



BACKPACKTM
School Air Solutions

Installation & Operation Manual

Models CV36H2B CV60H3B

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

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AIRSYS

7820 Reidville Rd.

Greer, SC 29334

855-874-5380

<https://airsysnorthamerica.com>

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1 Introduction

1.1 Using this Manual

Read this manual carefully before attempting to install or start the unit. Retain this manual for reference for the entire operational life of the unit. This manual provides information on the following topics:

- Product Overview
- Instructions for physical, and electrical installation of heat pump units
- User's guide

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 1-1 Packaging Symbols

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

1.2 Model Identification

Each unit is identified by a model number, such as CV36H2A-AWXXX-X2XX. The elements in the number are explained in Table 1-2.

Table 1-2 Model Number

1-2	3-4	5-6	7	8	9	10	11	12	13	14	15	16-17	18	19
CV	60	H3	B	-	A	W	A	X	X	-	B	12	X	X

1-2	CV	Model Series CV: Variable Speed Inverter Compressor; EC Supply Fan; EC Condenser Fan
3-4	60	Cooling Capacity 36: 2~4Ton, 60: 3~6Ton
5-6	H3	Cabinet Size Code H2: 2~4Ton Outdoor, H3: 3~6 Ton Outdoor, N3: All Indoor Cabinet
7	B	Revisions: 2022 Model
8	-	Separator Character “-”
9	A	Power source code A: 208/230V 1PH 50/60Hz, B: 208/230V 3PH 50/60Hz, C: 460V 3PH 60Hz
10	W	Control Modules Wire Control
11	A	Refrigerant R410A
12	X	Coil Options X: Standard, C: Standard + Coastal Protection Coated Coils+ Stainless Steel Fastener, E: Option C + Stainless Steel Body
13	X	Color Options X: Tan (Def. Outdoor), G: Gray (Def. Indoor), Z: Bronze, W: White
14	-	Separator Character “-”
15	B	Ventilation Options B: Blank-Off Plate, C: CRV Motorized Fresh Air Damper R: Energy Recovery Ventilator, E: Economizer
16-17	12	Heater Options: 00: No Heater, 05: 5kW (CV36), 06: 6kW (CV60) 10: 10kW (CV36), 12: 12kW (CV60)
18	X	Filter Options X: MERV-8/G4, 3: MERV-13/F7
19	X	Custom Options X: Standard A: 2-10V modulating actuator for CRV or ERV

1.3 Acronyms and Abbreviations

Table 1-3 lists acronyms and abbreviations used in this manual.

Table 1-3 Acronyms and Abbreviations

Term	Meaning
A	Ampere, unit of electric current, or rate of flow of electricity
AAST	AIRSYS Authorized Service Technician
AUT/MAN	Automatic/Manual
BMS	Building Monitoring System
CFM	Cubic Feet per Minute
Com	Common
Comp	Compressor
Cond	Condenser
CRV	Commercial Room Ventilator
DC	Direct Current
EC	Electronically Commutated (Refers to variable speed evaporator/supply fan)
ERV	Energy Recovery Ventilator
Evap	Evaporator
FC	Free Cooling
HVAC	Heating, Ventilation, and Air Conditioning
Humid	Humidity
I/O	Input/ Output
kW	Kilowatt
LED	Light Emitting Diode
MC	Mechanical Cooling
N.C.	Normally Closed
N.O.	Normally Open
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
EVI	Enhanced vapor injection

2 Product Overview

The AIRSYS BackPack™ Wall Mounted Heat Pump is a self-contained energy efficient heating and cooling system, which is designed to offer maximum indoor comfort at a minimal cost without using valuable indoor floor space or outside ground space. The control system determines the unit's mode of operation: Cooling or Heating, as shown in Figure 2-1.

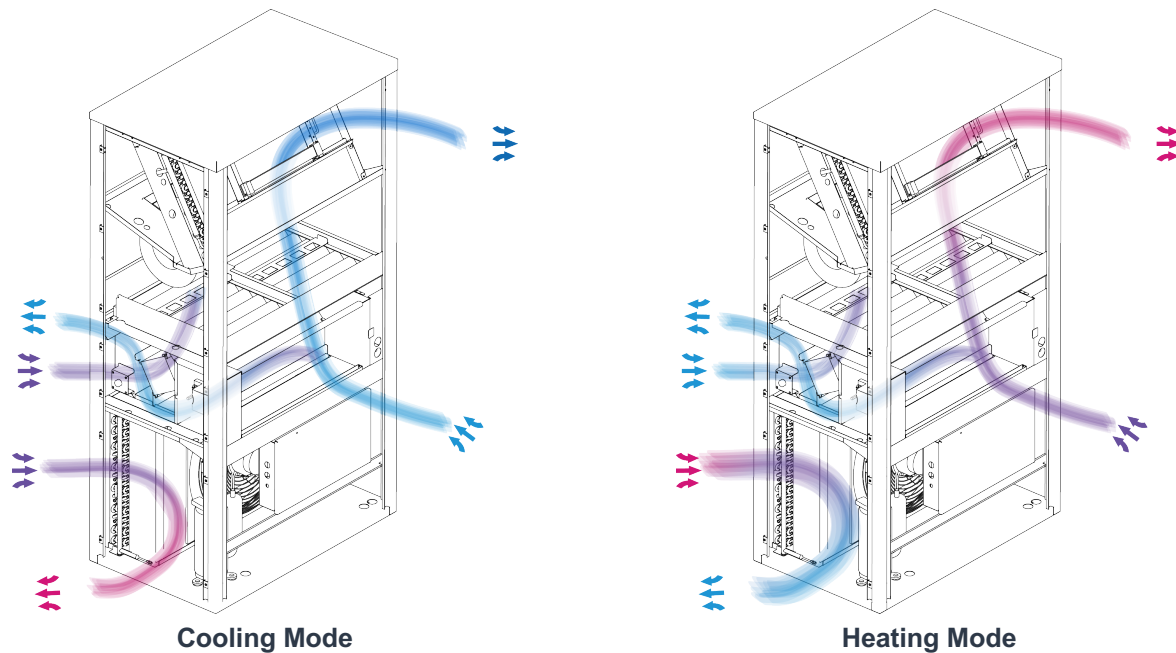


Figure 2-1 Basic Operating Modes

Any grille that meets the 5/8" louver criteria may be used. It is recommended that AIRSYS Return Air Grille Kit installed when no return duct is used. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400fpm.

Note: If no return air duct is used, applicable installation codes may limit this cabinet to installation only in single-story structures.

2.1 Ventilation Options

2.1.1 Blank Off Plate

The blank-off plate prevents outside air from entering the building.

All capacity and efficiency ratings are based on installation of the blank off plate. This is recommended for maximum energy efficiency.

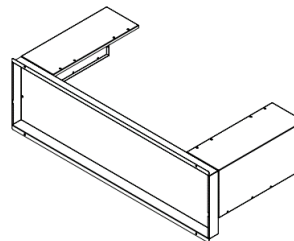


Figure 2-2 Blank Off Plate

2.1.2 Commercial Room Ventilator (CRV)

The power open, spring close, type fresh air damper allows outside fresh air to enter the building. The adjustable actuator allows varying amounts of outside air to enter the building.

There (4) blade positions to adjust the airflow allowed into the building. See Table 2-1 below,

Table 2-1 CRV Air Flow Data

Damper Position	CV36H2*(CFM)	CV60H3*(CFM)
1	550	800
8	450 (Default)	700
6	300	600 (Default)
4	180	400

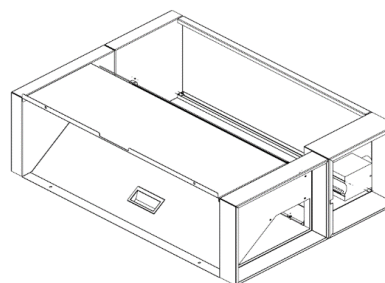


Figure 2-3 Commercial Room Ventilator

2.1.3 Energy Recovery Ventilator (ERV)

The energy recovery ventilator harvests energy contained in the exhaust air by mixing it with fresh air across a stationary cubic heat exchanger. The filter medium is designed to be pulled out for easy cleaning and replacement. See Table 2-2 below,

Table 2-2 ERV Fresh Air Flow Data

Damper Position	CV36H2*/CV60H3* (CFM)
ON	450
1	420
2	380
3	350
4	300
5	240
6	200 (Default)

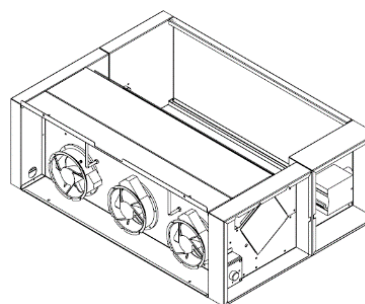


Figure 2-4 Energy Recovery Ventilator

2.1.4 Economizer

The economizer uses outdoor air to provide cooling when the outdoor temperature is sufficiently lower than the indoor temperature.

Table 2-3 Economizer Characteristics

DIP switch Position	CV36H2*/CFM	CV60H3*/CFM
1	0	0
2	0	30
3	100	150
4	300	400
5	500	850
6	850	1300 (Default)
7	920	1350
8	920(Default)	1350

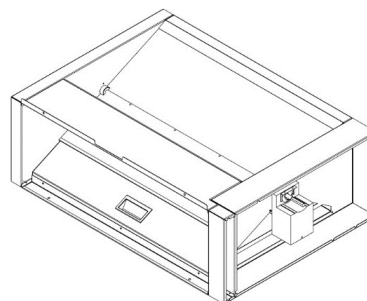


Figure 2-5 Economizer

2.2 Optional Installation Accessories

2.2.1 Top Supply Panel

The top supply panel is used with the top discharge plenum. It supplies higher horizontal air flow directly on the top of the indoor HVAC based site application (See Optional Installation Accessories for details).

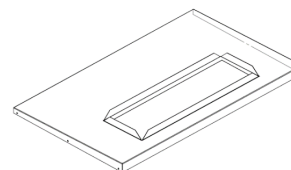


Figure 2-6 Top Supply Panel

2.2.2 Top Discharge Plenum

The top discharge plenum can be used with top supply panel and wall curb.

- 1) While using with top supply panel, it supplies high horizontal air flow directly on the top of the indoor HVAC based on site application.
- 2) While using with wall curb, it supplies higher horizontal air flow directly at the top of the indoor HVAC, reduces the noise of air supply and the airflow is more evenly distributed.

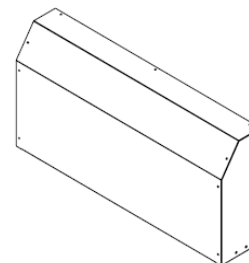


Figure 2-7 Top Discharge Plenum

2.2.3 Wall Curb

The wall curb is installed behind the main machine. It can be used separately or together with the top discharge plenum.

- 1) While using separately, it supplies horizontal air flow with adjustable location of air return.
- 2) While using with top discharge plenum, it supplies horizontal air flow directly at the top of the indoor HVAC, reduces the noise of air supply and the airflow is more evenly distributed.

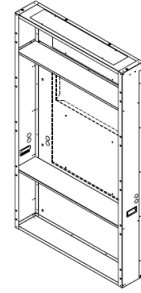
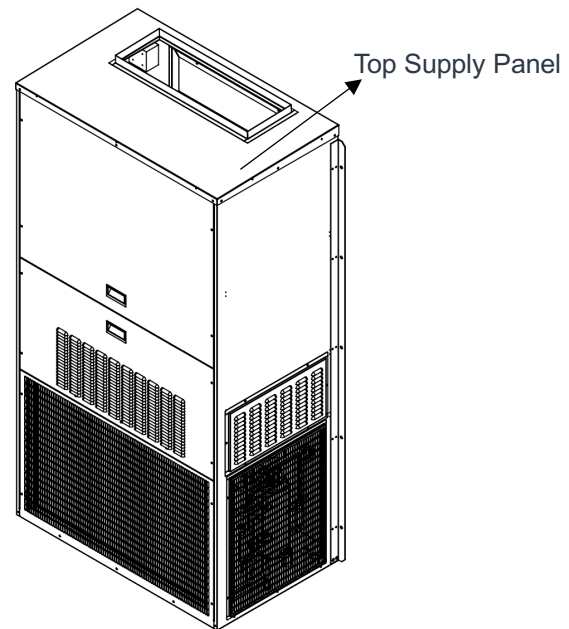
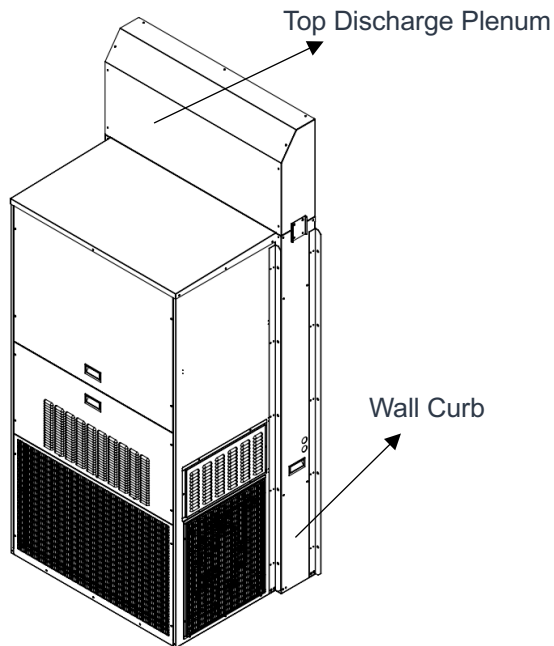


Figure 2-8 Wall Curb

2.2.4 Optional Installation Schematic



2.3 Heater Options

2.3.1 PTC Heater

The PTC electrical heater has both fast thermal response time and low inrush current. A protection device will automatically cut current when unsafe levels are reached.

The outer edge of the PTC heating component is designed with double insulation. When in contact with metal, it will not cause short circuits.

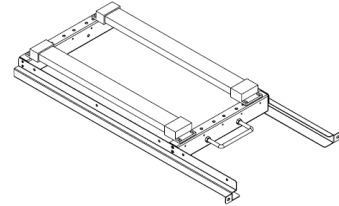


Figure 2-9 PTC Electrical Heater

2.4 Filter Options

2.4.1 Non-Standard Filters

2" MERV8/G4 pleated filters are standard with each unit. The filter slides into for easy serviceability. This filter can be serviced from the outside by removing the filter access panel. Filters are also available in MERV13/F7.

2.5 Condensate Drain

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system, it must be an open or vented type system to assure proper drainage.

3 Installation

3.1 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 3-1 on Page 18. for the complete list of materials shipped with each unit.

Check for the following:

- The supply voltage meets the requirements as designated: 197-252VAC.
- The install location is clean on the inside and free of excess dirt and dust.
- Ensure that minimum clearance requirements are met (see Clearances on page 24)

Also verify that all installer provided items, listed in Table 3-2 on Page 22 are accounted for.



Danger. All the installation work must be done by a licensed 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 operation of the units.



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



Warning: For outdoor use, the risk of electric shock can cause injury or death. Disconnect all remote electric power supplies before installation.

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

3.1.1 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 packaging shows 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.

3.1.2 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. Additionally, AIRSYS warrants that the compressor is free from defects in materials and workmanship for a period of (60) months.

AIRSYS will furnish, free of charge, all replacement parts for any component failures that occur within the warranty period. The customer is responsible for the cost of shipment of replacement material from AIRSYS Cooling Technologies.

Note: Warranty assumes the warranty registration card that accompanied the units in shipment is submitted. If the warranty registration card was not filled out and returned to the supplier, then the warranty will expire (12) months from the date of shipment for all components or (60) month for the compressor.

The 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.

3.1.3 Moving the Unit

Forklifts are recommended for moving, loading, unloading, and positioning the BACKPACK™ unit 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.

3.1.4 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 and gloves.

3.2 Required Materials

3.2.1 AIRSYS Supplied Materials

Table 3-1: AIRSYS System Shipping Materials List has 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 Cooling Technologies

support@air-sys.us

855-874-5380

Table 3-1 AIRSYS Provided Materials

System Shipping Materials List

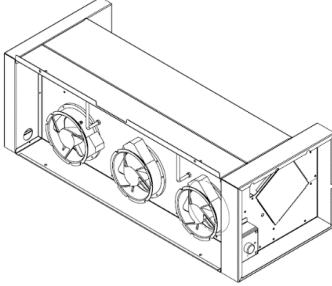
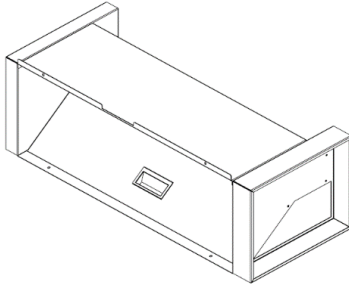
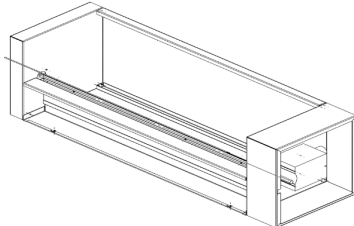
Item	Part #	Item Description	Comments	CV36H2B	CV60H3B
1	4070143150	CV36H2B-AWAXX	Main Unit	Corresponding model	Corresponding model
2	4070143160	CV60H3B-AWAXX	Main Unit		
3	4070143045	CV36H2B-BWAXX	Main Unit		
4	4070143055	CV60H3B-BWAXX	Main Unit		
5	4070143205	CV36H2B-CWAXX	Main Unit		
6	4070143305	CV60H3B-CWAXX	Main Unit		
7	-	Shipping list	In document pack	1	1
8	-	Installation and operation manual	In document pack	1	1
9	-	Blank nameplate	In document pack	1	1
10	8458716720	Cable ties, G370HDB L=370	In document pack	10	10
11	7151011110	Rubber insulation cotton	In the box	3	3
12	7354006900	Nylon washers , $\phi 10.6 \times \phi 5.2 \times 1.2$	For door panel backup, in the document pack	4	4
13	8551016130	Hexagon flange bolts with cross recess, M5*16	In document pack, for door panel backup	4	4

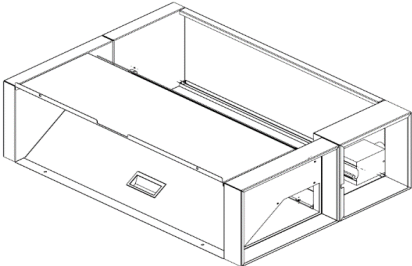
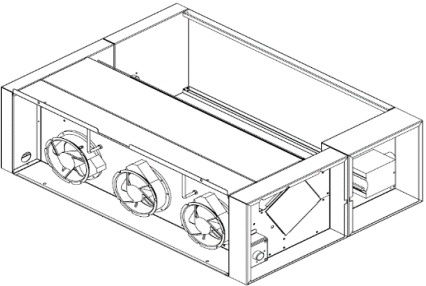
Ventilation Options

Item	Part#	Item Description	Unit	Qty.	Comments
1	2121008960	Blank Off Panel for cabinet H2/H3	EA	1	Per unit
2	2121008570	Energy Recovery Ventilator	EA	1	Per unit
3	2121009420	Blank-off of CRV	EA	1	Per unit
4	2121009430	Air Damper Section (CRV/ERV)	EA	1	Per unit
5	2121008610	CRV Motorized Fresh Air Ventilator for Cabinet H2/H3 (Full Assembly)	EA	1	Per unit
6	2121009610	Energy Recovery Ventilator for Cabinet H2/H3 (Full Assembly)	EA	1	Per unit
7	2121008860	Economizer (Full Flow) for Cabinet H2/H3	EA	1	Per unit

Note: Materials for installation are included when ventilation options are ordered separately.

ERV and CRV Options

Item	Part#	Item Description	Figure	Comments
1	2121008570	Energy Recovery Ventilator		
2	2121009420	Blank-off of CRV		
3	2121009430	Air Damper Section (CRV/ERV)		

Item	Part#	Item Description	Figure	Comments
4	2121008610	CRV Motorized Fresh Air Ventilator for Cabinet H2/H3 (Full Assembly)		Item 2+Item3
5	2121009610	Energy Recovery Ventilator for Cabinet H2/H3 (Full Assembly)		Item 1+Item3

Optional Installation Accessories

Item	Part #	Item Description	Unit	Qty.	Comments
1	2121008580	Curb for Cabinet H2/H3	EA	1	Per unit
2	2121008590	Top discharge plenum for Wall Curb for Outdoor Cabinet H2/H3	EA	1	Per unit
3	2121009330	Top Supply Panel Option for Cabinet H2/H3	EA	1	Per unit
4	8252509870	2" Standard MERV-8/ G4 Throwaway	EA	2	Per unit
5	8252510380	2" MERV-13/F7 Throwaway	EA	2	Per unit

Note: Materials for installation are included when optional installation accessories are ordered separately.

Heater Options List

Item	Part #	Comments	5kW	6kW	10kW	12kW
1	2121013920	230VAC/1P/60HZ	CV36H2B	CV60H3B	--	--
2	2121013930	230VAC/3P/60HZ	CV36H2B	CV60H3B	--	--
3	2121012480	460VAC/3P/60HZ	CV36H2B	CV60H3B	--	--
4	2121008500	230VAC/1P/60HZ	--	--	CV36H2B	CV60H3B
5	2121013670	230VAC/3P/60HZ	--	--	CV36H2B	CV60H3B
6	2121013610	460VAC/3P/60HZ	--	--	CV36H2B	CV60H3B

Note: Materials for installation are included when heater options are ordered separately.

3.2.2 Materials to be Supplied by Installer

Table 3-2 lists items required for installation that must be supplied by installer. The wire length and gauge depend on site-specific conditions. However, recommendations are provided.

Table 3-2 Installer Supplied Materials

No.	Item	Qty	Description	Comments
1	AC power supply cable	Same as number of units	1 set of two-wire cable per unit	Refer to Summary Electrical Ratings; Note the electric heater capacity.
2	Silicone sealant	As needed	Commercial grade outdoor silicone sealant	
3	Weather stripping	As needed	Commercial grade neoprene weather stripping or equivalent Recommend a minimum of 25 mm (~1") wide and 20 mm (~0.8") thick	Used to frame the HVAC outlet and inlet to create a weather tight seal
4	Nylon zip-tie	As needed	Small nylon zip tie	For properly dressing cables and harnesses
5	Thermostat	1	Thermostat should have at least 2 stage heat pump compatibility	
6	Thermostat cable	As needed	24-32AWG	
7	Expansion bolt M10	10	Connect unit/curb to wall.	Length depends on the wall material and thickness.

3.2.3 Summary Electrical Ratings (Wire Sizing)

Table 3-3 Electrical Ratings

Model	Heater Size	Single Circuit			Dual Circuit #1			Dual Circuit #2		
		MCA	MOP	Recommended Breaker Size	MCA	MOP	Recommended Breaker Size	MCA	MOP	Recommended Breaker Size
CV36H2B-A	0kW	26	40	40	--	--	--	--	--	--
	5kW	50	60	63	26	40	40	27	30	32
	10kW	77	80	90	26	40	40	54	60	63
CV60H3B-A	0kW	38	60	63	--	--	--	--	--	--
	6kW	71	80	80	38	60	63	33	35	40
	12kW	103	110	110	38	60	63	65	70	70
CV36H2B-B	0kW	16	25	32	--	--	--	--	--	--
	5kW	30	35	50	16	25	32	16	20	25
	10kW	45	50	63	16	25	32	31	35	40
CV60H3B-B	0kW	23	35	40	--	--	--	--	--	--
	6kW	42	50	50	23	35	40	19	20	25
	12kW	61	70	63	23	35	40	38	40	50
CV36H2B-C	0kW	8	10	25	--	--	--	--	--	--
	5kW	15	15	32	--	--	--	--	--	--
	10kW	23	25	40	--	--	--	--	--	--
CV60H3B-C	0kW	12	15	32	--	--	--	--	--	--
	6kW	22	25	40	--	--	--	--	--	--
	12kW	31	35	50	--	--	--	--	--	--

Note:

MCA = Minimum Circuit Ampacity (Wiring Amps)

MOP = Maximum Overcurrent Protection (HACR Breaker Size)

* Under 230VAC/1P/60HZ and 230VAC/3P/60HZ, the heater on Dual Circuit#2 while other loads on Dual Circuit#1.

* Under 460VAC/3P/60HZ, the heater and other loads on Dual Circuit#2 while compressor inverter on Dual Circuit#1

3.3 Physical Installation

3.3.1 Select the location 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 9 below for unit dimensions and weights by model number. Refer to Table 10 for weights of ventilation options.

Table 3-4: Unit Dimensions and Weight

Model	Unit	CV36H2B	CV60H3B
Width	in	45 5/8	45 5/8
Depth	in	27 9/16	27 9/16
Height	in	85 7/8	92 7/8
Weight	lbs	730	830

Table 3-5: Ventilation Option Weight

Accessory	Blank Off Plate	Fresh Air Damper	Economizer	ERV
Weight (lbs)	10	40	40	50

3.3.2 Clearance

- 48" (1200mm) free space in front of the unit
- 40" (1000mm) free space at the side of the unit



Important

1. The floor 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.
2. For any unit equipped with electrical heat, the supply grille should be at least three inches away from combustible material.

To assist in the installation process, the following Table 11 and Figure 11 provide the unit dimensions to a tolerance of $\pm 1/16"$ (2 mm).

Table 3-6: Unit Dimensions

Model	Unit	Width (W)	Depth (D)	Height (H)	Supply		Return		A	B	E	G	V	J	M	N	O	K	S	L	T	P	Q
					I	W1	F	W1															
CV36H2B	mm	1160	700	2180	250	760	403	760	738	560	684	762	40	81	1200	1240	20	178	450	130	110	803	855
	inch	45 5/8	27 9/16	85 7/8	9 7/8	29 15/16	15 7/8	29 15/16	29.06	22 1/16	26 15/16	30	1 9/16	3 3/16	47 1/4	48 13/16	3/4	7	17 3/4	5 1/8	4 5/16	31 5/8	33 5/8
CV60H3B	mm	1160	700	2360	250	760	403	760	956	560	890	762	40	55	1200	1240	20	268	450	220	110	1021	1073
	inch	45 5/8	27 9/16	92 7/8	9 7/8	29 15/16	15.7/8	29 15/16	37.64	22 1/16	35 1/16	30	1 9/16	2 3/16	47 1/4	48 13/16	3/4	10 9/16	17 3/4	8 5/8	4 5/16	40 3/16	42 1/4

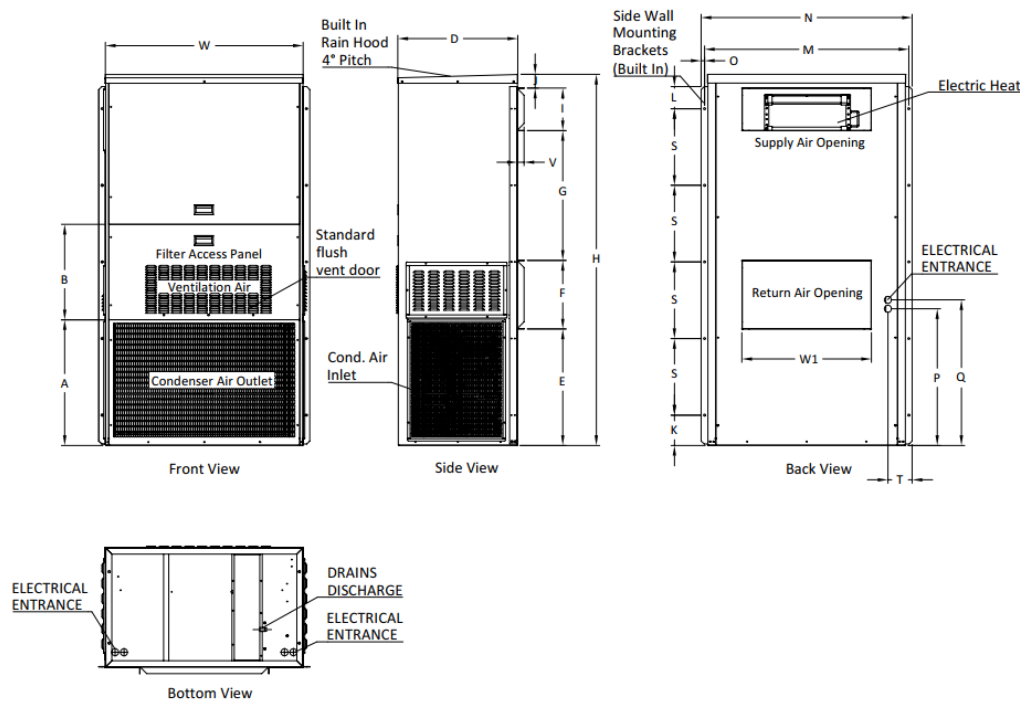


Figure 3-1 Unit Dimension

3.3.3 Make Openings in the Wall

Case 1: Direct Wall Mount. Cut Openings Per Table 3-7 Below.

Table 3-7 Opening Dimension

Model	Note	Unit	Dimensions										
			A	B	C	D	E	F	G	H	I	J	K
CV36H2B	Required Dimensions To Maintain 1/4" Min. Clearance From Combustible Materials	mm	775	267	213	133	756	90	Φ35	119	52	1200	Φ12
		inch	30 1/2	10 1/2	8 3/8	5 1/4	29 3/4	3 9/16	Φ1 3/8	4 11/16	2 1/16	47 1/4	Φ1/2
CV60H3B		mm	775	267	213	249	756	90	35	132	52	1200	Φ12
		inch	30 1/2	10 1/2	8 3/8	9 3/4	29 3/4	3 9/16	Φ1 3/8	5 3/16	2 1/16	47 1/4	Φ1/2
CV36H2B	Required Dimensions To Maintain Recommended 1" Clearance From Combustible Materials	mm	813	305	194	152	737	90	Φ35	119	52	1200	Φ12
		inch	32	12	7 5/8	6	29	3 9/16	Φ1 3/8	4 11/16	2 1/16	47 1/4	Φ1/2
CV60H3B		mm	813	305	193.55	268	737	90	35	132	52	1200	Φ12
		inch	32	12	7 5/8	10 5/8	29	3 9/16	Φ1 3/8	5 3/16	2 1/16	47 1/4	Φ1/2

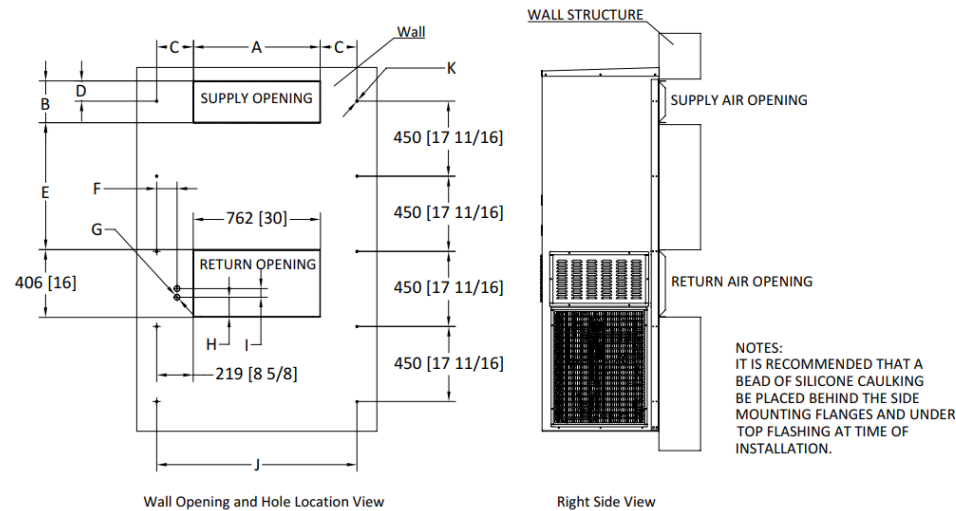


Figure 3-2 Wall Opening and Hole Location View

Case 2: Curb Mounting:

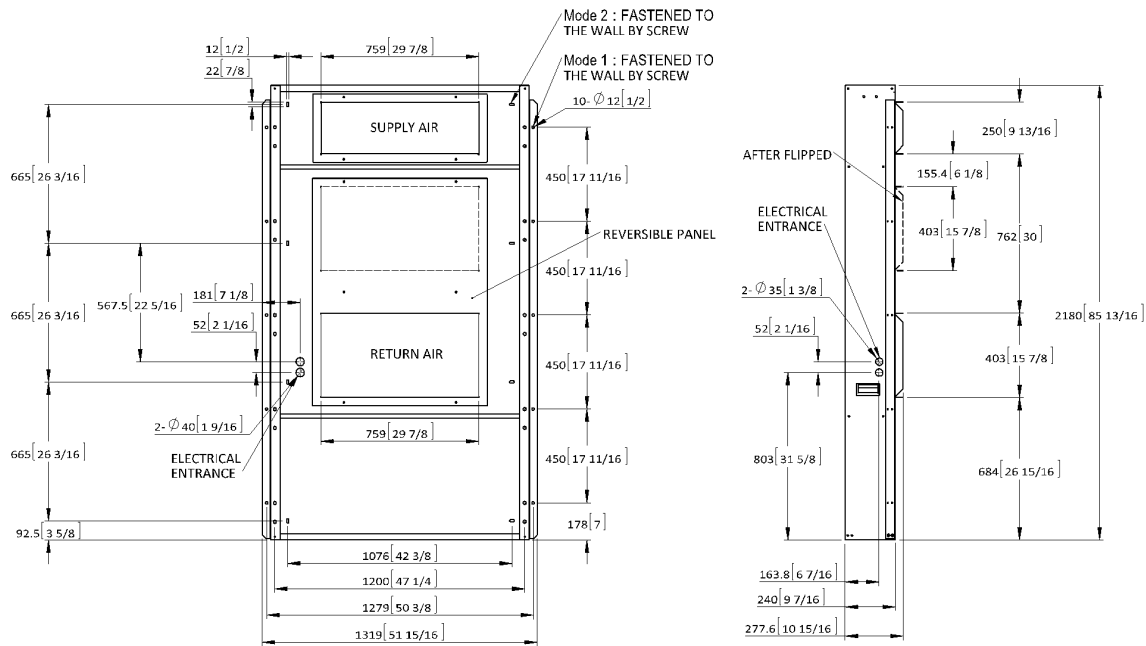


Figure 3-3 Wall Opening and Hole Location View

Case 3: Curb Mounting With Extension

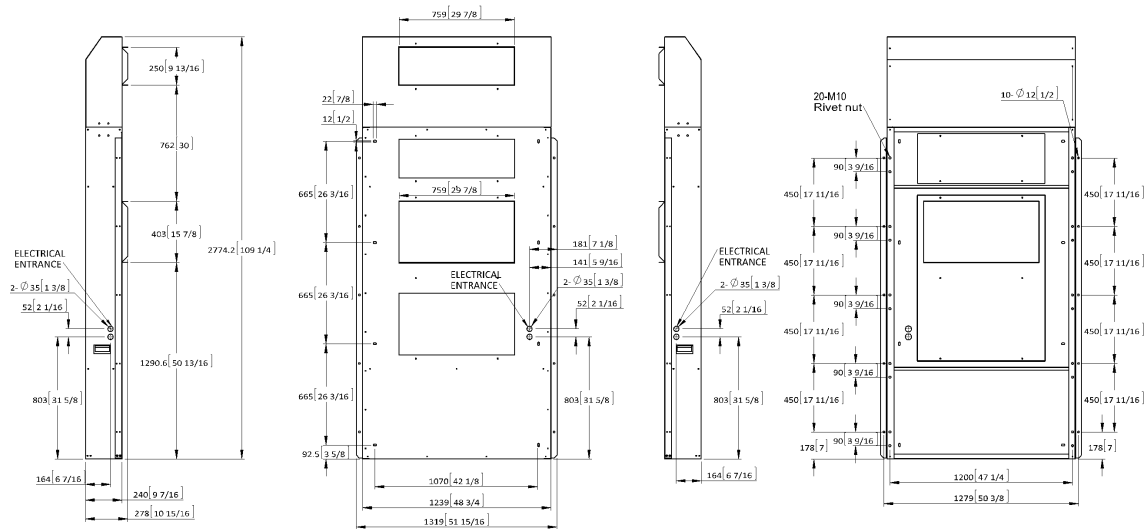
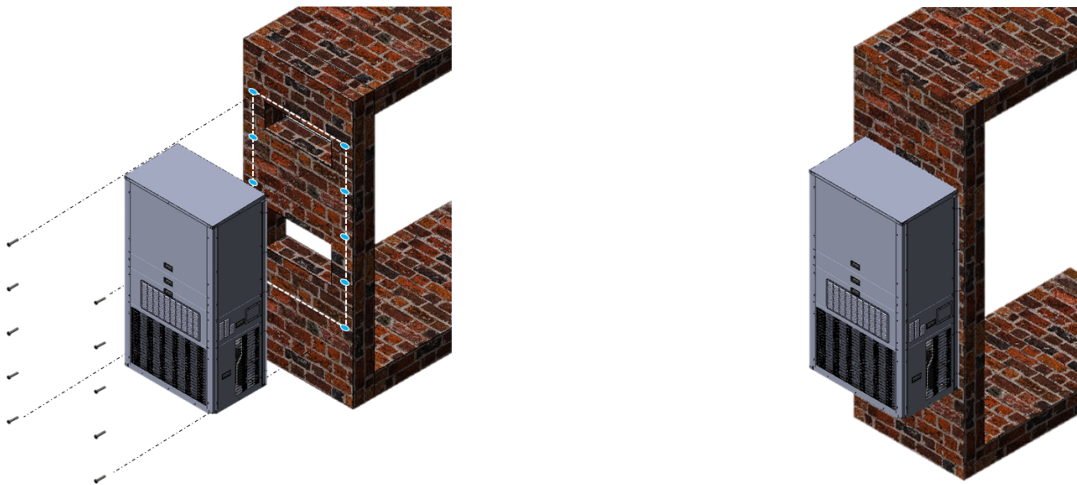
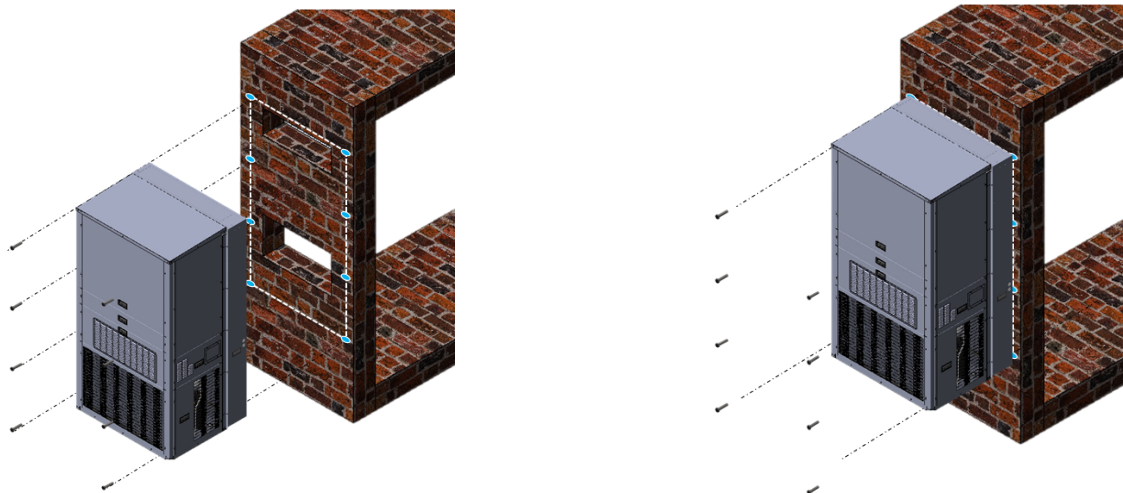


Figure 3-4 Wall Opening and Hole Location View

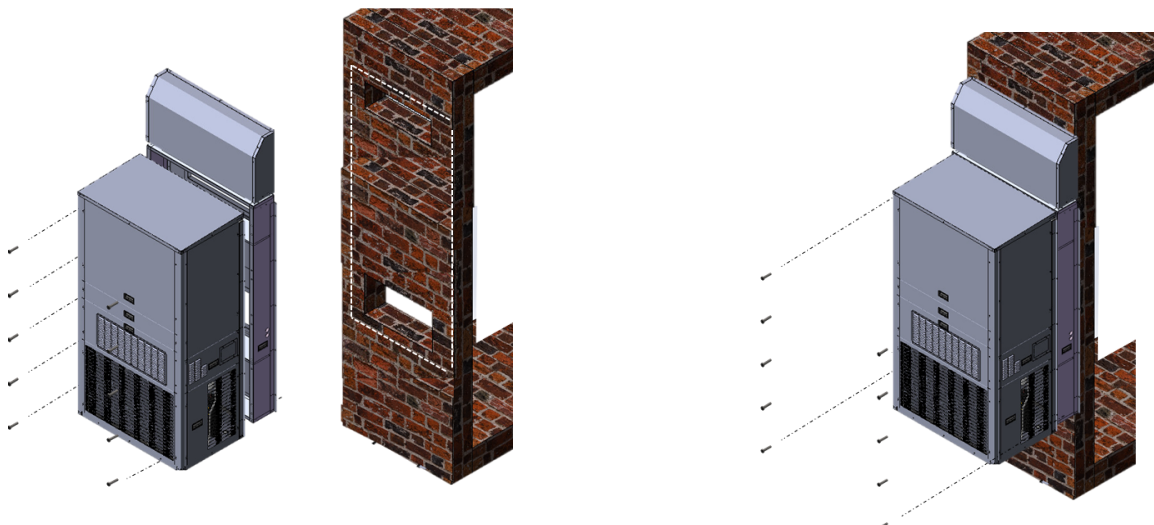
Case 1



Case 2



Case 3



3.3.3.1 Framing and Mounting Instructions

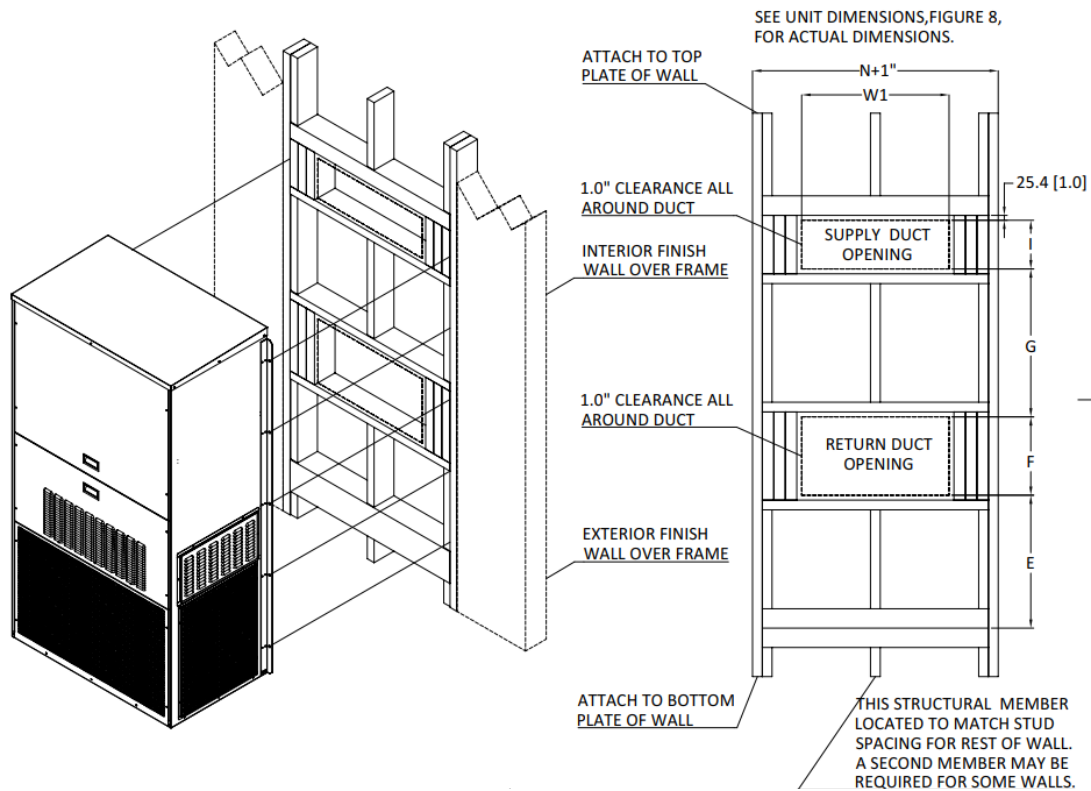


Figure 3-5 Wall Mounting Instruction

3.3.3.2 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 3-6.

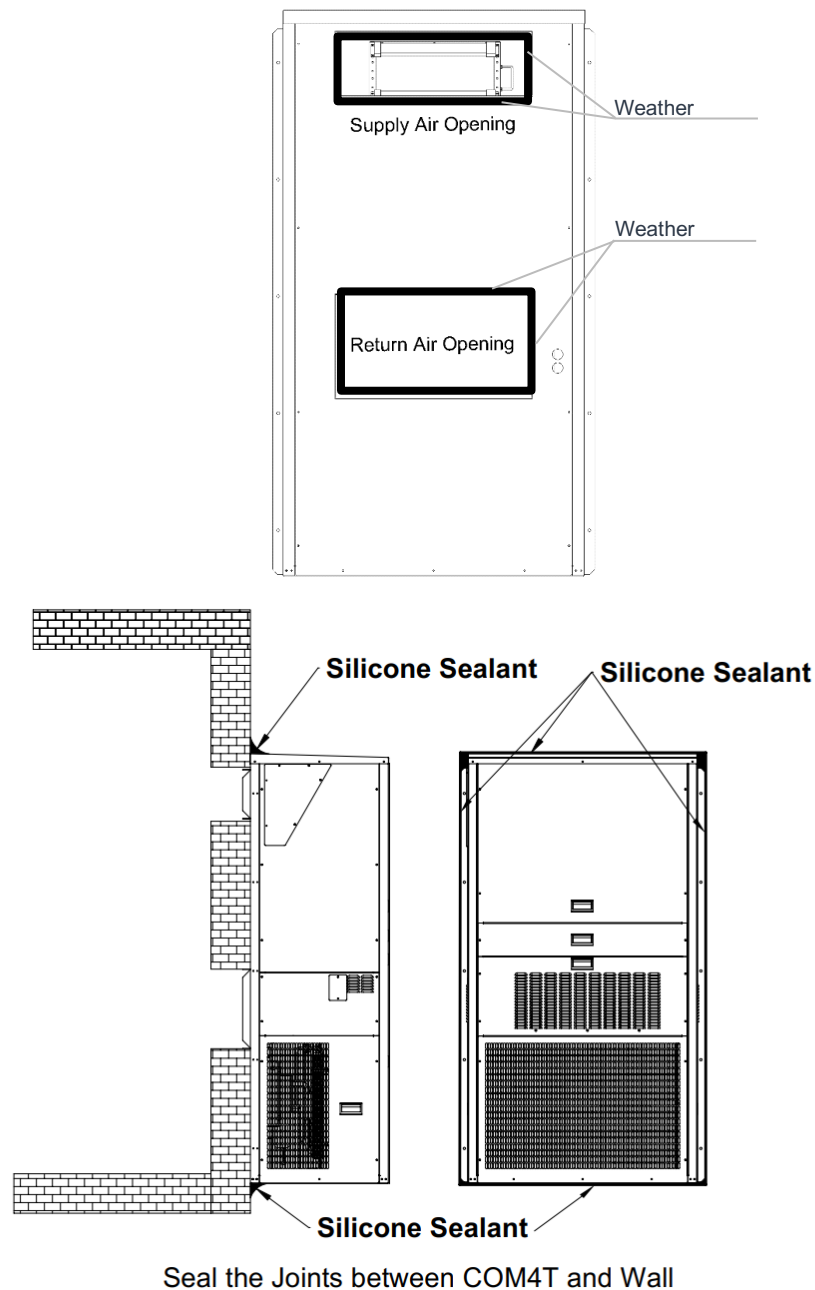


Figure 3-6 Install Weather Stripping

3.3.3.3 Position the Unit



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

The unit must be installed in a level position. An inclination of more than 6-7 mm ($\pm 1^\circ$) could cause the condensation tray to overflow.

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

1. Remove front cover
2. Position the unit next to the wall.
3. Secure unit using one M10 Bolts

3.3.4 Seal the Joints between Units 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 7: Installer Supplied Materials, item 1)

3.3.5 Duct Work

All duct work shall be properly sized for the airflow requirement of the equipment. A minimum of 1" of fiberglass insulation or equivalent is recommended to prevent energy loss and moisture build up. All joints shall be sealed to prevent leakage. Flexible joints shall be used to reduce noise transmission.

When no supply or return duct are used, metal grilles shall be deployed on all supply and return openings.

3.3.6 Install Ventilation Options

Following steps below to install different ventilation options. (Refer to Page 11 for ventilation options)

1. Install CRV

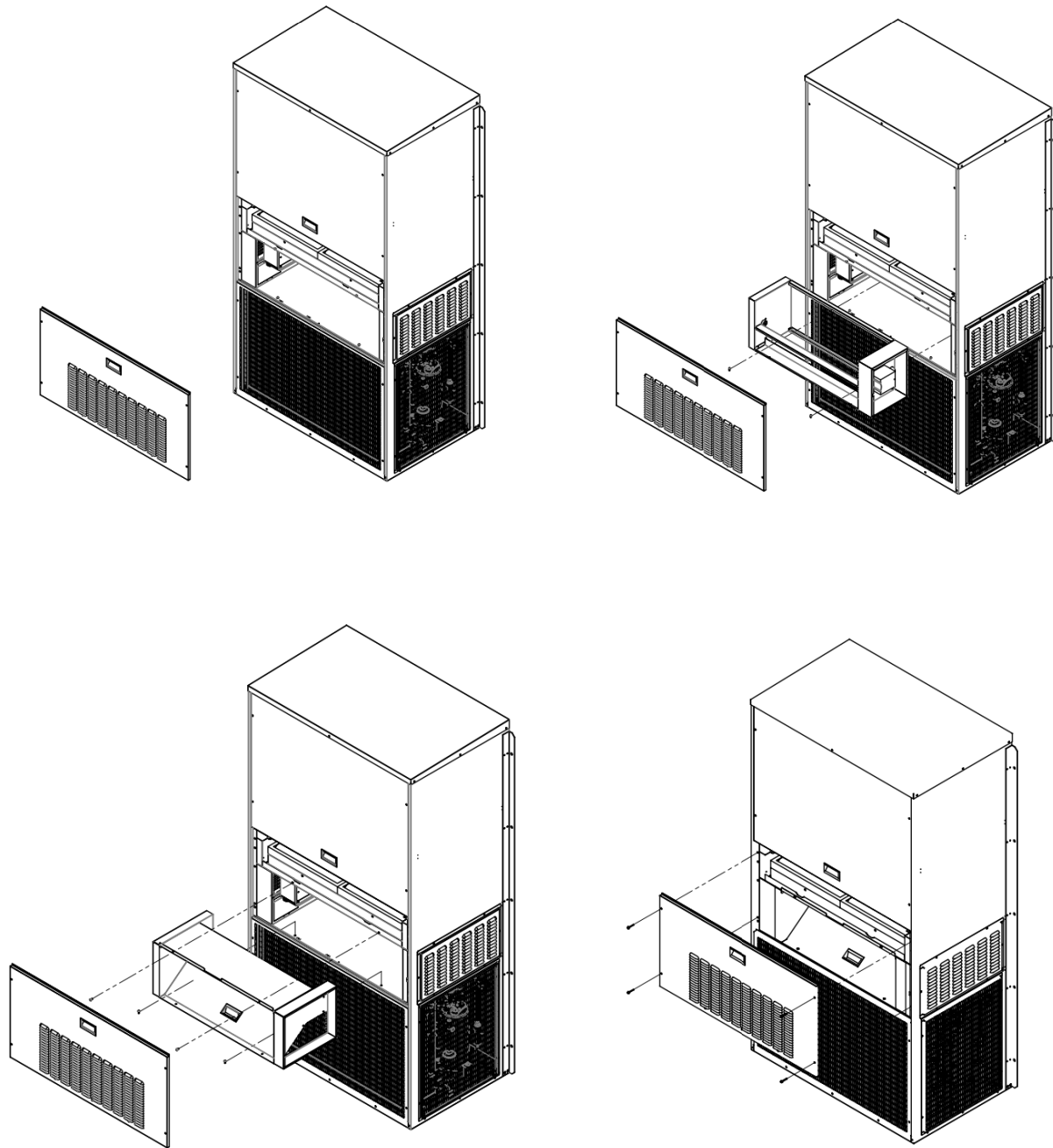


Figure 3-7 Install CRV

2. Install ERV

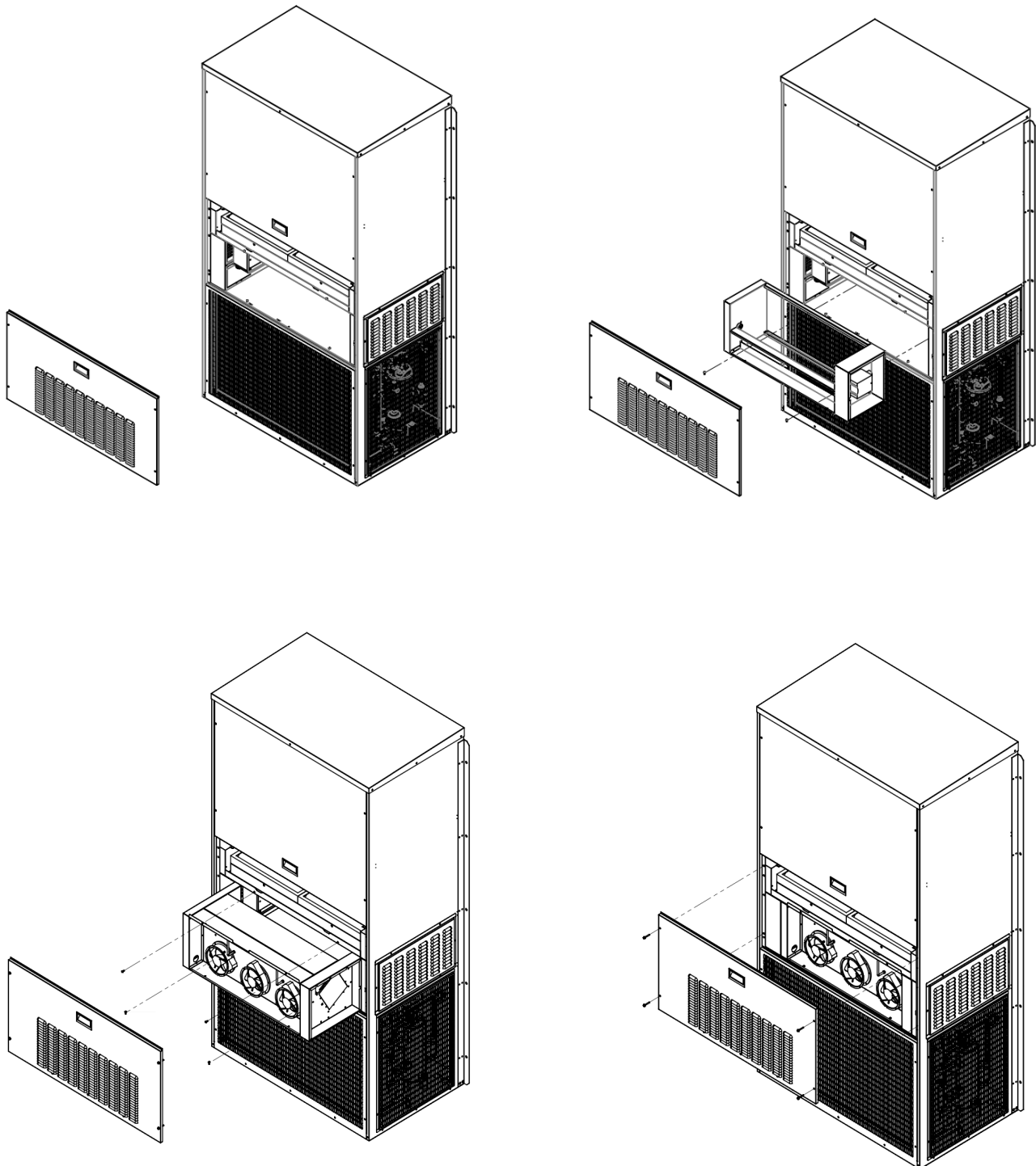


Figure 3-8 Install ERV

3. Install Economizer

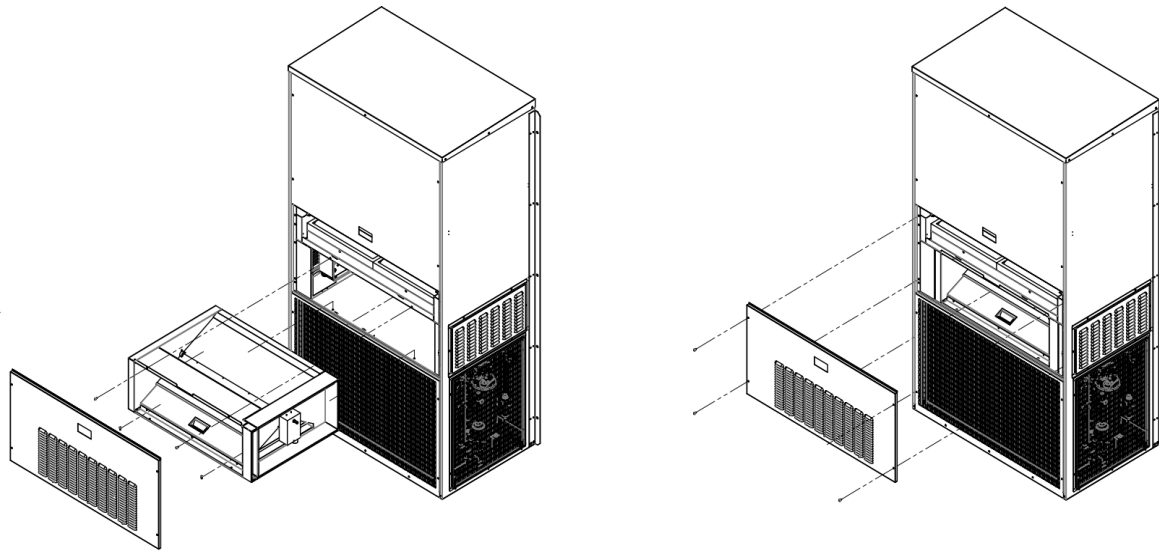


Figure 3-9 Install Economizer

4. Install Blank-Off Plate

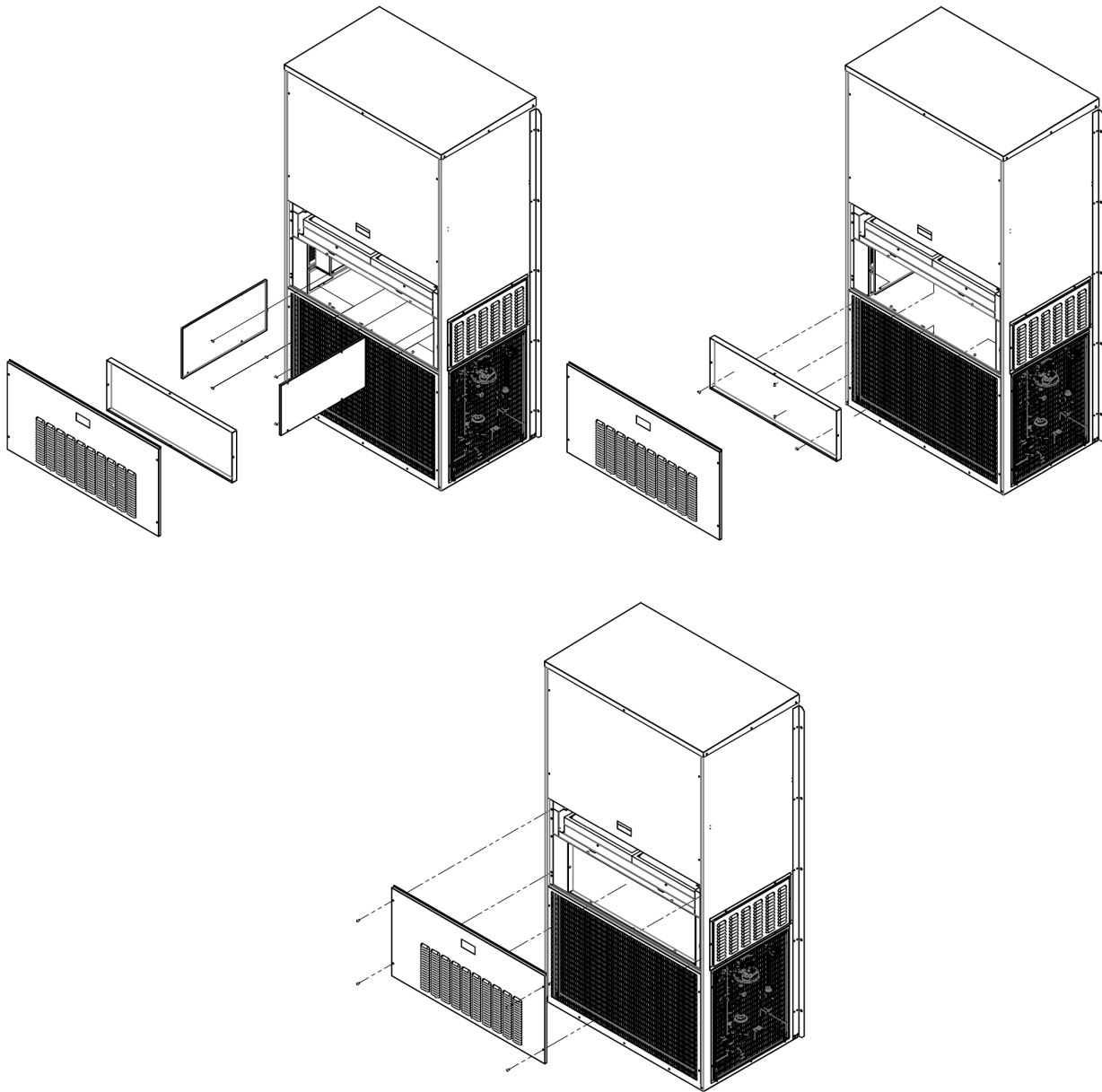


Figure 3-10 Install Blank-Off Plate

3.3.7 Locate Supply Air Temperature Sensor

For better de-hum performance, installing the supplier air temperature sensor is recommended.

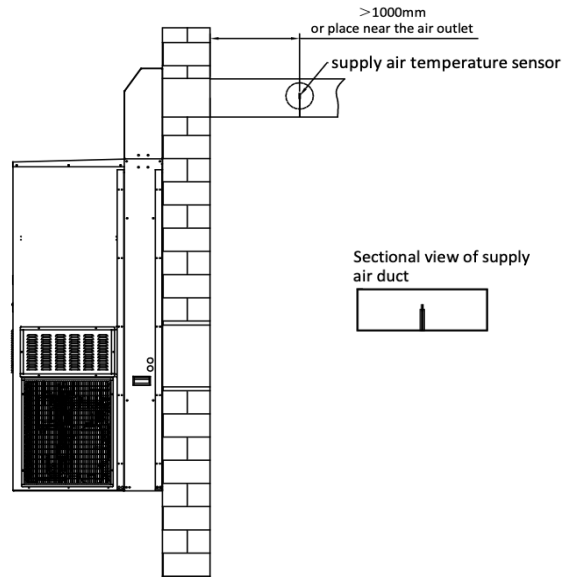


Figure 3-11 Sensor Installation in Duct

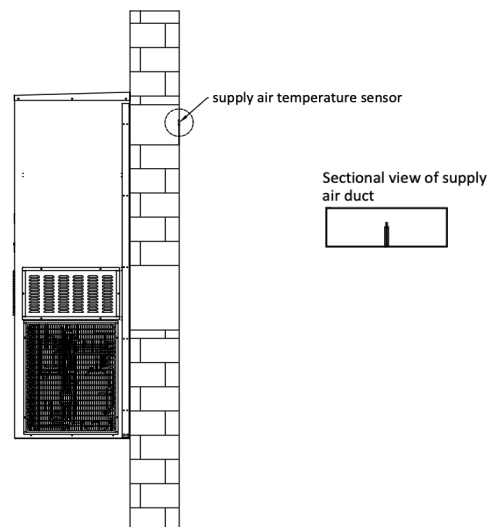


Figure 3-12 Sensor Installation in Grilles

3.4 Complete Electrical Connections

The unit shall be installed in accordance with National Electrical Code (NEC) regulations.

3.4.1 Cautions



Danger: Only an authorized service technician should make the electrical connections to the heat pump unit.



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 unit. 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.

3.4.2 Wiring-Main Power

Refer to Table 3-3 on page 23 for electrical ratings. All wiring must conform to all applicable national and local codes.

The unit rating plate lists a maximum fuse or circuit breaker size that is to be used with the equipment. The correct size must be used to ensure proper operation of the units.

Units can be wired with either a single or a dual circuit. See the instructions below for wiring each type of power input.

Single circuit connection:

- Connect main power to circuit breaker QS1

Dual Circuits connection:

- Disconnect factory jumper from QS1 to QS2
- Connect Circuit #1 power supply to QS1
- Connect Circuit #2 power supply to QS2

See Figure 3-13 and Figure 3-14 below for the location of QS1 for single circuit and QS1 and QS2 for dual circuit.

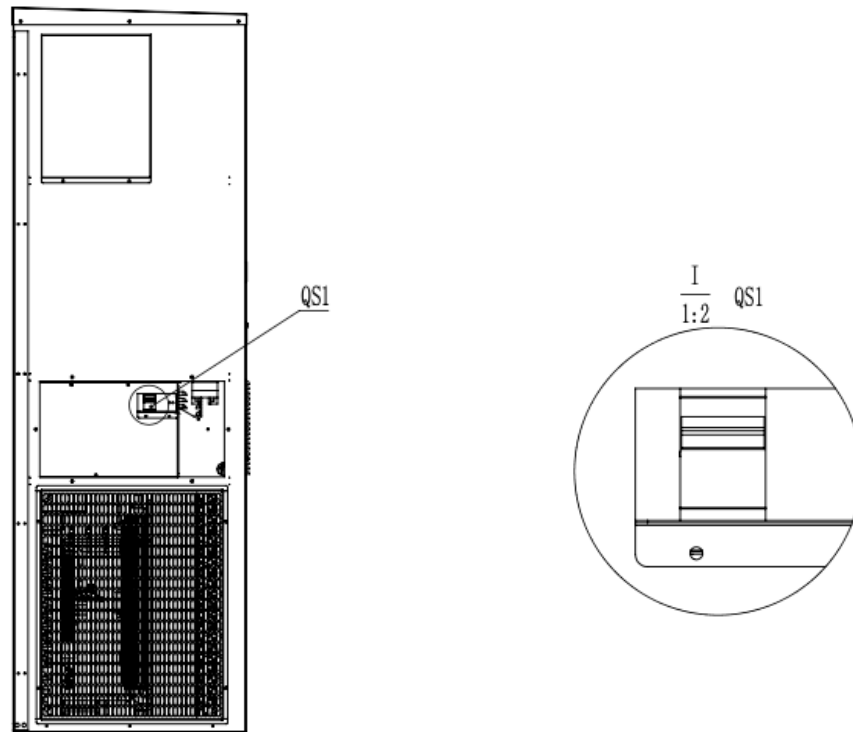


Figure 3-13 Single Circuit QS1 Location

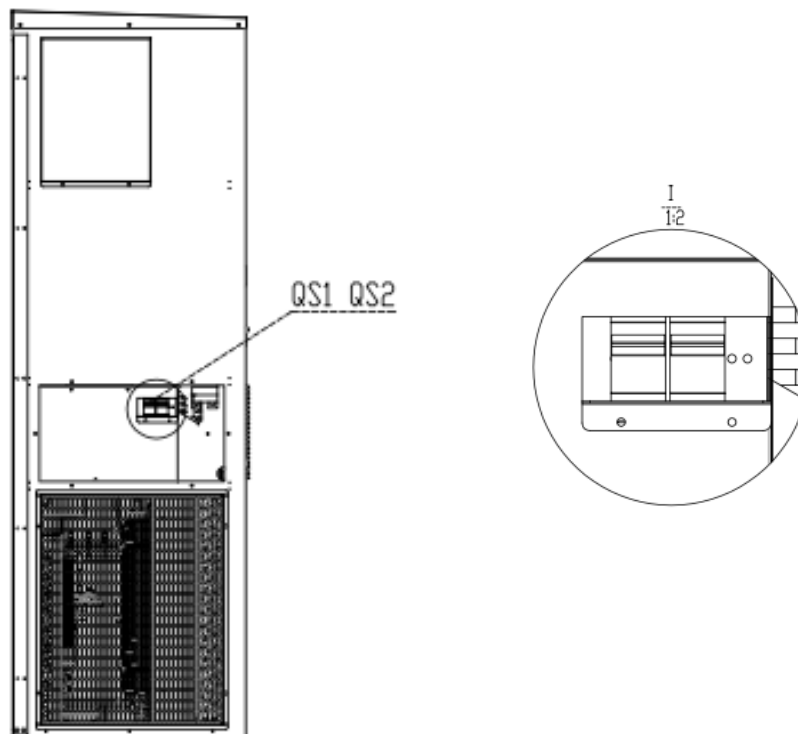


Figure 3-14 Dual Circuit QS1, QS2 Location

3.4.3 Wiring-Low Voltage Wiring

Control wiring from the thermostat is landed on a terminal strip inside the unit. The Table 13 below indicates which terminals will be energized for system functions.

Table 3-8 Low Voltage Wiring

Function	G	O	Y1	Y2	W2	Dehum.
Fan Only	X					
Low Speed Cool	X	X	X			
High Speed Cool	X	X	X	X		
Low Speed Heat	X		X			
High Speed Heat	X		X	X		
Electric Heat (Opt.)	X				X	
Dehum. (Opt.)	X	X	X	X		X

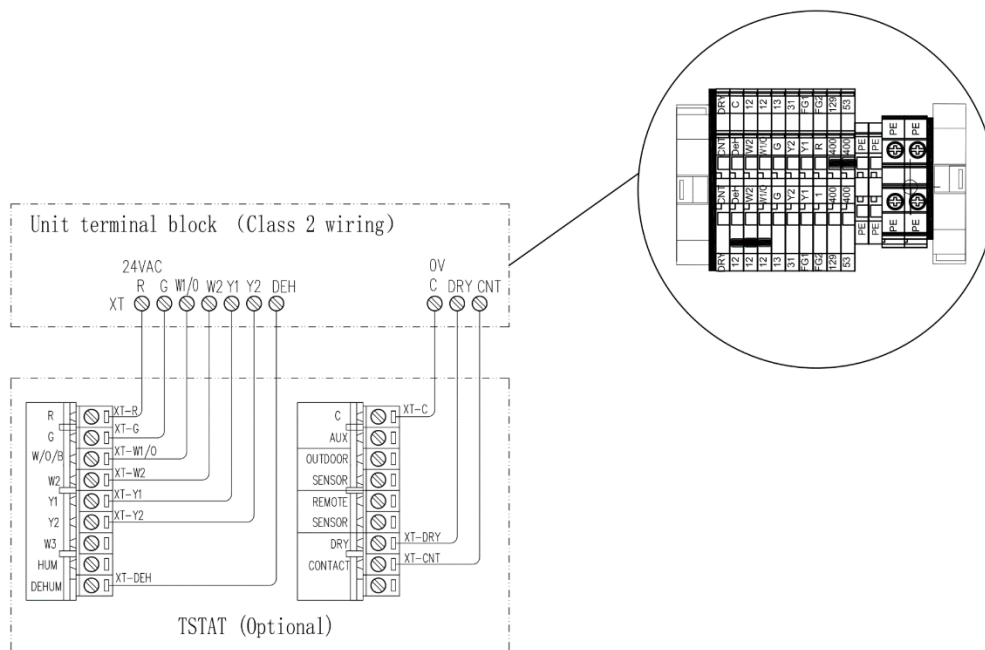
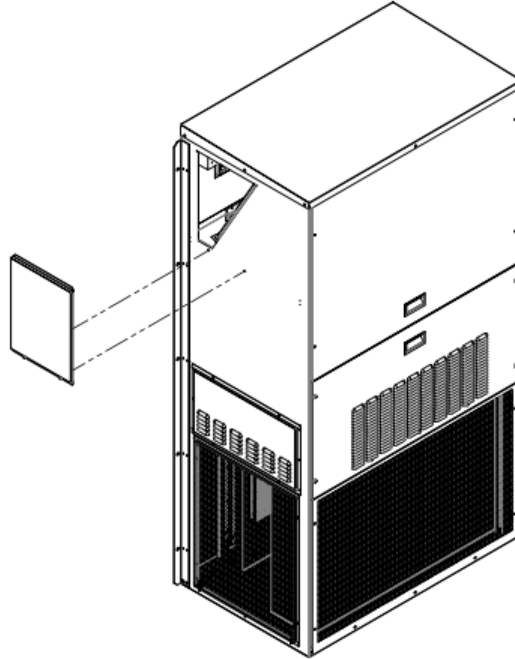


Figure 3-15 Low Voltage Wiring

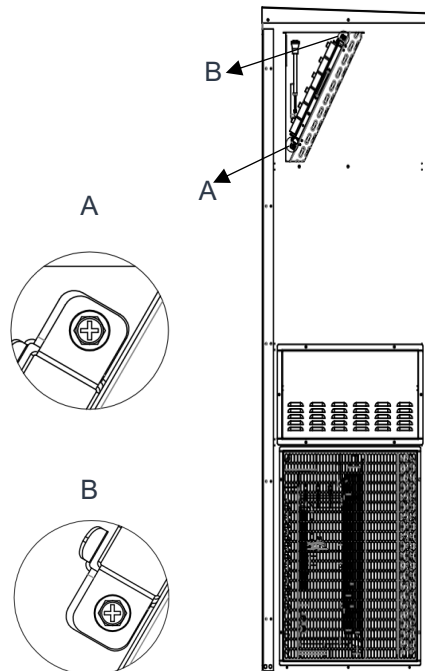
3.4.4 Electrical Heater Replacement (Optional)

See details below for onsite heater replacement:

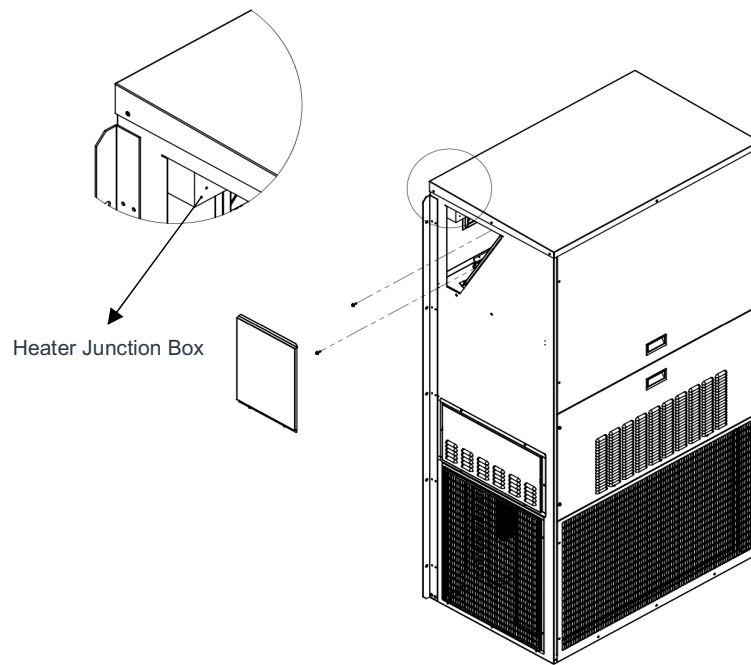
1. Remove Heater cover panel



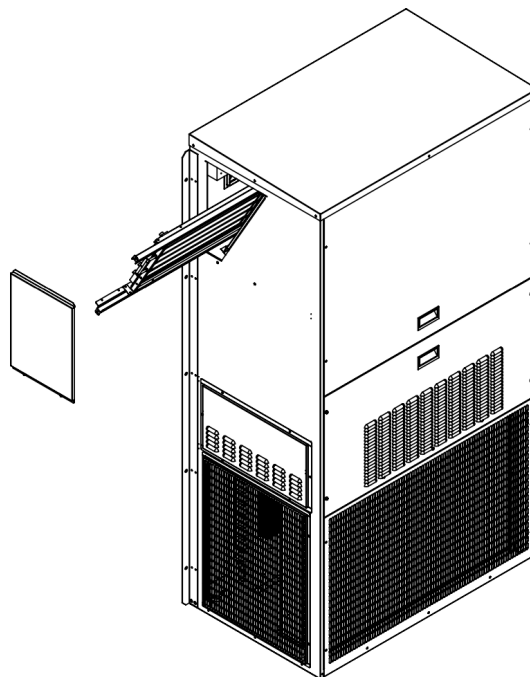
2. Loosen and remove the screws at the outside of the heater.



3. Loosen and remove the screws at the inside of the heater. Remove the wires at the heater junction box.

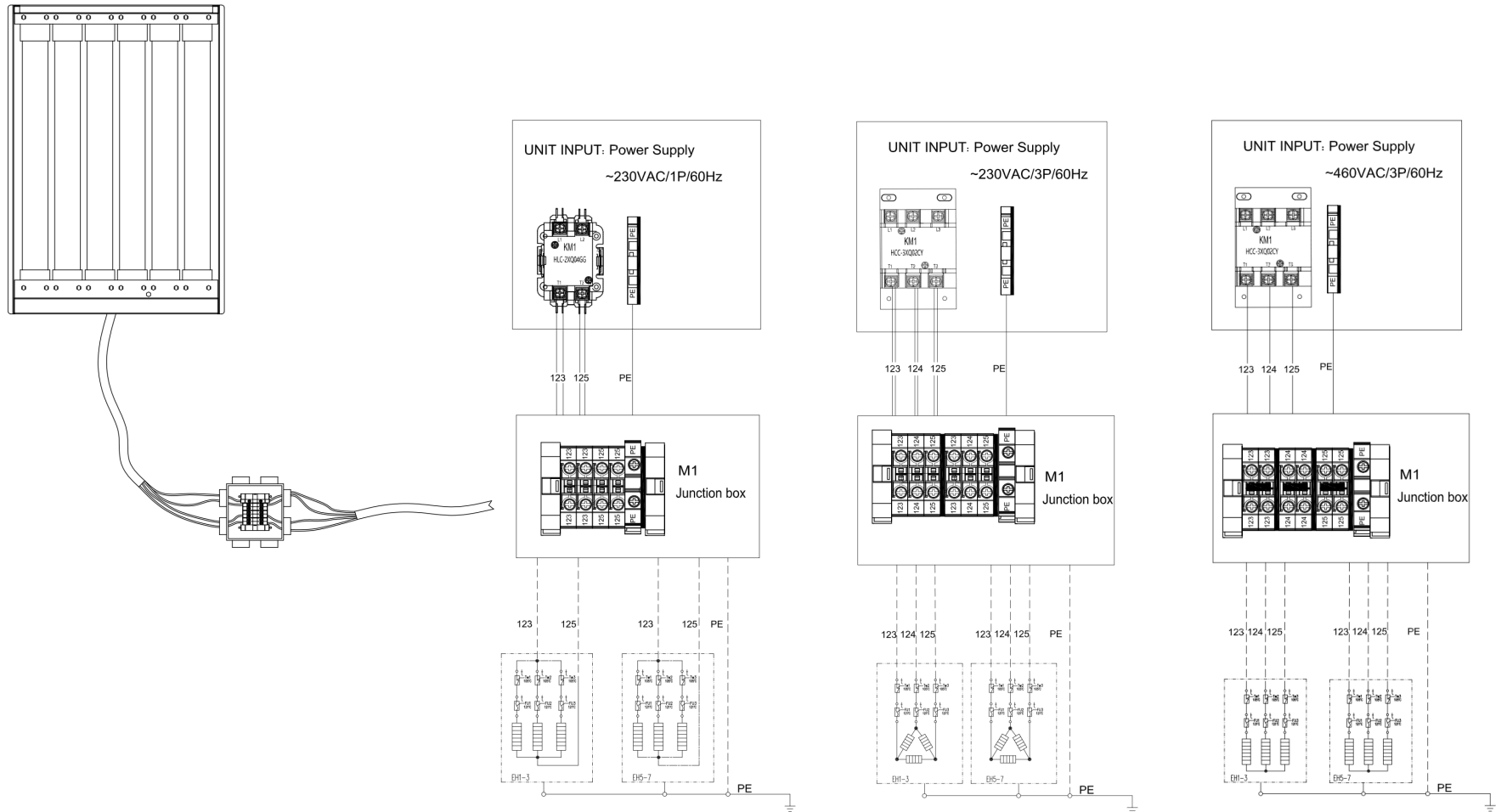


4. Slide off electrical heater and remove the electrical heater.



5. Wiring the heater.

The main power cable to the electrical heater junction box has been connected at the factory. Customer only needs to connect the heater to the junction box at the site according to the corresponding wiring diagram as shown below.



3.5 Complete the Installation Checklist

The installation checklist should be completed prior to starting the system to ensure that no steps have been omitted. Please complete the installation and wiring checklist below.

Date: _____ **Unit Factory Number:** _____ (refer to the unit name plate)

Verify Physical Installation

✓ or ✕

Weather stripping has been applied to the inner and outer wall sleeves

All machines are securely fastened to the floor

Space between wall sleeve and wall penetration sealed with silicone.

Verify Electrical Installation

The main voltage connections of heat pump unit are secured.

The power connections between controller and units are secured.

3.5.1 Turn on Component Breakers

After completing the checklist, turn on all breakers of all components in heat pump unit. Then reattach all covers and panels before turning on the breakers in the prime power panel.

3.5.2 Turn on Primary Power

Turn on the primary power breakers on the heat pump unit.

4 System Operation

4.1 Sequence of Operation

4.1.1 Cooling and Heating

All units in the BACKPACK™ product line are equipped with variable speed compressors that can vary its frequency to meet capacity demand. The compressor speed will continuously modulate depending on return temperature and cooling/heating stage. When stage 1 command is received on Y1, the system will start the compressor at medium speed and slowly modulate between low to medium speed until a stable return temperature is found. When stage 2 command is received on Y2, the system will increase its speed and modulate between medium and high speed until a stable return temperature is found.

4.1.2 Compressor protection

After supplying power to the unit and after compressor has stopped, the compressor will remain off for 3 minutes to prevent short cycling. Low and high pressure alarms, if triggered 3 or more times in an hour, will prevent the compressor from running for 12 hours or until power is reset. A supply fan alarm, if triggered 5 or more times in an hour, will prevent the compressor from running for 12 hours or until power reset.

4.1.3 Aux/Emergency Heating

If auxiliary heaters are installed, they are triggered by W2 command.

4.1.4 Supply Fan (Indoor Blower)

The system will engage indoor blower when G command is received. If cool/heat command is received without G, the supply fan will also engage.

4.1.5 Defrost

Frost can build up on outdoor coil when the heat pump is operating in low temperatures and can adversely affect rate of heat transfer. If conditions are met, the automatic defrost function will engage to prevent frost buildup.

When the heating mode has been running for at least 4 minutes AND coil temperature is below 23°F for at least 10 minutes AND coil temperature is lower than outdoor air temperature by at least 15°F, defrost will engage. When defrost mode starts, the reversing valve is disengaged, and compressor runs at high speed to heat the outdoor coil. Defrost will disengage immediately after coil temperature reaches 64°F OR coil temperature stays above 50°F for 2 minutes OR continuous defrost for 10 minutes.

4.1.6 Dehumidification (optional)

When dehumidification is triggered on the *dehum* command, the EEV and compressor will automatically adjust to maximum latent (moisture removal) capacity. The system can seamlessly transition between cooling/heating and dehumidification without restarting the system.

4.2 Alarms

When a problem occurs during operation of the unit, the alarm will be expressed by a blinking code on the main control board. Depending on the severity of the alarm, various components are automatically shut down. The system will restart most of these devices without human intervention after a defined delay period. However, manual reset is required when certain alarms occur three or five times within an hour (configurable). A description of all system alarms is given below.

Table 4-1 Alarm List

Alarm Code	Alarm Name	Type	Alarm Explanation	Recommended Actions
AL001	AI_Retain	User reset	Error in the number of retain memory writings	Software faults that need to be checked and handled from software programming
AL002	AI_Err_Retain_Write	User reset	Error in retain memory writings	Software faults that need to be checked and handled from software programming
AL003	AI_Prbc_W_InTemp	Auto reset	B1-Room temperature probe error or offline. Compressor will keep the current operation. Unit no other actions.	Indoor temperature sensor failure or indoor temperature sensor offline. Need to check whether the sensor is well wired, or whether the sensor is damaged.
AL005	AI_Prbc_AmbTemp	Auto reset	B3-Ambient temperature probe error or offline. When the compressor starts, the base speed will be reduced by two stages, the enthalpy expansion valve will not open, and the electronic expansion valve pre-opening will open according to the default opening and will not be adjusted according to the outdoor temperature.	Indoor temperature sensor failure or indoor temperature sensor offline. Need to check whether the sensor is well wired, or whether the sensor is damaged.
AL007	AI_SupplyFanOverload	Auto reset until counter	Supply Fan Overload. Unit will be locked if alarm happens 5 times in 3600s.	When the supply fan speed feedback is lower than the set value (default 100Hz), delayed the time for supply fan failure alarm. Check whether the fan wiring is good, whether the fan is damaged, and if the fan feedback fault set value is appropriate.
AL036	AI_ComprOff_BLDC1	Auto reset	Compressor shut off by inverter alarm. Unit will be locked if alarm happens 3 times in 3600s.	Inverter fault shutdown compressor alarm, generated by the inverter
AL114	AI_InvOffline_PWRP_1	Auto reset	Invertor offline. Compressor stops running.	When the frequency converter off-line alarm occurs, the compressor stops, check whether the invertor is energized, whether the invertor communication line is wired correctly.
AL115	AI_LowSH_1	Auto reset	EEV low Super heat. Compressor stops running.	Low superheat alarm, when the EEV superheat is lower than the low superheat setting, it will report low superheat low alarm, check whether the EEV PID parameters are correct.

Alarm Code	Alarm Name	Type	Alarm Explanation	Recommended Actions
AL116	AI_LOP_1	Auto reset	EEV LOP error. Compressor stops running.	Check EEV settings and wiring connection.
AL117	AI_MOP_1	Auto reset	EEV MOP error. Compressor stops running.	Check EEV settings and wiring connection.
AL118	AI_HiTempCond_1	Auto reset	EEV high condensing temperature. Compressor stops running.	Check for potential causes on high condensing temperature.
AL119	AI_LowSuct_1	Auto reset	EEV low suction pressure. Compressor stops running.	Electronic expansion valve low suction pressure alarm. Check for potential cause.
AL120	AI_EEV_1	Auto reset	EEV error. Compressor stops running.	Check EEV settings and wiring connection.
AL121	AI_SelfTuning_1	Auto reset	EEV Self tuning error. Compressor stops running.	Check EEV settings and wiring connection.
AL122	AI_EmergClos_1	Auto reset	EEV emergency close. Compressor stops running.	Check EEV settings and wiring connection.
AL125	AI_RangeError_1	Auto reset	EEV parameter out of Range error. Compressor stops running.	Check EEV settings and wiring connection.
AL126	AI_ServicePosit_perc_1	Auto reset	EEV step out of range. service error. Compressor stops running.	Check EEV settings and wiring connection.
AL127	AI_ValveID_1	Auto reset	EEV ID error. Compressor stops running.	Check EEV settings and wiring connection.
AL128	AI_Low_Press	Auto reset until counter	Low pressure alarm. Unit will be locked if alarm happens 3 times in 3600s	Check for potential causes on low pressure alarm.
AL129	AI_High_Press	Auto reset until counter	High pressure alarm. Unit will be locked if alarm happens 3 times in 3600s.	Check for potential causes on high pressure alarm.
AL130	AI_Prb_DscgTemp	Auto reset	Discharge temperature probe error or offline. Compressor stops running.	Check the discharge temperature sensor and the wire connection.
AL131	AI_Prb_SuctTemp	Auto reset	Suction temperature probe error or offline. Compressor stops running.	Check the suction temperature sensor and the wire connection.
AL132	AI_Prb_DscgP	Auto reset	Discharge Pressure probe error or offline. Compressor stops running.	Check the discharge pressure sensor and the wire connection.
AL133	AI_Prb_SuctP	Auto reset	Suction Pressure probe error or offline. Compressor stops running.	Check the suction pressure sensor and the wire connection.
AL141	AI_RangeError_2	Auto reset	EVI parameter out of Range error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.

Alarm Code	Alarm Name	Type	Alarm Explanation	Recommended Actions
AL142	AI_LowSH_2	Auto reset	EVI low Super heat. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL143	AI_LOP_2	Auto reset	EVI LOP error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL144	AI_MOP_2	Auto reset	EVI MOP error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL145	AI_HiTempCond_2	Auto reset	EVI high condensing temperature. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL146	AI_LowSuct_2	Auto reset	EVI low suction pressure. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL147	AI_EEV_2	Auto reset	EVI error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL148	AI_SelfTuning_2	Auto reset	EVI Self tuning error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL150	AI_ServicePosit_perc_2	Auto reset	EVI step out of range error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL151	AI_ValveID_2	Auto reset	EVI ID error. Alarm only, EVI valve doesn't work.	Check EVI valve statues, settings, and wiring connection.
AL153	AI_HiP_Pstat	Auto reset until counter	High pressure switch alarm. Unit will be locked if alarm happens 3 times in 3600s	Check the high-pressure switch and the wire connection. Check for potential causes on high pressure.
AL154	AI_LowP_Pstat	Auto reset until counter	Low pressure switch alarm. Unit will be locked if alarm happens 3 times in 3600s	Check the low-pressure switch and the wire connection. Check for potential causes on ow pressure.
AL160	AI_AmbTemp_StopComp	Auto reset	Compressor stopped by high ambient. Temp. Under heating mode, the outdoor temperature is greater than 33 °C (91°F). or under cooling mode, there is a dehumidification demand for outdoor temperature below -4 °C (95°F)to stop the compressor work. Compressor stops running.	/
AL161	AI_OvldCondenserFan	Auto reset until counter	Condenser fan overload. Unit will be locked if alarm happens 5 times in 3600s.	Check statues of condenser fan and the wiring connection of condenser fan.

Alarm Code	Alarm Name	Type	Alarm Explanation	Recommended Actions
AL162	AI_OvldHeater	Auto reset	Electric heater overload. Electric heater stops.	Check statuses of electric heater and the wiring connection of electric heater.
AL164	AL_ExpansionBoard	Auto reset	Expansion board offline alarm.	
AL165	AI_SupplyFanOverload2	Auto reset until counter	Supply Fan Overload 2. Unit will be locked if alarm happens 5 times in 3600s.	When the supply fan speed feedback is lower than the set value (default 100Hz), delayed the time for supply fan failure alarm. Check whether the fan wiring is good, whether the fan is damaged, and if the fan feedback fault set value is appropriate.
AL167	AI_Power	Auto reset	AC Power failure. Compressor stops running.	Check the AC power statuses.
AL168	AI_Supply_Probe_error	Auto reset	Supply temperature probe error or offline	Air supply temperature sensor failure, check the air supply temperature sensor

4.3 Complete the Registration Card

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

The nameplate with the required information can be found on the outside of the unit. Information must be recorded on the AIRSYS Product Warranty Registration Card. The registration card can also be submitted online at:

<https://airsysnorthamerica.com/support/warranty-registration/>

AIRSYS Product Warranty Registration Card**Product Information**

HVAC #1	Model #: _____	Serial #: _____
HVAC #2	Model #: _____	Serial #: _____
HVAC #3	Model #: _____	Serial #: _____
HVAC #4	Model #: _____	Serial #: _____
HVAC #5	Model #: _____	Serial #: _____
HVAC #6	Model #: _____	Serial #: _____

Installation Information

Street address: _____	City: _____	State: _____	Zip: _____
Date Install Completed: ____/____/____	Installation Company: _____		
Installer Name: _____	Phone #: _____	Email: _____	

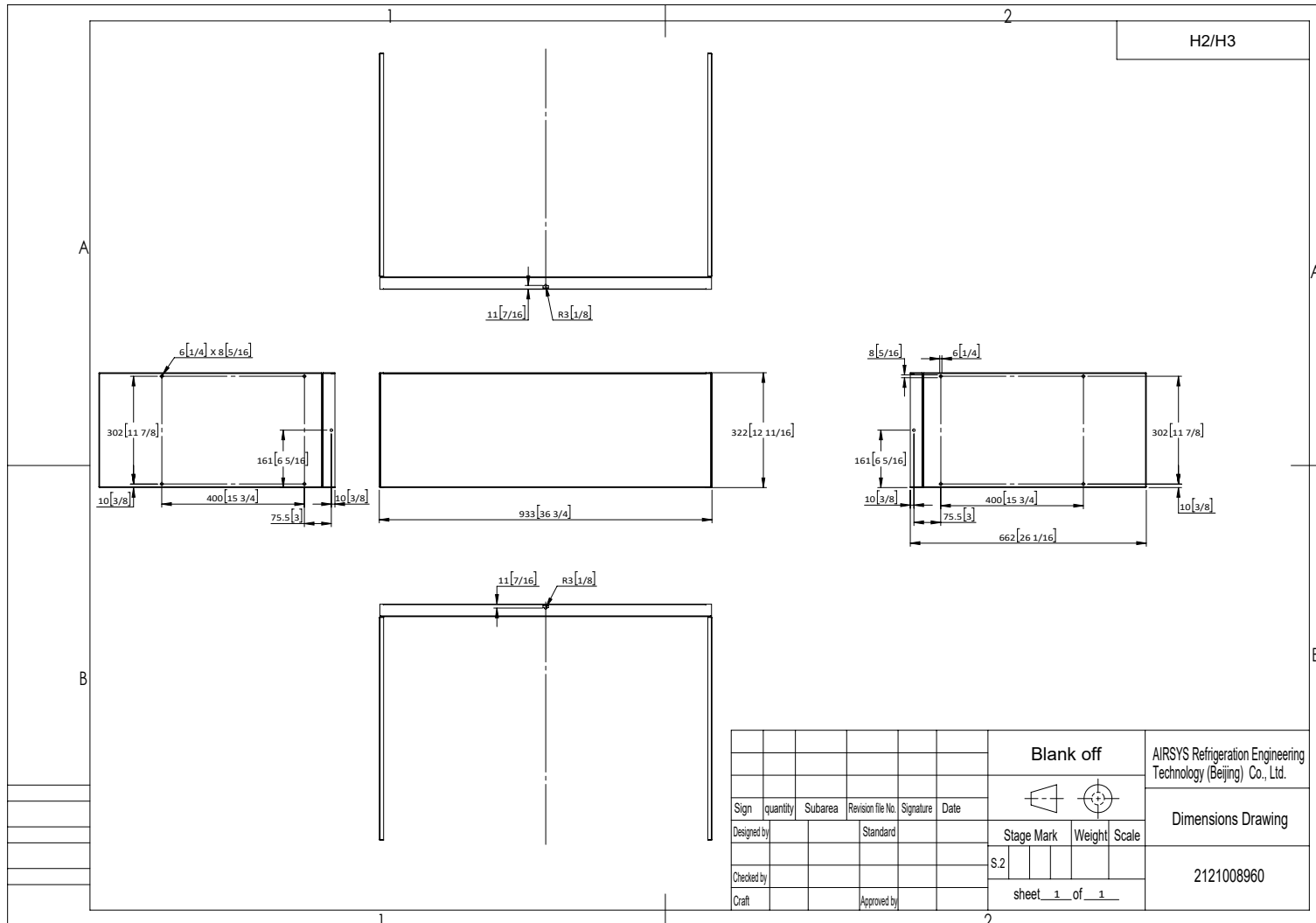
Ownership Information

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

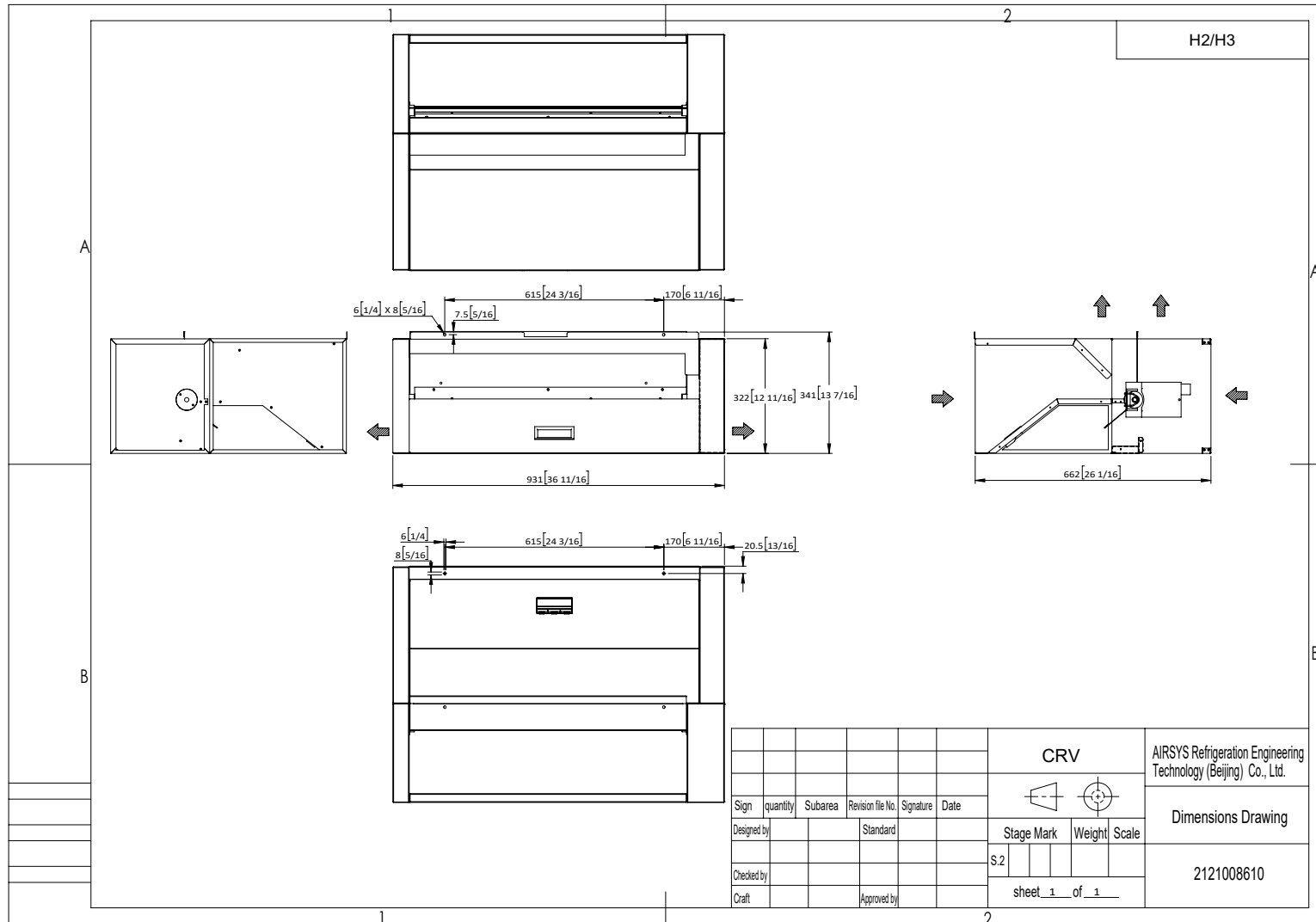
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Greer, SC 29334

5 Appendix A Ventilation Options

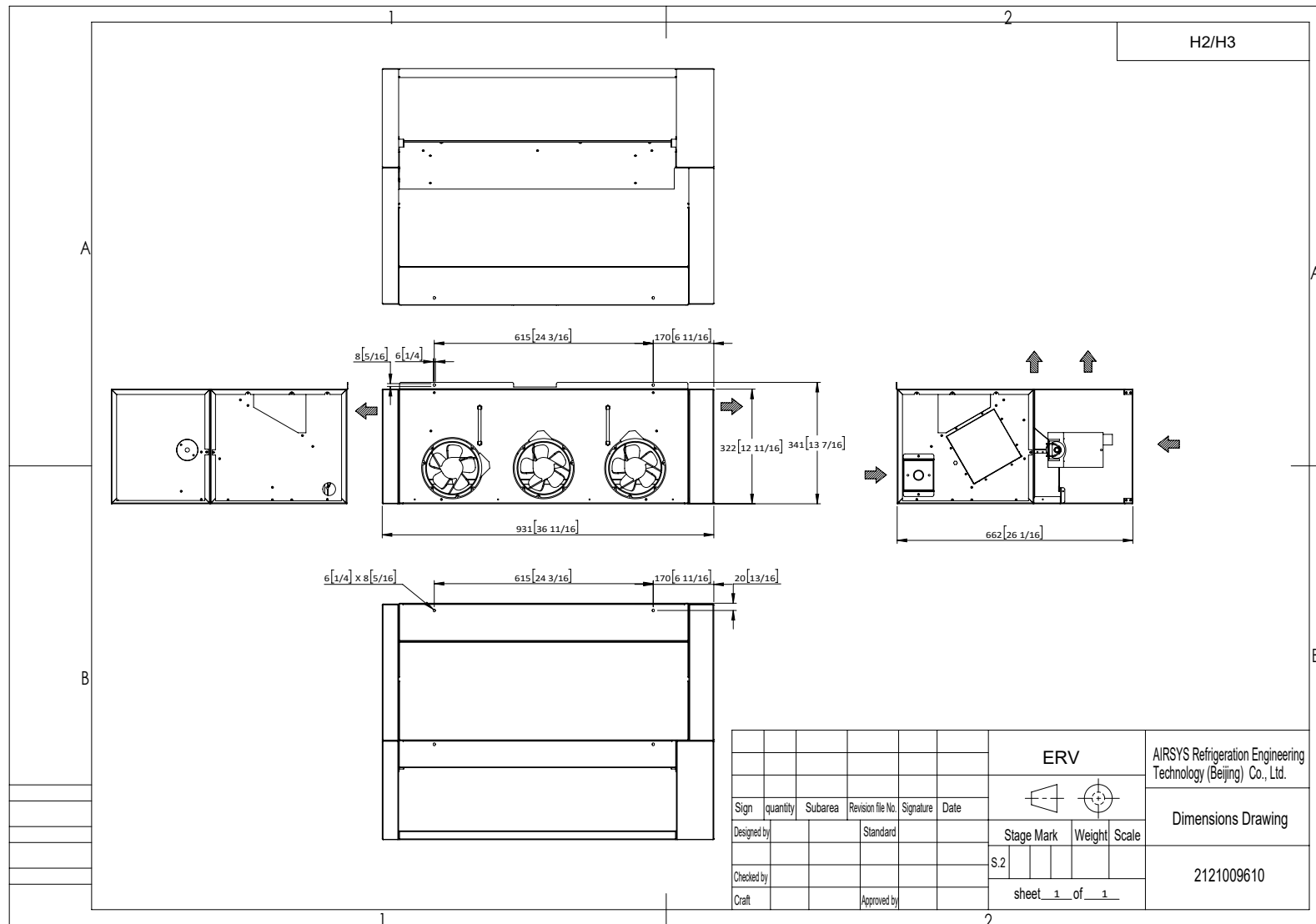
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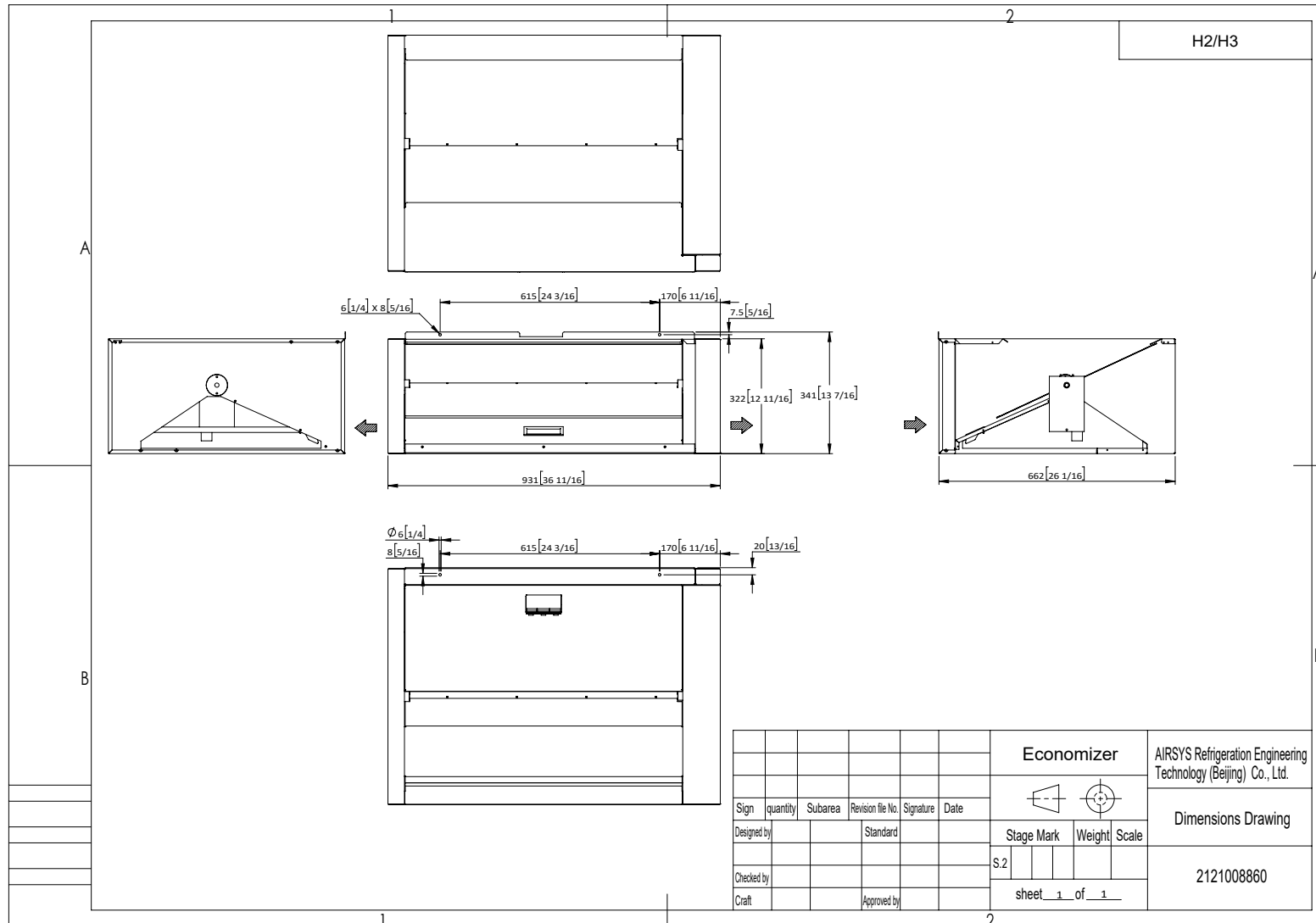
5.1.1.1.2 2121008610 CRV



5.1.1.1.4 2121009610 ERV

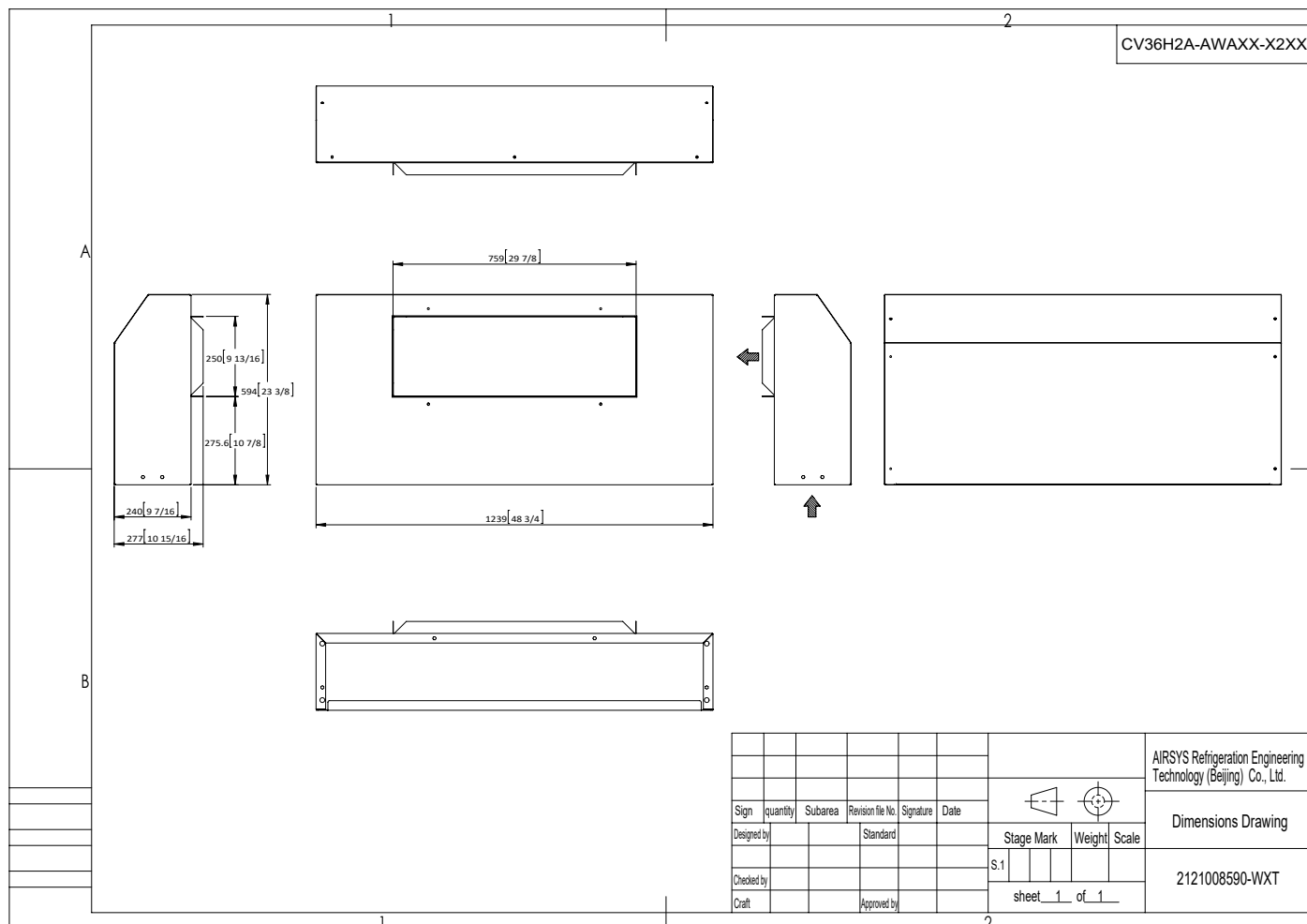


5.1.1.1.5 2121008860 Economizer

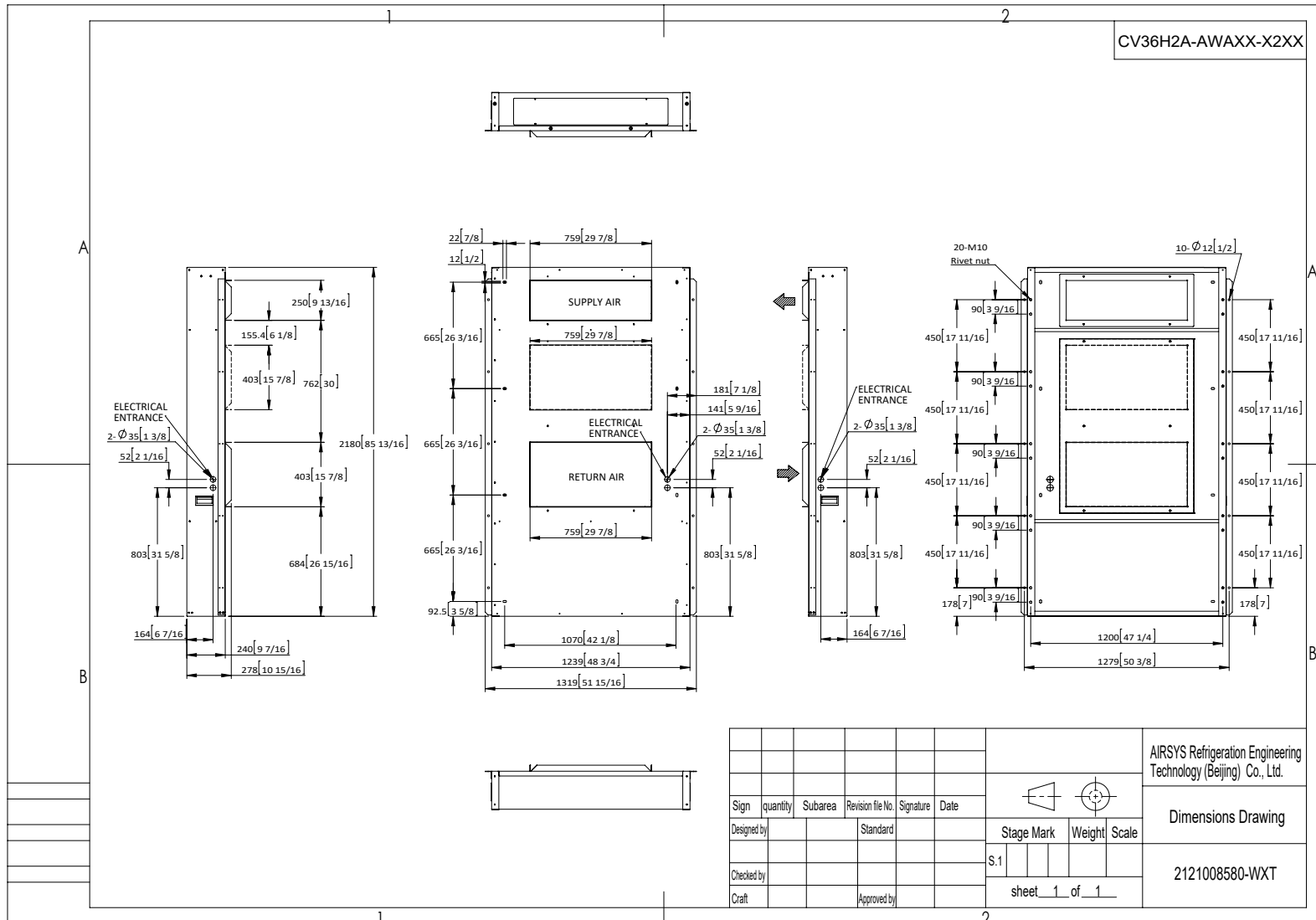


6 Appendix B Installation Accessories

6.1.1.1.1 2121008590 Top Discharge Plenum



6.1.1.1.2 2121008580 Curb



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AIRSYS Global Subsidiaries Contact:

Headquarter

AIRSYS Cooling Technologies, Inc

Add: 7820 Reidville Rd. Greer, SC 29651 , USA
Tel: +1 (855) 874 5380
Email: sales@air-sys.us

AIRSYS (UK) Ltd.

Add: 245 Europa Boulevard, Warrington, UK. WA5 7TN
Tel: +44 (0) 1925 377 272
Call Centre: +44(0)8456099950
Email: enquiries@air-sys.uk

AIRSYS Brasil Ltda.

Add: Av. Moaci, 395 Conj 35/36 04083-000 – Planalto Paulista
SAO PAULO – SP
Tel: +55 (11) 25976817 / +55 (11) 21585560
Email: airsys-brasil@air-sys.com.br

AIRSYS Deutschland GmbH

Add: Feringastr. 6, 85774 Unterföhring / München, Germany
Tel: +49 89 9921 6510
Email: anfragen@air-sys.eu

AIRSYS Refrigeration Engineering Technology (Beijing) Co., Ltd.

Add: 10th floor, Hongkun Shengtong building, 19, Ping Guo Yuan
Xi Xiao Jie, Shijingshan, Beijing, China 100043
Tel: +86(0)10 68656161
Email: airsys@air-sys.com

Gu'an AIRSYS Environment Technology Company Ltd.

Add: 25, Dongfang Street, Gu'an Industry Park, Langfang City,
Hebei Province, China
Tel: +86(0)10 68656161

Shanghai AIRSERVE HVAC System Service Co., Ltd.

Add: Room 1701, Xinda building, No. 322 Xianxia Road,
Changning District, Shanghai, China 200336
Tel: +86(0)21 62452626 Fax: +86 (0)21 6245962

AIRSYS Singapore Pte. Ltd

Add: 50, Tagore Lane Entrepreneur Centre, #03-04 (F),
Singapore 787494
Tel: +65 64991850
Fax: +65 68416301
Email: sales@air-sys.sg

AIRSYS Philippines Corporation

Add: Unit 1603 16th Floor 139 Corporate Centre Building Valero
St. Salcedo Village Bel-Air 1209 Makati, Philippines
Tel: +63 84581047
Fax: +63 88470496
Email: sales@air-sys.sg

AIRSYS Malaysia Sdn. Bhd.

NO. 7-1, Jalan 109F, Plaza Danau 2, Taman Danau Desa,
58100 Kuala Lumpur Wilayah Persekutuan Malaysia
Tel: +60 3 7982 2010
Fax: +60 3 7980 1242
Email: sales@air-sys.sg

AIRSYS Australia Sales Office

Add: PO BOX 1088, Flagstaff Hill, SA, 5159, Australia
Tel: +61 479151080
Email: sales@air-sys.sg

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