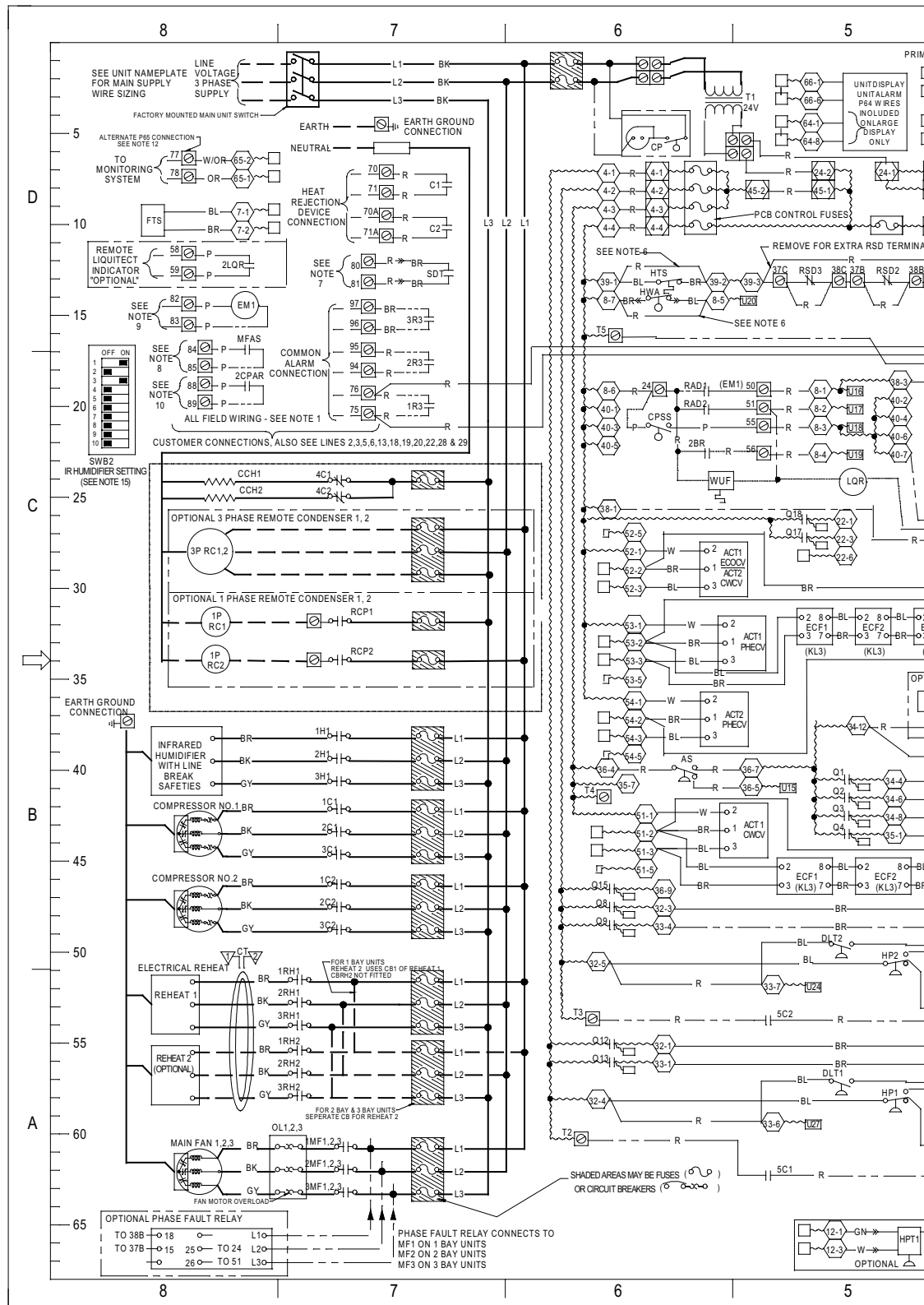


Figure 4

Appendix 3 Menu Structure

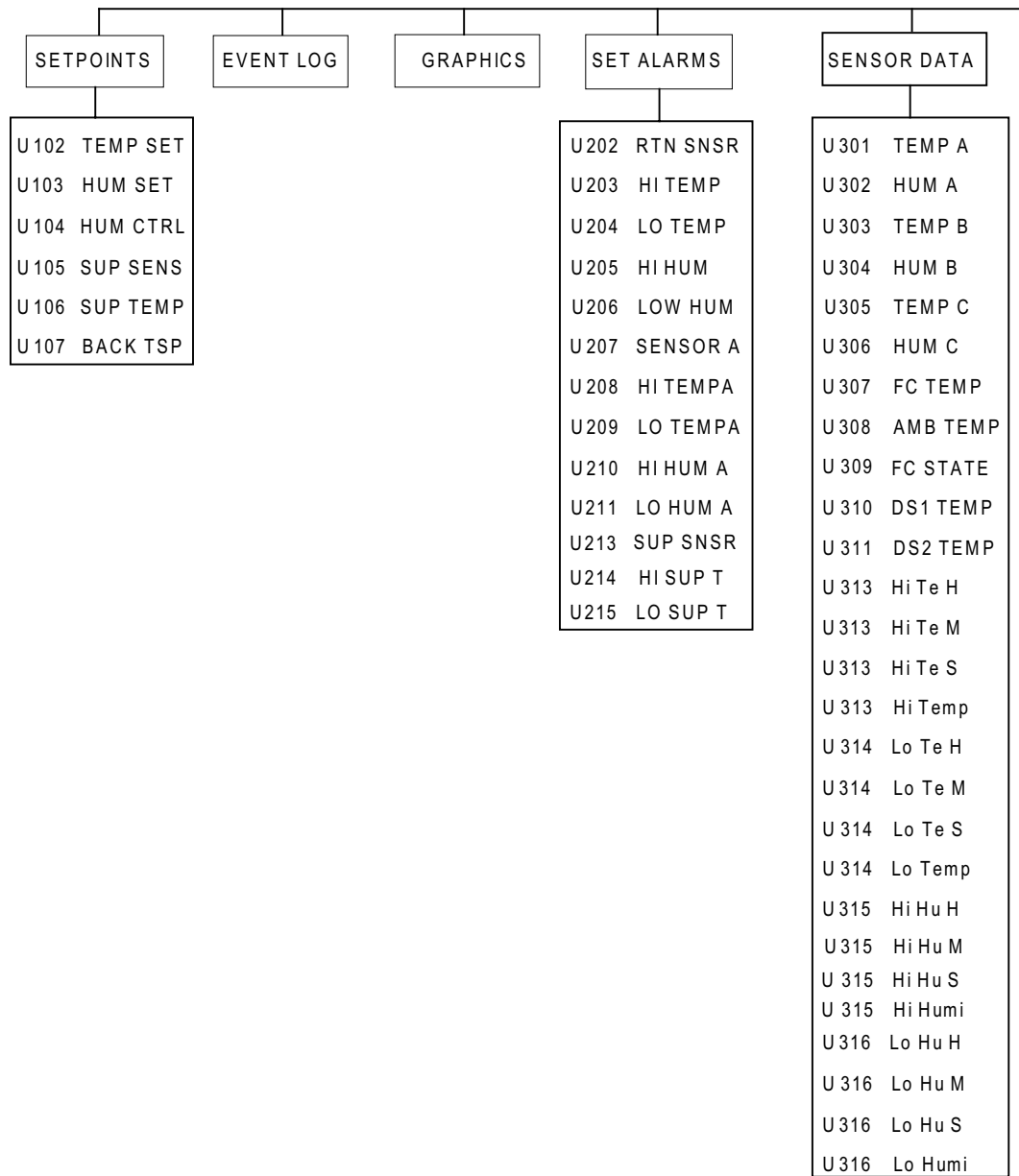


Figure 5 Us

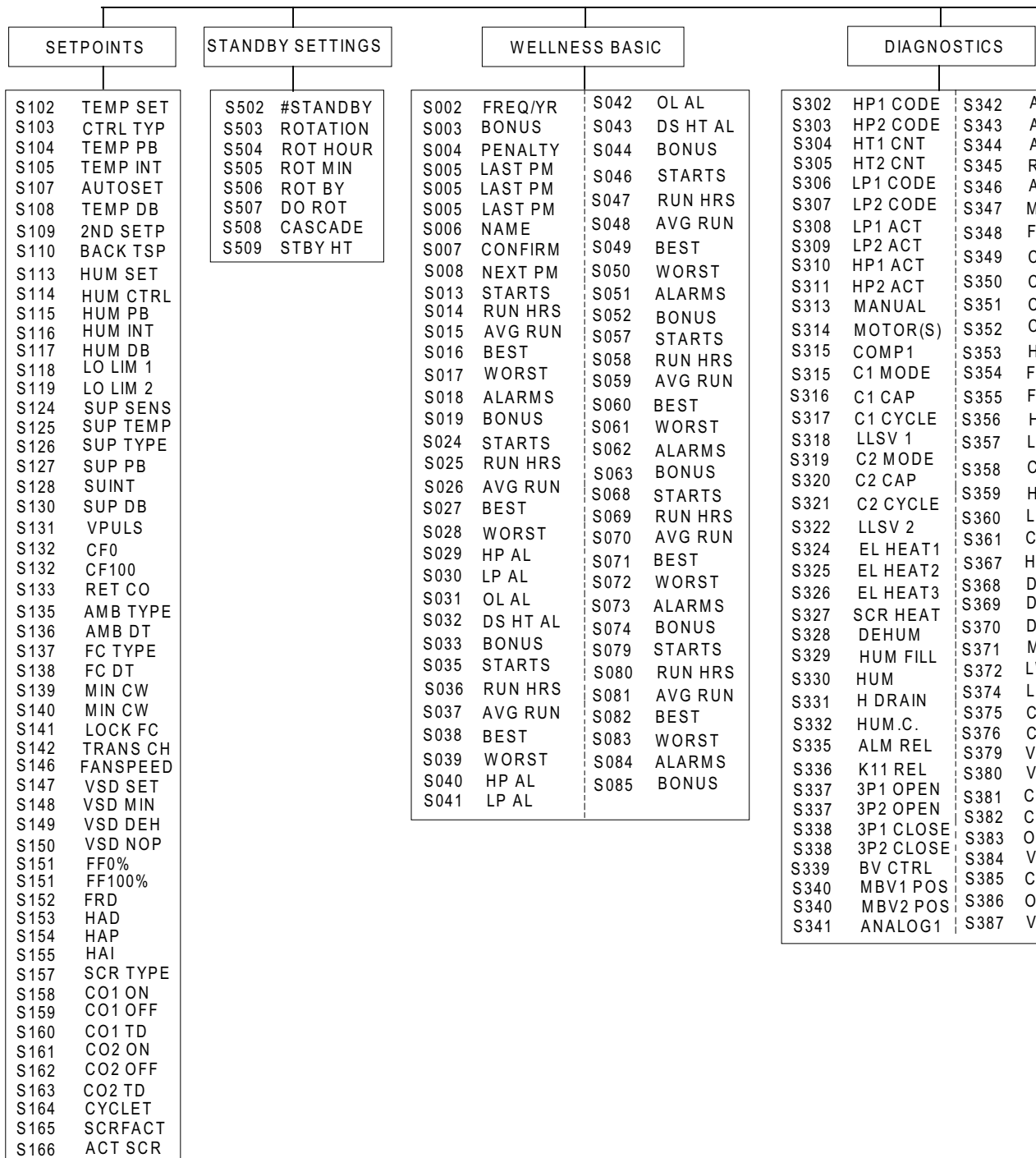


Figure 6 Maintenance

Emerson Network Power Asia

Australia

T: 1800-065345
F: 61-2-97438737

China

T: 86-755-860-10808
F: 86-755-860-10245

India

T: 91-22-67208000
F: 91-22-25828358

Indonesia

T: 62-21-2513003
F: 62-21-2510622

Japan

T: 81-3-54038594
F: 81-3-54032924

Korea

T: 82-2-34831500
F: 82-2-5927883

Malaysia

T: 603-78845000
F: 603-78845188

New Zealand

T: 64-3-3392060
F: 64-3-3392063

Pakistan

T: 92-42-36622526 to 28
F: 92-42-36622530

Philippines

T: 63-2-6203600
F: 63-2-6203693

Singapore

T: 65-64672211
F: 65-64670130

Thailand

T: 66-2-6178260
F: 66-2-6178277 / 78

Vietnam

T: 84-4-37628908
F: 84-4-37628909

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