INSTALLATION AND OPERATION MANUAL

Wall Packaged Air Conditioners with Ethernet Connected Lead/Lag Controllers

HVAC Models

3R1C1	**9E1C2**
5R1C1	**13E1C3**
7E1C2	**18E1C4**

Controller Models

ASLLC.2A **ASLLC.2A.48**

AIRSYS
Balance the Environment

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Version Number: 1.2

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Chapter 1: Overview

Thank you for choosing a unit manufactured by AIRSYS.

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 return 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 integrated economizer, described as "free cooling". This feature combines with the powerful controller to provide 100% of the rated cooling capacity of the wall pack unit (WPU) while 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 costs, especially in cool weather climates.

In addition to having excellent 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's requirements

The AIRSYS WPUs are available in cooling capacities from 1.0 - 5.0 tons; however, the sensible cooling capacity of these machines is as much as 40% higher than a traditional machine. An available ordering guide can help properly match the capacity of the HVAC system to the heat load in the shelter.

Heating elements can also 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, AIRSYS WPU units deliver quality and reliability while substantially reducing cost of operation.

Using this Manual

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

- Product overview

- System installation including preparation, physical and electrical installation of WPUs and the controller box, and commissioning the system

- System operation, including system alarms, program menus, and 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.
	PROTECTAGAINST RAIN: The packaged unit must be stored in a dry place.		DO NOT STACK

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Model Identification

Each unit is identified by a model number, such as M-OD.13E1C3DR410.230/1/60.DC. The elements in the number are explained in
Table 2.

Table 2: Model Number Nomenclature

M-OD.13E1C3DR410.230/1/60.AC
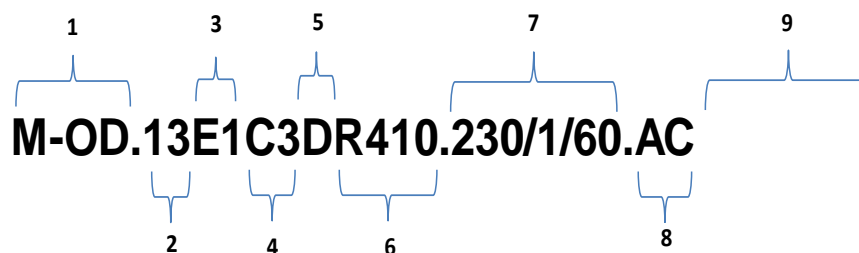
1	M-OD	Product series name: M-OD = MOBILECOOL-OUTDOOR : Packaged air conditioner with fresh air free cooling.
2	13	Unit nominal total cooling capacity in kW
3	E1	Compressor type & number: E1 = Hermetic scroll compressor qty 1; R1= Rotary compressor qty 1
4	C3	Cabinet size code: There are 4 cabinet sizes: C1, C2, C3 & C4.
5	D	Control configuration: D = Unit is designed to operate in a Dual control environment (aka Lead/Lag operation)
6	R410	Refrigerant: R410 = R410a.
7	230/1/60	Power source: Voltage/Phase/Frequency; 230V/1φ/60Hz, 230V/3φ/60Hz, 460V/3φ/60Hz.
8	AC	Supply Fan configuration: DC = DC EC fan; AC = AC EC fan. (EC = Electronically commutated variable speed fan)
9		Special code: Utilized to designate unit customization (non-standard configuration)

Acronyms and Abbreviations

Table 3 lists acronyms and abbreviations used in this manual.

Table 3: Acronyms and Abbreviations

Term	Meaning
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	Common
Comp	Compressor
Cond	Condenser
DC	Direct Current
Gen Run	Generator Run Signal
EC	Electronically Commutated (Refers to variable speed evaporator/supply fan)
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
N.C.	Normally Closed
N.O.	Normally Open
pLAN	PCO controller Local Area Network
PLD	Programmable LED Display
PSI	Pounds per Square Inch
PWM	Pulse Width Modulation
R	Read Only
RoHS	Restriction of Hazardous Substances Directive
R/W	Read/Write
Temp	Temperature
VAC	Voltage in Alternating Current
VDC	Voltage in Direct Current
WPU	Wall Packaged Unit

Product Overview

Unit Operation

The air conditioning system has three key components:

1. The free cooling system
2. The mechanical cooling system
3. The control system

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

Free Cooling Mode   Mechanical Cooling Mode
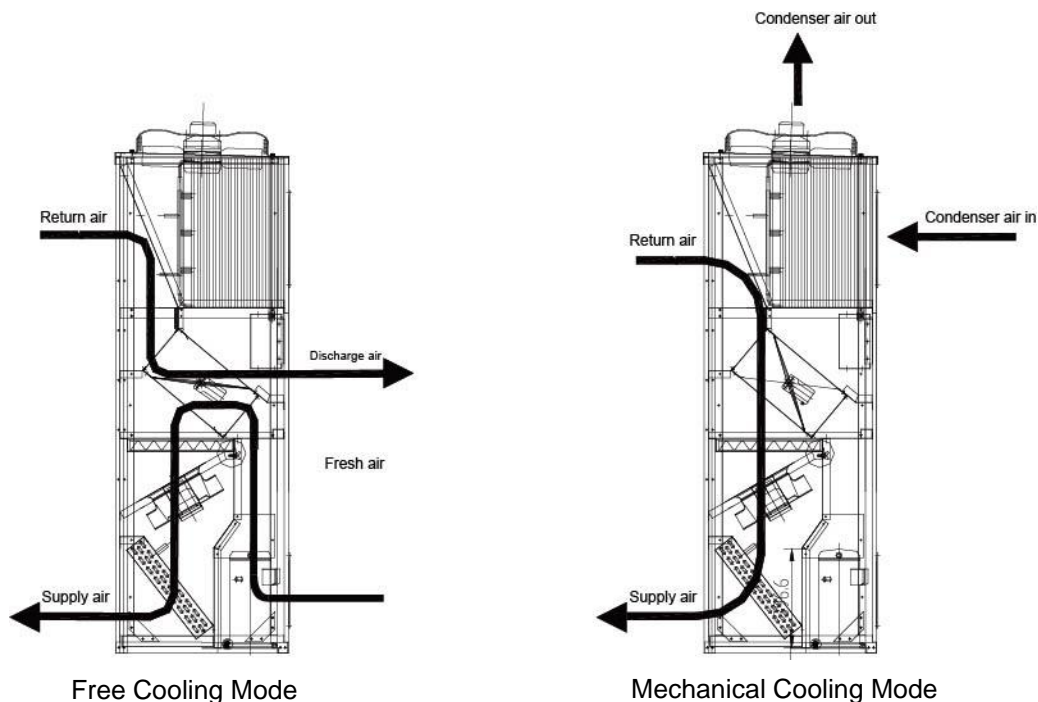
Figure 1: Basic Operating Modes

Free Cooling System

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 System

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 to go 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 repeatedly, absorbing heat from the indoor environment and discharging the condenser heat to the outdoor environment.

The Control System (Controller Box)

The AIRSYS controller box is designed to operate a fully or partially redundant air conditioning system for equipment shelters or enclosures. Two variations of the **A**IR**S**YS **L**ead **L**ag **C**ontroller are available: ASLLC.2A & ASLLC.2A.48.

ASLLC.2A is standard for WPUs equipped with an AC EC evaporator fan.

ASLLC.2A.48 is standard for WPUs equipped with a 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 **P**rogrammable **L**ED **D**isplay (PLD). The PLD and button actions are explained in more detail in Chapter 3 starting on Page 45. 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 a 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 unit that has this primary role during MC is referred to as the *lead* unit. The unit functioning in a backup role during periods of MC is referred to as the *lag* unit. After a set period, the lead and lag units 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 (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 WPU 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. This design extends the life of the system and reduces energy consumption.

Chapter 2: Installation

Installation Preparation

Unpack the unit carefully. Some parts are packed loosely and may move 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 9 for the complete list of material shipped with each unit.

Check that:

- The supply voltage meets the requirements as designated:

    AC part: 197-252 VAC

    (DC Supply fan only) DC part: 36-57 VDC

    Controller: 85-264 VAC

- 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 all installer provided materials are present (Table 5 on Page 10).

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

For more information about the AAST program, please contact:

AIRSYS North America
w. https://airsysnorthamerica.com/
ph. 855-874-5380
e. ASNSupport@air-sys.com

🚫 **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 the 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 can 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 AIRSYS North America.

Note: Warranty assumes that an 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, then 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 protective goggles.

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:

AIRSYS North America
Web: https://airsysnorthamerica.com
Email: ASNSupport@air-sys.com
Phone: 855-874-5380

Table 4: Material Supplied by AIRSYS

Item	Model # or Part #	Qty	Item Description	Comments
Wall Pack Unit Assembly: Two per Shelter				
1	Refer to Nameplate	1	Wall pack unit	**Refer to Table 2: Model Number Nomenclature**
2	2030104200	1	Return air grill	Only included for models 3/5R1C1
	2030104190	1	Supply air grill	
2	8255504110	1	Return air grill	Only included for models 7/9E1C2
	8255504120	1	Supply air grill	
2	8255503240	1	Return air grill	Only included for models 13E1C3
	8255503230	1	Supply air grill	
2	8255504090	1	Return air grill	Only included for models 18E1C4
	8255504100	1	Supply air grill	
3	8553703300	24	Self-tapping screw ST4.2*25	For the supply and return air grill installation
4	N/A	1 Roll	Weather stripping	Used to frame the WPU outlet and inlet. Not include in units built in 2016 and before.
5	1060519770	2	Alignment Lips for Supply	Only included for models 3/5R1C1. Not include in units built in 2016 and before.
	1060519780	2	Alignment Lips for Return	
5	1060519790	2	Alignment Lips for Supply	Only included for models 7/9E1C2. Not include in units built in 2016 and before.
	1060519800	2	Alignment Lips for Return	
5	1060519750	2	Alignment Lips for Supply	Only included for models 13E1C3. Not include in units built in 2016 and before.
	1060519760	2	Alignment Lips for Return	
5	1060519810	2	Alignment Lips for Supply	Only included for models 18E1C4. Not include in units built in 2016 and before.
	1060519820	2	Alignment Lips for Return	
Controller Box Assembly: One per Shelter				
5	2040303110 or 2040307640	1	Controller box	Model: ASLLC.2A or ASLLC.2A.48
6	9000000357	1	Indoor temperature sensor (rt1)	One end connected inside the controller box
7	9000000357	1	Backup Indoor temperature sensor (rt2)	One end connected inside the controller box
8	9000000357	1	Outdoor temperature sensor (Et)	One end connected inside the controller box
9	8454020720	1	Humidity sensor (Hu)	One end connected inside the controller box
10	8458716820	1	Sensor box	For housing outdoor temperature sensor and mounting on outside wall
11	1170104040	1	Installation and Operation Manual	
12	1110212510	1	Registration card	Must be returned according to instructions on page 40

13	1110212560	2	Compressor shipping bracket removal sticker	To remind the service technician to remove the shipping bracket before turning on the HVAC unit.
14	9000000357	2	Supply air temperature sensor (SU1 / SU2)	
15	8458716650	4	Temp sensor hold connector	
16	1050500720	2	Right angle supply air temp sensor mounting bracket	

Materials Supplied by Installer

Table 5 lists items required for installation that must be supplied by an AIRSYS Authorized Service Technician (AAST). The wire length and gauge depend 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 WPUs	2	2 cables for two WPUs, AC part (compressor & heater)	Refer to Summary Electrical Ratings
2	DC power supply cable to two WPUs (If the HVAC is equipped with DC EC supply fan)	2	2 sets of three –wire cable for two WPUs DC part (supply fan).	Refer to Summary Electrical Ratings
3	Power supply cable to controller box	1	A set of two-wire cable for WPU controller box	Max current capacity 0.5 Amps; 18 gauge recommended
4	Control harness from controller box to WPU	4	2 sets of Ethernet cable per WPU (4 total for 2 units)	The Ethernet (cat5/5e/6) cable should meet ANSI/TIA-568-B.2 standard
5	Alarm wiring harness	5	1 cable with 2 wires, length as needed	Alarm connection to controller box, 3 alarm inputs and 4 alarm outputs; all alarm connections are optional
6	Supply air frame	2	Refer to Figure 22: Frame Dimensions on page 78 for size details for each model	Built inside wall to facilitate air flow
7	Return air frame	2	Refer to Figure 22: Frame Dimensions on page 78 for size details for each model	Built inside wall to facilitate air flow
8	WPU Mounting Screws	20	Mounting hole diameter 7/16"	10 per WPU
9	Controller Mounting Screws	4	Mounting hole diameter 5/16"	
10	Adhesive tape	A/R	With single-sided adhesive	Used to line the return and supply air frames
11	Silicone sealant	A/R	Commercial grade outdoor silicone sealant	
12	Nylon zip-tie	A/R	Small nylon zip tie	For properly dressing cables and harnesses
13	Breakers for AC power panel	3	One **10** amp circuit breaker for ASLLC.2A; One circuit breakers each for each unit's AC power, amperage based on model number	Refer to Table 6: WPU Electrical Ratings on page 11
14	Breakers for DC power panel (only for ASLLC.2A.48 and DC fan HVAC)	3	One **10** amp circuit breaker for ASLLC.2A.48; One circuit breaker each unit's DC power, amperage based on model number	Refer to Table 6: WPU Electrical Ratings on page 11

Summary Electrical Ratings (Wire Sizing)

Table 6: WPU Electrical Ratings

ELECT. HEAT		1.5 KW				2.4kW				5 KW			
		AC		48VDC		AC		48VDC		AC		48VDC	
	Model	MCA	MFS	MCA	MFS	MCA	MFS	MCA	MFS	MCA	MFS	MCA	MFS
AC Supply Fan													
M-OD	3R1C1DR410.230/1/60.AC	10	15	--	--	15	20	--	--	--	--	--	--
	5R1C1DR410.230/1/60.AC	11	15	--	--	15	20	--	--	--	--	--	--
	7E1C2DR410.230/1/60.AC	--	--	--	--	17	25	--	--	31	35	--	--
	9E1C2DR410.230/1/60.AC	--	--	--	--	--	--	--	--	31	35	--	--
	13E1C3DR410.230/1/60.AC	--	--	--	--	--	--	--	--	32	40	--	--
	18E1C4DR410.230/1/60.AC	--	--	--	--	--	--	--	--	37	55	--	--
	18E1C4DR410.230/3/60.AC	--	--	--	--	--	--	--	--	28	40	--	--
	18E1C4DR410.460/3/60.AC	--	--	--	--	--	--	--	--	18	25	--	--
DC Supply Fan													
M-OD	9E1C2DR410.230/1/60.DC	--	--	--	--	18	30	7	10	28	35	7	10
	13E1C3DR410.230/1/60.DC	--	--	--	--	--	--	--	--	28	40	14	20
	13E1C3DR410.230/3/60.DC	--	--	--	--	--	--	--	--	17	25	14	20
*MCA = Minimum Circuit Ampacity (Wire Size Amps) MFS = Maximum Fuse Size or HACR circuit breaker													

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Physical Installation

To assist in the installation process, the following figure and table provide the dimensions of the units to a tolerance of ± 1/16" (2 mm).
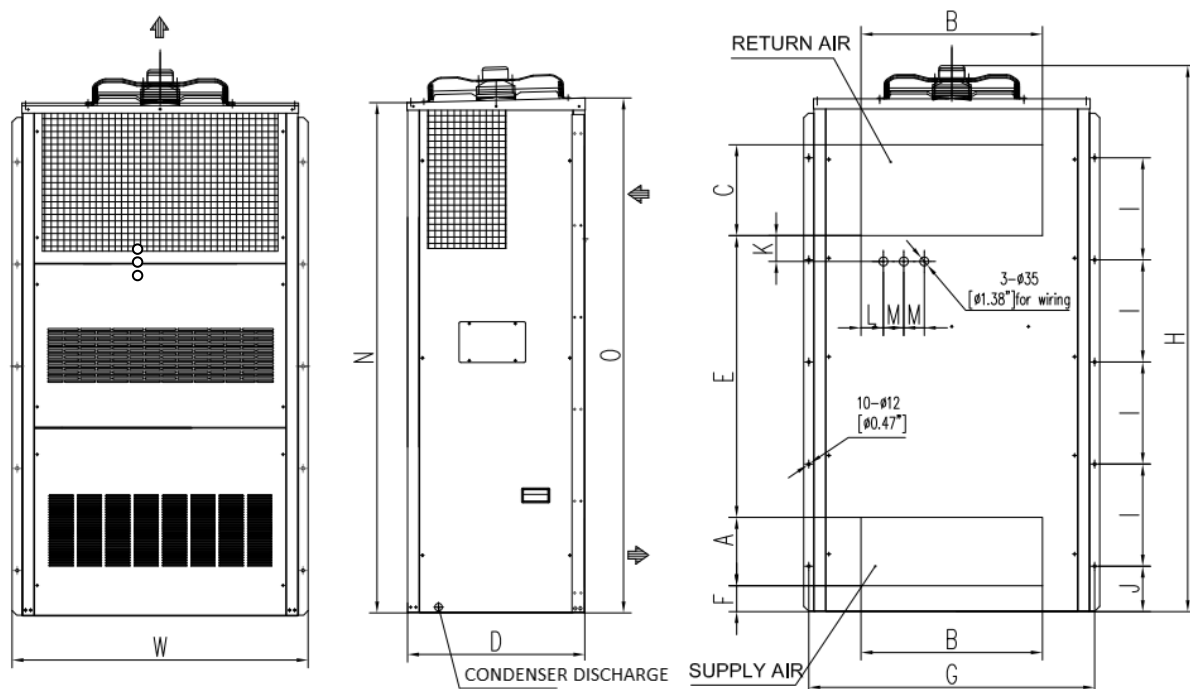
Table 7: External Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

Cabinet Size		C1		C2		C3		C4	
Unit of measurement		mm	in	mm	in	mm	in	mm	in
Width (W)		700	27.6	1010	39.8	1160	45.7	1360	53.5
Depth (D)		620	24.4	700	27.6	700	27.6	700	27.6
Height (H)		1930	76.0	2130	83.9	2130	83.9	2130	83.9
Supply	A	200	7.9	268	10.6	268	10.6	268	10.6
	B	450	17.7	708	27.9	759	29.9	880	34.7
Return	C	300	11.8	356	14.0	356	14.0	356	14.0
	B	450	17.7	708	27.9	759	29.9	880	34.7
	E	1000	39.4	1104	43.5	1104	43.5	1104	43.5
	F	133	5.2	101	4.0	101	4.0	101	4.0
	G	660	26.0	970	38.2	1120	44.1	1320	52.0
	I	350	13.8	400	15.8	400	15.8	400	15.8
	J	226	8.9	178	7.0	178	7.0	178	7.0
	K	101	4.0	101	4.0	101	4.0	101	4.0
	L	87	3.4	87	3.4	112	4.4	112	4.4
	M	80	3.2	80	3.2	80	3.2	80	3.2
	N	1800	70.9	1999	78.7	1999	78.7	1999	78.7
	O	1815	71.5	2017	79.4	2017	79.4	2017	79.4

Select the Wall for Installing the Unit

Select the wall where the unit will be installed. Be certain that the wall can support the weight of the unit and that sufficient space is available for easy operation and installation, both inside and outside the mounting location. Refer to Table 7 on Page 12 and Table 8 below for unit dimensions and weights by model number.

Leave at least:

- 1200mm (47.24") free space in front of the unit

- 400mm (15.75") free space at the side of the unit (minimum of 200 mm (8")

If any protrusions will hang over the unit covering any portion of the exhaust fans, there must be a minimum of 1000mm (39.37") free space above the unit.

Allow spacing as noted if any physical structure will significantly reduce air flow. Minor obstructions, such as a chain linked fence, will not impact the HVAC system.
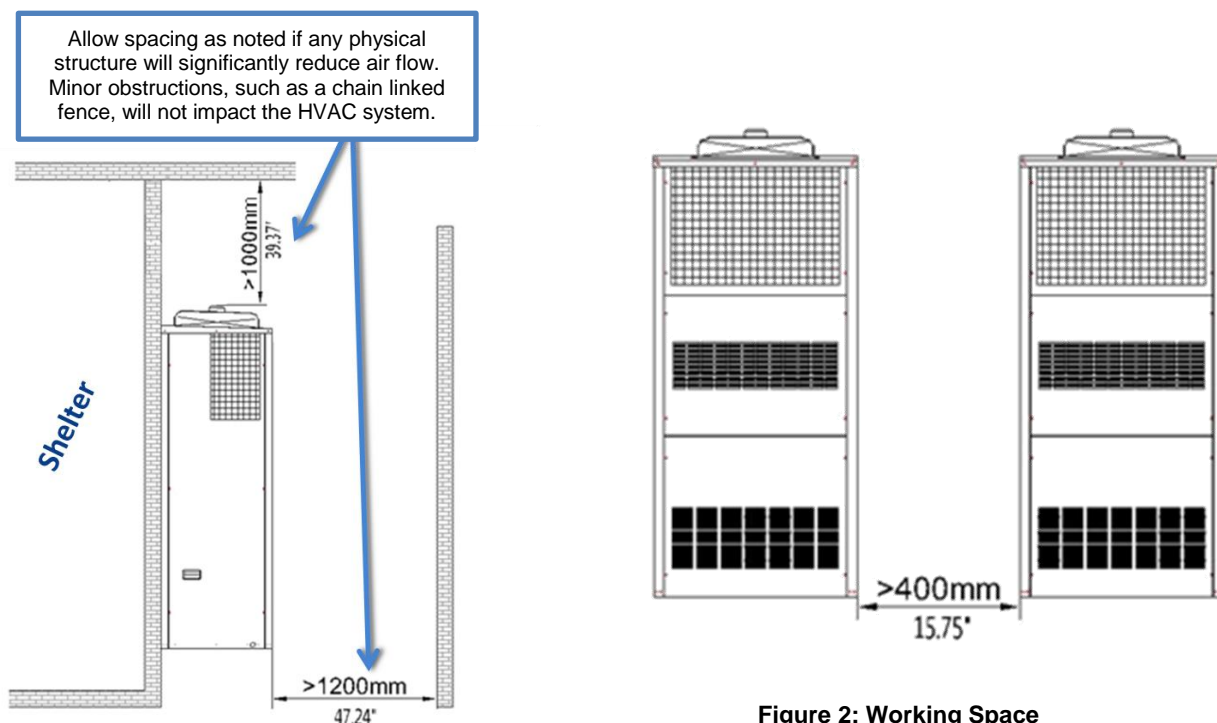
Figure 2: Working Space

Table 8: Dimensions and Weight by model number

Model		1 Ton	1.5 Ton	2 Ton	2.5 Ton	3.5 Ton	5 Ton
		3R1C1	**5R1C1**	**7E1C2**	**9E1C2**	**13E1C3**	**18E1C4**
Width	in	27.56	27.56	39.76	39.76	45.67	53.54
Depth	in	24.41	24.41	27.56	27.56	27.56	27.56
Height	in	75.98	75.98	83.86	83.86	83.86	83.86
Weight	lbs	355	370	515	530	615/635*	712
*3.5 Ton (13E1C3) AC WPU = 615 lbs / 3.5 Ton (13E1C3) DC WPU = 635 lbs							

⚠ **Important.** The wall selected for the unit must be strong enough to support both the static weight of the unit and the vibration of a unit under operation.

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Make Openings and Holes

Make openings for supply and return air and cable and bolt holes in the installation wall as shown in Figure 3 and Figure 4; refer to Table 7 on Page 12 for dimensions.

Figure 3: Left Side View

Note: The template printed on the shipping carton can be used to create wall cuts.
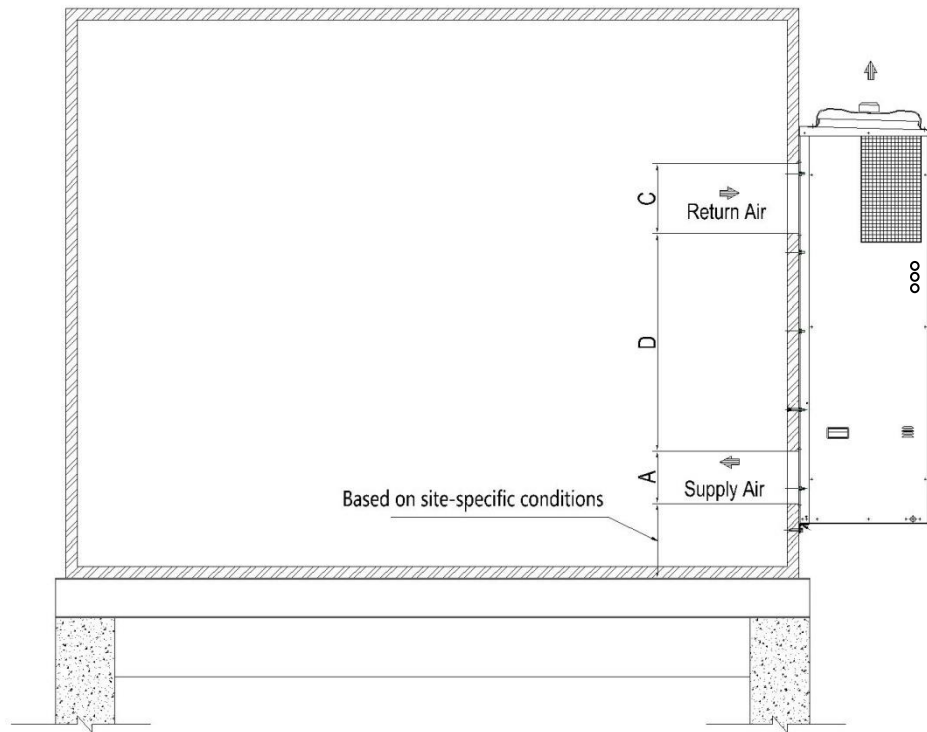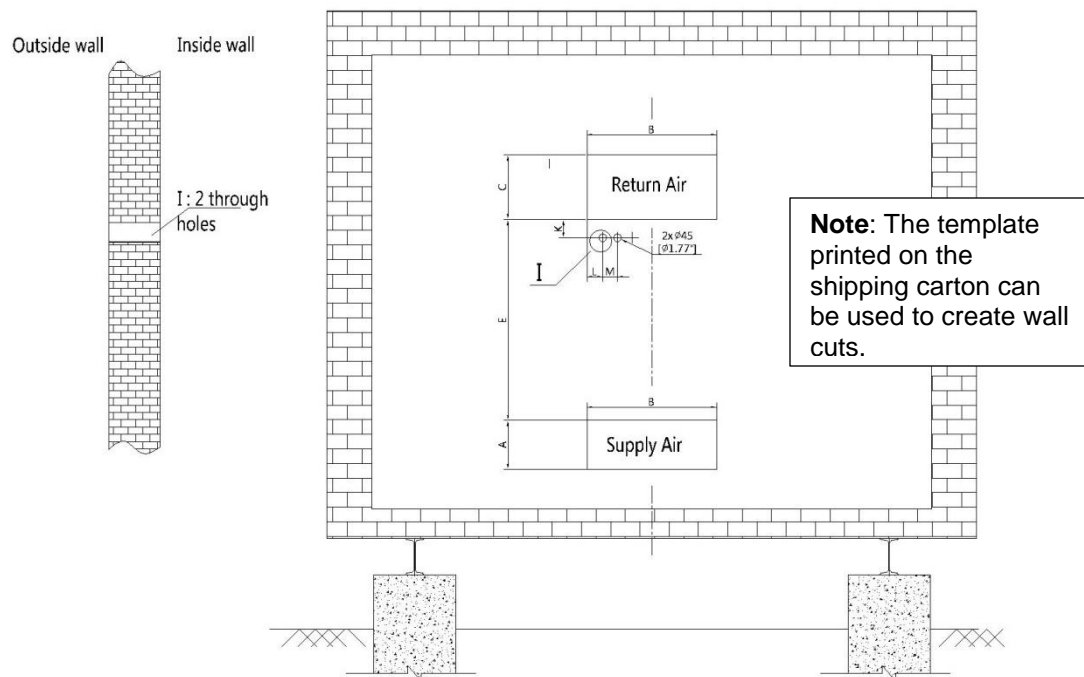
Figure 4: Openings and Holes in the Wall

Install Weather Stripping

Before mounting the unit on the outside wall, fix 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.
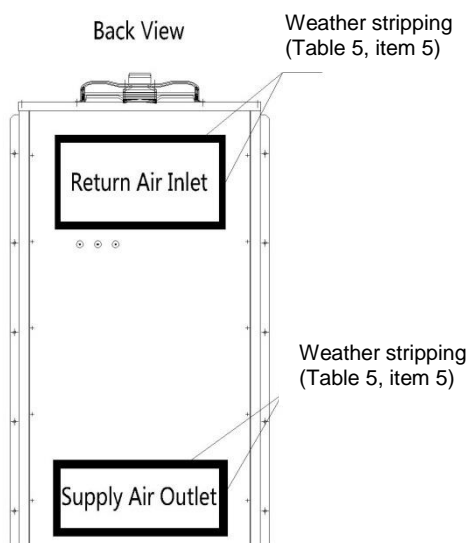
Figure 5: Install Weather Stripping

Position the Unit

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

The unit must be installed in a level position. An inclination of more than 6-7 mm ($\pm\ 1°$) could cause the condensation tray to overflow (refer to Figure 6).
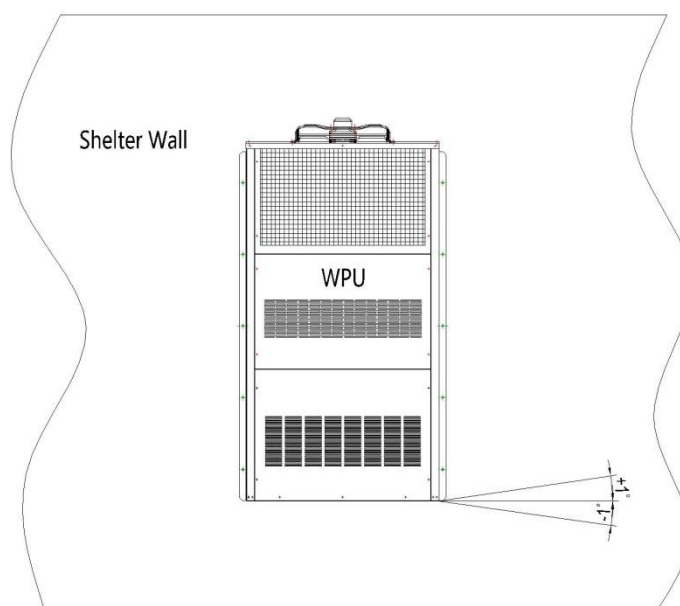
Figure 6: Inclination of Mounted WPU

Lift the unit from below with lifting equipment or tools, and then move the unit to the wall. Use the screws (installer supplied) to affix the unit on the wall. Generally, this is done by following these steps:

1. Position the unit next to the wall using a forklift or leveling system.

Use either a level system or a forklift to position the unit.

Figure 7: Position the Unit

2. Attach a single mounting screw and adjust to ensure the unit is level.

3. After the unit is level, attach the remaining mounting screws (a quantity of 10 total for each WPU).

Remove Wooden Pallet from WPU

The WPU is bolted to a wooden pallet to facilitate safe lifting and transport of the unit. Four bolts attach the pallet to the unit, as shown in Figure 8. The pallet frame is recessed under the WPU to allow for easy installation while using a forklift. Before completing the mounting of the unit to the wall, remove the pallet by removing the four bolts.

Remove the 4 bolts under the unit to remove the pallet

Figure 8: Remove Wooden Pallet

Seal the Joints between WPUs and Wall

To prevent moisture from getting in and air leaking out, coat the joint between the rear panel of the unit and the wall with a layer of silicone sealant (installer provided, see Table 5, item 11) as shown in Figure 9.
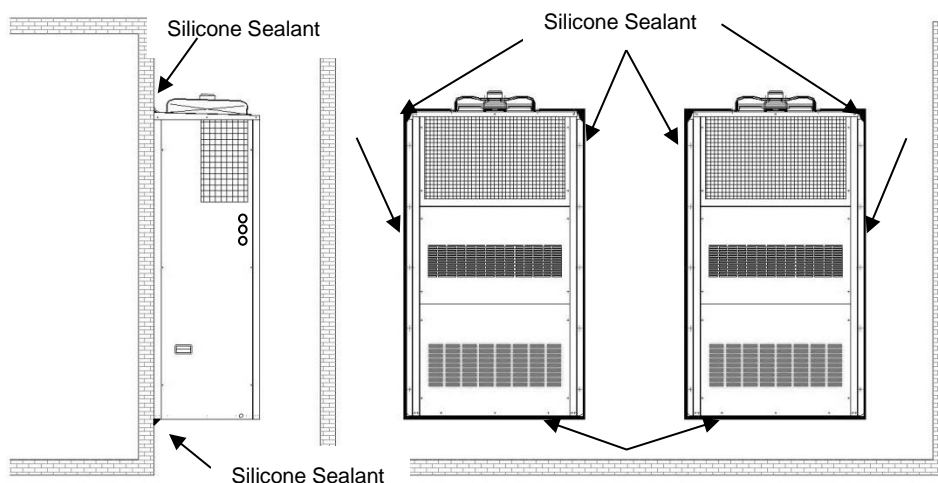
Figure 9: Seal the Joints between WPUs and Wall

Attach the Supply Air Grill and the Return Air Grill to the Wall

The supply air grill and the return air grill should be installed at the holes inside the shelter as shown in Figure 11.
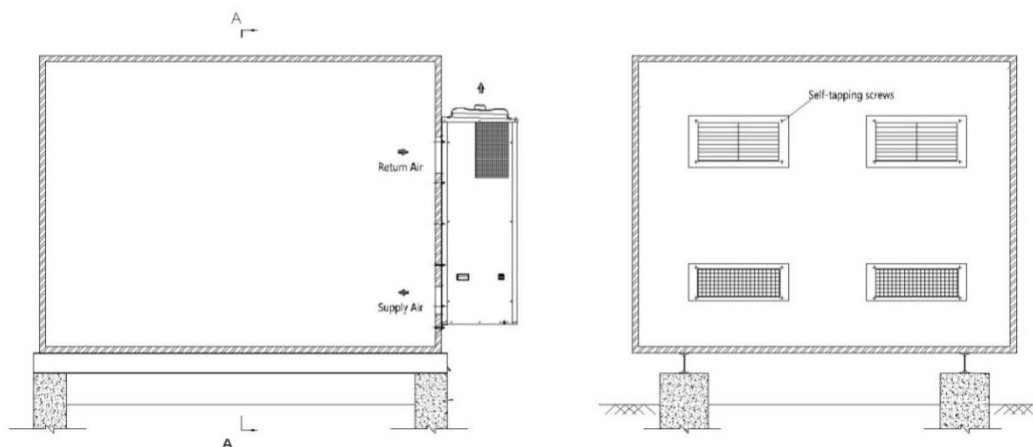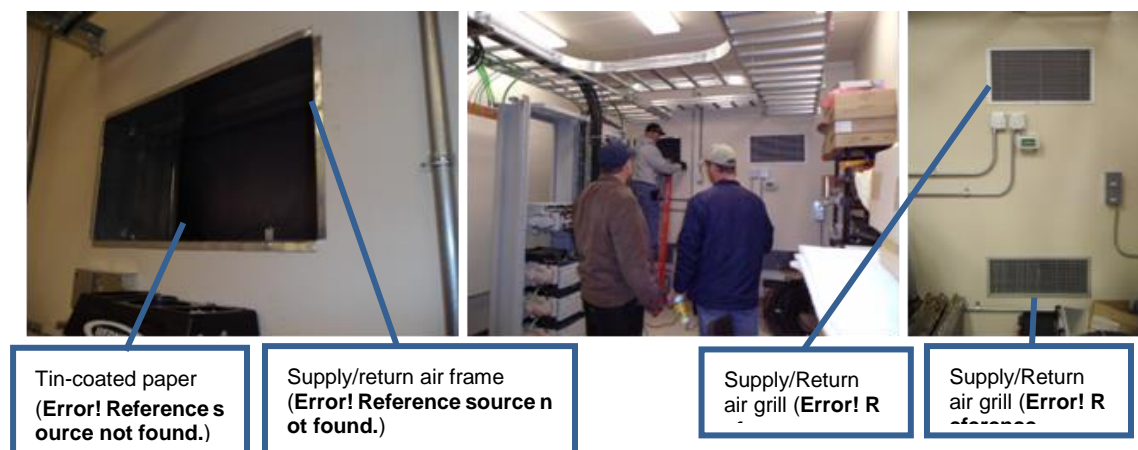
Figure 10: Install the Supply and Return Air Grills

1. Install the supply and return air frames into their respective cutouts.

2. Use an adhesive tape to tape down the edges of the return and supply air frames on the WPU side.

3. After installing the supply air grill, adjust the angle of the fins to direct airflow away from adjacent equipment and prevent bounce-back of supply air. Adjust the fins first up and down; then, left and right.

Refer to Figure 22: Frame Dimensions on page 78 and Table 28 on page 79 for each model.

Remove the Compressor Brackets

Open the front, bottom panel on the WPU to locate the compressor. The two brackets at the base of the compressor are required for transport only. Loosen the four bolts, remove the two brackets, and then tighten the four bolts back down to the base of the compressor.

Figure 11: Remove Compressor Brackets

Controller Box Installation

Find a suitable location inside the shelter between the two WPUs to mount the controller box. Mount the controller box so that the PLD is near the eye level of the intended operator.
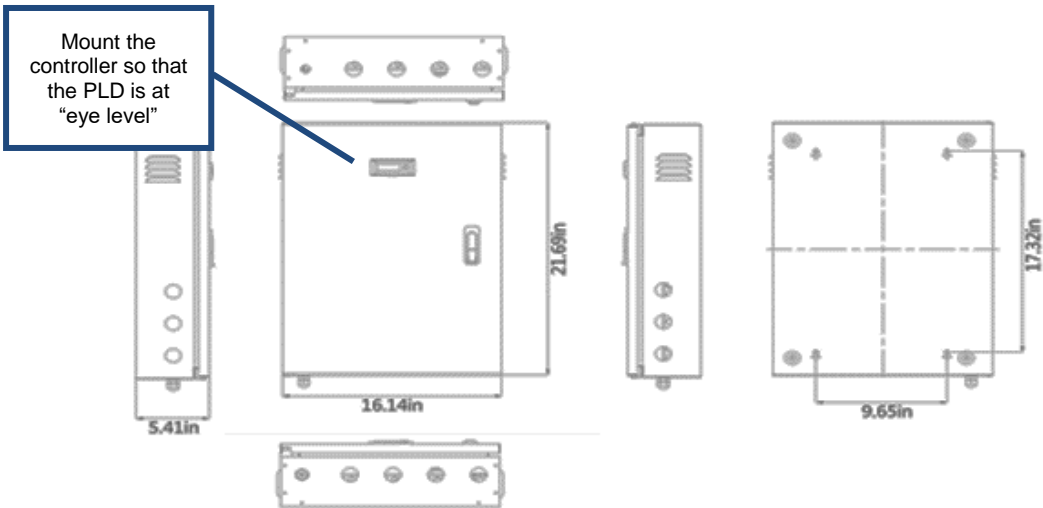
Figure 12: Controller Box Dimensions

Table 9: Key Components in the Controller Box Assembly

Note: Each unit should have a unique breaker/fuse connection to the main power service.
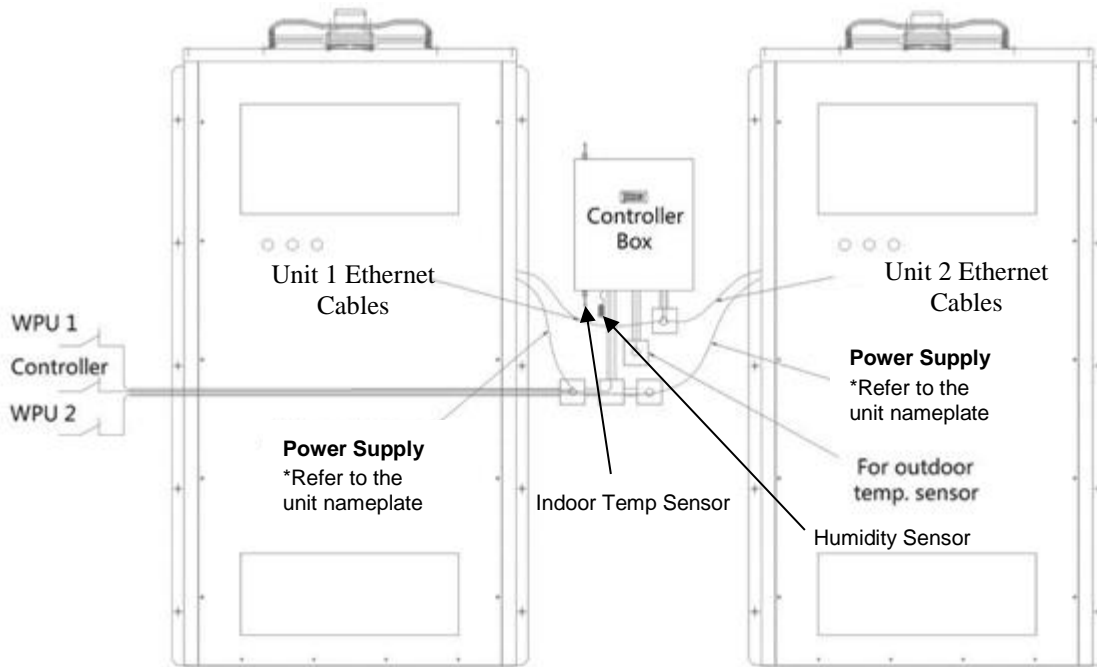
Figure 13: System Block Diagram

Install Outdoor Temperature Sensor

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

1. Select the wall where the WPU is mounted.

1. Drill a 0.5 inch diameter hole for the outdoor temperature sensor (ST2 or $E\,E$) through the shelter wall.
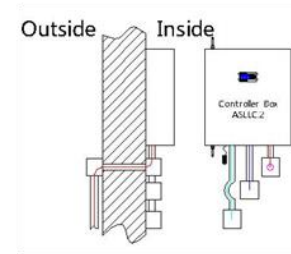
2. Open the controller box assembly and locate the outdoor temperature sensor (ST2 or $E\,E$) assembly.

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

Outdoor
Temperature
Sensor

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

5. Secure the sensor to the bottom of the box with a nylon zip-tie.

6. Secure the box to the outside wall. Snap the sensor box cover in place and use sealant along the seam between the box and the wall.

Figure 14 illustrates the relationship of the sensor to the installed WPUs
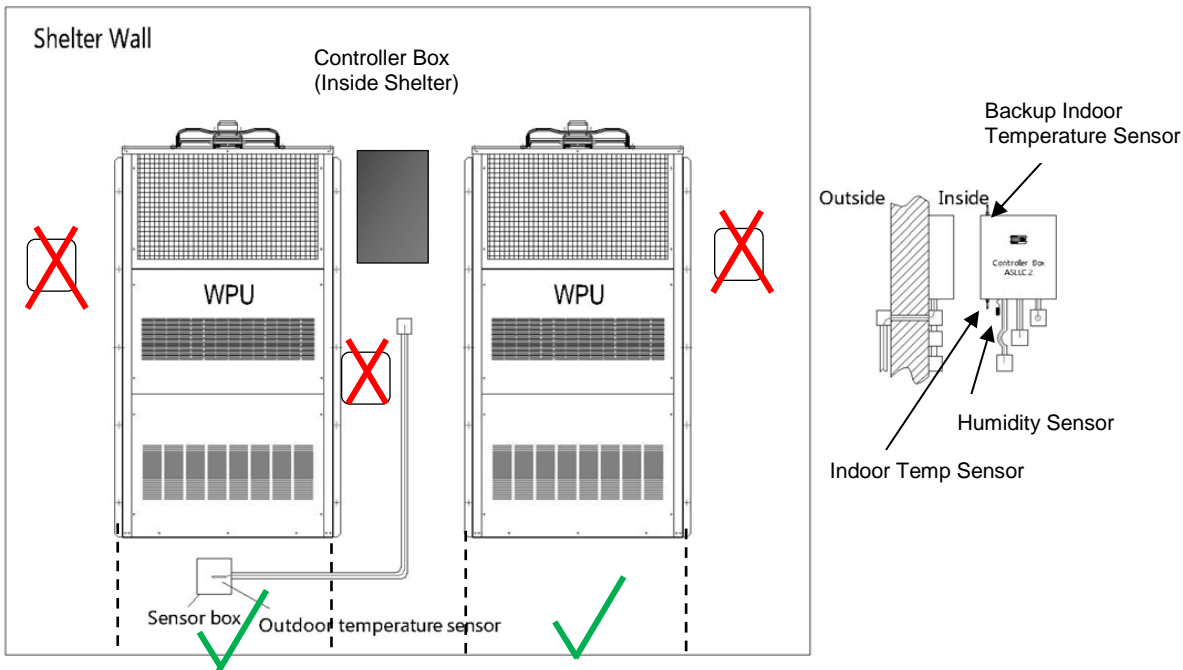
Figure 14: Location of Outdoor Temperature Sensor

Note: punching out the holes on the sides and the bottom of the sensor box is critical to allow proper airflow and 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.
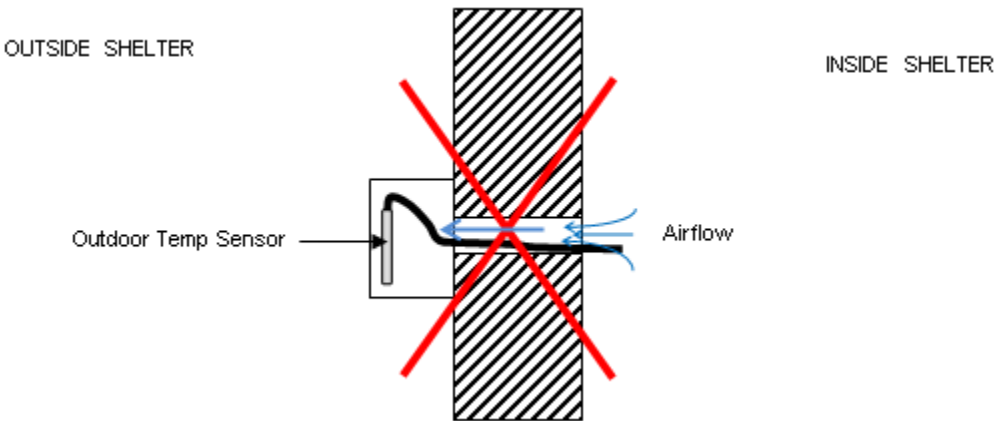
Figure 15: Ensure No Leakage

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 or *H U*) 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. Note: If further shipping is required after mounting the controller, secure the humidity sensor under the controller box with tape to protect the sensor from vibration.
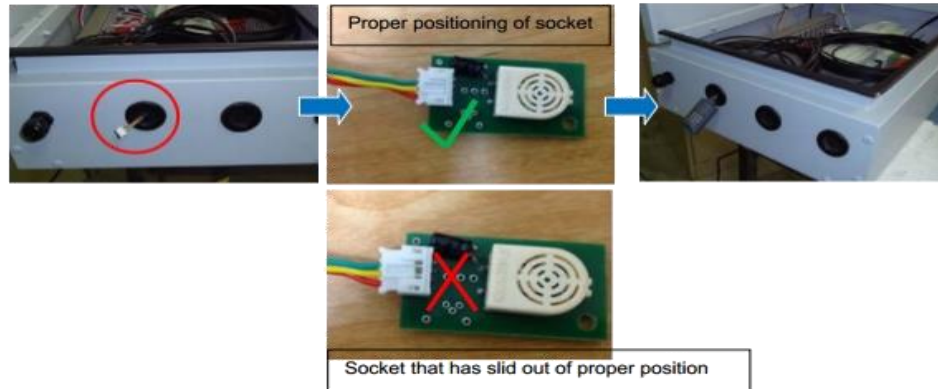
Position Indoor Temperature Sensors and Supply Air Temperature Sensors

An indoor temperature sensor (ST1 or *r t 1*) is located at the bottom of the controller box and a backup temperature

sensor (ST1' or *r t 2*) at the top of the controller box. The sensor monitors the shelter temperature to control the WPU 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 16: Position Indoor Temperature Sensor

The supply air temperature sensors (ST3 or *S U* for Unit 1, ST3' or *S U 2* for Unit 2) should be installed at the middle-front of the supply air grill as shown in Figure 18.

Supply air temperature sensor location

Controller Box ASLLC.2

Two screws should be used for fixing the supply air temperature sensor mounting hardware.
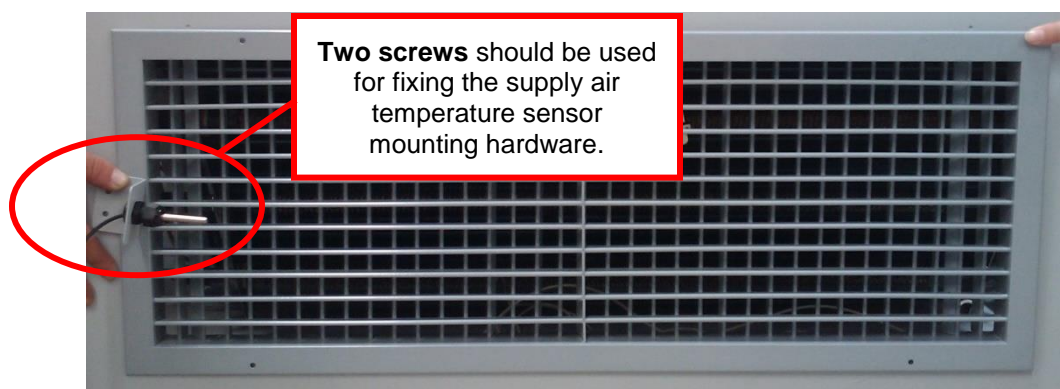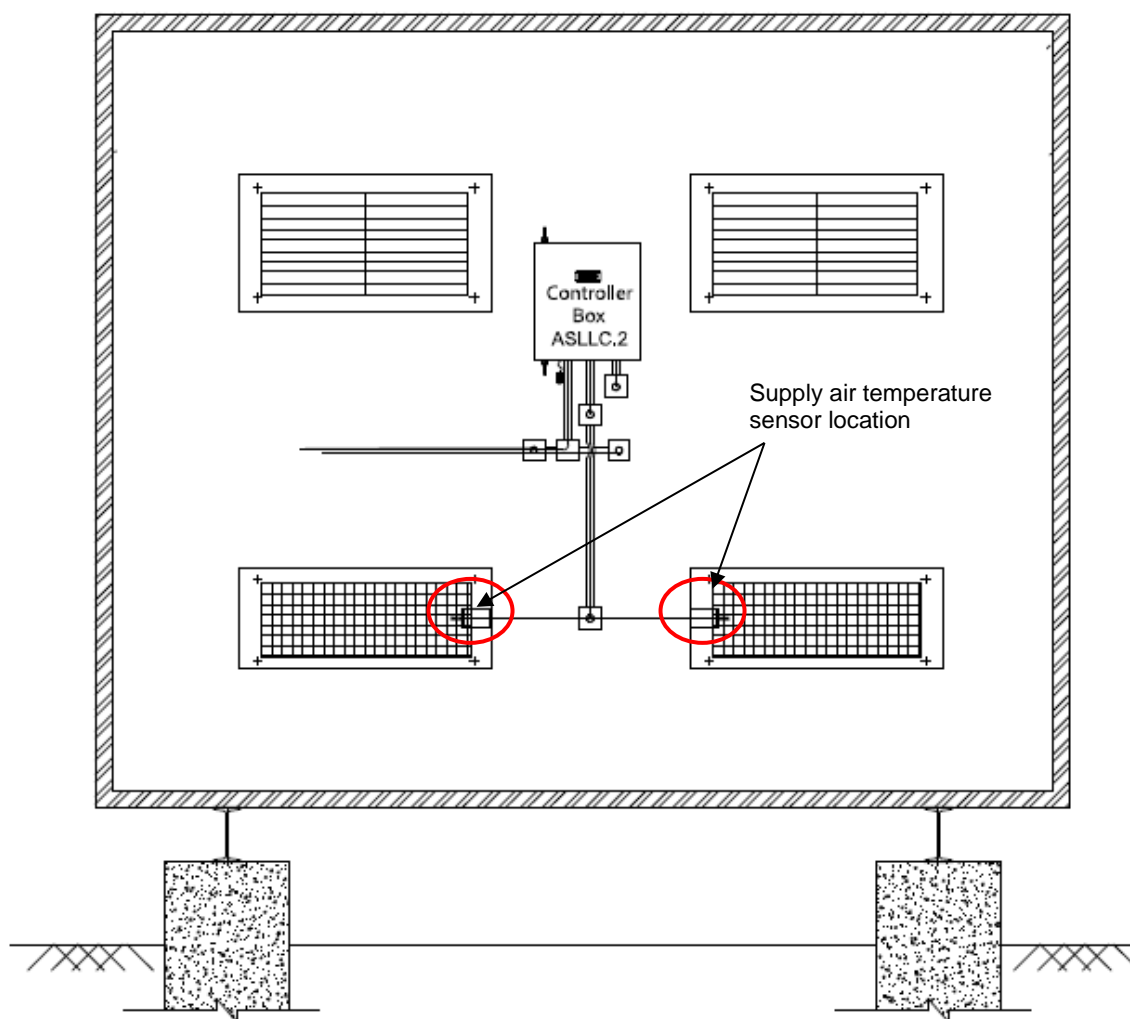
Figure 17: Position Supply Air Temperature Sensors

Complete Electrical Connections

Cautions

⛔ **Danger.** Only an authorized service technician should make the electrical connections to the WPUs and the controller box.

⚠️ **Important.** The electrical wiring of the unit must comply 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 WPU or the controller box. 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 Alarm Wiring

Figure 18 illustrates the alarm terminals in the controller.
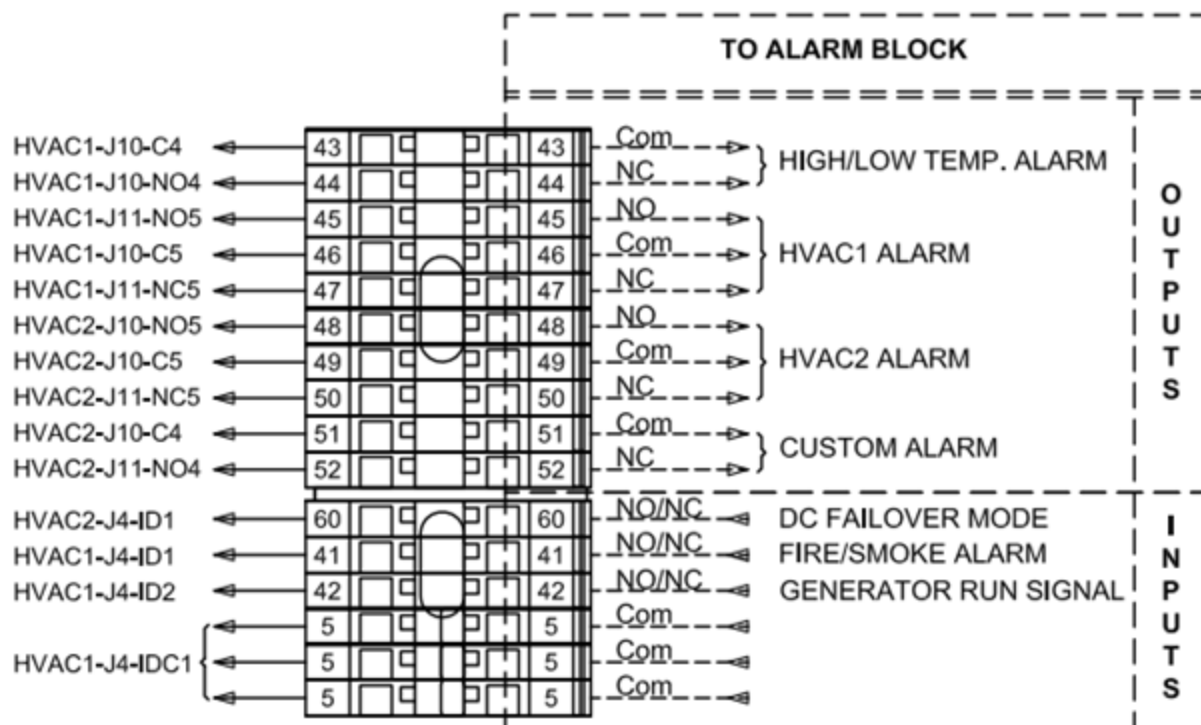
Figure 18: Field Wiring Terminals

Output Alarms

Output alarms are dry contract outputs from the ASLLC to a remote monitoring block/station.

High Temp Alarm

A high temp alarm will trigger when the indoor temperature has exceeded the high temperature setpoint for at least 1 minute. The default high temp setpoint is 18F above the main setpoint (5 Ł P) and can be changed through H Ł in the E Menu.

The default output setting is Normally Closed (NC), which can be changed to Normally Open (NO) through H Ł Ł in the D Menu.

HVAC1 and HVAC2 Alarm

An HVAC alarm indicates one or more major alarms that will prevent a unit from cooling. This includes:

- High and low refrigerant pressure (only affects mechanical cooling)
- Power loss
- Fan overload / airflow alarm
- Communication to HVAC2 fail, will trigger HVAC2 alarm
- Failure of both indoor and backup indoor temperature sensors

Note: if only one contact slot is available for remote monitoring, both HVAC alarms may be wired in series if NC or in parallel if NO

Customizable Alarm Output

This alarm can be customized to output any alarm code 1-32. This can be used to provide an extra output for the smoke/fire alarm (A05) or used to monitor any of the filters (A15 or A16).

To customize the alarm output, access Ц 5 Ɛ under L04 Menu and input the alarm number needed for monitoring. (For example, change to 5 will trigger this output whenever the Smoke Alarm (A05) is trigger)

Input Alarms

Input Alarms are used to inform the ASLLC of an alarm that is present in the building and make ASLLC behave accordingly. Note: all inputs must be dry contact signal.

DC Failover Input

This alarm is only applicable when the DC failover is installed. This alarm input informs the controller that power is only available through the DC inverter, so the controller will only run the supply fan and outdoor air damper. Alarm code A09 (DC failover mode) will display if this alarm is triggered.

Smoke Fire Alarm Input

This alarm input informs the controller that the smoke/fire detector has been triggered. All components will immediately shut down and outside air damper will fully close until alarm condition is removed. The default setting is NC. Access 5 F Ł under the D Menu to change to NO.

Alarm code A05 (Smoke/Fire Alarm) will display if this alarm is triggered.
Note: this is an input only and will not work as an output to a remote monitoring station.

Generator Run Input

This alarm input should be wired from the controller to outputs on the ATS or generator to inform the system that the generator is running. The outside air damper will fully close to prevent diesel fumes from entering the building and only one unit will be permitted to run to minimize generator load. The default setting is NO. Access ₫ Ū Ł under the D Menu to change to NC. Alarm code A28 (Generator Mode) will display if this input is triggered.

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Optional: Enable the 2nd compressor during generator run by accessing E2C in the D menu and change to Yes.
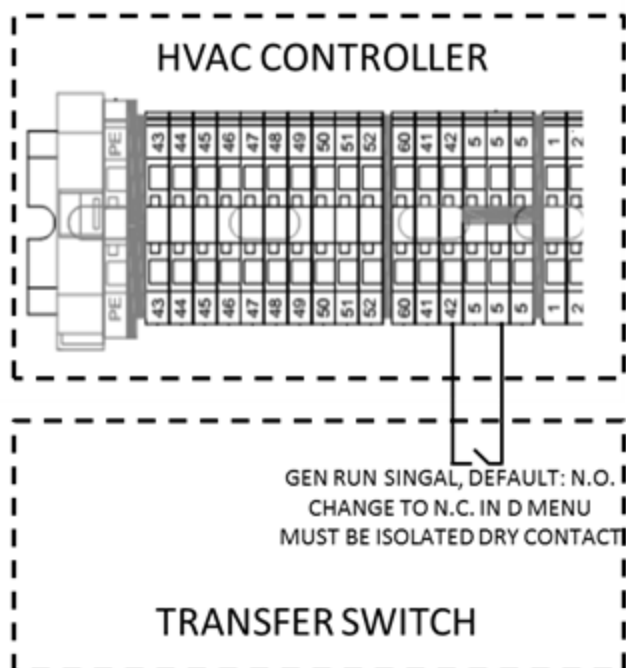
Figure 19: Generator Run Wiring

Ethernet Terminal Detail

The two sets of Ethernet cables have 16 signal wires in total, 13 of which are used. The signals carried in each wire are detailed below for troubleshooting purposes

Table 10: Ethernet terminal identification

	Description	Detail
Terminal 1	Call for Compressor	24VDC between terminal 1 and 4 → Call for Compressor
Terminal 2	AC/DC Power Detection	20kΩ between terminal 2 and 4 → AC System. 10kΩ between 2 and 4 → DC System. Open between 2 and 4 → DC fan system AC power loss.
Terminal 3	Call for Heater	24VDC between terminal 3 and 4 → Call for Heater
Terminal 4	DC Reference	Same as Terminal 12
Terminal 5	Alarm Common	Common terminal 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	Power Loss / Fan Overload	Between terminal 9 & terminal 5 is NC. DC Fan only closes if fan is running
Terminal 10	Signal to damper actuator	The signal voltage for damper actuator, 0-10VDC. 10VDC = Fully Open

Terminal 11	Speed signal to supply fan	The signal voltage for supply fan, 0-10VDC
Terminal 12	DC Reference	Same as Terminal 4
Terminal 13	24 VDC	Power supply for Damper actuator, the voltage between terminal 12 & terminal 13 should be 24VDC.

Electrical Connection to Controller Box

Follow these steps to complete the connections:

1. Open the controller box.

2. Ensure the PLD cable is FIRMLY plugged into the user interface terminal located on the inside of the controller box cover.

3. Ensure the other side of the PLD cable is FIRMLY plugged into the HVAC1 controller board terminal J7 as shown below.
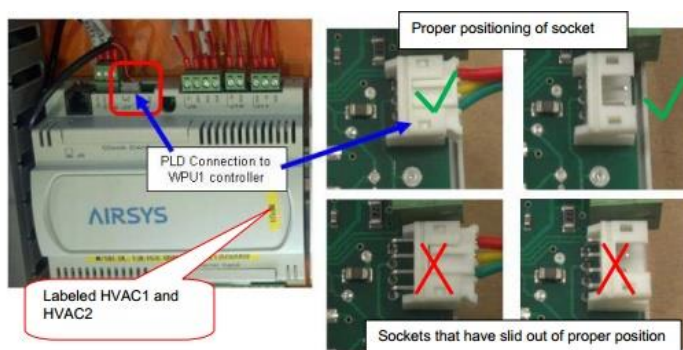
4. Connect the Ethernet Cables
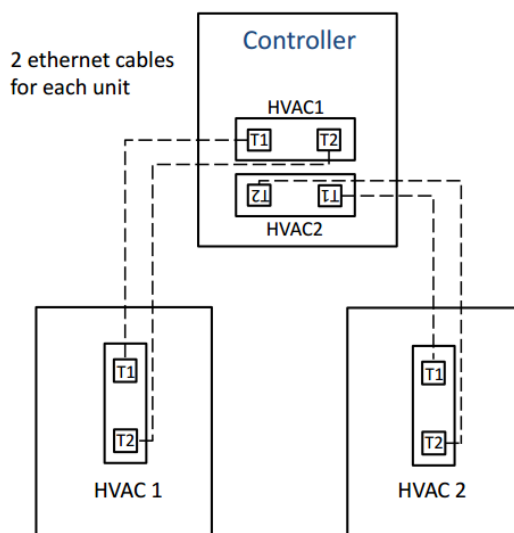
5. Connect the power cable from power plant to the controller box. **Note:** for ASLLC.2A.48, one OR both power inputs may be connected. Using both power inputs will provide power redundancy to the controller.
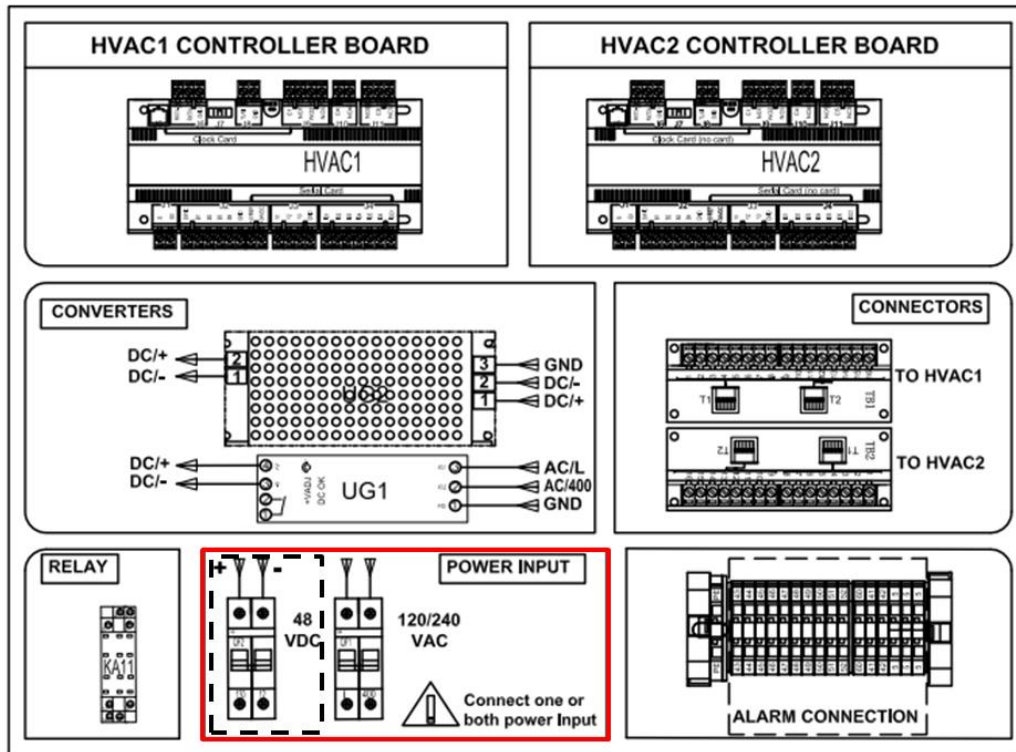
Electrical Connection to WPUs

Depending on the unit being installed, either two or three wire harnesses are passed through the shelter wall into the WPUs:

- Control cables (Cat5)
- Prime power
- 48VDC power **- ONLY** if the HVAC is equipped with DC EC supply fan

1. Bring the control and power cable to the WPU through either the side panel or the back panel

    a. From side panel:

Righthand wiring holes

(when looking at installed units from outside the shelter)

Left-hand wiring holes

(when looking at installed units from outside the shelter)

b. From the back panel:

From: here

Important. Ensure the wiring harnesses are dressed inside the machine in such a way that they will not interfere with the movement of the air damper.

routing through "mid-plate"

Or here

To here.

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2. Connect the Ethernet cables to the WPU
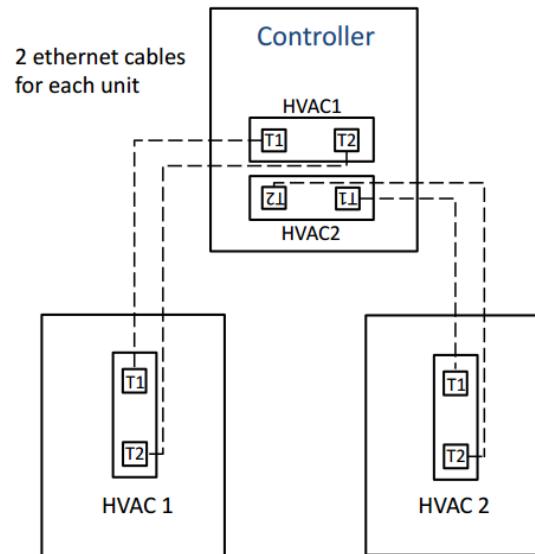
3. Connect the power cables to each WPU.

Prime power
connections to WPU

48VDC power
connections to WPU
(If applicable)
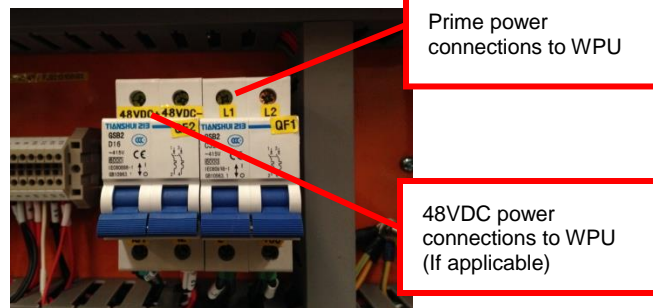
4. Connect the ground

Optional: Configure Controller for Single Unit Operation[1]

For some installations, it is desired to run only one unit off of a controller. To eliminate nuisance alarms, the controller should be configured for single unit operation.

1. Ensure that the ethernet cables from the controller terminal block for module 1 are connected to HVAC1, and that HVAC1 is turned on.

2. Change the System count from 2 to 1 in the E menu.
    i) Ensure that the controller is turned on.

    ii) From the main menu (indoor temp display) press **Up** & scroll to 5 E ᵗ .

    iii) From 5 E ᵗ press **Down** and **Sel** simultaneously. If done correctly, the PLD should be flashing 0. If not, return to step 1 and start over.

    iv) Press **Sel**, the screen should display 5 ᵗ ᴾ .

    v) Press **Down** until 5 ᵧ 5 is displayed, and then press **Sel**. The PLD should display 2.
    vi) Press **Down** to change this value from 2 to 1. Then press **Sel** to confirm.
    vii) Press **Up** and **Down** together to return to the main menu.

3. Disconnect the pLAN module communication cable.
    i) Turn off the internal circuit breaker for the controller.
    ii) Disconnect the J6 pLAN cable connector from controller module 2 as shown below. It's located on the top left side of the right module.
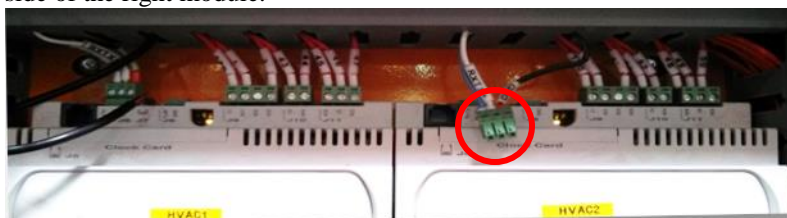
    iii) Turn the circuit breaker back on.
    iv) After booting up, if both Green & Amber LEDS are not lit:

    (1) Please scroll up to find ᴼ ᶠ ᶠ press and hold **Sel** for 3 seconds and then the HVAC system will turn on.

    (2) The PLD may indicate ᴺ ᴼ . This indicates there are currently no alarms.
    (3) Press **Up** and **Down** together to return to the main menu.

---

[1] *If changing from 1 unit to 2 unit operation, please follow instructions in reverse.*

Complete the Installation Checklist

All physical installation steps should now have been completed. Prior to 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)	
Verify Physical Installation	✓ or ✗
Weather stripping has been attached to the air inlet and outlet of the WPU between the wall and the unit.	
The entire machine is fastened.	
All the leaks are sealed with gel.	
The indoor temperature sensor, backup indoor temperature sensor, and humidity sensor have been installed *Note:* they should be mounted near the controller box or as specified in the engineering plan, away from direct or indirect supply or return air stream	
The aluminum grills are fastened.	
The brackets at the bottom of the compressor have been removed and the screws refastened.	
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.	
Verify Electrical Installation	
Ethernet connections are secured.	
The main voltage connections between each WPU and the prime power panel are secured.	
The power connections between the controller box and power plant panel are secured.	
Proper clearance is allowed between the cables and air damper in the WPU to avoid interference.	

Verify System Operation

A complete system operation verification is vital to ensure all components are operating correctly after the installation. A system commissioning checklist is available on page 41. Follow instructions in this section to complete the checklist and leave a copy on site.

Turn On Component Breakers

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

Turn on Primary Power

Turn on the primary power breakers on the two WPU units followed by the breaker on the controller box.

Note: The PLD display should light up and after a brief delay will display the inside temperature. If all instructions were followed correctly, a Prime Power (A09) alarm may be present. This is normal. Press **Sel** to clear the alarm. Any other alarm should be investigated, with the most common cause being a mistake in the wiring.

Note: Use the information in "Alarm Descriptions" on page 54 to understand the meaning of any alarms. Detailed information on PLD operation and how to understand and respond to alarms is covered in Chapter 3.

Commissioning Checklist

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.

- For systems with controller software older than revision 13B64, the test must be completed within **30 minutes**. If the tests cannot be completed within this time frame, step test mode must be re-entered to perform another step. More recent versions of software do not have a time limit.

- The system will display the main menu (indoor temperature) automatically after ten minutes when there has been no input from the technician.

- Step Test takes the system out of automatic mode. Turn the system back ON to return to automatic mode.

PLD button actions are listed in more detail on page 41. If any alarms are triggered during the test, refer to "Alarms" on page 50 for details.

⊘ **Warning.** Once the compressor has been turned on, it must be allowed to run for at least one minute before the next step to prevent compressor damage.

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.

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2. When the system is on, press and hold **Up** and **Sel** together for 3 seconds. The user terminal will display ⎓ ⨍ ⏆.

    Press **Up** until ⎓ ⎕ ⌐ displays. When the system is off, press **Up** and **Sel** together for 3 seconds and the user

    terminal will display ⎓ ⎕ ⌐.

3. With ⎓ ⎕ ⌐ displayed on screen press **Sel** to confirm. The screen will display ⎕. Press **Up** to select the appropriate step (**1-10**; see Table 11: Step-Test below). Press **Sel** to confirm selection. The user terminal returns

    to ⎓ ⎕ ⌐ and the component will be engaged. Repeat these steps as needed.

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

Table 11: Step-Test

	⎓ ⎕ ⌐ Value		
ACTION	**WPU #1**	**WPU #2**	**NOTES**
Turns on Supply Fan	1	5	
Turns on Heater	2	6	May take a few minutes before warm air can be felt
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, indirect daylight can be seen via opening behind exhaust grill
Turns on Fan <u>and</u> Heater for both Lead and Lag WPUs	9		
Turns on Fan, Compressor, <u>and</u> Damper for both Lead and Lag WPUs	10		Damper will open to 100% **IMPORTANT:** Let compressors run for <u>at least one minute</u>

Turn the HVAC System On

1. Press **Up** and **Down** together to enter the main screen (current room temperature will be displayed).

Press both buttons together to enter the main screen

2. Press **Down** until the screen displays OFF.
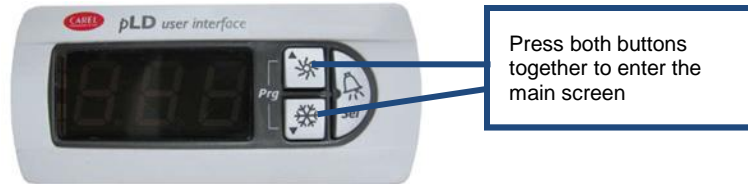
Press until screen displays OFF

3. Hold **Sel** for 3 seconds. The screen will display On, 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 On, both the **Up** and **Down** LEDs will be lit. When the system is OFF 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). The 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, **Up** and **Down** LEDs will be lit (green and amber) and steady.

Set System Time

The system time parameters are listed in Table 12. R/W indicates that the code can be viewed and updated.

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

Table 12: 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
n 1A	R/W	Display and set the day of the week	Mon-Sun

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

2. Press **Up** until 5 E t displays. Then press **Sel**, the user terminal will display 5 t P.

3. Press **Down** until the screen displays n 15; then press **Sel** to confirm. Set the current hour; then press **Sel** to confirm.

4. Press **Down** until the screen displays n 16; then press **Sel** to confirm. Set the current minute; then press **Sel** to confirm.

5. Press **Down** until the screen displays n 17; then press **Sel** to confirm. Set the current year; then press **Sel** to confirm.

6. Press **Down** until the screen displays n 18; then press **Sel** to confirm. Set the current month; then press **Sel** to confirm.

7. Press **Down** until the screen displays n 19; then press **Sel** to confirm. Set the current day; then press **Sel** to confirm.

8. Press **Down** until the screen displays n 1A; then press **Sel** to confirm. Set the current day of the week; then press **Sel** to confirm.

9. Press **Up** and **Down** together to return to the main menu.

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Verify the sensor readings

All the sensors are factory calibrated before shipping. However, it is essential to verify that all sensors are properly placed and connected.

1. Press **Up** and **Down** together to return to the default display (indoor temperature). Press **Up** or **Down** to scroll through the main menu (Table 13).

2. Press **Sel** to display readings for humidity, outdoor temperature, and supply temperatures. Press **Sel** again to return to the menu.

3. Scroll to $5\,2\,t$ and Press **Sel**. The PLD will display $5\,t\,P$.

4. Press **Down** until $r\,t\,2$ is displayed and press **Sel** to display backup temp sensor reading.

Table 13: Sensor Verification Parameters (Main Menu)

Sensor	Display	R/W	Description	Comments
ST1 or $r\,t\,l$	77.3	R	Current indoor temperature; default display	*Press UP and DOWN together to get to the indoor temp. Press DOWN to access other menus.*
SH or $H\,u$	$H\,u$	R	Indoor humidity	*Blow on the sensor to verify operation*
ST2 or $E\,t$	$E\,t$	R	Outdoor temperature	
ST3 or $5\,u$	$5\,u$	R	Unit 1 supply air temperature	**Important:** *Wrap hand around supply air sensor to verify unit 1 sensor is mounted on unit 1 and vice versa*
ST3' or $5\,u\,2$	$5\,u\,2$	R	Unit 2 supply air temperature	

Note: Sensors can be calibrated in the C menu. See section **Accessing the C Menu** on page 61 for detail.

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Verify Input and Output Alarms

1. Verify Generator Signal (A28 alarm)

Important: Incorrect signal from generator will prevent the 2nd unit from cooling

      a.   Press **Up** and **Down** together to return to the default display (indoor temperature).

      b.   Press **Up** to scroll to ⁵ᴱᵗ and press **Sel** → The PLD should display ⁵ᵗᴾ.

      c.   Press **Down** until ᵈ⁵ᴬ is displayed and press **Sel** to display generator status.

      d.   If the generator is not running or generator signal is not wired, the screen should display **OFF**

      e.   Press the **Sel** button to return to ᵈ⁵ᴬ.

2. Verify Smoke/Fire Alarm Signal (A05 alarm)

      a.   Press the test button on the smoke/fire detector. The system should completely shut down (Fans and compressors off, damper closed, A05 alarm code will be displayed).

      b.   The Smoke/fire Alarm is connected to 41 and 5 on the controller terminal. If the smoke/fire detector does not have a test button, disconnect the jumper on 41; the system should shut down.

3. Verify HVAC Alarm

      a.   HVAC1: Turn off the HVAC1 prime power breaker at panel or unit

      b.   Verify **NC** terminal 46 and 47 is *Open*

      c.   HVAC2: Turn off the HVAC2 prime power breaker at panel or unit

      d.   Verify **NC** terminal 49 and 50 is *Open*

Complete the Registration Card

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

The following pictures show serial number locations for the WPU and controller. These must be recorded on the AIRSYS Product Warranty Registration Card.
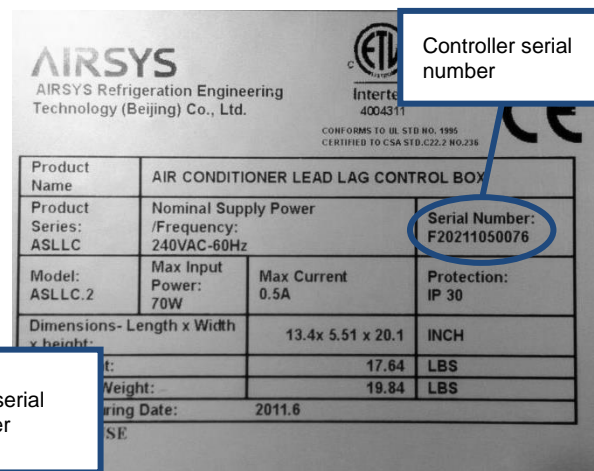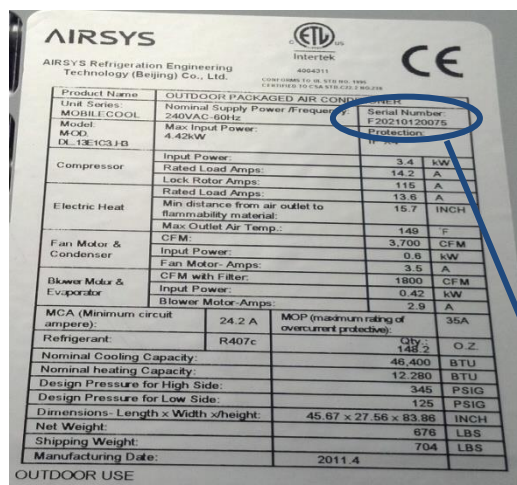
Site name or building serial #: _____ Name of Tester: _____

ASLLC.2 Serial #: _____ Title/Position: _____

Date Tested: _____ Contact information: e. _____

Ph. _____

Checklist applicable for ASLLC software revision 46 and higher.

1. **Execute Step Test (verifies all four functions of each WPU)**

   1.1. HVAC #1 Supply Fan ☐

   1.2. HVAC #1 Heater ☐

   1.3. HVAC #1 Mechanical Cooling ☐

   1.4. HVAC #1 Outside Air Damper ☐

   1.5. HVAC #2 Supply Fan ☐

   1.6. HVAC #2 Heater ☐

   1.7. HVAC #2 Mechanical Cooling ☐

   1.8. HVAC #2 Outside Air Damper ☐

2. **Turn ON the HVAC System** ☐

3. **Verify Temp and Humidity sensor reading and Set Point**

   3.1. <u>Primary Indoor Temp</u> sensor ($r t 1$) ☐

   3.2. <u>Humidity</u> sensor   ($H U$) ☐

   3.3. <u>External</u> (outside) <u>Temp</u> sensor ($E t$) ☐

   3.4. HVAC #1 <u>Supply Air</u> sensor ($5 u$) ☐

   3.5. HVAC #2 <u>Supply Air</u> sensor ($5 u 2$) ☐

   3.6. <u>Confirm indoor temperature Set Point</u> ($5 t P$) ☐

   3.7. <u>Backup Indoor Temp</u> sensor ($r t 2$) ☐

4. **Verify Signal from Generator** ☐

5. **Set the System Clock** ☐

6. **Verify Smoke/Fire Alarm** ☐

7. **Verify HVAC1/HVAC2 Alarms** ☐

8. **Verify DC-Failover *(if installed)*** ☐

9. **Clear Alarm History *(Optional)*** ☐

10. **Fill out Warranty Card and send to AIRSYS North America** ☐

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AIRSYS PRODUCT WARRANTY REGISTRATION CARD

PRODUCT INFORMATION

Controller   Model #:_____   Serial #:_____

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

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

INSTALLATION INFORMATION

Site #:_____   Site Name:_____

Street address:_____   City:_____   State:_____   Zip:_____

Date Install Completed:_____/_____/_____   Installation Company:_____

Installer Name:_____   Phone #:_____   Email:_____

OWNERSHIP INFORMATION

Company:_____

Site Supervisor Name:_____   Phone #:_____   Email:_____

REGISTRATION ONLINE: airsysnorthamerica.com/support/warranty-registration

BY EMAIL: Scan and send to: ASNSupport@air-sys.com

By MAIL:

AIRSYS Product Registration, 915 De La Vina St, Santa Barbara, CA 93101

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 for all factory default settings is shown. 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 20: PLD User Interface

Button actions are described in Table 14: PLD Button Actions.

Table 14: PLD Button Actions

Button and LED	Function Description
Sel/Alarm	Confirm selection or display value. When the LED is on, indicates that an alarm has been triggered.
Up	Increase value or go back to previous parameter. When flashing (slow flash), there is no Mechanical Cooling on HVAC 1 (aka Lockout)
Down	Decrease value or go to next parameter. 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 buttons are lit, the system is on. When both are dark, the system is off.
Up + Down	When both buttons are flashing **once every second**, the system is in comfort mode.
Up or Down	When **Up** is flashing **once every 2 seconds** and the alarm button is red, this indicates the HVAC1 is in lockout. This requires manual reset. When **Down** is flashing **once every 2 seconds** and the alarm button is red, this indicates the HVAC2 is in lockout. This requires manual reset. **Note**: Power cycling the controller will clear the lockout condition **Note:** Please check that 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 displays the PLD Main Menu. The default display is the current room temperature. Use **Up** or **Down** to scroll through the main menu. The order of the options varies depending on whether the HVAC system is currently on or off.

Table 15: Main Menu (A) lists the options on the main menu.

Note: Ref A-10 (5 ट ट) lets an AAST access all preconfigured system parameters. Typically, only a few are ever needed during normal operation. A list of all parameters can be found in "System Parameters and Default Values" starting on page 60.

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 15: Main Menu (A)

Ref	Display	R/W	Description	Unit	Range	Default
A-1	7 7 . 3	R	Current indoor temperature; default display	°F	33.8~ 104	
A-2	O F F	R/W	Turn the system on at the terminal (System off Only)		On/Off	
A-3	C O F	R/W	Comfort mode ON/OFF		On/Off	Off
A-4	C F t	R/W	Comfort mode run time	Hrs	1~9	1
A-5	5 P 2	R/W	Set comfort mode indoor temperature	°F	0.0～100	72.0
A-6	H U	R	Humidity (Default: indoor)			
A-7	E t	R	Outdoor temperature	°F		
A-8	5 U	R	Supply air temperature 1	°F		
A-9	5 U 2	R	Supply air temperature 2	°F		
A-10	5 ट t		Access other menus for viewing and modifying preconfigured system parameters			
A-2	O n	R/W	Turn the system off at the terminal (System on Only)		On/Off	

Some of the options on the main menu allow users to view system parameters (humidity, outdoor temperature, supply air temperature). Press **Sel** to display the value; press **Up** and **Down** together to return to the main menu.

The following actions can be performed from the main menu:

- Turn the system on and off.

- Start comfort mode.

- Set the comfort mode temperature.

- Access other menus.

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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** until the screen displays either *O n* or *O F F*. *O n* indicates the system has been turned on.

Press until screen displays *O F F* or *O n*

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

Hold **Sel** for 3 seconds

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

Note: When the system is *O n*, both the **Up** and **Down** LEDs will be lit. When the system is *O 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). The site will have no temperature control, which likely will result in an urgent site visit to correct.

Using Comfort Mode

The settings on the HVAC system are optimized for operating efficiency and not for human comfort. If the shelter will be occupied for extended periods of time, the site temperature can be temporarily adjusted using the comfort mode setting.

⚠️ **Important.** The HVAC system must be *O n* to enter comfort mode. To turn comfort mode *O n* (if it is currently off) or *O F F* (if it is currently on), press **Sel** and **Down** together for 3 seconds. Both the **Up** and **Down** LEDs will flash once every second to indicate the system is in comfort mode.

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

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To change the comfort mode run time:

1. From the main menu, press **Down** until the screen displays $\llcorner \vdash \vdash$.

2. Press **Sel** to display the comfort mode run time set point, the default is 1 (range: 1~9 hours)

3. Change the run time setting using **Down** or **Up** and then press **Sel** to confirm the new set point.

To change the comfort mode temperature set point:

1. From the main menu, press **Down** until the screen displays $\mathsf{5\ P\ 2}$.

2. Press **Sel** to display the comfort mode temperature set point; the factory default is 72°F.

3. 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 WPUs may go into mechanical cooling mode which will trigger an A23 alarm.

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Sequence of Operation

Compressor and Heater Operation
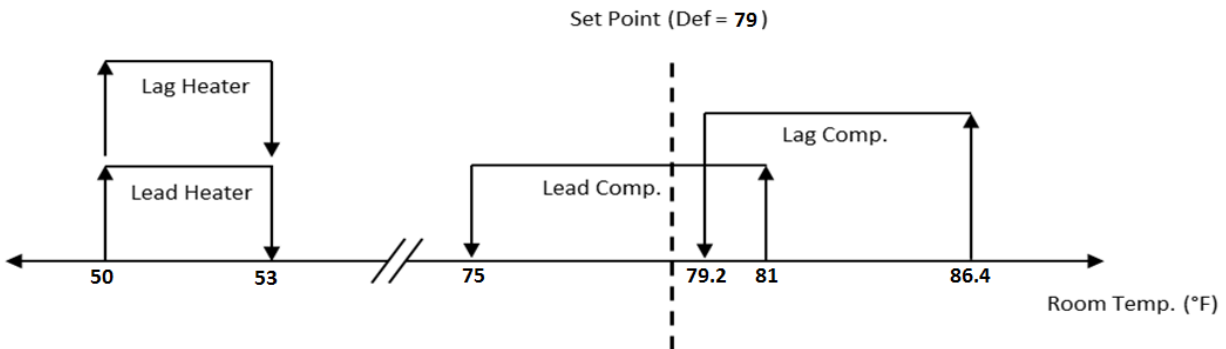
Note: Diagram based on Main Setpoint ($5 \, t \, P$) = 79°F. For details on changing trigger points, please refer to "System Parameters and Default Values" on Page 60 for details.

Lead Compressor

The lead compressor turns on at main setpoint +2 (configurable at $C \, O \, 2$ under E Menu).

The lead compressor turns off 6°F below its turn on point (configurable at $C \, O \, I$ under E Menu).

Note: Compressor engages a 3 min delay when the units are powered to prevent rapid compressor cycling.
Note 2: When outdoor temp is lower than indoor temp, the lead compressor will have a delayed start ranging from 10s to 300s to give the system a chance to use FC before turning on the compressor.

Lag Compressor

The lag compressor turns on at main setpoint + 7.4°F with 1 min delay (configurable at $F \, 3 \, 8$ under L05 Menu).

The lag compressor turns off at 7.2°F below its turn on point (configurable at $F \, 3 \, 9$ under L05 Menu)

Lead Heater

The lead heater turns on at setpoint - 29°F (configurable at $H \, O \, 2$ under E Menu).

The lead heater turns off 3°F above its turn on point (configurable at $H \, O \, I$ under E Menu).

Lag Heater

The lag heater turns on at setpoint – 29°F with 1 minute delay (configurable at $F \, 3 \, 6$ under L05 Menu).

The lag heater turns off 3°F above its turn on point (configurable at $F \, 3 \, 7$ under L05 Menu).

Free Cooling (Economizer) Operation

When the Free Cooling is engaged, the damper opens to introduce cooler air from outside to be delivered to the shelter. The top exhaust design causes the exhaust air to be significantly hotter than the indoor temperature. This allows small temperature differences between indoor and outdoor temperature (minimum 3.6°F, configurable at

$U \, O \, 6$ under L04 Menu) to deliver large cooling capacity.

FC starts at low fan speed when the indoor temperature reaches above the lead compressor turn off point

(configurable at $C\ 0\ 1$ under E Menu) . As the indoor temperature rises, the fan speed increases to maintain the indoor temperature within 1°F of the main temp setpoint. If the indoor temperature cannot be maintained below the lead compressor turn on point, the compressor will start to assist FC. During cold weather, the outdoor damper

modulates to keep mixed air temperature above 51.8°F (configurable at $U\ 5\ 4$ under L04 Menu).

Note: For shelters without a secondary pressure relief (e.g. a barometric louvre), FC can be disabled when the

compressor is running. (configurable at $F\ 0\ 4$ under L05 Menu).

Executing 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.

- For systems with controller older than revision 13B64, the test must be completed within **30 minutes**. If the test cannot be completed in this time frame, step test mode must be re-entered to perform another step. More recent versions of software do not have a time limit.

- The system will display the main menu (indoor temperature) automatically after ten minutes when there has been no input from the technician.

- **Step Test takes the system out of automatic mode. Turn the system back ON to return to automatic mode after testing is completed.**

PLD button actions are listed in more detail on page 41. If any alarms are triggered during the test, refer to **Alarms** on page 50 for details.

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

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 on, press and hold **Up** and **Sel** together for 3 seconds. The user terminal will display $5\ F\ t$.

   Press **Up** until $C\ 0\ d$ displays. When the system is off, press **Up** and **Sel** together for 3 seconds and the user

   terminal will display $C\ 0\ d$.

3. With COD displayed on screen press **Sel** to confirm. The screen will display 0. Press **Up** to select appropriate

   step (**1-10**; see Table 11: Step-Test below). Press **Sel** to confirm selection. The user terminal returns to $C\ 0\ d$ and the component will be engaged. Repeat these steps as needed.

4. **IMPORTANT: When the step-test is complete, return to the main menu and turn the HVAC system on (Page 47).**

Table 16: Step-Test

ACTION	$\mathsf{C}\,\mathsf{o}\,\mathsf{d}$ Value — WPU #1	$\mathsf{C}\,\mathsf{o}\,\mathsf{d}$ Value — WPU #2	NOTES
Turns on Supply Fan	1	5	
Turns on Heater	2	6	May take a few minutes before warm air can be felt
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, indirect daylight can be seen via opening behind exhaust grill
Turns on Fan <u>and</u> Heater for both Lead and Lag WPUs	9		
Turns on Fan, Compressor, <u>and</u> Damper for both Lead and Lag WPUs	10		Damper will open to 100% **IMPORTANT:** Let compressors run for <u>at least one minute</u>

Alarms

When a problem occurs during operation of the unit, the controller records the related information and the **Sel** button will be lit. Depending on the severity of the alarm, various components will 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.

If the **Sel** button is illuminated, press the **Sel** button when the screen displays indoor temperature. The code identifying the system alarm will display on the screen of the user terminal. Press **Up** to scroll through any other active alarms. Alarm history can be viewed in a separate menu, which is covered in "Viewing Alarm History" on Page 52

Table 17 lists the alarm codes that may display with a brief description. Table 19 on Page 54 provides more detail on troubleshooting alarms should they occur during operation of the system.

Table 17: Summary of System Alarms

Code	Description	Output Delay	Alarm Contact Reporting — High/low temp. Alarm	Alarm Contact Reporting — HVAC 1 Major Alarm	Alarm Contact Reporting — HVAC 2 Major Alarm
A02[5]	Low pressure 1[5]	60/10s		X	
A03[5]	High pressure 1[5]	2s		X	
A04[5]	Low pressure 2[5]	60/10s			X
A05	Smoke/Fire	None			
A06[5]	High pressure 2[5]	2s			X
A07	High temperature	300s	X		
A08	Low temperature	300s	X		
A09[2]	Prime power outage (Only if DC Failover is used)	40s		X	X
A10[2]	Supply fan overload 1	0s		X	
A11[2]	Supply fan overload 2	0s			X
A15	Dirty air filter1	10s			

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Code	Description	Output Delay	Alarm Contact Reporting		
			High/low temp. Alarm	HVAC 1 Major Alarm	HVAC 2 Major Alarm
A16	Dirty air filter2	10s			
A17	pLAN alarm	30s			X
A18	Clock card alarm	60s			
A19	Humidity alarm	60s			
A20	Indoor temperature sensor defective	60s			
A21	Backup indoor temp. sensor defective	60s			
A20&A21	Indoor & backup indoor temp. sensors defective	60s		X	X
A22	Outdoor temp. sensor defective	60s			
A23	2nd compressor run	5s			
A24	Damper Failure 1	60m			
A25	Damper Failure 2	60m			
A26	HVAC 1 supply air temp. sensor defective	60s			
A27	HVAC 2 supply air temp. sensor defective	60s			
A28	Generator run	5s			
A29[3]	HVAC1 air flow defective or DC part powered off	30s		X	
A30[3]	HVAC2 air flow defective or DC part powered off	30s			X
A31[3]	HVAC1 AC part powered off alarm	30s		X	
A32[3]	HVAC2 AC part powered off alarm	30s			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.2A.48 is chosen.
3. A29, A30, A31& A32 will not display if the HVAC is equipped with AC EC supply fan and ASLLC.2A 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. If a Low pressure or High pressure alarm is triggered 3 times in one hour, the corresponding unit will lock out. In this state, only the supply fan will operate. There are two ways to clear the alarm:
   a. Power cycle the controller
   b. Access the parameters in the table: $L\:0\:4 - U\:2\:L$ (Manual reset if low pressure) or $U\:2\:E$ (Manual reset if 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 $5\:E\:t$. Press **Sel** to confirm. This will display $5\:t\:P$.

2. Press **Up** until $A\:L\:n$ displays. Press **Sel** to confirm. This will display the most recent alarm code.

3. Then press **Up** to review the history. When the desired alarm number is displayed, press **Sel** to select it. This should display $n\:1\:P$, the first display in the alarm history menu.

4. Press **Sel** to display the code's value, for example when $n\:1\:P$ 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 $n\:1\:P$).

6. Use **Up** and **Down** to review the additional details listed in Table 18 and follow the same steps to view the value and return to the code display.

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7.   Press **Up** and **Down** together to return to the alarm code display.

Table 18: Alarm History

Ref	Display	R/W	Description
C-40-1-1	*n 1P*	R	Sequence number of the alarm (for example, 4 for the fourth alarm to be recorded)
C-40-1-2	*n 1C*	R	Year of the alarm
C-40-1-3	*n 1L*	R	Month of the alarm
C-40-1-4	*n 1E*	R	Day of the alarm
C-40-1-5	*n 1F*	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, clearing the alarm history may be desired.

⊙   **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, a password is required to access the L05 menu.

Follow these steps to enter the *L 0 5* menu and erase alarm history:

1.   Press **Down** and **Up** simultaneously to display the main screen.

2.   Press **Up** until the screen displays *S E t*.

3.   Then press **Down** and **Sel** simultaneously. The user terminal will display *0*.

4.   Enter the supplied password. The user terminal will display *L 0 1*.

5.   Press **Up** to display *L 0 5*. Press the **Sel** button and the terminal will display *F 0 1*.

6.   Press the **Up** button to display *F 3 A*; press the **Sel** button to display *n o* on the PLD.

7.   Use the **Up** button to flash *Y E S* on the PLD and erase the alarm history.

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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
A 0 2 *A 0 4*	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 0 4* menu, *U 2 L* parameter, or restart the unit to remove the alarm. Charge appropriate amount of 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.				
A 0 3 *A 0 5*	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.	Reduced condenser heat exchange	Run the unit and check if the high pressure value is in the normal range.	Reset manually using the *L 0 4* 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.				

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	**Compressor/ Cond Fan**	**Heat**	**Damper**
A05	Smoke/Fire alarm	The entire unit stops working. The alarm resets automatically.	Fire/Smoke detector is triggered.	Check the external Fire/Smoke detector WPU 1.	Replace the external Fire/Smoke detector	Off	Off	Off	Closed
			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.				
A07	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.

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. | Patch the leak. 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.				
A08	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.

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.				
A09	Prime power outage	Only available when the DC Fail-Over Box is installed.	Primary power is or was turned off.	Verify power going into the DC failover box		Off	Off	Off	Closed

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
A 10 A 11	AC Supply fan overload	The unit will stop working. Alarm is reset automatically.\n\nIf the unit does not have AC supply fans, change setting SF1 in the D menu to 0 or AC, depending on the software revision.	The fan is blocked.	Check if the fan speed and operating current are normal.	Remove the blockage.\nIf the fan is defective, replace it.	Off	Off	Off	Closed
			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.\nIf 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.\nIf the controller board is defective, replace it.				
A 15 A 16	Dirty air filter	Alarm is reset automatically.\nThe 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.\nIf 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.				
			The tubes leading to the switch are blocked	Check for blockages in the tubes leading to the switch	Clear the blockages.\nIf the switch is still stuck open, replace it.				
A 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.				
A 18	Clock card alarm	The clock function is not available. Both time display function and history alarm record function are disabled.\nIt 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.				

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
A 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 cleared.	Relocate the sensor.				
A 20	Indoor temp. sensor defective	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.				
A 21	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.				
A 20 A 21	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
A 22	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
A 23	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 system.				
A 24 A 25	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 or loose.	If loose, tighten. If the damper actuator is broken, replace it.	None	None	None	None
				Check if the damper is blocked.	If the damper is blocked, clear blockage.				
A 26 A 27	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

Code	Signal	Description	Possible Cause	Component to Check	Recommended Action	Device Actions			
						Supply Fan	Compressor/ Cond Fan	Heat	Damper
A28	Generator run signal	This indicates that the generator is running. Lag compressor will be prevented from running by default.							
A29 A30	DC Fan Air Flow Alarm	If the unit does not have DC supply fans, change setting SF1 in the D menu to 1 or DC, depending on the software revision.	The supply fan doesn't work. The 48VDC power is powered off or no 48VDC power input The pressure switches PF2 or 3 or both for HVAC supply fan are broken. The pressure switches PF2 or 3 or both for HVAC are disconnected.	Check the supply fan.	If the supply fan is blocked or broken, please remove the object or replace the fan.	Off	Off	Off	Closed
				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 loose, secure the cable.				
					If the air pressure differential switch is broken, replace it.				
				Check the set point of the air pressure differential switch.	If the set point is not near 50 Pa, change it back.				
A31 A32	AC Loss for DC Fan Systems	AC power loss for DC systems If the unit does not have DC supply fans, change setting SF1 in the D menu to 1 or DC, depending on the software revision.	The AC power is powered off	Check the breaker.	If the breaker is broken, replace it.		Off	Off	
				Check the AC power source.	If the AC power plant has no power, 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, secure 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 factory settings and how they can be viewed and modified

Port Definitions

Figure 21 is a schematic drawing of the controller module (PLC) ports.
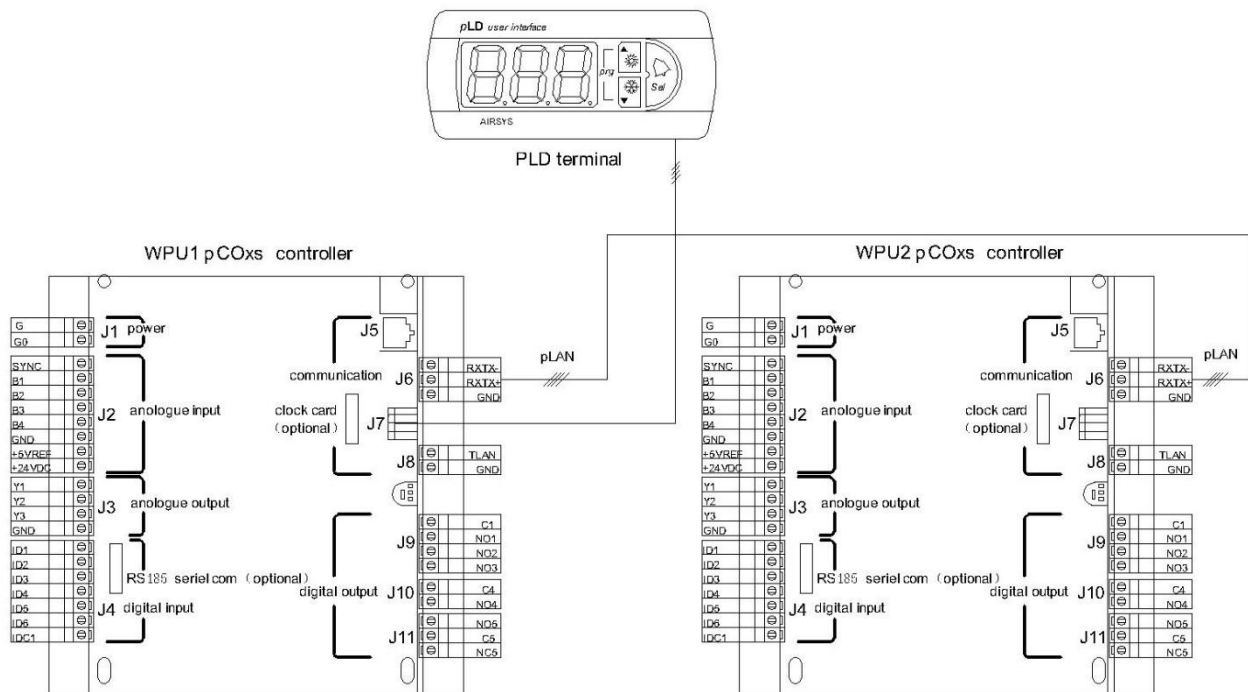
Figure 21: pCOxs Controller Hardware Structure

Table 20 lists the input and output ports on the controller modules.

Table 20: Port Values

Digital Input		Analog Input		Digital Output		Analog Output	
pCOxs-1 (Main, Address 1: WPU 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)		
ID5	Filter flow			NO5/NC5	HVAC1 alarms (NO/NC)		
ID6	Supply fan overload						

Digital Input		Analog Input		Digital Output		Analog Output	
pCOxs-2 (Extension, Address2: WPU 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.2.48A is chosen)	NO3	Electrical heater	Y3	
ID4	High pressure (HP)	B4	HVAC2 AC power powered off alarm (If ASLLC.2.48A is chosen)	NO4	2nd compressor run alarm (NC)		
ID5	Filter flow			NO5/ NC5	HVAC2 alarms (NO/NC)		
ID6	Supply fan overload						

System Parameters and Default Values

This section describes the controller menus used for completing operations and displaying information. Using the main menu is described in "Navigating the Main Menu" on page 46. The main menu is not described here. This section describes additional menus that give authorized technicians access to factory default settings.

Table 21: Menu Overview

ID	Purpose	Description
A	Main Menu	• View current sensor readings: indoor temperature, indoor humidity, outside temperature, supply air temperature • Comfort mode setting • Turn system on/off • Enter other menus (5 ₽ ₺)
C	Maintenance	• Main Temperature Setpoint • Rotate lead/lag unit immediately • Sensor Calibration • Component Status • Software Revision • System Clock
D	Installation	• Step Test • Alarm input/output settings
E	Factory Defaults	• High/low temperature alarm setpoints • Compressor/heater turn on/off setpoints • Reset to factory default
L	Software Parameters	• Run time/start counters • Controller board input/output status • Free cooling settings • Communication settings • Advanced alarm configuration • Erase Alarm History

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

1. Press the **Up** or **Down** button to find the desired code.

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.

Accessing the C Menu

When the PLD displays $5 \varepsilon \varepsilon$, 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.

Table 22: Parameters on Maintenance Menu (C)

Ref	Display	R/W	Description	Unit	Range	Default
C-1	5 Ł P	R/W	Main temperature setpoint	˚F	33.8~104	79.0
C-2	H Ł	R	High temp. alarm difference. High temp alarm occurs at Main temp. setpoint + high temp. alarm difference	˚F		18.0
C-3	L Ł	R	Low temp. alarm difference. Low temp alarm occurs at Main temp. setpoint - low temp. alarm difference	˚F		32.0
C-4	r O Ł	R/W	Lead/lag rotation. Rotates Lead/Lag once after Yes is selected		no/YES	no
C-5	r Ł 2	R	Backup room temperature sensor reading	˚F		
C-6	A C I	R	Unit 1 AC power status (DC EC Fan Only)		-C-/-O-	
C-7	A C 2	R	Unit 2 AC power status (DC EC Fan Only)		-C-/-O-	
C-8	d 5 I	R	Unit 1 Supply fan status		On/off	
C-9	d 5 2	R	Unit 1 Compressor status		On/off	
C-10	d 5 3	R	Unit 1 Heater status		On/off	
C-11	d 5 4	R	Unit 1 Free cooling status		On/off	
C-12	d 5 A	R	Generator status		On/off	
C-13	d 5 6	R	Unit 2 Supply fan status		On/off	
C-13	d 5 7	R	Unit 2 Compressor status		On/off	
C-14	d 5 8	R	Unit 2 Heater status		On/off	
C-15	d 5 9	R	Unit 2 Free cooling status		On/off	
*C-16	U I Ł	R	Unit 1 System Status		0~7	
*C-17	U 2 Ł	R	Unit 2 System Status		0~7	
C-18	b I O	R	Bios version			

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Ref	Display	R/W	Description	Unit	Range	Default
C-19	b O O	R	Boot version			
C-20	U E 1	R	Software version 1			
C-21	U E 2	R	Software version 2			
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	5 t A	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	Unit 1 Supply fan manual mode		On/off	Off
C-29	n 2 H	R/W	Unit 1 Supply fan manual mode to change the input voltage	V	0-10	0
C-30	n 2 9	R/W	Unit 1 Free cooling manual mode		On/off	Off
C-31	n 4 H	R/W	Unit 1 Free cooling manual mode to change the input voltage	V	0-10	0
C-32	n 2 6	R/W	Unit 1 Compressor manual mode		On/off	Off
C-33	n 2 3	R/W	Unit 1 Heater manual mode		On/off	Off
C-34	n 4 1	R/W	Unit 2 Supply fan manual mode		On/off	Off
C-35	n 5 H	R/W	Unit 2 Supply fan manual mode to change the input voltage	V	0-10	0
C-36	n 4 O	R/W	Unit 2 Free cooling manual mode		On/off	Off
C-37	n 6 H	R/W	Unit 2 Free cooling manual mode to change the input voltage	V	0-10	0
C-38	n 3 F	R/W	Unit 2 Compressor manual mode		On/off	Off
C-39	n 3 E	R/W	Unit 2 Heater manual mode		On/off	Off
C-40	n 2 A	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

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Ref	Display	R/W	Description	Unit	Range	Default
C-45	*n43*	R/W	Supply temperature sensor 2 calibration	˚F	-99.9~99.9	0
C-46	*AL n*	R	View history of alarm code, date, and time		---	

The range of parameters *U1t* & *U2t* is 0-7. The identification of the numbers is listed in the table below. The two parameters are used to check the system status.

Table 23: *U1t* & *U2t* Parameter Range

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

Accessing the D Menu

After the terminal displays *SPt*, press the **Up** and **Sel** buttons at the same time to enter the D menu. Then press the **Down** button to display the parameters in Table 24 in the listed order.

*Note: The parameters *tES* and *COd* will display on PLD when the system is off.

Table 24: Installation Menu (D)

Ref	Display	R/W	Description	Unit	Range	Default
*D-1	*tES*	R/W	Device test, displays when the unit has been turned off using the PLD interface		On/off	Off
*D-2	*COd*	R	Device test code, displays when the unit has been turned off using the PLD interface		0-8	0
D-3	*SFt*	R/W	Fire/Smoke alarm input		n.C/n.O	n.C
D-4	*dGt*	R/W	Generator run status input		n.C/n.O	n.O
D-5	*2Ct*	R/W	Second compressor run status output		n.C/n.O	n.C
D-6	*PUt*	R/W	HVAC1/HVAC2 lockout output		n.C/n.O	n.O
D-7	*Htt*	R/W	High/low temperature alarm output		n.C/n.O	n.C
D-8	*CSt*	R/W	Generator on, compressor stop time, or Power on compressor turns on with a delay time.	S	0-999	180
D-9	*E2C*	R/W	Generator on, enable second compressor turn-on.		no/YES	no
D-10	*E23*	R/W	Enable second compressor run alarm (A23)		no/YES	YES
D-11	*SF1*	R/W	Supply fan configuration; AUT means automatic detection. DC means DC supply fan; AC means AC supply fan		AUT/AC/DC	AUT
*D-12	*AFP*	R/W	Allow dust sensor		no/YES	no

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Ref	Display	R/W	Description	Unit	Range	Default
*D-13	A F d	R/W	After dust sensor is allowed, the damper actuator will open with a delay time. Set the delay time	m	1-999	120
D-14	E 2 3	R/W	Allow two compressor run alarm. "no" means no alarm will be shown and output. "YES" means the alarm will be shown and output.		no/YES	YES

Accessing the E Menu

After the terminal displays 5 E E , press the **Down** and **Sel** buttons at the same time to enter the E menu. Then press the **Down** button to display the parameters in Table 25 in the listed order.

Table 25: Protected Factory Defaults (E)

Ref	Display	R/W	Description	Unit	Range	Default
E-1	0	R/W	Input user password		0~999	000
Input Password, Press Sel button, the following parameters will display.						
E-2	5 t P	R/W	Temperature setting	°F	33.8~104.0	79.0
E-3	H t	R/W	High temp. alarm difference. High temp alarm occurs at Main temp. setpoint + high temp. alarm difference	°F	0.0~999.9	18.0
E-4	L t	R/W	Low temp. alarm difference. Low temp alarm occurs at Main temp. setpoint - low temp. alarm difference	°F	0.0~999.9	32.0
E-5	C 0 1	R/W	Lead compressor turn off difference	°F	0.0~100	6.0
E-6	C 0 2	R/W	Lead compressor turn on difference	°F	0.0~99.9	2.0
E-7	H 0 1	R/W	Lead heater turn off difference	°F	0.0~100	3.0
E-8	H 0 2	R/W	Lead heater turn on difference	°F	0.0~99.9	29.0
E-9	C 0 3	R/W	Not used	--	--	0
E-10	C A d	R/W	Controller address		1/2	1
E-11	t 5 1	R/W	Allow adjustment of supply fan speed as PI		no/ YES	YES
E-12	t 5 2	R/W	Allow 1st compressor to start with a variable delay time		no/ YES	YES
E-13	E t 2	R/W	Enable pCOxs-2 temperature sensor failure alarm and temperature sensor backup		no/ YES	YES
E-14	5 Y 5	R/W	Number of units		1/2	2
E-15	F C 1	R/W	Enable FC damper alarm		no/ YES	YES
E-16	F C 2	R/W	Check △T (close)	°F	1.0~999.9	10.0
E-17	F C 3	R/W	Check △T (open)	°F	1.0~999.9	10.0
E-18	F C 4	R/W	FC damper alarm delay	S	1~999	300
E-19	F C 5	R/W	FC damper alarm restart time	M	1~540	60
E-20	F C 6	R/W	Damper Lockout counters		1~10	3

Ref	Display	R/W	Description	Unit	Range	Default
E-21	F C 7	R/W	Lockout time	M	1~540	540
E-22	d E 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 give authorized technical personnel access to factory default settings. Accessing these parameters requires the technician to supply a password. The parameters are divided 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 – WPU 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 5 P t.

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 26: L Parameters

Display	R/W	Description	Unit	Range	Default
L01 – Main Screen					
R d d	R	Unit Address			1
d 5 1	R	Unit 1 supply fan status		On/Off	Off
d 5 2	R	Unit 1 compressor status		On/Off	Off
d 5 3	R	Unit 1 heater status		On/Off	Off
d 5 4	R	Unit 1 free cooling status		On/Off	Off
d 5 R	R	Generator status		On/Off	Off
d 5 6	R	Unit 2 supply fan status		On/Off	Off

Display	R/W	Description	Unit	Range	Default
d57	R	Unit 2 compressor status		On/Off	Off
d58	R	Unit 2 heater status		On/Off	Off
d59	R	Unit 2 free cooling status		On/Off	Off
d55	R	Supply air limit		On/Off	Off
L02 – Maintenance Menu					
ALn	R	Not used			
n01	R	Free cooling running hours *1000	Hrs	0~999	0
n02	R	Free cooling running hours *1	Hrs	0~999	0
r01	R/W	Free cooling running hours reset		no/YES	no
n03	R	Free cooling 1 start counters		0~999	0
r03	R/W	Free cooling 1 start counters reset		no/YES	no
n31	R	Free cooling 2 running hours *1000	Hrs	0~999	0
n32	R	Free cooling 2 running hours *1	Hrs	0~999	0
r31	R/W	Free cooling 2 running hours reset		no/YES	no
n33	R	Free cooling 2 start counters		0~999	0
r33	R/W	Free cooling 2 start counters reset		no/YES	no
n09	R	Compressor 1 running hours *1000	Hrs	0~999	0
n0A	R	Compressor 1 running hours *1	Hrs	0~999	0
r09	R/W	Compressor 1 running hours reset		no/YES	no
n0P	R	Compressor 1 start counters		0~999	0
r0P	R/W	Compressor 1 start counters reset		no/YES	no
n34	R	Compressor 2 running hours *1000	Hrs	0~999	0
n35	R	Compressor 2 running hours *1	Hrs	0~999	0
r34	R/W	Compressor 2 running hours reset		no/YES	no
n36	R	Compressor 2 start counters		0~999	0
r36	R/W	Compressor 2 start counters reset		no/YES	no
n0L	R	Heater 1 running hours *1000	Hrs	0~999	0

Display	R/W	Description	Unit	Range	Default
n0E	R	Heater 1 running hours *1	Hrs	0~999	0
r0L	R/W	Heater 1 running hours reset		no/YES	no
n0F	R	Heater 1 start counters		0~999	0
r0F	R/W	Heater 1 start counters reset		no/YES	no
n37	R	Heater 2 running hours *1000	Hrs	0~999	0
n38	R	Heater 2 running hours *1	Hrs	0~999	0
r37	R/W	Heater 2 running hours reset		no/YES	no
n39	R	Heater 2 start counters		0~999	0
r39	R/W	Heater 2 start counters reset		no/YES	no
n11	R	Supply fan 1 start counters		0~999	o
r11	R/W	Supply fan 1 start counters reset		no/YES	no
n13	R	Supply fan 1 running hours *1000	Hrs	0~999	0
n14	R	Supply fan 1 running hours*1	Hrs	0~999	0
r13	R/W	Supply fan 1 running hours reset		no/YES	no
n3A	R	Supply fan 2 start counters		0~999	0
r3A	R/W	Supply fan 2 start counters reset		no/YES	no
n3P	R	Supply fan 2 running hours *1000	Hrs	0~999	0
n3C	R	Supply fan 2 running hours *1	Hrs	0~999	0
r3C	R/W	Supply fan 2 running hours reset		no/YES	no
n15	R/W	Hour		0-23	
n16	R/W	Minute		0-59	
n17	R/W	Year		0-99	
n18	R/W	Month		1-12	
n19	R/W	Date		1-31	
n1A	R/W	Day (Monday, Tuesday, …, Sunday)		Mon~Sun	
n2A	R/W	Indoor temperature calibration	˚F	-99.9~99.9	0.0
n2P	R/W	Outdoor temperature calibration	˚F	-99.9~99.9	0.0

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Display	R/W	Description	Unit	Range	Default
n2C	R/W	Supply air temperature sensor 1 calibration	˚F	-99.9~99.9	0.0
n2L	R/W	Humidity sensor calibration	%	-99.9~99.9	0.0
n42	R/W	Backup Indoor temperature calibration	˚F	-99.9~99.9	0.0
n43	R/W	Supply air temperature sensor 2 calibration	˚F	-99.9~99.9	0.0
L03 – Controller Board Input/Output					
110	R	ID1:Fire/smoke alarm output		-C or O-	
111	R	ID2:Generator status signal		-C or O-	
112	R	ID3:Low pressure		-C or O-	
113	R	ID4:High pressure		-C or O-	
114	R	ID5:Dirty filter		-C or O-	
115	R	ID6: Supply fan overload		-C or O-	
120	R	2 ID1: Prime Power Outage		-C or O-	
121	R	2 ID2: Smoke/Fire		-C or O-	
122	R	2 ID3:Low pressure 2		-C or O-	
123	R	2 ID4:High pressure 2		-C or O-	
124	R	2 ID5:Dirty Filter 2		-C or O-	
125	R	2 ID6: Supply fan 2 overload		-C or O-	
118	R	Y1: Supply fan speed		0.0~10.0	
119	R	Y2: Free cooling damper opening		0.0~10.0	
126	R	2 Y1: Supply fan speed 2		0.0~10.0	
127	R	2 Y2: Free cooling damper opening 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: High/low temp alarm		-C or O-	
11F	R	NO5: HVAC1 Fail		-C or O-	
128	R	2 NO1: Compressor (MC)		-C or O-	

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Display	R/W	Description	Unit	Range	Default
129	R	2 NO2: Supply fan (MF2)		-C or O-	
12A	R	2 NO3: Heater (EH1-3)		-C or O-	
12P	R	2 NO4: 2nd compressor run		-C or O-	
12C	R	2 NO5: HVAC2 Fail		-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
U0A	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 baud rate: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
U54	R/W	Free cooling supply air temperature limit	˚F	-70.0~999.9	51.8
U55	R/W	Free cooling supply air temperature modulating range	˚F	0.0~99.9	1.8
U56	R/W	Free cooling cycle time	S	0.0~99.9	50.0
U5E	R/W	Alarm dry contact output on terminal 51 and 52	Alarm #	1-32	23

Display	R/W	Description	Unit	Range	Default
U60	R/W	Enable De-humidification mode		no/YES	no
U61	R/W	De-humidification mode target	%	0.0~99.9	55
U62	R/W	De-humidification deadband	%	0.0~99.9	15
U63	R/W	Electric reheat differential when automatic dehumidification is enabled.	˚F	0.0~99.9	9
U64	R/W	Max fan speed during dehumidification.	V	0.0~10.0	7.5
L05 – Manufacturer Menu					
F01	R/W	BMS network		no/YES	YES
F02	R/W	Allow clock card		no/YES	YES
F03	R/W	Allow free cooling		no/YES	YES
F04	R/W	Allow free cooling and compressor to work simultaneously		no/YES	YES
F48	R/W	Enable audible buzzer (Rev 13B64 and after)		no/YES	no
F47	R/W	Allow free cooling ONLY in emergency ventilation mode		no/YES	no
F44	R/W	Not used		no/YES	YES
F06	R/W	Enable Major alarms output		no/YES	YES
F07	R/W	Type of Major alarm output		n.O/n.C	n.O
F3P	R/W	Unit of temperature, C means Celsius. F means Fahrenheit.		-F-/-C-	- F -
F16	R/W	Minimum speed setting of supply fan	V	0.0~10.0	0.1
F17	R/W	Maximum speed setting of supply fan	V	0.0~10.0	10.0
F46	R/W	Fan speed change during the DC-failover on	V	0.0~10.0	8.0
F18	R/W	Free cooling speed	V	0.0~10.0	10.0
F19	R/W	Startup delay time of supply fan	S	0~999	5
F1A	R/W	Stop delay time of supply fan	S	0~999	60
F3C	R/W	Startup delay time of supply fan overload	S	0~999	0
F3L	R/W	Recovery delay time of supply fan overload	S	0~999	120
F1P	R/W	Startup delay time of low pressure alarm	S	0~999	60
F1C	R/W	Recovery delay time of low pressure alarm	S	0~999	10
F1L	R/W	Low pressure alarms allowed before system (per hour)			3

Display	R/W	Description	Unit	Range	Default
F 1E	R/W	High pressure alarms allowed before system (per hour)			3
F 20	R/W	Minimum stop time of compressor	S	0~999	180
F 21	R/W	Minimum run time of compressor	S	0~999	60
F 22	R/W	Supply fan air flow defective if the supply fan is DC fan	S		30
F 23	R/W	Delay time of filter alarm output	S	0~999	10
F 24	R/W	Shut off free cooling due to dirty filter alarm		no/YES	no
F 27	R/W	Minimum voltage input of free cooling	V	0.0~10.0	2
F 31	R/W	Number of backup units for unit rotation			1
F 32	R/W	Unit rotation time	Hrs	0~999	168
F 33	R/W	Force startup of the backup unit		no/YES	YES
F 34	R/W	Delay time of low temperature	M	0/1	1
F 35	R/W	Delay time of high temperature	M	0/1	1
F 36	R/W	Lag heater turn on difference	˚F	0.0~99.9	29.0
F 37	R/W	Lag heater turn off difference	˚F	0.0~99.9	3.0
F 38	R/W	Lag compressor turn on difference	˚F	0.0~99.9	7.4
F 39	R/W	Lag compressor turn off difference	˚F	0.0~99.9	7.2
F 3A	R/W	Erase alarm history		no/YES	no

Chapter 4: Preventive Maintenance

AIRSYS WPUs are designed to be among the highest performing in the world for both energy efficiency and reliability. Good preventive maintenance (PM) plays a crucial role in maintaining high levels of efficiency and reliability. It is also important to keep track of findings during PM for future reference.

Preventive Maintenance Schedule

Table 28 provides PM guidelines that should be followed for optimal performance. Following these guidelines will help avoid serious damage to components and expensive repairs by skilled personnel.

Table 27: Preventive Maintenance Schedule

Task	Recommended Frequency	Comments
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
Check general operations	12 months	Perform the Step-Test
Inspect all hardware for "snug" connection	12 months	Make note of any loose hardware so it can be checked again at next scheduled PM
Air filter inspection/cleaning and replacement 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 pipes (condenser and evaporator)	12 months	
Physical Inspection of 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 that 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 both important to ensure good operation. Before beginning PM, general system status should be verified by looking at the areas outlined in this section.

Check Main Voltage

For the main voltage, check:

- The main voltage is within $\pm15\%$ of the rated voltage required by the machine.
- The DC voltage is in normal range, if applicable. (36VDC~ 57VDC)
- 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.

Grounding cable

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, see "Executing the Step Test" on Page 49.

Refer to "Alarms" on Page 51 if any alarm occurs during the step test. Refer to wiring diagrams included in the controller shipment to diagnose possible mechanical/electrical issues.

Wiring diagrams are also available at airsysnorthamerica.com.

Replace Air Filter

A dirty air filter reduces the air volume and the system capacity. This problem can be avoided by regularly cleaning or replacing filters. The frequency at which filters must be checked depends on the amount of dust in the environment. If the filters are frequently very dirty, the frequency of checks and maintenance should be increased.

Remove middle-front panel

Replace the 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.

Remove bottom-front panel

Take off the filter

Clean the filter
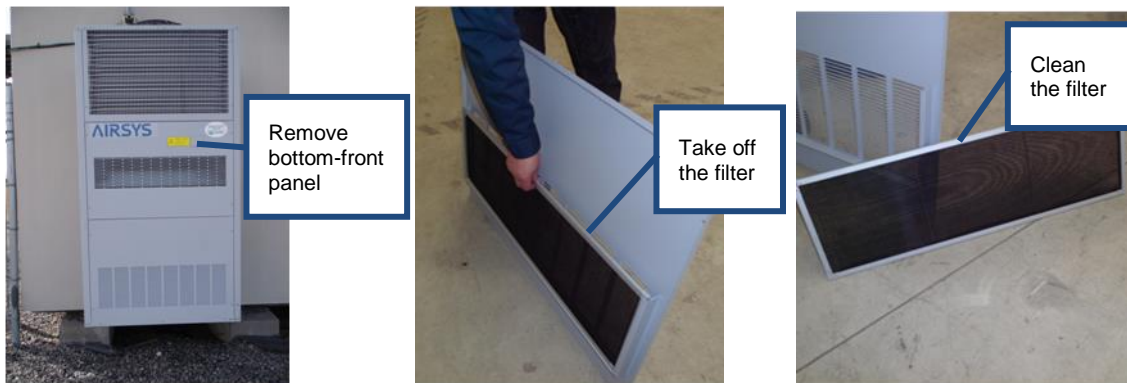
Inspect and Clean Condenser Coils

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

Debris such as paper, dead leaves, and dust can be sucked in around the coils, reducing the thermal exchange rate. Remove any objects from the coil which may have accumulated and wash the system with water and commercial coil cleaner.

Dirty condenser coils may trigger the high pressure switch and cause system lockout.

The coil should be inspected more frequently if the environment experiences seasons of high dust or falling leaves.

Inspect and Clean the Drain Pipes (Both Evaporator and Condenser Drain Pipes)

To avoid water overflow, ensure that the system has proper drainage discharges. The pipe and outflow should be completely free of any obstructions. If necessary, clean the drain and outflow area.

Physical Inspection of the Damper

The air damper is a critical element in the WPU. 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 fully open and close via the manual override

2. Check if the nuts are properly tightened, as shown in the following images.
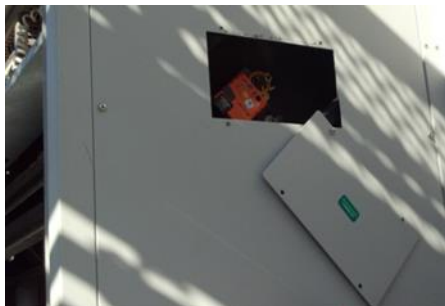
Operation Checklist

If problems are experienced with the system, use this checklist to verify the system and determine the root cause. Keep these records for future inspections.

Check Items	✓ or ✗
Address: _____**Site No.:** _____ **Date:** _____	
Unit Factory Number:_____ (refer to the unit name plate)	
Step-Test or Manual Operation	
Verify WPU 1 supply fan is working(1)	
Verify WPU1 heater works normally (2)	
Verify WPU 1 compressor works normally (3) At the same time, check if the WPU 1 condenser fan works normally.	
Verify WPU 1 free cooling is working (4)	
Verify WPU 2 supply fan works normally(5)	
Verify WPU 2 heater works normally (6)	
Verify WPU 2 compressor works normally(7) At the same time, check if the WPU 2 condenser fan works normally.	
Verify WPU 2 free cooling works normally (8)	
Record these values using pressure gauges or multi-meter readings **Outdoor Temperature:** _____**Indoor Temperature:** _____	
The WPU 1 low pressure value R410a system, normal range:8-12Bar/116-174PSI	Bar/PSI
The WPU 1 high pressure value R410a system normal range:25-30Bar/362.5-435PSI	Bar/PSI
The WPU 1 current of the compressor (refer to nameplate)	Amp
The WPU 1 current of the supply fan (refer to nameplate)	Amp
The WPU 2 low pressure value R410a normal range:8-12Bar/116-174PSI	Bar/PSI
The WPU 2 high pressure value R410a normal range:25-30Bar/362.5-435PSI	Bar/PSI
The WPU 2 current of the compressor (refer to nameplate)	Amp
The WPU 2 current of the supply fan (refer to nameplate)	Amp

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Spare Parts

For all part requests, please contact:

AIRSYS North America

Web: https://airsysnorthamerica.com/

Email: ASNSupport@air-sys.com

Phone: 855-874-5380

Appendix 1: Drawings

Figure 22: Frame Dimensions

Appendix 2: Reference Tables

Table 28: Supply and Return Air Frame Dimensions

Model	3R1C1,5R1C1				7E1C2, 9E1C2				13E1C3				18E1C4			
Frame Type	Supply		Return		Supply		Return		Supply		Return		Supply		Return	
Unit	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
A	435	17.13	435	17.13	693	27.28	693	27.28	744	29.29	744	29.29	864	34.02	864	34.02
A'	467	18.39	467	18.39	725	28.54	725	28.54	776	30.55	746	30.55	896	35.28	896	35.28
B	200	7.87	300	11.81	254	10.00	344	13.54	254	10.00	344	13.54	254	10.00	344	13.54
B'	232	9.13	332	13.07	286	11.26	376	14.80	286	11.26	376	14.80	286	11.26	376	14.80
C	100	3.94	100	3.94	100	3.94	100	3.94	100	3.94	100	3.94	100	3.94	100	3.94
D	90	3.54	90	3.54	90	3.54	90	3.54	90	3.54	90	3.54	90	3.54	90	3.54
E	30	1.18	30	1.18	30	1.18	30	1.18	30	1.18	30	1.18	30	1.18	30	1.18
F	9	0.35	9	0.35	9	0.35	9	0.35	9	0.35	9	0.35	9	0.35	9	0.35

Table 29: WPU Filter Sizes

Model	Filter Qty	Nominal Size (in)	Exact Size (in)
3R1C1,5R1C1	1	16 x 16 x 2	15½ x 15½ x 1¾
7E1C2, 9E1C2	1	25 x 18 x 2	24½ x 17½ x 1¾
13E1C3	2	16 x 16 x 2	15½ x 15½ x 1¾
18E1C4	2	20 x 16 x 2	19½ x 15½ x 1¾

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Appendix 3: List of Tables

Appendix 4: List of Figures

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