
INSTALLATION AND OPERATION MANUAL

Indoor Packaged Air Conditioners

Models: M-ID.DL.10E1D3

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Chapter 1: Overview

Thank you for choosing a unit manufactured by AIRSYS REFRIGERATION ENGINEERING TECHNOLOGY (BEIJING) CO., LTD.

The AIRSYS line of wall mounted HVAC systems is optimized for energy efficiency. These systems are uniquely designed for the efficient removal of heat generated by electronics from enclosed shelters. The supply air of the AIRSYS system is delivered from the bottom of the machine and the exhaust is at the top, the opposite of a traditional HVAC system. This “bottom throw” is designed to take full advantage of the fact that hotter air rises. With the exhaust located higher within the shelter, every rotation of the fan removes more heat. The cooler air supplied at the bottom accelerates this natural process. This is just one of many design features that makes the AIRSYS HVAC systems among the most energy efficient in the world.

Another feature that promotes energy efficiency is the robustly designed built-in economizer, described as “free cooling.” This feature combines with the powerful controller to provide 100% cooling capacity of the indoor packaged unit (IPU), consuming ~ 1kW or less whenever the outdoor temperature is a few degrees lower than a predetermined set point. This feature alone can save telecom operators significant utility dollars, especially in cool weather climates.

Along with the energy efficiency, these systems are simple to operate, maintain, and service. The AIRSYS design team is committed to listening and responding to the customer community. As a result, these systems have continuously evolved with customer-defined features that have improved the overall quality and the user experience. Usability features include:

- A functional step test that facilitates complete operational verification in less than 5 minutes
- Simple unobstructed access to all key components for Preventive Maintenance (PM) and servicing
- No need to define compressor orientation as the units can be easily serviced with as little as an 8 inch clearance on either side
- A high level of redundancy in the precision lead/lag controller to enhance reliability
- Completely selectable alarm relays (NC or NO) to enable the system to adapt to the customer rather than the other way around

The sensible cooling capacity of AIRSYS HVAC systems is as much as 40% higher than a traditional machine. An ordering guide helps properly match the capacity of the HVAC system to the heat load in the shelter.

Heating elements can be included per customer requirements in a range from 1.5 kW through 5.0 kW.

With a suite of best-in-class components from around the globe, the AIRSYS IPU delivers quality and reliability while substantially reducing cost of operation.

Using this Manual

Before attempting to install or start the unit, you should read this manual carefully. Retain this manual for reference for the life of the unit. This manual provides information on the following general topics:

- Product overview
- How to install the system, including preparation, installing the wall units, installing the controller box and its wiring, and verifying the installation
- How to use the functions on the controller box, understand system alarms, and perform advanced troubleshooting
- Preventive maintenance

Documentation Conventions

For safety, and to achieve the highest levels of performance, always follow the warnings and cautions in this manual when handling and operating the AIRSYS unit.



Danger. Emphasizes hazardous conditions that could cause personal injury or death.



Warning. Indicates where the operator must proceed with caution to avoid personal injury or damage to property.



Important. Indicates technical information critical for proper installation or operation.

Table 1 lists symbols and their meaning that may appear on the external packaging.

Table 1: Packaging Symbols

Symbol	Meaning	Symbol	Meaning
	THIS SIDE UP Shows the orientation of the unit.		NO HOOKS Do not use hooks to lift the packed unit.
	FRAGILE Handle with care.		KEEP AWAY FROM HEAT The unit must be kept away from heat sources.
	PROTECT AGAINST RAIN: The packaged unit must be stored in a dry place.		DO NOT STACK

Unit Identification

Each unit is identified by a model number, such as M-ID.10E1D3DR407.230/1/60.AC.L. The elements in the number are explained in **Table 2: Model Number**

MOBILECOOL-INDOOR	.	13	E1	D3	D	R407	.	220/1/60	.	AC	.	L
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Product series name: MOBILECOOL-INDOOR : Packaged air conditioner with fresh air free cooling, it can be abbreviated as “M-ID”.											
2	Separator character“.”											
3	Unit nominal cooling capacity by kW											
4	Compressor type & number: “E1” means the unit is equipped with 1 hermetic scroll compressor											
5	Cabinet size code: There are 3 cabinet sizes: D3.											
6	Control configuration: D: Dual control											
7	Refrigerant: R407=R407c.											
8	Separator character“.”											
9	Power source: Voltage/Phase/Frequency											
10	Separator character“.”											
11	AC means AC Electronically Commutated Supply Fan.											
12	Separator character“.”											
13	Special code L means Left installation; R means Right installation.											

For example:

M-ID.13E1D3DR407.220/1/60.AC.L: means MOBILECOOL-ID unit with 13 kW nominal cooling capacity, equipped with 1 hermetic scroll compressor; cabinet size is D3. Dual control; R407c refrigerant; The power supply is 220V/1Ph/60Hz; equipped with AC EC fan, Left installation (Air Damper direction).

Table 2: Model Number

MOBILECOOL-INDOOR	.	13	E1	D3	D	R407	.	220/1/60	.	AC	.	L
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Acronyms and Abbreviations

Table 3 lists acronyms and abbreviations used in this book.

Table 3: Acronyms and Abbreviations

Term	Meaning
AIRSYS	AIRSYS Refrigeration Engineering Technology (Beijing) Co., Ltd
AAST	AIRSYS Authorized Service Technician
Amp	Ampere, unit of electric current, or rate of flow of electricity
AUT/MAN	Automatic/Manual
BMS	Building Monitoring System
CFM	Cubic Feet per Minute
Com	Communication
Comp	Compressor
Cond	Condenser
DC	Direct Current
DG	Diesel Generator
Evap	Evaporator
FC	Free Cooling
HVAC	Heating, Ventilation, and Air Conditioning
Humid	Humidity
I/O	Input/Output
IPU	Indoor Packaged Unit
kW	Kilowatt
LED	Light Emitting Diode
MC	Mechanical Cooling
NC	Normally Closed
NO	Normally Open
pLAN	PCO controller Local Area Network
PLD	Programmable LED Display
PSI	Pounds per Square Inch
R	Read
R/W	Read/Write
Temp	Temperature
VAC	Voltage in Alternating Current
VDC	Voltage in Direct Current
WPU	Wall Pack Unit

Product Overview

Unit Operating Modes

The air conditioning system has three key components:

- The free cooling system
- The mechanical cooling system
- The control system

The control system determines the unit's mode of operation: free or mechanical, as shown in Figure 1.

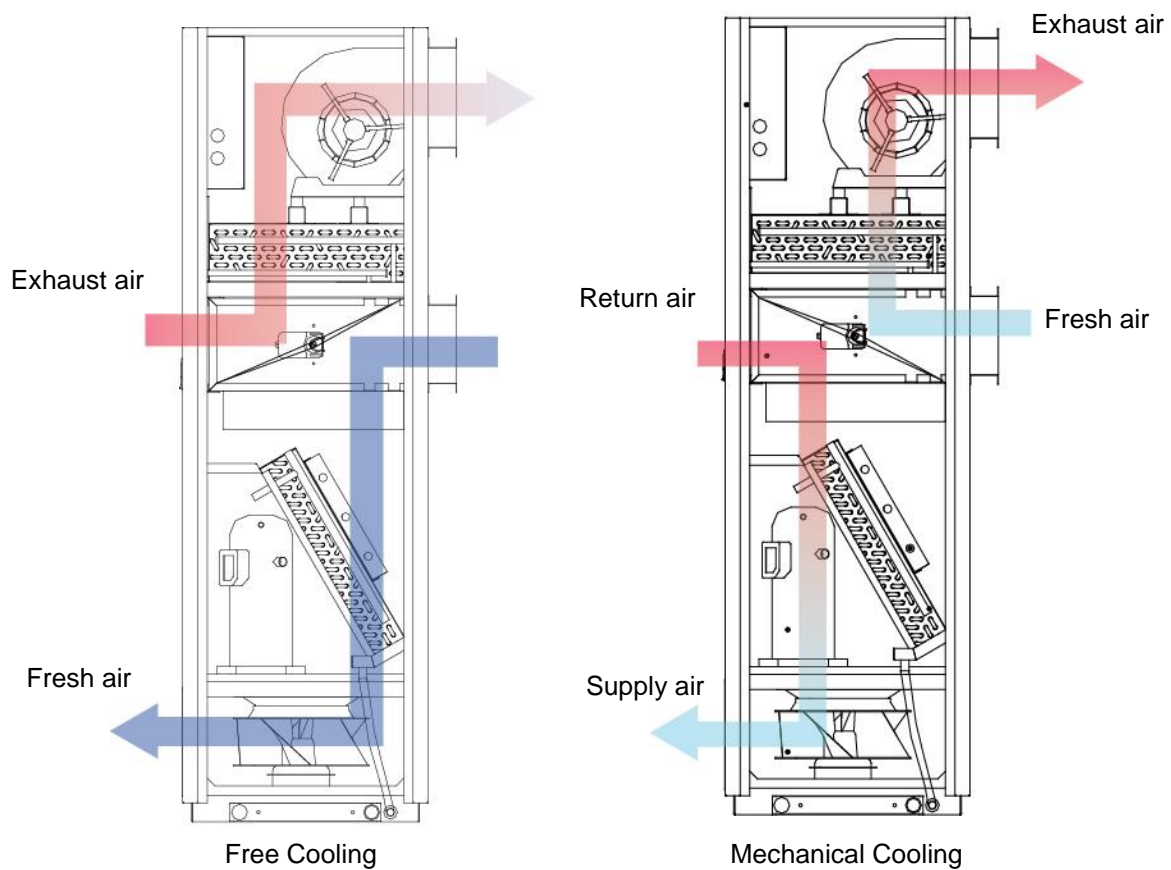


Figure 1: Basic Operating Modes

Free Cooling

When the operating conditions for free cooling are met, the control system switches the air damper to the free cooling position. Cooler air from outside is delivered to the shelter by the supply air fan. At the same time, hot air in the shelter is discharged to the outdoor environment.

Mechanical Cooling

When the operating conditions for mechanical cooling are met, the control system switches the air damper to the mechanical cooling position. The compressor compresses the refrigerant gas and sends it to the condenser. The condenser is a heat exchanger, removing heat from the hot compressed gas and allowing it to condense into a liquid.

The liquid refrigerant is then routed to the thermal expansion valve, which acts as a restriction device by forcing the refrigerant through a small hole. This causes the pressure to drop. Then the liquid refrigerant is routed to the evaporator. The evaporator is also a heat exchanger, absorbing heat from the indoor hot air causing the liquid refrigerant to change back into gas. The refrigerant gas is then routed back to the compressor to complete the cycle.

The refrigerant is used over and over again, absorbing heat from the indoor environment and discharging the condenser heat to the outdoor environment.

Controller Box

The AIRSYS controller box is designed to operate a fully or partially redundant air conditioning system for shelters or enclosures, Models are ASLLC.2 & ASLLC.2.48.

Element:	AS	L	L	C	.	2	.	48
Meaning:	AIRSYS	Lead	Lag	Controller	.	Control two HVAC systems	.	Utilized with HVAC systems that have 48Vdc drive fans

ASLLC.2 is standard for HVAC equipped with AC EC evaporator fan.

ASLLC.2.48 is standard for HVAC equipped with DC EC evaporator fan.

The controller box is factory programmed with standard industry set points, but can be configured on site to meet specific needs. Settings are retained indefinitely in the event of a power loss.

Ease of Control and Configuration

The controller box has a convenient Programmable LED Display (PLD). The PLD and button actions are explained in more detail in Chapter 3: System Operation. This three-button PLD is the user interface by which an operator can do the following:

- Check current status of the HVAC system such as sensor readings and operating mode
- Change factory set points
- Place the system temporarily into *comfort mode*
- Review alarms and alarm history

Labeling on the outside of the controller box provides a convenient guide on how to access the most common functions.

Many of these same functions can be accessed remotely via an RS485 communication interface built into the controller.

Lead and Lag Roles

When mechanical cooling (MC) is required to maintain site temperature, only one unit is called upon to provide the cooling. The system that has this primary role during MC is referred to as the *lead* system. The system functioning in a backup role during periods of MC is referred to as the *lag* system. After a set period of time, the lead and lag systems switch roles. This scheduled change of roles ensures an extended and balanced operational life for each unit.

The factory default for the scheduled switch of roles is 168 hours (seven days); however, this can be adjusted using the PLD from 1 to 999 hours.

The lag unit will provide MC if the lead unit is unable to maintain site temperature on its own. This MC assistance will occur if the heat load at the site is higher than the cooling capacity of a single IPU or if the system in the lead role is functioning at a reduced capacity. A system in this state should be serviced as soon as possible.

During periods of free cooling (FC), both the lead and the lag units work together. This ensures longer periods of FC, which minimizes compressor run time, thereby extending the life of the system and reducing energy consumption.

Chapter 2: Installation

Installation Preparation

Unpack the unit carefully. A number of parts are packed loosely and will be free moving as the packaging is opened. Before discarding the box, check the packaging carefully for any parts or documents inside. Refer to Table 4 on page 10 for the complete list of material shipped with each unit.

Check that:

- The supply voltage meets the requirements as designated:
AC part: 208/230 VAC \pm 10%;
DC part: 36VDC~57VDC.
- The shelter to be conditioned is clean on the inside, and free of excess dirt and dust.

A minimum clearance of 61 cm (24") between supply air and any equipment/rack or other obstruction is recommended since any interference with the airflow will adversely affect the efficiency of the machine.

Also verify that you have all of the items that the installer must provide, listed in Table 5 on page 14.

Installation and startup must be performed by an AIRSYS Authorized Service Technician (AAST).

For more information about the AAST program, please contact:

Tempest Telecom Solutions

w. <http://tempesthvac.com/>

ph. 805-879-5432

e. HVACSupport@tempesttelecom.com

136 W. Canon Perdido Street, Suite 100 Santa Barbara CA 93101



Danger. All the installation work must be done by a skilled professional. Installation that does not comply with the instructions herein can result in the loss of warranty coverage. AIRSYS shall not be held liable for any damage caused to persons or objects due to incorrect installation or incorrect operational use of the units.



Warning. All the wiring installation must comply with the local compulsory safety standards and building codes under all circumstances.



Warning. Outdoor use. Risk of electric shock can cause injury or death: disconnect all remote electric power supplies before servicing

When no longer in use, disposal of equipment and materials must be compliant with the local relevant laws and standards.

Delivery

When your units are delivered, be sure to inspect them to verify that they have not been damaged during transport. Also verify that all requested accessories listed on the purchase order have been included.



Important. If packages show **any** signs of shipping damage or potential shipping damage, it is very important to annotate *shipping damage* on the Bill of Lading **prior** to signing for the freight. In order to recover for any damage, please take detailed photographs of all the packaging **before** the external packaging is removed. Once detailed photos of the external packaging have been taken, then the external packaging may be removed so the items can be inspected further. Please document with photos any damage to the equipment that relates directly to the damage observed to the external packaging.

Without the detailed photos, it will be very difficult to recover equipment loss.

Warranty

The warranty duration is 12 months from the date of installation. AIRSYS warrants that its products will be free from defects in materials and workmanship for a period of 12 months after installation.

The compressor is to be free from defect in material or workmanship for a period of 60 months from date of installation.



Important. For sites equipped with a generator, when the generator switches to the primary source of power, the instantaneous voltage may become lower. At this time, the compressor may run at a lower voltage which may decrease the compressor's working life. Make sure **the wiring of Gen-Run signal input is connected** which can protect the compressor. The warranty does not cover damage to the compressor caused by repetitive out of specification condition of the supply voltage during compressor operation.

AIRSYS will furnish free of charge replacement parts for any component failures that occur within the warranty period. Customer is responsible for the cost of shipment of replacement material from the US distributor, Tempest Telecom Solutions LLC.

Note: Warranty assumes that an AIRSYS Authorized Service Technician (AAST) performs the installation and submits the warranty registration card that accompanied the units in shipment. If the warranty registration card was not filled out and returned to the supplier, the warranty will be assumed to expire 12 months from the date of shipment for all components except the compressor, which will be assumed to expire 60 months from date of shipment.

This warranty does not cover damage to the systems caused by misuse or abuse of the systems such as physical damage due to mishandling. The warranty does not cover damage caused by force majeure.



Important. Any mishandling of the equipment or modifications to the equipment, unless agreed upon in writing by AIRSYS, will void the warranty.

Moving the Unit

Forklifts are recommended for moving, loading, unloading, and positioning the WPU for installation. If bands or ropes are used to create a sling, make sure that excessive force is not applied to the upper edges of the machines or the package to avoid cosmetic or material damage. When using spacing bars, protective materials are required around the units to prevent damage.

To avoid damage to the units while moving or transporting, ensure the units always remain in the upright position.

General Safety Rules



Danger. Do not carry out any operation on the machines if you do not have sufficient knowledge of the operating principles and have not taken all the precautions that permit the system to operate in safe conditions.



Warning. Work on the electric board only after verifying prime power is disconnected. Do not apply power to the machine with the covers removed.



Important. Before carrying out inspections, maintenance operations, and safety checks, follow all accident-prevention standards such as wearing goggles, wearing gloves, and wearing appropriate uniform.

Required Materials

AIRSYS Supplied Materials

Table 4 lists all the material supplied by AIRSYS. After opening the package, verify that all items are accounted for. If any material is missing, please contact an AIRSYS distribution center using the following information:

Tempest Telecom Solutions,LLC

Web: <http://tempesthvac.com/>

Email: HVACSupport@tempesttelecom.com

Phone: 805-879-5432

Table 4: Material Supplied by AIRSYS

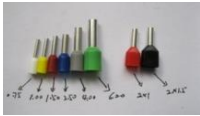

Item	Model #or Part #	Qty	Item Description	Comments
Indoor Packaged Unit Assembly: Two per Shelter				
1	(x)E1D(y)	1	HVAC Unit	x=10; y=3.
2		1	Rain cover	
Optional parts (Must be ordered separately)				
3	2170200110	1	90° Air baffle	Facilitates center path air flow for both IPUs
4	2021000770	1	Stand	Stand for two IPU 90° Air Baffles
5	ASPCB.2 (24 or48)	1	DC Fail-over box for DC powered supply fan only mode when prime power is lost	Installs between Prime Power and all three components: HVAC1, HVAC2 & ASLLC.2. Available to support 24 or 48 volt DC plants
Controller Box Assembly: One per Shelter				
6	2040303110 or 2040307640	1	Controller box	Model: ASLLC.2 or ASLLC.2.48
7	9000000357	1	Indoor temperature sensor (ST1)	One end connected inside the controller box
8	9000000357	1	Backup Indoor temperature sensor (ST1')	One end connected inside the controller box
9	9000000357	1	Outdoor temperature sensor (ST2)	One end connected inside the controller box

Item	Model #or Part #	Qty	Item Description	Comments
10	8454020720	1	Humidity sensor (SH)	One end connected inside the controller box
11	8458716820	1	Sensor box	For housing outdoor temperature sensor and mounting on outside wall
12	N/A	1	Installation and Operation Manual	
13	8453500390	1	PLD cable	From user terminal to HVAC 1 controller board
14	1110212510	1	Registration card	Must be returned according to instructions on Complete the Registration Card 36.
15	1110212560	2	Compressor removing bracket sticker	To remind the service technician to remove the compressor bracket before turning on the HVAC unit.
16	9000000357	2	Supply air temperature sensor (ST3&ST3')	
17	8458716650	4	Temp sensor hold connector	
18	1050500720	2	Right angle supply air temp sensor mounting bracket	

Installer Supplied Material

Table 5 lists items required for installation that must be supplied by an AIRSYS Authorized Service Technician (AAST). The wire length and gauge depends on site-specific conditions. However, recommendations are provided.

Table 5: Materials Supplied by the Installer

No.	Item	Qty	Description	Comments
1	AC power supply cable to two IPU's	2	2 cables for two IPU's, AC part (compressor & heater)	Refer to Nameplate
2	DC power supply cable to two IPU's (If the HVAC is equipped with DC EC supply fan)	2	2 sets of three –wire cable for two IPU's DC part (supply fan).	Refer to Nameplate
3	DC power supply cable to controller box	1	A set of three-wire cable for IPU controller box	Max current capacity 10 Amps; 11 gauge recommended
4	Control harness from controller box to IPU	2	Control harnesses with 13 wires from controller box to each IPU	Terminals recommended but not required. 18 gauge recommended
5	Alarm wiring harness	5	1 cable with 2 wires, length as needed	Alarm panel to controller box, 2 alarm inputs and 3 alarm outputs; all alarm connections are optional
6	Tin-coated paper	As needed	With single-sided adhesive	Used to line the return and supply air frames
7	Silicone sealant	As needed	Commercial grade outdoor silicone sealant	
8	Weather stripping	As needed	Commercial grade neoprene weather stripping or equivalent Recommend a minimum of 25 mm (~1") wide and 20 mm (~0.8") thick	Used to frame the WPU outlet and inlet to create a weather tight seal
9	Terminals	52		Recommended for ease of terminal block installation; however, not required
10	Crimping pliers	If needed		Only needed when using terminals
11	Nylon zip-tie	1	Small nylon zip tie	For properly dressing cables and harnesses
12	Breakers for AC power panel	3	One 10 amp circuit breaker for ASLLC.2; One circuit breakers each for the two HVACs AC part, amperage based on model number	Refer to Nameplate
13	Breakers for DC power panel (If ASLLC.2.48 is chosen and the HVAC is equipped with DC EC supply fan)	3	One 10 amp circuit breaker for ASLLC.2.48; One circuit breaker each for two IPU's DC part, amperage based on model number	Refer to Nameplate

Install IPUs

To assist in the installation process, the following figure and table provide the schematic dimensions of the units using a dimensional tolerance of $\pm 1/16''$ (2 mm).

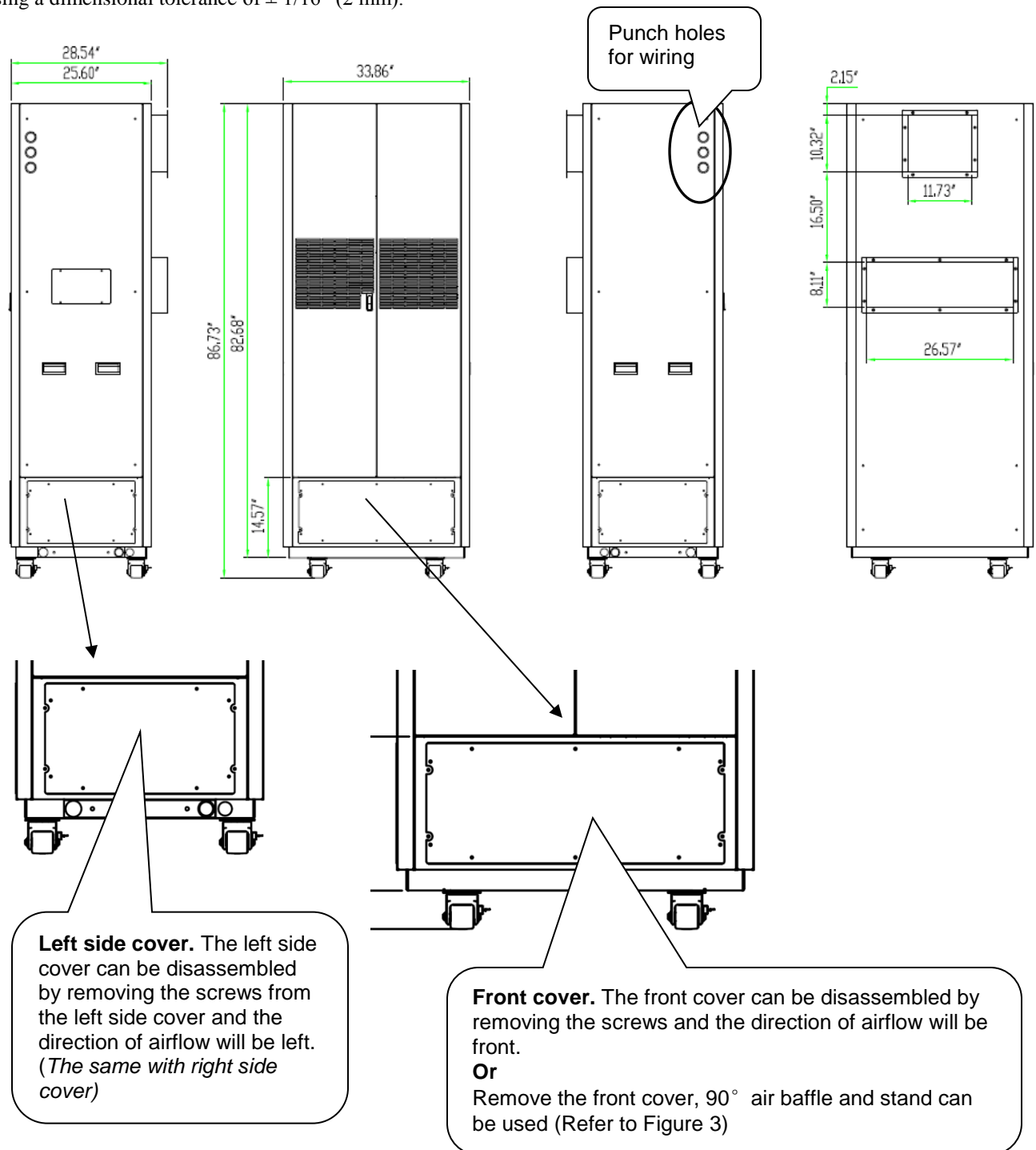


Figure 2: IPU Dimensions

Make Openings and Drainage Hole

Make openings for supply and return air and cable and bolt holes in the installation wall as shown in Figure 3 and Figure 4.

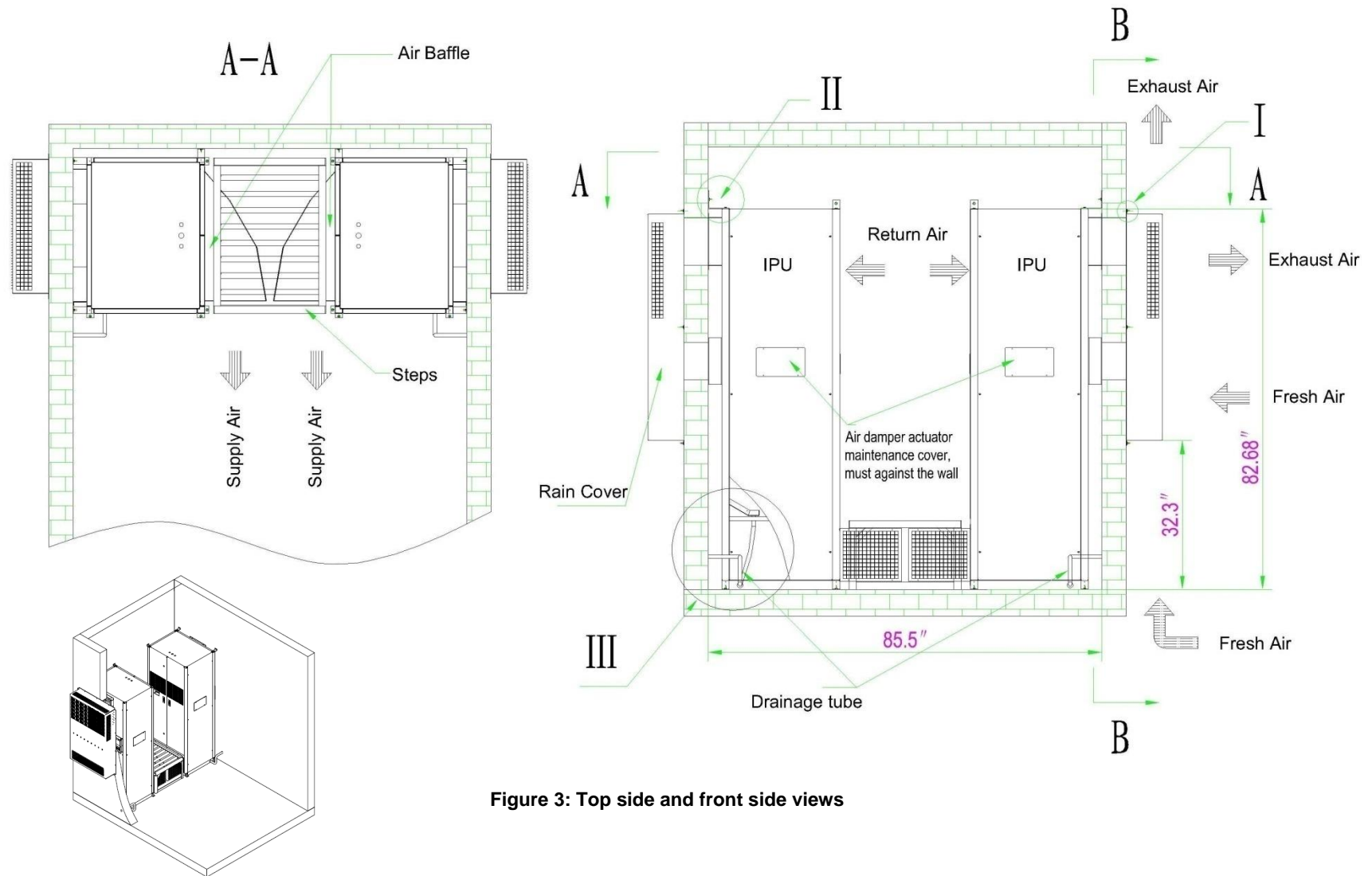


Figure 3: Top side and front side views

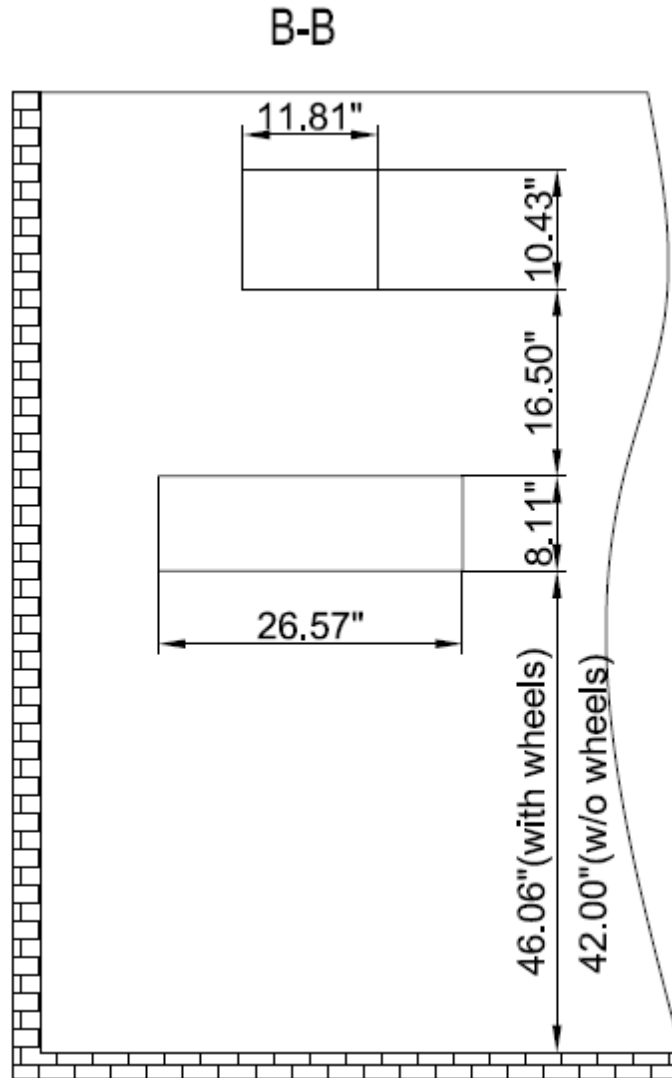


Figure 4: Openings and Drainage Hole in the Wall

Note the following:

Wall openings for supply air and exhaust air need to be smooth and straight to facilitate air flow. Aluminum tape can be used to smooth out rough surfaces especially edges and corners, and to seal any potential leakage path.

Install Weather Stripping

Before mounting the unit on the inside wall, fix the neoprene weather stripping (installer provided) around the openings of the air supply and the air return to ensure an airtight closure, as shown in Figure 5.

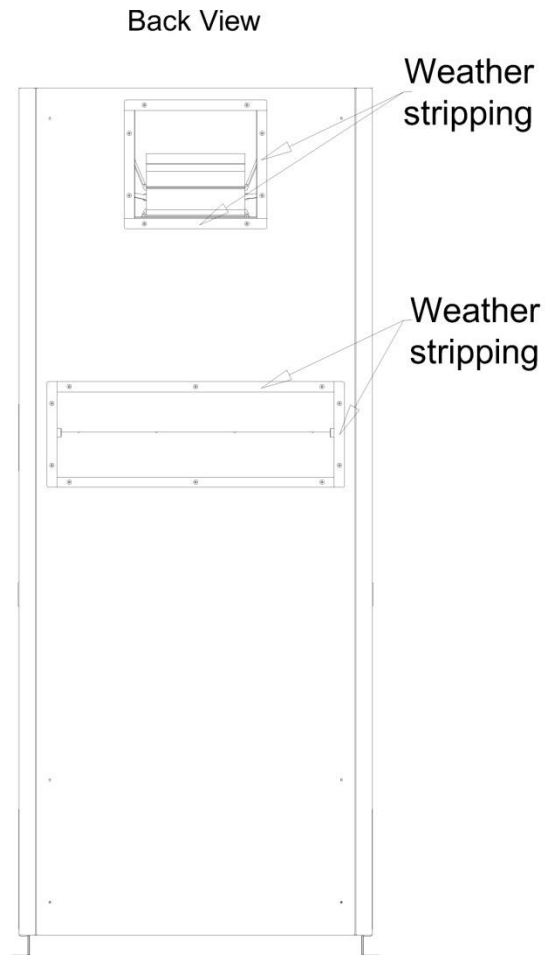



Figure 5: Install Sealing Strips

Position the Unit

 **Important.** The unit is heavy. Exercise caution while putting the unit in place to prevent damage to IPU or personnel.

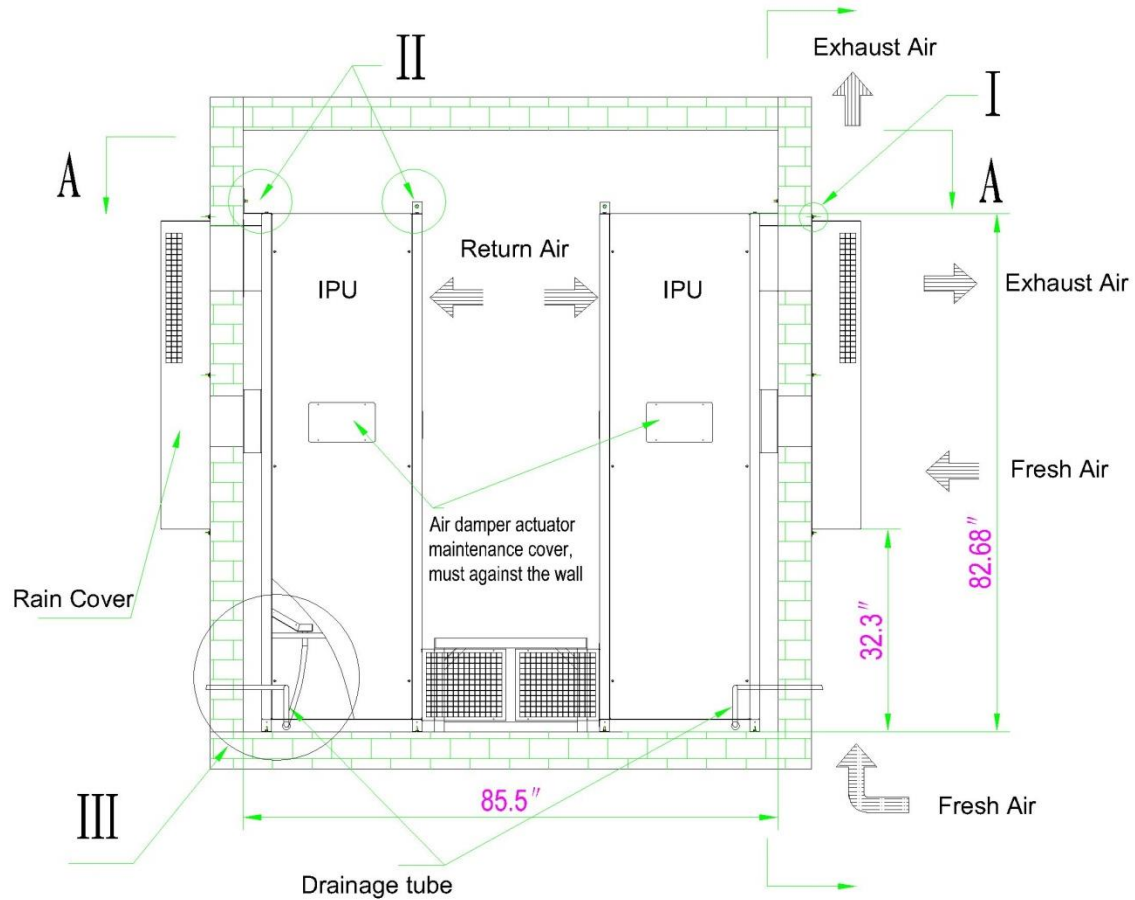


Figure 6: Position the unit overview

Note:

- I. Rain covers need to be fixed on the wall to protect water get into HVAC system when it is rainy day.
- II. The HVAC systems need to be fixed from the top to prevent shaking when the compressor is running.
- III. Drainage tubes need to be installed through the drainage holes to outside.

Install Controller Box

Find a suitable location inside the shelter between the two HVACs to mount the controller box. Mount the controller box so that the PLD is about eye level.

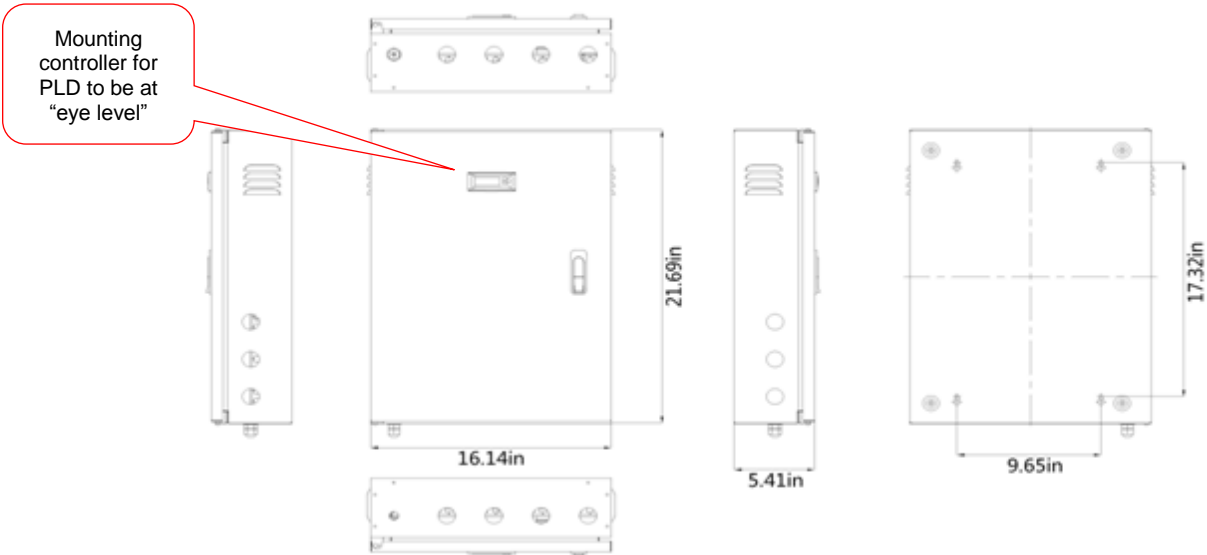
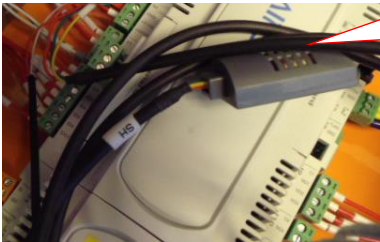

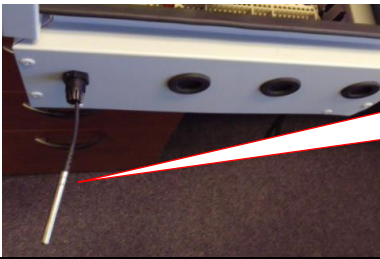



Figure 7: Controller Box Dimensions

Table 6: Key Components in the Controller Box Assembly

<p>Humidity sensor (SH)</p>  <p>Humidity sensor</p>	<p>Outdoor temperature sensor (ST2)</p>  <p>Outdoor temp sensor (ST2)</p>
<p>Indoor temperature sensor (ST1)</p>  <p>Indoor temp sensor (ST1)</p>	<p>PLD Cable</p>  <p>PLD Cable</p>

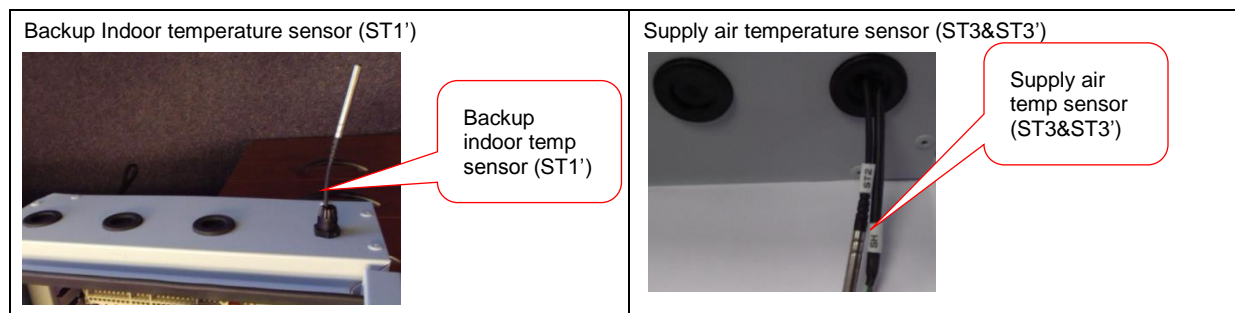


Figure 8 illustrates the basic arrangement of two IPUs and the controller box.

Note: The prime power feed to all three components should be in parallel. Each unit should have a unique breaker/fuse connection to the main power service.

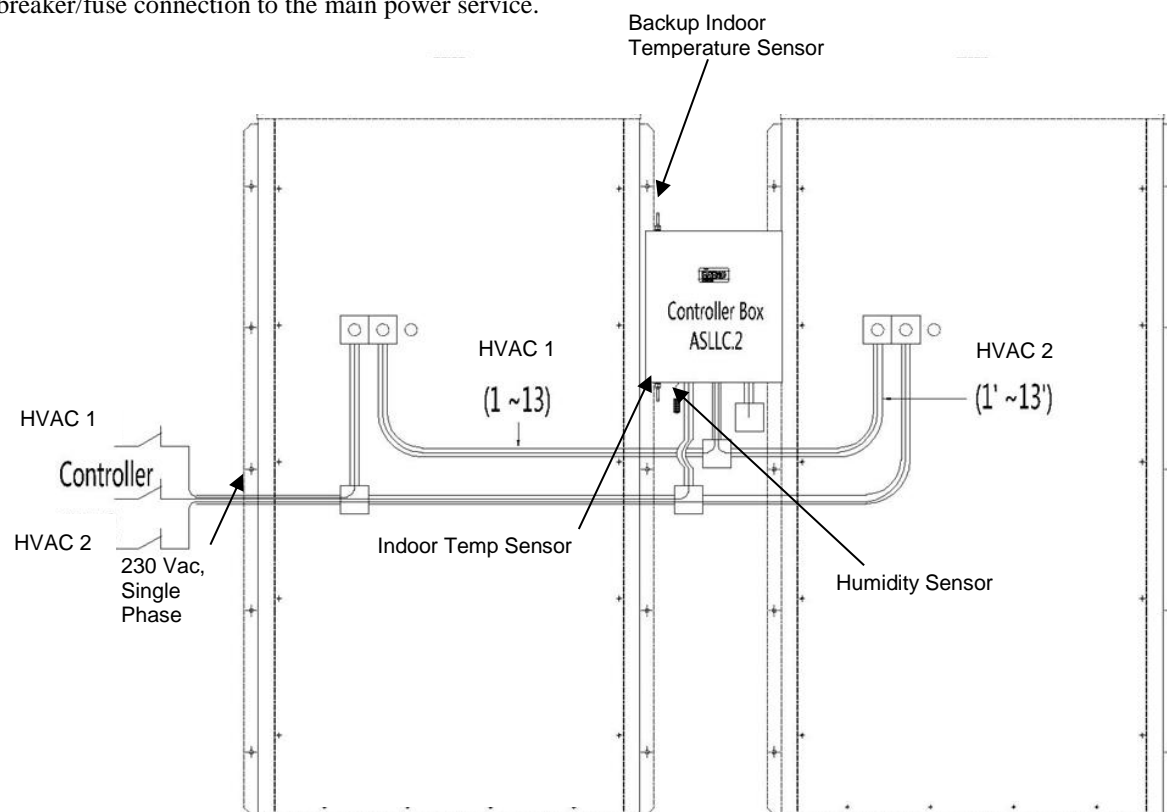


Figure 8: System Block Diagram

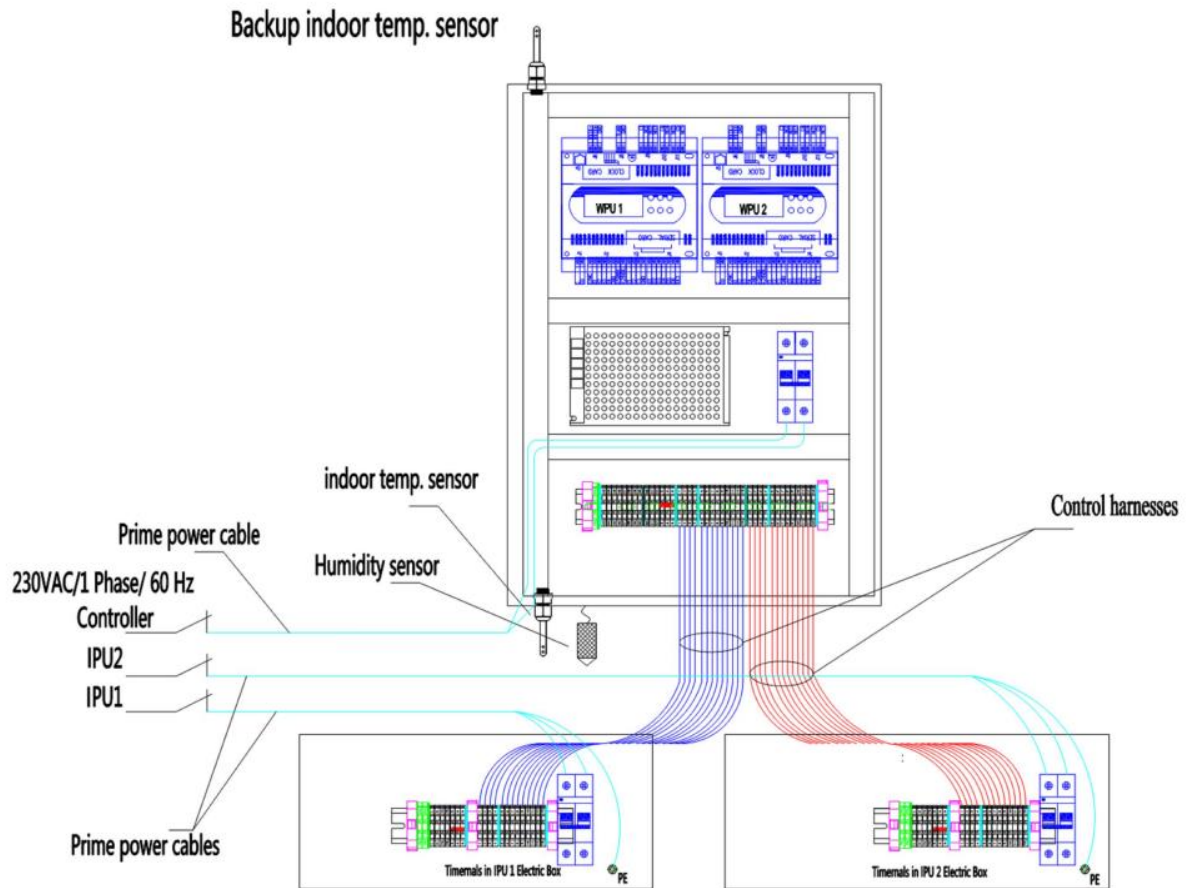
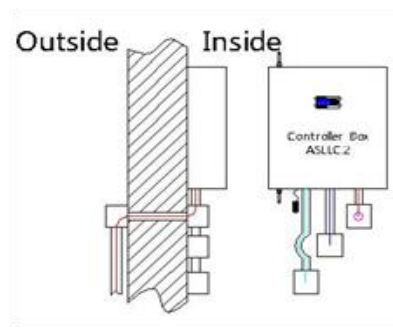


Figure 9: System Schematic Diagram

Install Outdoor Temperature Sensor

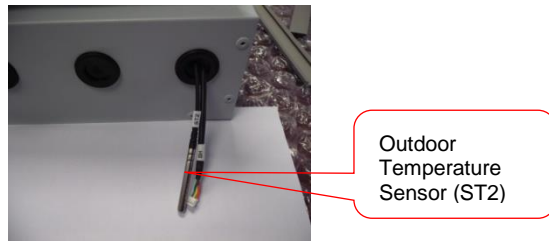
The outdoor temperature sensor that is connected to ASLLC.2 must be installed outside the shelter. Use the following steps to complete this task.

1. Drill a 0.5 inch diameter hole for the outdoor temperature sensor through the shelter wall.



2. Open the controller box assembly and locate the outdoor temperature sensor (ST2) assembly.

3. Thread the outdoor temperature sensor through the right-hand port at the bottom of the controller box.



4. Remove the sensor box from the controller box and make 4 holes toward one side of the box as shown below.



5. Thread the outdoor temperature sensor from the controller box through the hole in the bottom of the box.



6. Secure the sensor to the bottom of the box with a nylon zip-tie.
7. Secure the box to the outside wall. Then, snap the sensor box cover in place and provide a bead of silicon sealant along the seam between the box and the wall.




 **IMPORTANT:** Please mount outdoor temp sensor close to the IPU vents and where the sensor box will be exposed to as little direct sunlight as possible. Direct sunlight will warm the sensor box which can alter the accuracy of the outdoor temp sensor measurements and lead to errant alarms.

Figure 10 illustrates the relationship of the sensor to the installed IPU's

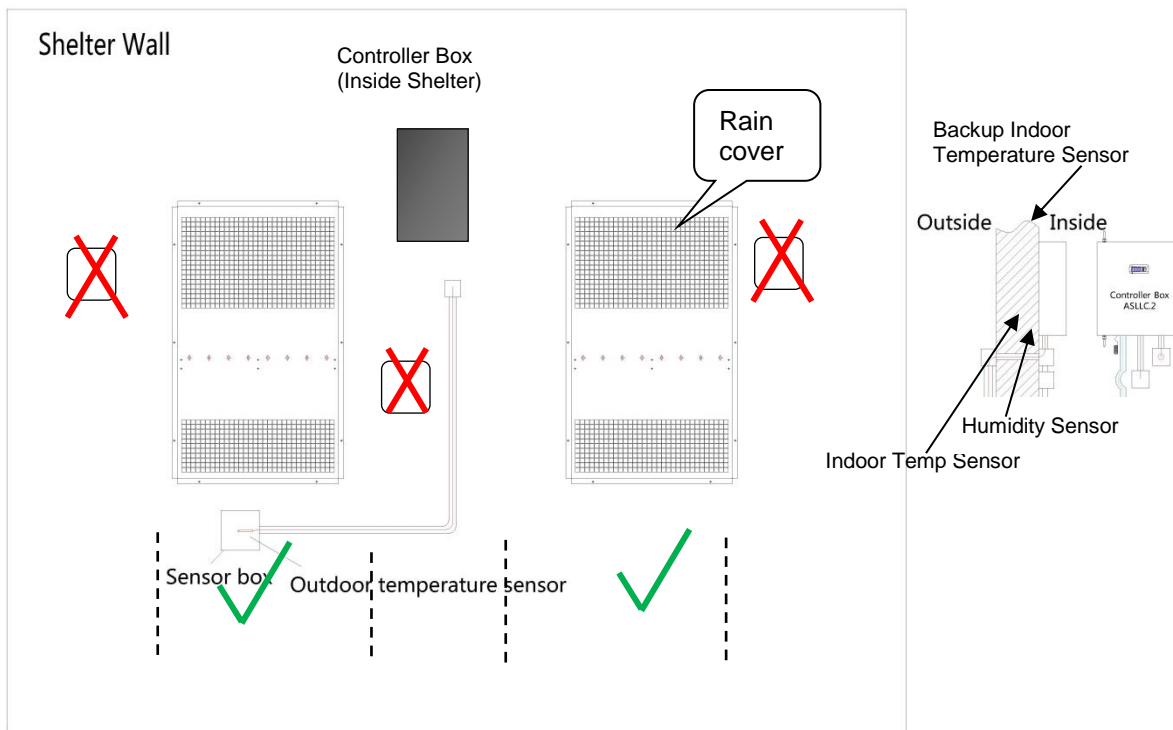


Figure 10: Location of Outdoor Temperature Sensor

Note: All four holes face downward to allow airflow and facilitate drainage from rain and dew.

! Important. Ensure no air leakage exists from inside the shelter to the box housing the outdoor temperature sensor. Any path whereby air could exit the shelter and arrive in the sensor box will adversely affect the outdoor temperature sensor reading. The hole in the shelter wall where the outdoor temperature sensor has passed through must be 100% sealed so no air can leak out of the shelter.

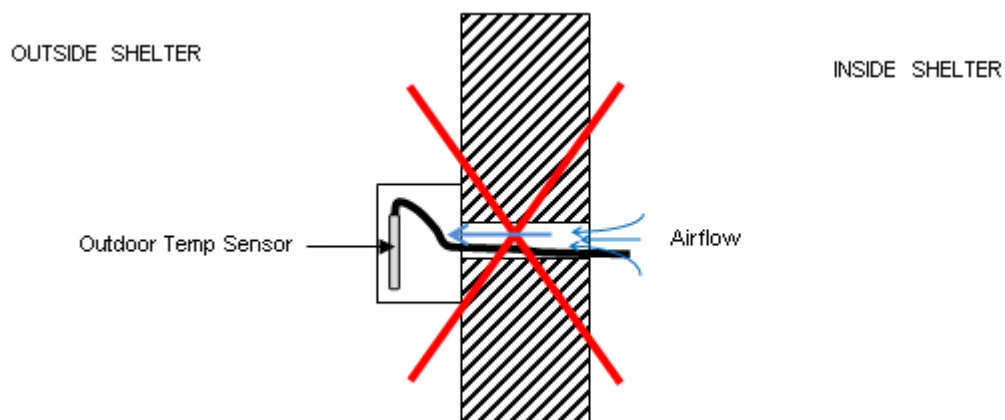
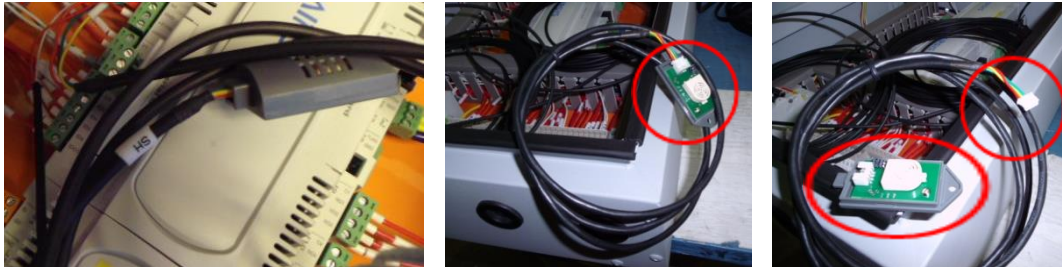


Figure 11: Ensure No Leakage

Position the Humidity Sensor

Follow these steps to install the humidity sensor that is connected to the controller box:

1. Open the controller box assembly and locate the humidity sensor (SH) assembly.
2. Remove the cover of the humidity sensor, and then unfasten the harness from the sensor.



3. Thread the harness through the hole at the bottom or top of the controller box and reattach the sensor and then the cover.



IMPORTANT: When re-attaching the humidity sensor to its cable harness please ensure the harness connector is pressed **FIRMLY** back into position other wise intermittent or inconsitent humidity readings could occur.

Position Indoor Temperature Sensors


An indoor temperature sensor is located at the bottom of the controller box and a backup temperature sensor at the top of the controller box. The sensor monitors the shelter temperature which is used by the controller to control IPU operation. Slide the sensor through the port on the bottom left side of the controller box. Tighten the port cover to hold the sensor cable in place. Follow the same steps to position the backup sensor at the top of the box.





Figure 12: Position Indoor Temperature Sensor


Complete Electrical Connections


Cautions

 **Danger.** Only an authorized service technician should make the electrical connections to the HVAC systems and ASLLC.2.

 **Important.** The electrical wiring of the unit must be in compliance with IEC standards or with appropriate national standards.

 **Danger.** The power supply must be disconnected or turned off before working on the unit.

 **Important.** Noncompliance with these instructions may cause damage to the HVAC systems or ASLLC.2. Not following instructions can void the warranty.

 **Important.** No modification to the unit's electric circuit is allowed. If a change is required, it must be authorized by AIRSYS in writing.

Overview of Wiring

Figure 13 illustrates the wiring terminals in the control box. Each unit has an identical set of terminals. The terminal numbers for the second unit are distinguished with a single quote (') after the number.

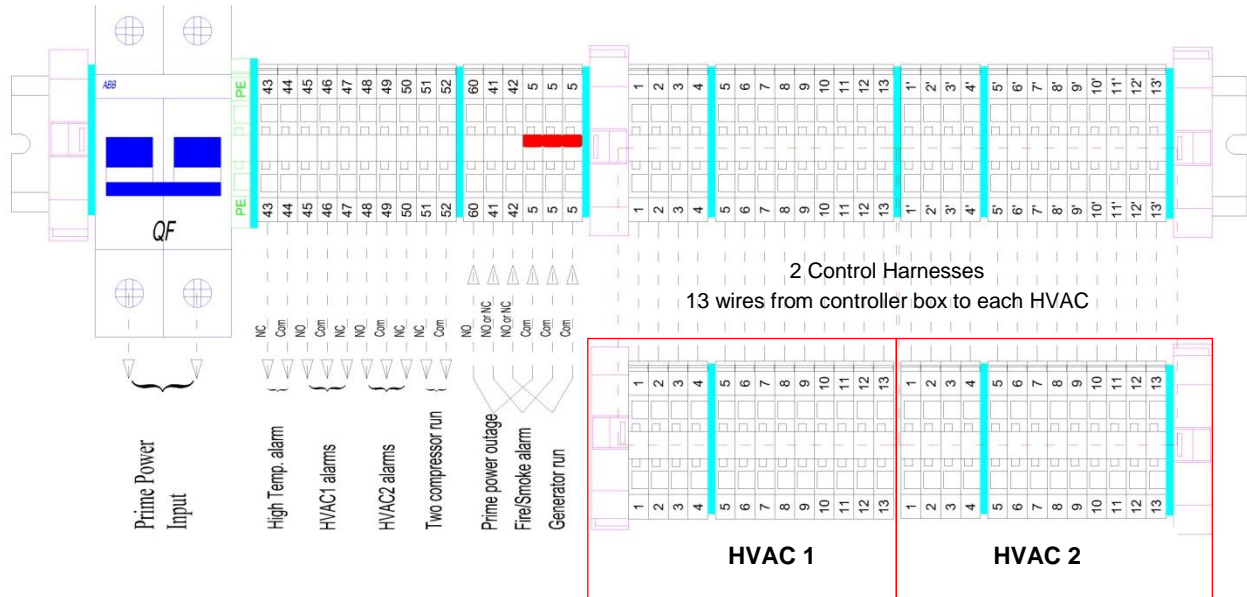


Figure 13: Field Wiring Terminals

Table 7: Alarm Connections

	Alarm Name	Alarm Type (Input/ Output)	Severity	Default (NC or NO)	Adjustability (S=software via PLD) (HW= Hard Wired)	Connections To ASLLC.2	Related Alarm codes:	Comments
Form C Contact Alarm INPUTS	Fire/Smoke alarm	Input	Critical	NC	S --> parameter 5 F t	41 and 5	A05 Only	Remove factory jumper prior to connecting alarm input
	Generator Run	Input	None	NO	S --> parameter d U t	42 and 5	A28 Only	Connected to Gen-Run signal
	Prime Power Outage	Input	Major	NO	NA	60 and 5	A09 Only	Only when using DC Fail- Over Box: ASPCB.2
Form C Contact Alarm OUTPUTS	High/low temperature alarm	Output	Critical	NC	S --> parameter H t t	43 and 44	A07	Can connect in series for NC or in parallel (NO) with analog High/low Temp thermostats in many sites.
	HVAC1 alarms	Output	Major	NO	HW	45 and 46	A02, A03, A10, A29, A31	Means Mechanical cooling is disabled until problem is addressed on site
				NC		46 and 47		
	HVAC2 alarms	Output	Major	NO	HW	48 and 49	A04, A06, A11, A30, A32	Means Mechanical cooling is disabled until problem is addressed on site
				NC		50 and 49		
	Two compressor run	Output	Minor	NC	S → parameter z U t	51 and 52	A23	Indicates compressors running in both Lead & Lag WPUs simultaneously

Control Harness Terminal Identification

Table 8: The control harness terminal identification of ASLLC.2

AC power part	Terminal 1	MC, compressor	The voltage between terminal 1 & terminal 4 is 240Vac
	Terminal 2	MF2, supply fan	The voltage between terminal 2 & terminal 4 is 240Vac
	Terminal 3	EH1-3, electrical heater	The voltage between terminal 3 & terminal 4 is 240Vac
	Terminal 4	L, L of line voltage	Line voltage
Alarm part	Terminal 5	Common terminal	Common terminals for alarms
	Terminal 6	LP, low pressure switch	Between terminal 6 & terminal 5 is NC
	Terminal 7	HP, high pressure switch	Between terminal 7 & terminal 5 is NC
	Terminal 8	PF, air pressure differential switch	Between terminal 8 & terminal 5 is NC
	Terminal 9	MF2, output the operating status of supply	Internal overload protection, it is NC.
DC power part	Terminal 10	YE, input signal to air damper actuator	The signal voltage for damper actuator, 0~10Vdc
	Terminal 11	MF2, input signal to supply fan	The signal voltage for supply fan, 0~10Vdc
	Terminal 12	Ground	Power supply for Damper actuator,
	Terminal 13	24 VDC	Power supply for Damper actuator, the voltage between terminal 12 & terminal 13 is 24Vdc.

Table 9: The control harness terminal identification of ASLLC.2.48

48 VDC power part	Terminal 1	MC, compressor	The voltage between terminal 1 & terminal 12 is 48Vdc
	Terminal 2	HVAC prime power powered off	Open (The resistance is ∞)
	Terminal 3	EH1-3, electric heater	The voltage between terminal 3 & terminal 12 is 48Vdc
	Terminal 4	None	
Alarm part	Terminal 5	Common terminal	Common terminals for alarms
	Terminal 6	LP, low pressure switch	Between terminal 6 & terminal 5 is NC
	Terminal 7	HP, high pressure switch	Between terminal 7 & terminal 5 is NC
	Terminal 8	PF1, air pressure differential switch	Between terminal 8 & terminal 5 is NC
	Terminal 9	PF2 or PF2&3, output the operating status	Between terminal 9 & terminal 5 is NC
24 VDC power part	Terminal 10	YE, input signal to air damper actuator	The signal voltage for damper actuator, 0~10Vdc
	Terminal 11	MF2, input signal to supply fan	The signal voltage for supply fan, 0~10Vdc
	Terminal 12	Ground	Power supply for Damper actuator,
	Terminal 13	24 VDC	Power supply for Damper actuator, the voltage between terminal 12 & terminal 13 is 24Vdc.

Refer to Figure 9: System Schematic Diagram on page 22 lists some of the key alarm connections in the wiring.

Electrical Connection to ASLLC.2/ASLLC.2.48

Follow these steps to complete the connections:

1. Open the door of ASLLC.2.
2. Plug the PLD cable (item 12 in Table 4: Material Supplied by AIRSYS on page 12) to the user interface terminal located on the inside of the controller box cover.



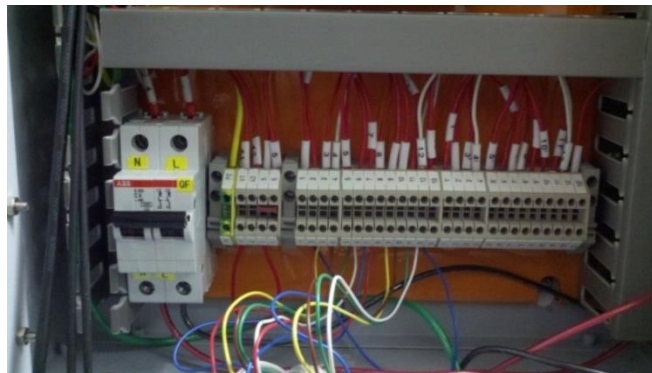
3. Then plug the other side to the HVAC 1 controller board terminal J7 as shown below.



Labeled HVAC 1 or HVAC 2

⚠ IMPORTANT: Make sure the PLD cable is pressed **FIRMLY** back into position to the back of the PLD and to the HVAC1 controller J7 port. Socket can slide out during removal and must be re-seated properly to ensure a good electrical connection between the PLD user interface and the HVAC 1 controller module.

4. Connect the HVAC 1 control harness in the controller box. When this is complete, do the same for the HVAC 2 control harness. Refer to Figure 9: System Schematic Diagram on page 22



5. Connect the prime power from the primary supply to the controller box as shown in the picture below.



Electrical Connection to IPU's

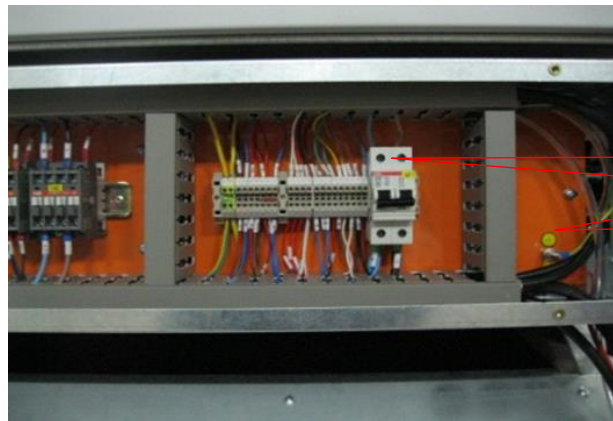
Two wire harnesses are passed through the shelter wall into the IPU's:

- Control harness
 - Prime power
1. Bring the control harness (item 3 in Table 5: Materials Supplied by the Installer on page 14) from the controller box to the IPU by passing it through one of the three available punch-outs on each side of the IPU. Make the thirteen wire connections inside the IPU according to Figure 13: Field Wiring TerminalsFigure 13: Field Wiring Terminals on page 27.



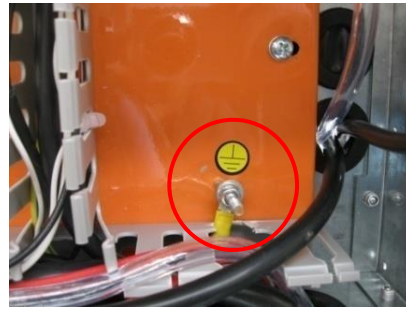
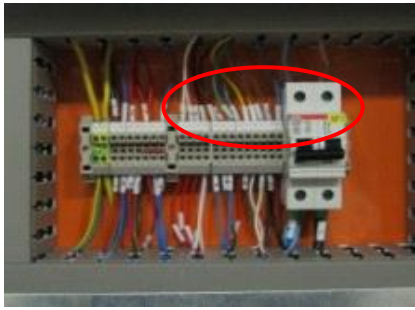
Control harness
connections in the HVAC
system

2. Connect prime power from the primary supply to each IPU.



Prime power
connections to IPU

3. The complete connection should look like the following pictures.



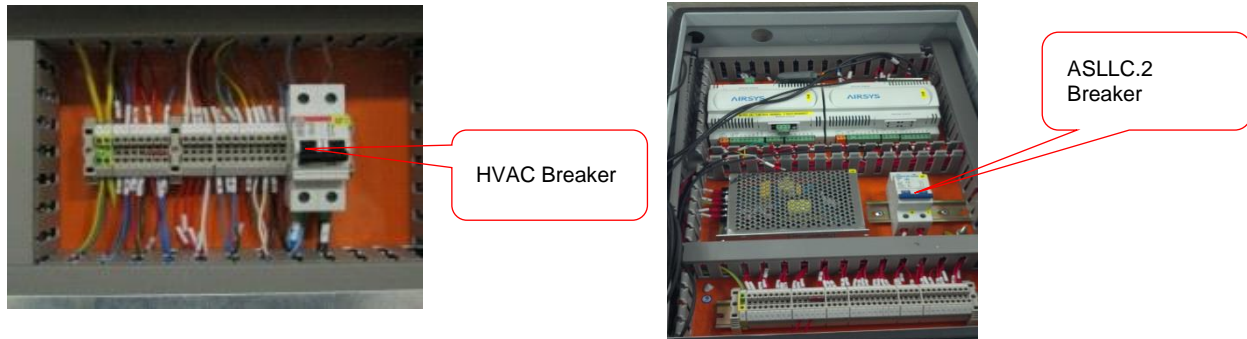
Complete the Installation Checklist

You should now have completed all of the physical installation steps. However, before starting the system, ensure that no steps have been omitted by completing this installation and wiring checklist.

Date: _____ Unit Factory Number: _____ (refer to the unit name plate)	
Installation	✓ or X
Weather stripping has been attached to the air inlet and outlet of the IPU at the room side.	
The entire machine is fastened to the interior wall to prevent travel during MC operation.	
All potential air leaks have been sealed with commercial grade high reliability sealant.	
The indoor temperature sensor, backup indoor temperature sensor, and humidity sensor have been mounted around the controller box inside the shelter.	
The supply and return air paths are smooth with no air leakage paths.	
The outdoor temperature sensor is inside the sensor box and mounted outside the shelter. Sensor box drain holes are facing downward and the through hole in the shelter wall has been sealed.	
Wiring	
A one-to-one correspondence exists between 1 to 13 connections from IPU to controller box.	
The 1 to 13 connections are secure.	
The main voltage connections between each HVAC system and the prime power panel are secure.	
The main voltage connections between the controller box and the prime power panel are secure.	
Proper clearance is allowed between the cables and air damper in the HVAC system to avoid interference.	

Turn On Component Breakers

After completing the checklist, turn all three breakers to the on position: one in each HVAC and one in the ASLLC.2. Then reattach all covers and panels before turning on the breakers in the prime power panel.



Verify the Installation

To verify the installation, you will complete these steps:

- Turn on the switches at the main power supply.
- Execute the step-test to verify the equipment is functioning correctly.
- Turn the system on.
- Set the correct time.
- Fill out the registration card and mail it to the address on the back of the card so the warranty period can be properly established.

Three of these steps require using the PLD interface. Additional details on using the PLD to perform operational functions can be found in Chapter 3: System Operation starting on page 37. The steps that require using the PLD in this section are in summary form.

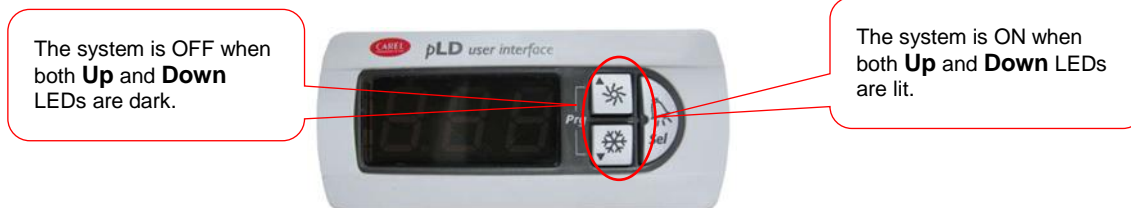
Turn on Primary Power

Turn on the primary power breakers at the breaker panel in this order: first the two HVAC breakers, then the controller box.

Note: The PLD display should light up and after a brief delay should display the inside temperature. If all instructions were followed correctly, you are still likely to get an A09 alarm. This is normal. Any other alarm should be investigated, with the most common cause being a mistake in the wiring. Pressing the **Sel** button will clear the alarm.

Use the information in **Alarm Descriptions** on page 46 to understand the meaning of any alarms. Chapter 3 includes detailed information on PLD operation and how to understand and respond to alarms.

Execute the Step-Test



The step-test systematically verifies that key components of the system are operating as expected.

Note the following considerations:

- The steps in the test can be executed in any order; they do not need to be sequential.
- The test must be completed within 30 minutes. If you cannot complete it in that time, you will need to start again.
- The system will display the main menu (indoor temperature) automatically after ten minutes when there has been no input from the technician.
- If any alarms are triggered during the test, refer to “Alarm Descriptions” on page 61 for details.
- After completing the step test, you must turn the HVAC system ON to resume normal operation.

As you execute the test, mark off each step in the appropriate column of Table 10: Step-Test.



Warning. Once a compressor has been turned on, it must be allowed to run for at least one minute before shutdown to prevent damage.

Table 10: Step-Test

Step #	Description	Notes	✓ or X
Step 1	Verify HVAC 1 supply fan is working normally		
Step 2	Verify HVAC 1 heater is working normally	A few minutes may be required for heated air to be noticeable. Allow enough time to verify operation.	
Step 3	Verify HVAC 1 compressor is working normally	The compressor must run at least 1 minute before it is shut off.	
Step 4	Verify HVAC 1 free cooling is working normally	Air damper will open fully. This can be best observed outside the shelter at the HVAC.	
Step 5	Verify HVAC 2 supply fan is working normally		
Step 6	Verify HVAC 2 heater is working normally	A few minutes may be required for heated air to be noticeable. Allow enough time to verify operation.	
Step 7	Verify HVAC 2 compressor is working normally	The compressor must run at least 1 minute before it is shut off.	
Step 8	Verify HVAC 2 free cooling is working normally	Air damper will open fully. This can be best observed outside the shelter at the HVAC.	

To complete the test, follow these steps (for more detail see “Executing the Step-Test” on page 41):

1. Press the **Up** and **Down** buttons together to enter the main screen. The screen will display the indoor temperature. If the indoor temperature does not display, press both buttons again and repeat as needed.

2. When the system is on, press the **Up** and **Sel** buttons together for 3 seconds. The user terminal will display **5 F t**. Press the **Up** button until **CL d** displays. When the system is off, press the **Up** and **Sel** buttons together for 3 seconds and the user terminal immediately display **CL d**.
3. Then press **Sel** to confirm. The screen displays **0**. Press the **Up** button to check each step (1-8). When **1** displays, press **Sel** to confirm. The user terminal displays **CL d**. Repeat this by selecting each numbered step.
4. Record success or failure in Table 10: Step-Test.
5. When the step-test is complete, return to the main menu and turn the HVAC system on.

Note: After 30 minutes in step-test mode, the system will automatically return to the main menu.

Turn the HVAC System On

1. Press the **Up** and **Down** buttons together to enter the main screen.



Press both buttons together to enter the main screen

2. Press **Down** or **Up** until the screen displays **0 F F**.



Press until screen displays **0 F F**

3. If the screen displays **0 F F**, press the **Sel** button for 3 seconds. The screen will display **0 n**, indicating that the system is turned on. Press **Down** and **Up** together again to return to the main screen and display the indoor temperature.



Press the button for 3 seconds

Note: When the system is **0 n** both the **Up** and **Down** LEDs will be lit. When the system is **0 F F** both the **Up** or **Down** LEDs will be dark.



Warning. Never leave the site with the HVAC system in the off state (**Up** and **Down** LEDs dark). Your site will have no cooling, which likely will result in a high temperature alarm requiring an urgent site visit to correct.

When the HVAC system is on, the PLD will look like the following picture.



Set System Time

The system time parameters are listed in Table 11. R/W means that the code can be viewed and updated.

Table 11: System Time Parameters

Display	R/W	Description	Range
n 15	R/W	Display and set the current time/date - hour	0~23
n 16	R/W	Display and set the current time/date - minute	0~59
n 17	R/W	Display and set the current time/date - year	0~99
n 18	R/W	Display and set the current time/date - month	0~12
n 19	R/W	Display and set the current time/date - day	0~31

1. Press the **Up** and **Down** buttons together to enter the main screen. The screen will display the indoor temperature. If the indoor temperature does not display, press both buttons again and repeat as needed.
2. Press the **Down** button until SEt displays. Then press the **Sel** button. The user terminal will display $SEt P$.
3. Press the **Down** button until the screen displays n 15; then press **Sel** to confirm. Set the current hour; then press **Sel** to confirm.
4. Press the **Down** button until the screen displays n 16; then press **Sel** to confirm. Set the current minute; then press **Sel** to confirm.
5. Press the **Down** button until the screen displays n 17; then press **Sel** to confirm. Set the current year; then press **Sel** to confirm.
6. Press the **Down** button until the screen displays n 18; then press **Sel** to confirm. Set the current month; then press **Sel** to confirm.
7. Press the **Down** button until the screen displays n 19; then press **Sel** to confirm. Set the current day; then press **Sel** to confirm.

Complete the Registration Card

The information on the registration card is critical for establishing the warranty start point.

AIRSYS

AIRSYS PRODUCT WARRANTY REGISTRATION CARD

PRODUCT INFORMATION

Controller Part # _____ Model # _____ Serial # _____

WPU #1 (left of controller) Part # _____ Model # _____ Serial # _____

WPU #2 (right of controller) Part # _____ Model # _____ Serial # _____

INSTALLATION INFORMATION

Location Site # _____ Site Name _____

Street address _____ City _____ State _____ Zip _____

Date Install Completed ____/____/____ Installation Company _____

Installer Name _____ Installer Phone # _____ Installer email _____

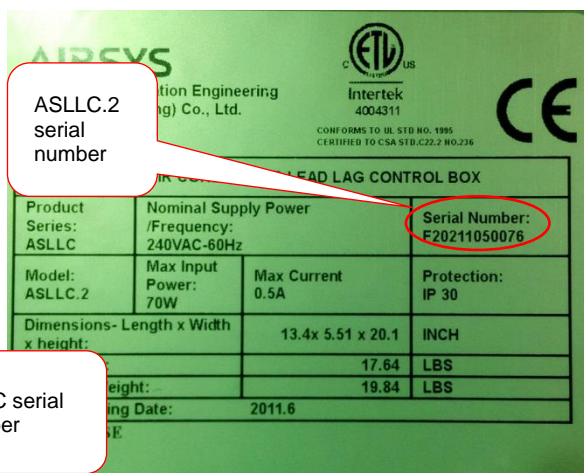
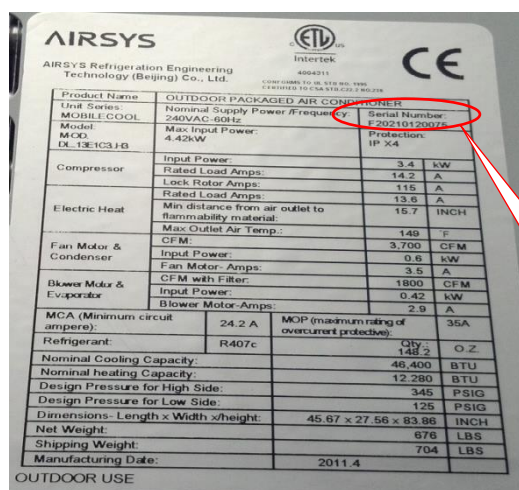
OWNERSHIP INFORMATION

Company _____

Site supervisor name _____ Site Sup # (____) _____ Site Sup email _____

Mail Card to:
 Attn: AirSys Product Registration Tempest Telecom Solutions, LLC, 136 W. Canon Perdido, Suite A Santa Barbara, CA 93101
 Or scan and email to: HVACsupport@tempesttelecom.com

The following pictures show the location of the serial numbers for HVAC system and ASLLC.2 that you must record on the registration card.



Chapter 3: System Operation

This chapter describes how to use the PLD interface to execute the functions needed during standard operation. In addition, reference information is supplied on all of the factory default settings. This information may be useful during troubleshooting and in conversations with technical support.

The following topics are covered:

- Using the Main Menu to execute basic functions
- Understanding alarms that may occur and clearing alarm history
- Additional system diagnostic information

User Interface Introduction




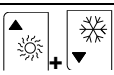
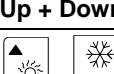
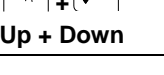
The units are controlled using a simple interface with an LED display and three buttons.



Figure 14: PLD User Interface

Button actions are described in Table 12: PLD Button Actions.

Table 12: PLD Button Actions

Button and LED	Function Description
 Sel	Confirm or review the value. When the LED is on, indicates that an alarm has been triggered.
 Up	Increase value or go back to previous display. When flashing (slow flash), there is no Mechanical Cooling on HVAC 1 (aka Lockout)
 Down	Decrease value or go to next display. When flashing (slow flash), there is no Mechanical Cooling on HVAC 2. (aka Lockout)
 Up + Down	Press together to return to the main menu. When both of these buttons are lit, the system is on. When both are dark, the system is off.
 Up + Down	When both of these buttons are flashing <u>every second</u> , the system is in comfort mode.
 Up or Down +	When Up and Down buttons are flashing <u>every 2 seconds</u> , alarm button is red, means the HVAC1 & HVAC2 are in lockout, need manual reset. Note: Power cycling the controller will clear the lockout condition Note: Please check the system is not in comfort mode (Up and Down button are both flashing every second).

Navigating the Main Menu

Pressing **Up** and **Down** at the same time returns the PLD to the Main Menu. The default main menu display is the current room temperature. Use **Up** or **Down** to access the other options on the main menu. The order of the options varies depending on whether the HVAC system is currently on or off.

lists the options on the main menu when the system is **off**;

lists the options on the main menu when the system is **on**.

Note: Option A-10 (**SPE**) lets an AAST access all of the preconfigured system parameters. These are described in “System Parameters and Default Values” on page 52.

In the table, the following abbreviations are used:

Ref	Reference number for the code
R	The parameter can only be viewed, not changed.
R/W	The parameter can be both viewed and updated.

Table 13: Main Menu (A) with System Off

Ref	Display	R/W	Description	Unit	Range	Default
A-1	77.3	R	Current indoor temperature; default display	°F	33.8~ 104	
A-2	OFF	R/W	Turn the system on at the terminal		On/Off	
A-3	COMF	R/W	Comfort mode ON/OFF		On/Off	Off
A-4	COMF t	R/W	Comfort mode run time	Hrs	1~9	1
A-5	SP2	R/W	Set comfort mode indoor temperature	°F	0.0~100	72.0
A-6	Hu	R	Humidity (Default: indoor)			
A-7	Et	R	Outdoor temperature	°F		
A-8	Su	R	Supply air temperature	°F		
A-9	Su2	R	Supply air temperature 2	°F		
A-10	SPE		Access other menus for viewing and modifying preconfigured system parameters			

Table 14: Main Menu (A) with System On

Ref	Display	R/W	Description	Unit	Range	Default
A-1	77.3	R	Current indoor temperature; default display	°F	33.8~ 104	
A-3	COMF	R/W	Comfort mode ON/OFF		On/Off	Off
A-4	COMF t	R/W	Comfort mode run time	Hrs	1~9	1
A-5	SP2	R/W	Set comfort mode indoor temperature	°F	0.0~100	72.0
A-6	Hu	R	Humidity (Default: indoor)			
A-7	Et	R	Outdoor temperature	°F		
A-8	Su	R	Supply air temperature	°F		
A-9	Su2	R	Supply air temperature 2	°F		
A-10	SPE		Access other menus for viewing and modifying preconfigured system parameters			
A-2	ON	R/W	Turn the system off at the terminal		On/Off	

Some of the options on the main menu let you view a sensor measurement (humidity, outdoor temperature, supply air temperature). Press **Sel** to display the value; press **Up** and **Down** together to return to the main menu.

Other options let you perform actions:

- Turn the system on and off.
- Start comfort mode.
- Set the comfort mode temperature.
- Access other menus.

These options are described in the following sections.

Turning the HVAC System On or Off

1. Press **Up** and **Down** together to enter the main screen.



Press both buttons together to enter the main screen

2. Press **Down** or **Up** until the screen displays either $\square n$ or $\square F F$. $\square n$ indicates the system has been turned on.



Press until screen displays $\square F F$ or $\square n$

3. If the screen displays $\square F F$, hold **Sel** for 3 seconds. The screen will display $\square n$, indicating that the system is turned on. Press **Down** and **Up** together again to return to the main screen and display the indoor temperature.



hold **Sel** for 3 seconds

If you want to turn the system off, repeat steps 1 and 2 and then press **Sel** for 3 seconds to change the $\square n$ to $\square F F$. Press **Down** and **Up** together again to return to the main screen and display the indoor temperature.

Note: When the system is $\square n$ both the **Up** and **Down** LEDs will be lit. When the system is $\square F F$ both the **Up** and **Down** LEDs will be dark.

Warning. Never leave the site with the HVAC system in the off state (**Up** and **Down** LEDs dark). Your site will have no cooling, which likely will result in a high temperature alarm requiring an urgent site visit to correct.

Using Comfort Mode

The settings on the HVAC system are optimized primarily for operating efficiency and not for the comfort of people. When you need to work inside the shelter for an extended period of time, you can temporarily adjust the site temperature to your personal preference. This temporary adjustment of site temperature is referred to as the *comfort mode*.



Important. The HVAC system must be *On* to enter comfort mode.

To turn comfort mode *On* (if it is currently off) or *Off* (if it is currently on), press **Sel** and **Down** together for 3 seconds.

Both the **Down** and **Up** LEDs will flash to indicate the system is in comfort mode. They will remain lit steadily when the system is in normal mode.

Note: When comfort mode has been turned on, the system will remain in comfort mode for one hour (user adjustable) or until the operator turns comfort mode off.

To turn comfort mode on or off, press the **Sel** and **Down** buttons together for 3 seconds. (Default run-time: 1 hour)

To change the comfort mode **run time** and **temperature set point**:

1. From the main menu, press **Down** until the screen displays *CLT*.
2. Press **Sel** to display the comfort mode run time set point, the default is 1; (The range: 1~9 hours)
3. Change the run time setting using **Down** or **Up** and then press **Sel** to confirm the new set point.
4. From the main menu, press **Down** until the screen displays *SP2*.
5. Press **Sel** to display the comfort mode temperature set point; the factory default is 72°F.
6. Change the temperature setting using **Down** or **Up** and then press **Sel** to confirm the new set point.



Important. If the HVAC system needs to cool aggressively to reach the comfort mode set point, both HVACs may go into mechanical cooling mode, which will trigger an A23 alarm.

Setting System Time

The system time parameters are listed in . R/W means that the code can be viewed and updated.

Note: System time is based on a 24 hour clock.

Table 15: System Time Parameters

Display	R/W	Description	Range
<i>n 15</i>	R/W	Display and set the current time/date – hour	0~23
<i>n 16</i>	R/W	Display and set the current time/date – minute	0~59
<i>n 17</i>	R/W	Display and set the current time/date – year	0~99
<i>n 18</i>	R/W	Display and set the current time/date – month	0~12
<i>n 19</i>	R/W	Display and set the current time/date – day	0~31

24 Hour Clock!
(eg.15 For 3pm)

1. Press the **Up** and **Down** buttons together to enter the main screen. The screen will display the indoor temperature. If the indoor temperature does not display, press both buttons again and repeat as needed.
2. Press the **Down** button until **SPE** displays. Then press the **Sel** button. The user terminal will display **5 E P**.
3. Press the **Down** button until the screen displays **n / 5**; then press **Sel** to confirm. Set the current hour; then press **Sel** to confirm.
4. Press the **Down** button until the screen displays **n / 5**; then press **Sel** to confirm. Set the current minute; then press **Sel** to confirm.
5. Press the **Down** button until the screen displays **n / 7**; then press **Sel** to confirm. Set the current year; then press **Sel** to confirm.
6. Press the **Down** button until the screen displays **n / 8**; then press **Sel** to confirm. Set the current month; then press **Sel** to confirm.
7. Press the **Down** button until the screen displays **n / 9**; then press **Sel** to confirm. Set the current day; then press **Sel** to confirm.

Executing the Step-Test

This set of steps verifies that the system is operating as expected. Note the following considerations:

- Before do the step test, the system should be turned off.
- The steps in the test can be executed in any order; they do not need to be sequential.
- The test must be completed within **30 minutes**. If you cannot complete it in that time, you will need to re-enter the step-test mode.
- The system will display the main menu (indoor temperature) automatically after ten minutes when there has been no input from the technician.
- If any alarms are triggered during the test, refer to “Alarms” on page 41 for details.
- When you have completed the step test, the system needs to be turned ON to resume normal operation.

The step-test has eight steps as show in Table 16: Step-Test.



Warning. The compressors must be allowed to run for at least one minute before shutdown to prevent damage.

Table 16: Step-Test

ACTION	Code Value		NOTES
	HVAC #1	HVAC #2	
Turns on Supply Fan	1	5	
Turns on Heater	2	6	May take a few minutes before you feel warm air
Turns on Compressor	3	7	IMPORTANT: Let compressor run for <u>at least one minute</u> before going to next step
Opens Fresh Air Damper	4	8	HINT: With the lights off in the shelter, you can see indirect daylight via opening behind exhaust grill

To complete the test, follow these steps:

1. Press **Up** and **Down** together to enter the main screen. The screen will display the indoor temperature. If the indoor temperature does not display, press both buttons again and repeat as needed.
2. When the system is off, press **Up** and **Sel** together for 3 seconds and the user terminal immediately display $\text{C } 0 \text{ d}$. When the system is on, press **Up** and **Sel** together for 3 seconds, the system will be turned off automatically and the user terminal will display $5 \text{ F } \text{E}$. Press **Up** until $\text{C } 0 \text{ d}$ displays.
3. Press **Sel** to confirm. The screen displays 0 . Press **Up** to check each step (1-8).

Step 1: HVAC 1 supply fan check. Press **Up** to change 0 to 1 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 1 supply fan is working.

Step 2: HVAC 1 heater check. Press **Sel**; the user terminal displays 1 . Press **Up** to change 1 to 2 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 1 heater is working.

Step 3: HVAC 1 compressor check. Press **Sel**; the user terminal displays 2 . Press **Up** to change 2 to 3 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 1 compressor is working.

Step 4: HVAC 1 free cooling check. Press **Sel**; the user terminal displays 3 . Press **Up** to change 3 to 4 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 1 free cooling is working.

Step 5: HVAC 2 supply fan check. Press **Sel**; the user terminal displays 4 . Press **Up** to change 4 to 5 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 2 supply fan is working.

Step 6: HVAC 2 heater check. Press **Sel**; the user terminal displays 5 . Press **Up** to change 5 to 6 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 2 heater is working.

Step 7: HVAC 2 compressor check. Press **Sel**; the user terminal displays 6 . Press **Up** to change 6 to 7 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 2 compressor is working.

Step 8: HVAC 2 free cooling check. Press **Sel**; the user terminal displays 7 . Press **Up** to change 7 to 8 ; then press **Sel** to confirm. The user terminal displays $\text{C } 0 \text{ d}$. Verify that the HVAC 2 free cooling is working.

4. Finally, press **Up**; the user terminal will display $\text{E } \text{E } 5$; press **Sel** to confirm. The user terminal will display 0 n . Press **Up** or **Down** to change 0 n to $0 \text{ F } \text{F}$ and press **Sel** to confirm and go back to the $\text{E } \text{E } 5$ screen. Then press **Up** and **Down** together to return to main screen.

When it takes longer than 30 minutes to complete the test, the system automatically returns to the main menu (indoor temperature)

When the step-test is complete, return to the main menu and turn the HVAC system on.

Alarms

When a problem occurs during operation of the unit, the controller records the related information and sounds an alarm signal. The code identifying the malfunction displays on the screen of the user terminal. Depending on the severity of the alarm, various devices are automatically shut down. The system will restart most of these devices without human intervention after a defined delay period. However, manual reset is required when high or low pressure alarms occur three times within an hour.

When an alarm occurs, press **Sel** to terminate the alarm sound and display the alarm code. The system also lets you review alarm history through a separate menu.

lists the alarm codes that may display with a brief description. on page 44 provides more detail on troubleshooting alarms should they occur during operation of the system.

Table 17: Summary of System Alarms

Code ¹	Description	Output Delay	Alarm Contact Reporting				PLD display
			High/low temp. Alarm	HVAC 1 Major Alarm	HVAC 2 Major Alarm	2 nd Comp. Run	
A02 ⁵	Low pressure ¹⁵	60/10s		X			X
A03 ⁵	High pressure ¹⁵	2s		X			X
A04 ⁵	Low pressure ²⁵	60/10s			X		X
A05	Smoke/Fire	None					X
A06 ⁵	High pressure ²⁵	2s			X		X
A07	High temperature	300s	X				X
A08	Low temperature	300s	X				X
A09 ²	Prime power outage	40s		X	X		X
A10 ²	Supply fan overload 1 or AC power powered off	0s		X			X
A11 ²	Supply fan overload 2 or AC power powered off	0s			X		X
A15	Dirty air filter1	10s					X
A16	Dirty air filter2	10s					X
A17	pLAN alarm	30s			X		X
A18	Clock card alarm	60s					X
A19	Humidity alarm	60s					X
A20	Indoor temperature sensor defective	60s					X
A21	Backup indoor temp. sensor defective	60s					X
A20&A21	Indoor & backup indoor temp. sensors defective	60s		X	X		X
A22	Outdoor temp. sensor defective	60s					X
A23	2nd compressor run	5s				X	X
A24	Damper Failure 1	60m					X
A25	Damper Failure 2	60m					X
A26	HVAC 1 supply air temp. sensor defective	60s					X
A27	HVAC 2 supply air temp. sensor defective	60s					X
A28	Generator run	5s					X
A29 ³	HVAC1 air flow defective or DC part powered off	30s		X			X
A30 ³	HVAC2 air flow defective or DC part powered off	30s			X		X
A31 ³	HVAC1 AC part powered off alarm	30s		X			X
A32 ³	HVAC2 AC part powered off alarm	30s			X		X

1. Alarm codes listed in the table above will result in an audible tone and a red alarm light presented on the PLD.
2. A09, A10&A11 will not display if the HVAC is equipped with DC EC supply fan and ASLLC.2.48 is chosen.
3. A29, A30, A31& A32 will not display if the HVAC is equipped with AC EC supply fan and ASLLC.2 is chosen.
4. HVAC major alarm will not be cleared until manually reset or the components can work normally at the next working time.
5. Low pressure alarm or High pressure alarm are triggered 3 times in one hour, the HVAC will LOCKOUT which means just supply fan work, no compressor. There are two ways to remove the alarm: a. Power cycling the controller. b. Accessing the parameters in the table: $L\ 0\ 4-U\ 2\ L$ (Manual reset as low pressure) or $U\ 2\ E$ (Manual reset as high pressure).

Viewing Alarm History

To review the history of alarm codes, follow these steps:

1. From the main menu, press **Up** until the screen displays **SPt**. Press **Sel** to confirm. This will display the most recent alarm code.
2. Press **Up** until **ALn** displays. Press **Sel** to confirm. This will display the most recent alarm code.
3. Then press **Up** to review the history. When you find an alarm number you want to review, press **Sel** to select it. This should display **n IP**, the first display in the alarm history menu.
4. Press **Sel** to display the code's value, for example when **n IP** displays, press **Sel** to display the alarm sequence such as 4.
5. After viewing the value, press **Sel** again to return to the Display code (such as **n IP**).
6. Use **Up** and **Down** to review the additional details listed in and follow the same steps to view the value and return to the code display.
7. Press **Up** and **Down** together to return the alarm code display.

Table 18: Alarm History

Ref	Display	R/W	Description
C-40-1-1	n IP	R	Sequence number of the alarm (for example, 4 for the fourth alarm to be recorded)
C-40-1-2	n IY	R	Year of the alarm
C-40-1-3	n IL	R	Month of the alarm
C-40-1-4	n IE	R	Day of the alarm
C-40-1-5	n IF	R	Hour of the alarm
C-40-1-6	n 20	R	Minute of the alarm

Clearing Alarm History

At significant points such as during yearly preventive maintenance you may want to clear the alarm history.



Warning. Alarm history is collected because it can be very helpful in identifying a problem with the system. The alarm history should never be arbitrarily cleared by an operator. Only an AIRSYS authorized service technician should clear the alarm history after all the alarms stored in history have been recorded.

To clear the alarm history, you access one of the L menus, which allow authorized technical personnel access to all of the factory default settings. Accessing these parameters requires the technician to supply a password. The parameters are distributed into five menus:

L01 – Temperature, humidity, and working status

L02 – Component run time and start counters, sensor calibration, manual mode, and alarm history

L03 – Input and output configuration

L04 – Cooling and heating set points, alarm delay time, free cooling damper set point

L05 – HVAC factory configuration

Follow these steps to enter the **L 05** menu and erase alarm history:

1. Press **Down** and **Up** simultaneously to display the main screen.
2. Press **Up** until the screen displays **SPt**.

3. Then press **Down** and **Sel** simultaneously. The user terminal will display \square .
4. Enter the supplied password. The user terminal will display $\square \square \square$.
5. Press **Up** to display $\square \square \square$. Press the **Sel** button and the terminal will display $\square \square \square$.
6. Press the **Up** button to display $\square \square \square$; press the **Sel** button to display $\square \square$ on the PLD.
7. Use the **Up** button to flash $\square \square \square$ on the PLD and erase the alarm history.

Alarm Descriptions

Table 19: Troubleshooting System Alarms

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
R 02 R 04	Low pressure alarm	If the alarm is triggered once or twice in an hour, it is reset automatically. If it occurs three times in an hour, the compressor and condenser fan are locked.	Lack of refrigerant	Run the unit and check if the low pressure value is in the normal range.	Reset manually using the L 04 menu, U 2 L parameter, or restart the unit to remove the alarm. Charge appropriate amount refrigerant.		Off		
			The switch is defective	Check if the low pressure switch is OK.	If it is defective, replace it.				
			Check if the connection to the corresponding input terminal (ID3) is ok or if the controller board is defective.	Check if the connection is OK. Check if the controller board is OK.	Reconnect the cables. If the controller board is defective, replace it.				
R 03 R 06	High pressure alarm	If the alarm is triggered once or twice in an hour, it can be reset automatically. If it occurs three times in an hour, the compressor and condenser fan are locked.	Bad heat exhausting of condenser	Run the unit and check if the high pressure value is in the normal range.	Reset manually using the L 04 menu U 2 E parameter or restart the unit to remove the alarm. Discharge appropriate amount of the refrigerant. Clean the condenser.		Off		
			Condenser fan has failed. The condenser fan speed controller has failed.	Check the condenser fan status while the high pressure is outside the normal setting.	Replace the condenser fan. Replace the condenser fan speed controller.				
			The switch is defective	Check if the high pressure switch is OK.	If it is defective, replace it.				
			Check if the connection to the corresponding input terminal (ID4) is ok or if the controller board is defective.	Check if the connection is OK. Check if the controller board is OK.	Reconnect the cables. If the controller board is defective, replace it.				
R 05	Smoke/Fire alarm	The entire unit stops working. The alarm resets automatically.	Fire/Smoke detector is triggered.	Check the external Fire/Smoke detector .	Replace the external Fire/Smoke detector	Off	Off	Off	Closed

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
			Check if the connection to the corresponding input terminal (ID1) is ok or if the controller board is defective.	Check if the connection is OK.	Reconnect the cable. If the controller board is defective, replace it.				
R 0 7	High temperature alarm	Alarm is reset automatically. Occurs when the current indoor temperature is greater than the indoor temperature set point value plus the temperature alarm offset. With a delay time, the default is 84.4° F with 5 minutes delay.	The cooling capacity loss or heat load is too great.	Check for leakages in the refrigerant circuit. Check if heat load exceeds the design range.	Remove the leakage. Increase the cooling capacity.				
			Compressor circuit failure	Check if components connected to the compressor are OK; Check if the compressor is OK. Check if the electric connection is OK.	Replace the defective components. Replace the compressor. Reconnect the cables.				
			Indoor temperature sensor (B1) failure.	Check if the sensor is shorted or has failed.	Replace the indoor temperature sensor.				
			Incorrect value set for the high temperature alarm.	Check if the value is correct.	Correct the value.				
R 0 8	Low temperature alarm	Alarm can be reset automatically. Occurs when the current indoor temperature is less than the indoor temperature set point value minus the temperature alarm offset. With a delay time, the default is 59°F with 5 minutes delay.	Heating capacity loss.	Check if the heaters are OK. Check for leaks around the unit.	If heaters have failed, replace them. Seal the leaks.				
			Indoor temperature sensor (port B2) failure.	Check for a short in the sensor or if it has failed.	Replace the indoor temperature sensor				
			Incorrect value set for the high temp alarm	Check if the value is correct.	Correct the value.				
R 0 9	Prime power outage	Alarm is reset automatically	Primary power has gone off.			Off	Off	Off	Closed
R 1 0 R 1 1	Supply fan overload	The unit will stop working. Alarm is reset automatically.	The fan is blocked.	Check if the fan speed and operating current are normal.	Remove the blocking objects. If the fan is defective, replace it.	Off	Off	Off	Closed

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
			Main power has been lost.	Check if the main power is OK.	Turn main power on.				
			The current to the fan is higher than normal.	Check if the switch, relay or built-in fan protection is disconnected.	Close the switch, and check. If the fan is defective, replace it.				
			Check if the connection to the corresponding input terminal (ID6) is ok or if the controller board is defective.	Check if the connection is ok.	Reconnect the cable. If the controller board is defective, replace it.				
R 15 R 16	Dirty air filter	Alarm is reset automatically. The alarm is a warning to the replace the filter.	Filter is clogged.	Check if the filter is dirty.	Clean or replace the filter				
			Check if the connection to the corresponding input terminal (ID5) is ok or if the controller board is defective.	Check if the connection is ok.	Reconnect the cable. If the controller board is defective, replace it.				
			The value set for the air pressure diff. switch is too low.	Check the air pressure diff switch value.	Correct the value of the switch to standard value.				
R 17	pLAN alarm	Each unit continues to work separately. It can be reset automatically.	The pLAN cable is disconnected.	Check if the cable is connected or shorted.	Reconnect the cable.				
R 18	Clock card alarm	The clock function is not available. Both time display function and history alarm record function are disabled. It can be reset automatically.	Clock card is loose.	Fix the clock card on the controller board	After the clock card is fixed, check if the alarm is removed.				
			The clock card has failed.	After fixing the clock card, the alarm still exists.	Replace it.				
R 19	Humidity alarm	The free cooling damper will be closed. It can be reset automatically.	Humidity sensor (port J2-B3 on unit 1 controller) failure.	Check if the cable is connected or shorted.	Replace it.				Closed
			The humidity is higher than standard value.	Dry the sensor, and then check if the alarm is removed.	Relocate the sensor or do nothing.				
R 20	Indoor temperature sensor	It can be reset automatically.	Indoor temperature sensor (port J2-B2 on unit1 controller) failure.	Check if the cable is connected or shorted.	Replace it.				

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
	defective								
R 2 1	Backup indoor temperature sensor defective	Both units stop working. It can be reset automatically.	Indoor temperature sensor (port J2-B2 on unit 2 controller) failure.	Check if the cable is connected or shorted.	Replace it.				
R 2 0 AND R 2 1	Indoor and backup indoor temperature sensors are both defective	Both units stop working. It can be reset automatically.	Both Indoor temperature sensors have failed.	Check if the cable is connected or shorted.	Replace it.	Off	Off	Off	Closed
R 2 2	Outdoor temperature sensor defective	The free cooling damper will be closed. It can be reset automatically.	Temperature sensor (port J2-B3 on unit 1 controller) failure.	Check if the cable is connected or shorted.	Replace it.				Closed
R 2 3	Second compressor run alarm	Both compressors are running at the same time.	Heat load at the site exceeds single HVAC capacity.	Check if the heat load of cell site exceeds the nominal heat load.	None				
				Check if refrigerant quantity is low.	Check for leakages in the refrigerant circuit.				
R 2 4 R 2 5	HVAC Damper failure	The alarm can be automatically reset once the alarm is removed.	HVAC damper is broken or blocked or loosen	Check if the damper actuator is broken.	If the damper actuator is broken, please replace it	None	None	None	None
				Check if the damper is blocked.	If the damper is blocked or interfaced by cables, please repair it.				
				Check if the damper actuator is loose	If the damper actuator is loose, please tighten it.				
R 2 6 R 2 7	HVAC Supply air temp. sensor defective	Damper will stop working. It can be reset automatically.	HVAC Supply air temp. sensor failure	Check if the cable is connected to (B1&GND) or shorted.	Replace it.				Closed
R 2 8	Generator run signal	This is not an alarm, It just tell you that the generator is running.							
R 2 9 R 3 0	HVAC air flow defective	The PLD will display A29/ A30	The supply fan doesn't work. The 48VDC power is	Check the supply fan.	If the supply fan is blocked or broken, please remove the object or replace the fan.	Off	Off	Off	closed

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
			<p>powered off or no 48VDC power input to the HVAC.</p> <p>The pressure switches PF2 or 3 or both for HVAC supply fan are broken.</p> <p>The pressure switches PF2 or 3 or both for HVAC are disconnected.</p>	Check the 48VDC power plant.	If the 48VDC power plant has no power, check the power source.				
				Check the 48VDC power breaker (QF2).	If the 48VDC power breaker is broken, please replace it.				
				Check the air pressure differential switch.	If the cable is loosen, please secured the cable.				
					If the air pressure differential switch is broken, please replace it.				
				Check the set point of the air pressure differential switch.	If the set point is not near 50Pa, please change it back.				
<p>A31</p> <p>A32</p>	HVAC AC power powered off alarm	The PLD will display A31/A32	The AC power is powered off	Check the breaker.	If the breaker is broken, please replace it.		Off	Off	
				Check the AC power source.	If the AC power plant has no power, please check the power source.				
				Check the ports B3&B4 of HVAC 2.	If the B3 or B4 or both are broken, replace the controller.				
					If the cables connected to B3 or B4 or both are loose, please secured them.				

System Diagnostics

The information provided in this section may be useful during the troubleshooting of issues that arise during operation of the system. Two types of information are provided:

- A description of the input and output ports of the controller
- A description of all of factory settings and how they can be viewed and possibly modified

Port Definitions

Figure 15: pCOxs Controller Hardware Structure is a schematic drawing of the controller box ports.

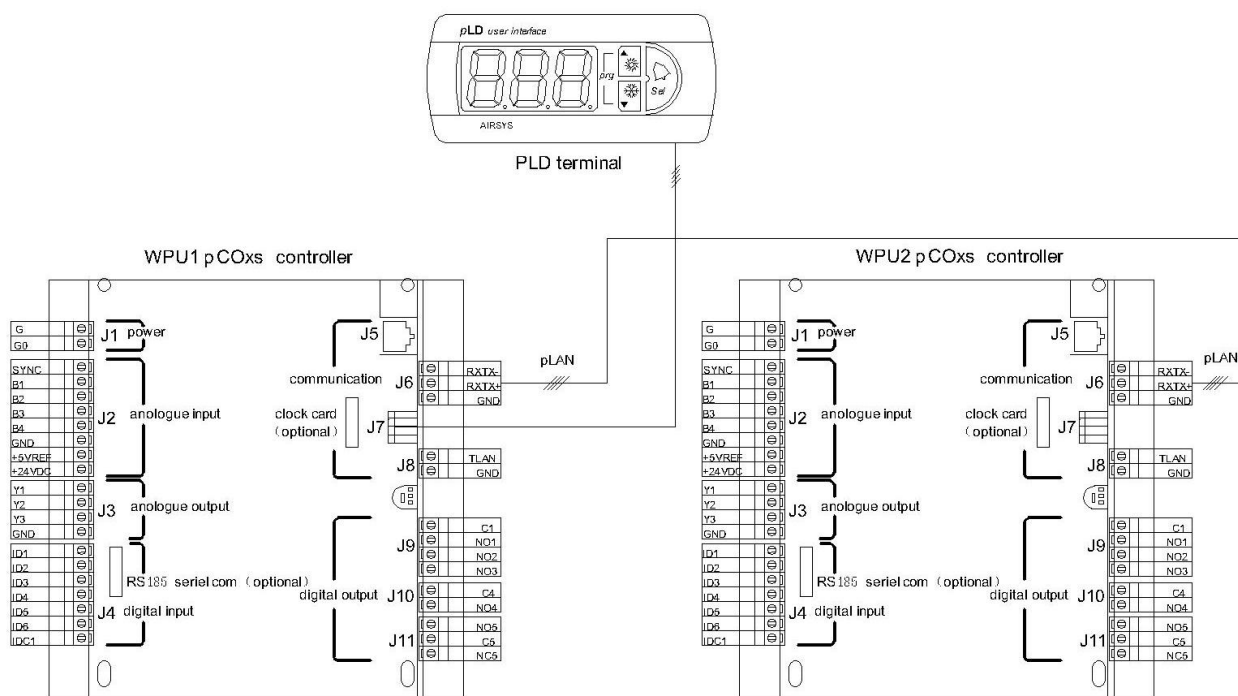


Figure 15: pCOxs Controller Hardware Structure

Table 20: Port Values lists the input and output ports of the unit.

Note: The supply air temperature is a calculated value; the unit does not have a supply temperature sensor. This temperature is used only when the unit is operating in free cooling mode.

Table 20: Port Values

Digital Input		Analog Input		Digital Output		Analog Output	
pCOxs-1 (Main, Address 1: HVAC 1)							
ID1	Smoke/Fire (NC)	B1	Supply temperature	NO1	Compressor	Y1	Supply fan
ID2	Gen run (NO)	B2	Indoor temperature	NO2	Supply fan	Y2	Free cooling
ID3	Low pressure (LP)	B3	Humidity	NO3	Electrical heater	Y3	
ID4	High pressure (HP)	B4	Outdoor temperature	NO4	High/low temperature alarm (NC)		

Digital Input		Analog Input		Digital Output		Analog Output	
ID5	Filter flow			NO5	HVAC1 alarms (NC/NO)		
ID6	Supply fan overload						
pCOxs-2 (Extension, Address2: HVAC 2)							
ID1	Prime power outage	B1	Supply temperature	NO1	Compressor	Y1	Supply fan
ID2	Smoke/Fire (NC)	B2	Backup indoor temperature	NO2	Supply fan	Y2	Free cooling
ID3	Low pressure (LP)	B3	HVAC1 AC power powered off alarm (If ASLLC.2.48 is chosen)	NO3	Electrical heater	Y3	
ID4	High pressure (HP)	B4	HVAC2 AC power powered off alarm (If ASLLC.2.48 is chosen)	NO4	2nd compressor run alarm (NC)		
ID5	Filter flow			NO5	HVAC2 alarms (NC/NO)		
ID6	Supply fan overload						

System Parameters and Default Values

This section describes the control box menus used for completing operations and displaying information. Using the main menu is described in “Navigating the Main Menu” on page 38. This section describes the additional menus that let an authorized technician access factory default settings.

Table 21: Control Box Menus

ID	Purpose	Description
A	Main Menu	Review the current indoor temperature, outdoor temperature, humidity, and supply air temperature (for free cooling function). Also access the comfort mode function. Instructions are located on the sticker on the front of the controller box.
C	Maintenance	Change the indoor temperature settings, adjust the temperature and humidity calibration based on real values, enter manual mode to check alarms, set the local time based on the time zone of the physical location.
D	Installation	Installation self-test, change the NC or NO setting of Fire/Smoke, GEN run, and filter alarm.
E	Factory Defaults	Password protected values that can only be changed by an AIRSYS AuthorizedService Technician.
L	Software Parameters	Password protected software parameters that can only be changed by an AIRSYS Authorized Service Technician.

To review or modify a parameter, follow these general steps:

1. Press the **Up** or **Down** button to find the code you want.
2. Then press the **Sel** button to review the value.
3. If the parameter can be modified (R/W), press the **Up** or **Down** button to modify the value. Then press **Sel** to confirm the change.
4. To review another parameter, press the **Up** or **Down** button to find its code, and repeat these steps. Press the **Up** or **Down** button together to return to the main screen.

The following four tables display the parameters for the A, C, D, and E menus. The tables use these abbreviations:

Ref	Reference number for the code
R	The parameter can only be viewed, not changed.
R/W	The parameter can be both viewed and updated.

Note: Fahrenheit is used as the default temperature unit although it can be set locally to Centigrade.

Accessing the C Menu

When the PLD displays **SPE**, press the **Sel** button to enter the C menu. Then press the **Down** button to display the parameters in the order listed in Table 22: Parameters on Maintenance Menu (C) .

*Note:

1. The parameters of $RC1$ & $RC2$ in C menu will display on PLD if the HVAC is equipped with DC EC fan and ASLLC.2.48 is chosen.
2. The range of parameters $U1E$ & $U2E$ are 0~7. The identification of the numbers is listed as below table. The two parameters are used for system check. If you want to rotate the lead and lag units, please change the parameter rUE from no to YES, and then find the two parameters $U1E$ & $U2E$ to confirm the lead and lag units are rotated successful.
i.e. HVAC1 is lead unit (the number of $U1E$ shall be 0), HVAC2 is lag unit (the number of $U2E$ shall be 7). Once the parameter rUE is changed from no to YES, the number of $U1E$ will be 7 and the number of $U2E$ shall be 0.

Value	Unit status
0	Unit ON
1	OFF by Alarms
2	OFF by Supervisory
3	OFF by Time zones
4	OFF by Digital Input
5	OFF by Keyboard,
6	Manual Procedure
7	Unit Stand-by

Table 22: Parameters on Maintenance Menu (C)

Ref	Display	R/W	Description	Unit	Range	Default
C-1	$SE P$	R/W	Temperature setting	°F	33.8~104	77.0
C-2	HE	R	ΔT for high temperature alarm and Emergency ventilation set point (Temperature setting + ΔT)	°F		18.0
C-3	LE	R	ΔT for low temperature alarm (Temperature setting - ΔT)	°F		32.0
C-4	rUE	R/W	Lead/Lag rotation		nO/YES	nO
C-5	$re2$	R	Backup room temperature sensor reading	°F		
*C-6	$RC1$	R	HAVC1 AC power status		-C/-O-	
*C-7	$RC2$	R	HAVC2 AC power status		-C/-O-	
C-8	$dS1$	R	Supply fan status		On/off	
C-9	$dS2$	R	Compressor status		On/off	
C-10	$dS3$	R	Heater status		On/off	

Ref	Display	R/W	Description	Unit	Range	Default
C-11	d 5 4	R	Free cooling status		On/off	
C-12	d 5 R	R	Generator run status		On/off	
C-13	d 5 6	R	Supply fan 2 status		On/off	
C-13	d 5 7	R	Compressor 2 status		On/off	
C-14	d 5 8	R	Heater 2 status		On/off	
C-15	d 5 9	R	Free cooling 2 status		On/off	
*C-16	U 1 E	R	Unit 1 Status		0~7	
*C-17	U 2 E	R	Unit 2 Status		0~7	
C-18	b 1 0	R	Bios version, must be >=430			430
C-19	b 0 0	R	Boot version			403
C-20	U E 1	R	Software version 1			13
C-21	U E 2	R	Software version 2		<u>Check on site</u>	
C-22	n 1 5	R/W	Display and set the current time/date - hour		0~23	
C-23	n 1 6	R/W	Display and set the current time/date - minute		0~59	
C-24	n 1 7	R/W	Display and set the current time/date - year		0~99	
C-25	n 1 8	R/W	Display and set the current time/date - month		0~12	
C-26	n 1 9	R/W	Display and set the current time/date - day		0~31	
C-27	S E R	R	System working status		1~7	7
The following parameters with gray highlight are displayed after the system is turned off using the PLD						
C-28	n 2 1	R/W	Supply fan 1 manual mode		On/off	Off
C-29	n 2 2	R/W	Supply fan 1 manual mode to change the input voltage	V	0-10	0
C-30	n 2 3	R/W	Free cooling 1 manual mode		On/off	Off
C-31	n 4 2	R/W	Free cooling 1 manual mode to change the input voltage	V	0-10	0
C-32	n 2 5	R/W	Compressor 1 manual mode		On/off	Off
C-33	n 2 3	R/W	Heater 1 manual mode		On/off	Off
C-34	n 4 1	R/W	Supply fan 2 manual mode		On/off	Off
C-35	n 5 2	R/W	Supply fan 2 manual mode to change the input voltage	V	0-10	0
C-36	n 4 0	R/W	Free cooling 2 manual mode		On/off	Off
C-37	n 5 2	R/W	Free cooling 2 manual mode to change the input voltage	V	0-10	0
C-38	n 3 F	R/W	Compressor 2 manual mode		On/off	Off
C-39	n 3 E	R/W	Heater 2 manual mode		On/off	Off
C-40	n 2 R	R/W	Indoor temperature calibration	°F	-99.9~99.9	0
C-41	n 2 P	R/W	Outdoor temperature calibration	°F	-99.9~99.9	0
C-42	n 2 C	R/W	Supply air temperature calibration	°F	-99.9~99.9	0
C-43	n 2 L	R/W	Humidity sensor calibration	%	-99.9~99.9	0
C-44	n 4 2	R/W	Backup indoor temperature calibration	°F	-99.9~99.9	0
C-45	n 4 3	R/W	Supply temperature sensor 2 calibration	°F	-99.9~99.9	0
C-46	R L n	R	View history of alarm code, date, and time		---	

Accessing the D Menu

After the terminal displays **SPE**, press the **Up** and **Sel** buttons to enter into the D menu. Then press the **Down** button to display the parameters in the listed order.

*Note:

1. The parameters $\epsilon \epsilon 5$ and $\zeta \zeta d$ will display on PLD when the system is off.
2. After the parameter $\epsilon \epsilon 5$ is changed from $\alpha F F$ to αn , and then press Sel button confirmed, the parameter $\zeta \zeta d$ will display on the PLD.
3. If the ASLLC.2.48 has been reset to factory default, the parameter $5 F i$ shall be changed from 1 to 0.

Table 23: Installation Menu (D)

Ref	Display	R/W	Description	Unit	Range	Default
*D-1	$\epsilon \epsilon 5$	R/W	Device test, displays when the unit has been turned off using the PLD interface		On/off	Off
*D-2	$\zeta \zeta d$	R	Device test code, displays when the unit has been turned off using the PLD interface		0-8	0
D-3	$5 F \epsilon$	R/W	Fire/Smoke alarm input		n.C/n.O	n.C
D-4	$d \zeta \epsilon$	R/W	Generator run status input		n.C/n.O	n.O
D-5	$2 \zeta \epsilon$	R/W	Two compressor run status output		n.C/n.O	n.C
D-6	$P U \epsilon$	R/W	HVAC1/HVAC2 lockout output		n.C/n.O	n.O
D-7	$H \epsilon \epsilon$	R/W	High/low temperature alarm output		n.C/n.O	n.C
D-8	$\zeta 5 \epsilon$	R/W	Generator on, compressor stop time, or Power on compressor turns on with a delay time.	S	0-999	180
D-9	$\epsilon 2 \zeta$	R/W	Generator on, enable 2 compressor on.		no/YES	no
D-10	$5 F i$	R/W	Supply fan alarm for DC drive fan or AC drive fan; 0 means DC drive supply fan; 1 means AC drive supply fan		0/1	0 or 1

Accessing the E Menu

After the terminal displays **SPE**, press the **Down** and **Sel** buttons to enter the E menu. Then press the **Down** button to display the parameters in the listed order.

Table 24: Protected Factory Defaults (E)

Ref	Display	R/W	Description	Unit	Range	Default
E-1	ζ	R/W	Input user password		0~999	000
Input Password, Press Sel button, the following parameters will display.						
E-2	$5 \epsilon P$	R/W	Temperature setting	°F	33.8~104.0	77.0
E-3	$H \epsilon$	R/W	ΔT (Temperature Diff) for high temperature alarm and Emergency ventilation set point	°F	0.0~999.9	18.0
E-4	$L \epsilon$	R/W	ΔT (Temperature Diff) for low temperature alarm	°F	0.0~999.9	32.0
E-5	$\zeta \zeta 1$	R/W	Cool diff.	°F	0.0~100	6.0
E-6	$\zeta \zeta 2$	R/W	Cool dead	°F	0.0~99.9	2.0
E-7	$H \zeta 1$	R/W	Heat diff	°F	0.0~100	3.0
E-8	$H \zeta 2$	R/W	Heat dead	°F	0.0~99.9	27.0
E-9	$\zeta \zeta 3$	R/W	Not used	--	--	0
E-10	$\zeta R d$	R/W	Controller address change (BIOS ≥ 4.30)		1/2	1

Ref	Display	R/W	Description	Unit	Range	Default
E-11	Ⓔ Ⓔ 1	R/W	Allow adjustment of supply fan speed as PI		no/ YES	YES
E-12	Ⓔ Ⓔ 2	R/W	Allow 1st compressor to start with a variable delay time		no/ YES	YES
E-13	Ⓔ Ⓔ 3	R/W	Allow pCOxs-2 temperature sensor failure alarm and temperature sensor backup		no/ YES	YES
E-14	5 1 5	R/W	Unit numbers		1/2	2
E-15	F Ⓔ 1	R/W	Enable FC valve alarm		no/ YES	YES
E-16	F Ⓔ 2	R/W	Check ΔT (close)	°F	1.0~999.9	10.0
E-17	F Ⓔ 3	R/W	Check ΔT (open)	°F	1.0~999.9	10.0
E-18	F Ⓔ 4	R/W	FC Check Delay Time	s	1~999	300
E-19	F Ⓔ 5	R/W	Restart check time	M	1~540	60
E-20	F Ⓔ 6	R/W	Lock counters		1~10	3
E-21	F Ⓔ 7	R/W	Lock time	M	1~540	540
E-22	d Ⓔ F	R/W	Reset the system to factory default			
E-23	P 5 U	R/W	Set password			0

Accessing the L Menus

The L menus allow authorized technical personnel access to all of the factory default settings. Accessing these parameters requires the technician to supply a password. The parameters are distributed into five menus:

L01 – Temperature, humidity, and working status

L02 – Component run time and start counters, sensor calibration, manual mode, and alarm history

L03 – Input and output configuration

L04 – Cooling and heating set points, alarm delay time, free cooling damper set point

L05 – HVAC factory configuration

Follow these steps to enter these menus:

1. From the main menu's temperature display, press the **Down** button until the screen displays **SPt**.
2. Then press **Down** and **Sel** simultaneously. The user terminal will display **0**.
3. Enter the supplied password. The user terminal will display **L 0 1**.
4. Press **Sel** to review the **L 0 1** menu. Press **Down** and **Up** simultaneously to return to the **L 0 1** screen
5. When the terminal displays **L 0 1**, press **Down** to display **L 0 2**, **L 0 3**, **L 0 4**, and **L 0 5**. Follow the same steps to select and view the parameters.

Table 25: L Parameters

Display	R/W	Description	Unit	Range	Default
L01 – Main Screen					
R d d	R	Unit Number			1
d 5 1	R	Supply fan		On/Off	Off
d 5 2	R	Compressor		On/Off	Off
d 5 3	R	Heater		On/Off	Off
d 5 4	R	Free cooling		On/Off	Off

Display	R/W	Description	Unit	Range	Default
d 5 A	R	Generator run status		On/Off	Off
d 5 B	R	Supply fan 2		On/Off	Off
d 5 C	R	Compressor 2		On/Off	Off
d 5 D	R	Heater 2		On/Off	Off
d 5 E	R	Free cooling 2		On/Off	Off
d 5 F	R	Supply air limit		On/Off	Off
L02 – Maintenance Menu					
A L n	R	No used			
n 0 1	R	Free cooling running hours *1000	Hrs	0~999	0
n 0 2	R	Free cooling running hours *1	Hrs	0~999	0
r 0 1	R/W	Free cooling running hours reset		no/YES	no
n 0 3	R	Free cooling 1 start counters		0~999	0
r 0 3	R/W	Free cooling 1 start counters reset		no/YES	no
n 3 1	R	Free cooling 2 running hours *1000	Hrs	0~999	0
n 3 2	R	Free cooling 2 running hours *1	Hrs	0~999	0
r 3 1	R/W	Free cooling 2 running hours reset		no/YES	no
n 3 3	R	Free cooling 2 start counters		0~999	0
r 3 3	R/W	Free cooling 2 start counters reset		no/YES	no
n 0 9	R	Compressor 1 running hours *1000	Hrs	0~999	0
n 0 A	R	Compressor 1 running hours *1	Hrs	0~999	0
r 0 9	R/W	Compressor 1 running hours reset		no/YES	no
n 0 P	R	Compressor 1 start counters		0~999	0
r 0 P	R/W	Compressor 1 start counters reset		no/YES	no
n 3 4	R	Compressor 2 running hours *1000	Hrs	0~999	0
n 3 5	R	Compressor 2 running hours *1	Hrs	0~999	0
r 3 4	R/W	Compressor 2 running hours reset		no/YES	no
n 3 6	R	Compressor 2 start counters		0~999	0
r 3 6	R/W	Compressor 2 start counters reset		no/YES	no
n 0 L	R	Heater 1 running hours *1000	Hrs	0~999	0
n 0 E	R	Heater 1 running hours *1	Hrs	0~999	0
r 0 L	R/W	Heater 1 running hours reset		no/YES	no
n 0 F	R	Heater 1 start counters		0~999	0
r 0 F	R/W	Heater 1 start counters reset		no/YES	no
n 3 7	R	Heater 2 running hours *1000	Hrs	0~999	0
n 3 8	R	Heater 2 running hours *1	Hrs	0~999	0
r 3 7	R/W	Heater 2 running hours reset		no/YES	no
n 3 9	R	Heater 2 start counters		0~999	0
r 3 9	R/W	Heater 2 start counters reset		no/YES	no

Display	R/W	Description	Unit	Range	Default
n 1 1	R	Supply fan 1 start counters		0~999	0
r 1 1	R/W	Supply fan 1 start counters reset		no/YES	no
n 1 3	R	Supply fan 1 running hours *1000	Hrs	0~999	0
n 1 4	R	Supply fan 1 running hours*1	Hrs	0~999	0
r 1 3	R/W	Supply fan 1 running hours reset		no/YES	no
n 3 R	R	Supply fan 2 start counters		0~999	0
r 3 R	R/W	Supply fan 2 start counters reset		no/YES	no
n 3 P	R	Supply fan 2 running hours *1000	Hrs	0~999	0
n 3 C	R	Supply fan 2 running hours *1	Hrs	0~999	0
r 3 C	R/W	Supply fan 2 running hours reset		no/YES	no
n 1 5	R/W	Hour		0~23	
n 1 6	R/W	Minute		0~59	
n 1 7	R/W	Year		0~99	
n 1 8	R/W	Month		0~12	
n 1 9	R/W	Date		0~31	
n 1 R	R/W	Day (Monday, Tuesday, ..., Sunday)		Mon~Sun	
n 2 R	R/W	Indoor temperature calibration	°F	-99.9~99.9	0.0
n 2 P	R/W	Outdoor temperature calibration	°F	-99.9~99.9	0.0
n 2 C	R/W	Supply air temperature sensor 1 calibration	°F	-99.9~99.9	0.0
n 2 L	R/W	Humidity sensor calibration	%	-99.9~99.9	0.0
n 4 2	R/W	Backup Indoor temperature calibration	°F	-99.9~99.9	0.0
n 4 3	R/W	Supply air temperature sensor 2 calibration	°F	-99.9~99.9	0.0
L03 – Output/Input Menu					
1 1 0	R	ID1:Fire/smoke alarm output		-C or O-	
1 1 1	R	ID2:Generator status signal		-C or O-	
1 1 2	R	ID3:Low pressure		-C or O-	
1 1 3	R	ID4:High pressure		-C or O-	
1 1 4	R	ID5:Filter clogging		-C or O-	
1 1 5	R	ID6: Supply fan overload		-C or O-	
1 2 0	R	2 ID1: Not used			
1 2 1	R	2 ID2: Not used			
1 2 2	R	2 ID3:Low pressure 2		-C or O-	
1 2 3	R	2 ID4:High pressure 2		-C or O-	
1 2 4	R	2 ID5:Filter 2 clogging		-C or O-	
1 2 5	R	2 ID6: Supply fan 2 overload		-C or O-	
1 1 8	R	Y1: Supply fan		0.0~10.0	
1 1 9	R	Y2: Free cooling		0.0~10.0	
1 2 6	R	2 Y1: Supply fan 2		0.0~10.0	

Display	R/W	Description	Unit	Range	Default
127	R	2 Y2: Free cooling 2		0.0~10.0	
11P	R	NO1: Compressor (MC)		-C or O-	
11C	R	NO2: Supply fan (MF2)		-C or O-	
11L	R	NO3: Heater (EH1-3)		-C or O-	
11E	R	NO4: Not used			
11F	R	NO5: Not used			
12B	R	2 NO1: Compressor (MC)		-C or O-	
129	R	2 NO2: Supply fan (MF2)		-C or O-	
12R	R	2 NO3: Heater (EH1-3)		-C or O-	
12P	R	2 NO4: Not used		-C or O-	
12C	R	2 NO5: Not used		-C or O-	
L04 – User Menu					
U01	R/W	Minimum temperature setting	°F	-999.9~999.9	33.8
U02	R/W	Maximum temperature setting	°F	-999.9~999.9	104
U49	R/W	Allow adjustment of temperature as PI logic		no/YES	no
U03	R/W	Free cooling humidity limit		no/YES	YES
U04	R/W	Free cooling humidity setting	%	50.0~99.9	85.0
U05	R/W	Free cooling humidity difference	%	0.0~20.0	5.0
U06	R/W	Free cooling temperature difference of indoor and outdoor temperatures	°F	0.0~30.0	3.6
U08	R/W	Auto-start after power on		no/YES	YES
U09	R/W	Turn the unit on or off by software		no/YES	YES
U0R	R/W	Delay time of high/low temperature alarm output	S	0~999	60
U0P	R/W	Supply air temperature limit		no/YES	no
U0C	R/W	Not used	°F	-999.9~999.9	6.0
U0L	R/W	Not used	°F	0.0~999.9	4.0
U2L	R/W	Manual reset for low pressure lockout		no/YES	no
U2E	R/W	Manual reset for high pressure lockout		no/YES	no
U30	R/W	Monitor system address			1
U31	R/W	Communication speed: 1 means 2400; 2 means 4800; 3 means 9600; 4 means 19200.			3
U32	R/W	Communication protocol, Ca means Carel; Nod means MODBUS		Ca/Nod	Nod
Not Used
U54	R/W	Free cooling supply air temperature limit set	°F	-70.0~999.9	51.8
U55	R/W	Free cooling supply air temperature up difference	°F	0.0~99.9	1.8
U56	R/W	Free cooling cycle time	S	0.0~99.9	50.0
L05 – Manufacturer Menu					
F01	R/W	BMS network		no/YES	YES
F02	R/W	Allow clock card		no/YES	YES

Display	R/W	Description	Unit	Range	Default
F 0 3	R/W	Allow free cooling		no/YES	YES
F 0 4	R/W	Allow free cooling and compressor to work simultaneously		no/YES	YES
F 4 7	R/W	Allows free cooling ONLY in emergency ventilation Mode		no/YES	no
F 4 4	R/W	Not used		no/YES	YES
F 0 5	R/W	The serious alarms output or not		no/YES	YES
F 0 7	R/W	The type of serious alarm output (NO or NC)		n.O/n.C	n.O
F 3 P	R/W	Unit of temperature, C means Celsius. F means Fahrenheit.		-F/-C-	- F -
F 1 5	R/W	Minimum speed setting of supply fan	V	0.0~10.0	0.1
F 1 7	R/W	Maximum speed setting of supply fan	V	0.0~10.0	10.0
F 4 5	R/W	Fan speed change during the DC-failover on	V	0.0~10.0	8.0
F 1 8	R/W	Free cooling speed	V	0.0~10.0	10.0
F 1 9	R/W	Startup delay time of supply fan	S	0~999	5
F 1 R	R/W	Stop delay time of supply fan	S	0~999	60
F 3 C	R/W	Startup delay time of supply fan overload	S	0~999	0
F 3 L	R/W	Recovery delay time of supply fan overload	S	0~999	120
F 1 P	R/W	Startup delay time of low pressure alarm	S	0~999	60
F 1 C	R/W	Recovery delay time of low pressure alarm	S	0~999	10
F 1 L	R/W	Low pressure triggered times in one hour for locking the system			3
F 1 E	R/W	High pressure triggered times in one hour for locking the system			3
F 2 0	R/W	Minimum stop time of compressor	S	0~999	180
F 2 1	R/W	Minimum run time of compressor	S	0~999	60
F 2 2	R/W	Supply fan air flow defective if the supply fan is DC fan	S		30
F 2 3	R/W	Delay time of filter alarm output	S	0~999	10
F 2 4	R/W	Close the free cooling due to alarm		no/YES	no
F 2 7	R/W	Minimum voltage input of free cooling	V	0.0~10.0	2
F 3 1	R/W	Number of backup units for unit rotation			1
F 3 2	R/W	Unit rotation time	10M	0~999	168
F 3 3	R/W	Force startup of the backup unit		no/YES	YES
F 3 4	R/W	Delay time of low temperature	M	0/1	1
F 3 5	R/W	Delay time of high temperature	M	0/1	1
F 3 5	R/W	Heating forcing differential settings of low temperature	°F	0.0~99.9	27.0
F 3 7	R/W	Heat dead settings of low temperature	°F	0.0~99.9	3.0
F 3 8	R/W	Cooling forcing differential settings of high temperature	°F	0.0~99.9	7.4
F 3 9	R/W	Cool dead settings of high temperature	°F	0.0~99.9	7.2
F 3 R	R/W	Erase alarm history		no/YES	no

Chapter 4: Preventive Maintenance



Important. The AIRSYS IPU's are designed to be among the highest performing in the world for both energy efficiency and reliability. Good preventive maintenance techniques are a crucial part of maintaining that high level of energy efficiency and reliability. It is also important to keep track of findings during each PM event so that trends can be established for future reference.

Preventive Maintenance Schedule

This section provides guidelines for the owner of an AIRSYS unit to ensure that the equipment continues to perform well. Following these guidelines for regular care will help avoid serious damage to components and expensive repairs by skilled personnel.

Table 26: Preventive Maintenance Schedule

Task	Recommended Frequency	Comments
Check general operations	12 months	Perform the Step-Test
Inspect all wiring for signs of wear	Based on local conditions	More frequently in areas with active rodent or insect populations that can damage wiring
Inspect all hardware for "snug" connection	12 months	Make note of any loose hardware so it can be checked again at next scheduled PM
Preliminary air filter inspection/cleaning and replace if needed	Based on local conditions	Depends on the amount and frequency of airborne particulates in the area
Inspect and clean condenser coil	12 months	More frequently in areas that experience excessive airborne particulates that will collect on the condenser coil
Inspect drain pipe	12 months	
Check air damper	12 months	



Danger. Stop the machine and remove the power supply from the equipment before performing maintenance operations.



Important. All PM should be performed by an AIRSYS Authorized Service Technician (AAST) to ensure the manufacturer's warranty is preserved.

General Operation Check

It is a good idea to compare the operation of the equipment with the results of the previous inspection. Any differences in operating characteristics can then be easily identified.

A detailed and periodic visual inspection of the equipment and a general cleaning are always important to ensure good operation. Before beginning the PM steps, you should verify the general system status by looking at the areas outlined in this section.

Check Main Voltage

For the main voltage, check:

- The main voltage is ranging within +10%/-10% of the rated voltage required by the machine (230V, 60Hz).
- The main electrical supply cable and the terminals, including the user terminal cable, are correctly hooked up.
- All cables are secured to the system.

Check Wiring and Components

For wiring and components, perform a preliminary check to verify the system is functional:

- Check that the system has been installed correctly.
- Check that the wiring cable sections meet current capacity. Report any incorrect mounting and setting to the AAST who installed the system so that the necessary modifications can be made.
- Check that the grounding cables have been installed in the controller box and unit as shown in the graphic.



Perform the Step-Test

The purpose of this test is to simulate real operation without damaging components due to incorrect operation or protection failures.

Use the step-test to check that the relays, breakers, and components work normally. For details on executing this test, see “Executing the Step-Test” on page 61.

1. When the supply fan turns on, the relay KA1 is triggered. If not, check the wiring.
2. When the compressor turns on, the relay KM1 is triggered. If not, check the wiring.
3. When the heater turns on, the relay KM2 is triggered. If not, check the wiring.

Replace Air Filter

A dirty air filter reduces the air volume and the system capacity. This problem can be avoided by periodically and regularly cleaning or replacing filters.

The frequency at which filters must be checked depends on the amount of dust in the environment. If during inspection, the filters are frequently very dirty, you should increase the frequency of checks and maintenance.



Remove
middle-front
panel



Replace
air filter

Clean the Preliminary Air Filter

The preliminary air filter can become clogged with dust and leaves or other debris after a period of use, and should be cleaned with water or compressed air.

Take the preliminary
filter out for cleaning



Inspect and Clear Condenser Coils

During times of peak usage, the condensing coils must be able to offer maximum thermal exchange.

Because of the outdoor connection, debris such as paper, dead leaves, and dust may have been sucked in around the coils, thus reducing the thermal exchange. You should check the coils to see if this has happened. Then remove any objects from the coil which may have accumulated and clear the system with **vacuum cleaner**. Note: don't use water to clean indoor packaged unit condenser.

Dirty condenser coils may cause the intervention of the high pressure switch and cause machine shutdown.

You should check the coil condition more frequently if your environment experiences seasons of high dust or falling leaves.

Inspect and Clean the Drain Pipe

To avoid condensation water overflow, make sure the system has proper drainage pipe for drainage pan. The pipe and outflow should be completely free of any obstructions. If necessary, clean the drain and outflow area.

Check Air Damper

The air damper is a critical element in the AIRSYS HVAC system. If it does not function normally, the free cooling function will fail. This can be avoided by periodically and regularly checking the following:

1. Check if the damper can open and close normally.
2. Check if the damper actuator is OK (no damage).
3. Check if the damper rotor is OK (no damage).
4. Check if the nuts are properly tightened, as shown in the following images.

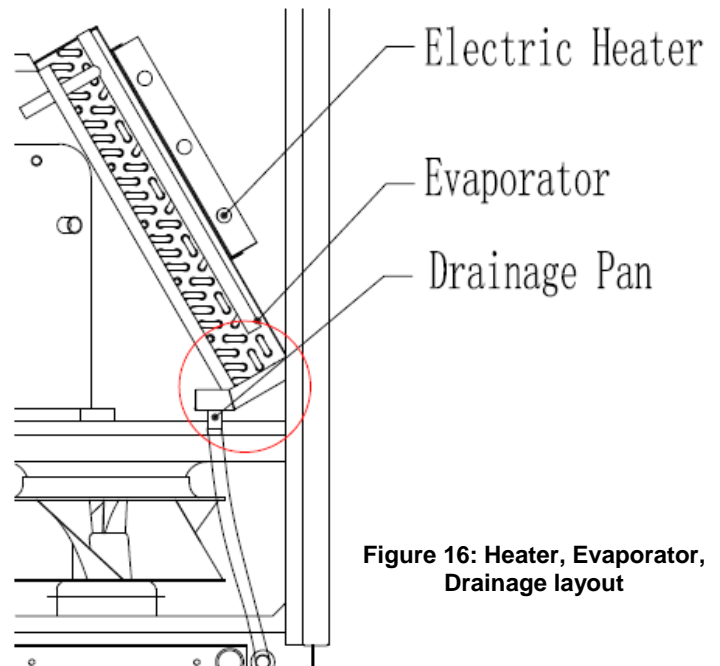
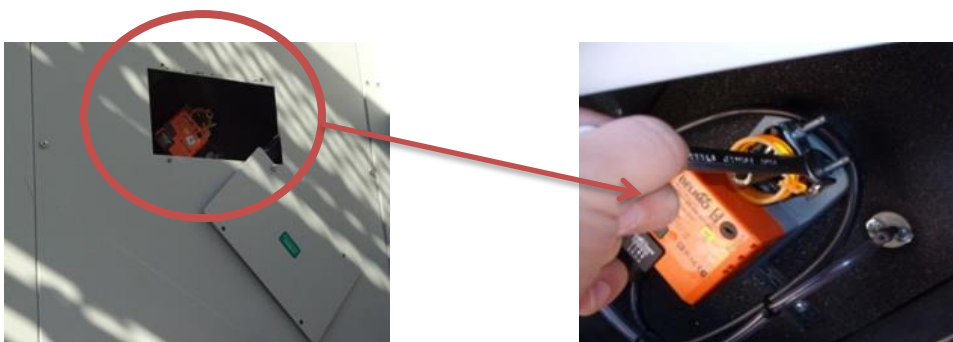


Figure 16: Heater, Evaporator, Drainage layout



Spare Parts

For all part requests, please contact:

Tempest Telecom Solutions, LLC

Web: <http://tempesthvac.com/>

Email: HVACSupport@tempesttelecom.com

Phone: 805-879-5432

Address: 136 W. Canon Perdido, Suite 100, Santa Barbara, CA 93101

Operation Checklist

If you experience a problem with the system, use this checklist to verify the system and determine the root cause. Keep these records for future inspections.

Address: _____ Site No.: _____ Date: _____	
Unit Factory Number: _____ (refer to the unit name plate)	
Check Items	✓ or X
Step-Test or Manual Operating	
Verify HVAC1 supply fan is working(1)	
Verify HVAC 1 heater works normally (2)	
Verify HVAC 1 compressor works normally (3) At the same time, check if the HVAC 1 condenser fan works normally.	
Verify HVAC 1 free cooling is working (4)	
Verify HVAC 2 supply fan works normally(5)	
Verify HVAC 2 heater works normally (6)	
Verify HVAC 2 compressor works normally(7) At the same time, check if the HVAC 2 condenser fan works normally.	
Verify HVAC 2 free cooling works normally (8)	
Record these values using pressure gauges or multi-meter readings	
Outdoor Temperature: _____ Indoor Temperature: _____	
The HVAC 1 low pressure value R410a system, normal range:8~12Bar/116~174PSI; R407c system, normal range:4~7Bar/58~101.5PSI.	Bar/PSI
The HVAC 1 high pressure value R410a system, normal range:25~30Bar/362.5~435PSI; R407c system, normal range:16~20Bar/232~290PSI.	Bar/PSI
The HVAC 1 current of the compressor (refer to nameplate)	Amp
The HVAC 1 current of the supply fan (refer to nameplate)	Amp
The HVAC 1 low pressure value R410a system, normal range:8~12Bar/116~174PSI; R407c system, normal range:4~7Bar/58~101.5PSI.	Bar/PSI
The HVAC 1 high pressure value R410a system, normal range:25~30Bar/362.5~435PSI; R407c system, normal range:16~20Bar/232~290PSI.	Bar/PSI
The HVAC 2 current of the compressor (refer to nameplate)	Amp
The HVAC 2 current of the supply fan (refer to nameplate)	Amp

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