Installation & Operation Manual
Vertical Air Conditioners

Model CFH1012A

CFH1012A

Manufactured By:

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The most current version of this manual can be found at www.acice.com.

ICE CFH1012A I&O Manual
10/2025 Rev.2

How To Use This Manual

This manual is intended to be a guide to Industrial Climate Engineering's line of vertical air conditioners. It contains installation, troubleshooting, maintenance, warranty, and application information. The information contained in this manual is to be used by the installer as a guide only. This manual does not supersede or circumvent any applicable national or local codes.

If you are installing the air conditioner first read Chapter 1 and scan the entire manual before beginning the installation as described in Chapter 2. Chapter 1 contains general, descriptive information and provides an overview which can speed up the installation process and simplify troubleshooting.

If a malfunction occurs, follow this troubleshooting sequence:

1. Make sure you understand how the air conditioner works (Chapters 1 & 3).
2. Identify and correct installation errors (Chapter 2).
3. Refer to the troubleshooting information in Chapter 4.

If you are still unable to correct the problem, contact the Factory at 1-229-273-9558 for additional assistance.

Please read the following "Important Safety Precautions" before beginning any work.

Important Safety Precautions

1. This unit uses an A2L, or mildly flammable, refrigerant. Extra precautions should be taken when handling or servicing the unit so as not to puncture the refrigerant tubing.

WARNING - Risk Of Fire. Flammable Refrigerant Used. To Be Repaired Only By Trained Service Personnel. Do Not Puncture Refrigerant Tubing.

WARNING - Risk Of Fire. Dispose Of Properly In Accordance With Federal Or Local Regulations. Flammable Refrigerant Used.

2. LEAK DETECTION SYSTEM Installed. Unit must be powered on except for service.
3. FULLY EVACUATE the system and verify that there is no refrigerant in the working area before brazing.
4. USE CARE when LIFTING or TRANSPORTING equipment.
5. TRANSPORT the UNIT UPRIGHT. Laying it down on its side may cause oil to leave the compressor and breakage or damage to other components.
6. TURN ELECTRICAL POWER OFF AT THE breaker or fuse box BEFORE installing or working on the equipment. LINE VOLTAGES ARE HAZARDOUS or LETHAL.
7. OBSERVE and COMPLY with ALL applicable PLUMBING, ELECTRICAL, and BUILDING CODES and ordinances.
8. DO NOT USE MEANS TO ACCELERATE THE DEFROSTING PROCESS OR TO CLEAN, other than those recommended by the manufacturer.
9. The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
10. DO NOT PIERCE OR BURN.
11. BE AWARE THAT REFRIGERANTS MAY NOT CONTAIN AN ODOR.
12. SERVICE may be performed ONLY by QUALIFIED and EXPERIENCED PERSONS.
    - *** Wear safety goggles when servicing the refrigeration circuit**
    - *** Beware of hot surfaces on refrigerant circuit components**
    - *** Beware of sharp edges on sheet metal components**
    - *** Use care when recovering or adding refrigerant**
13. **Use COMMON SENSE - BE SAFETY-CONSCIOUS**

This is the safety alert symbol ⚠. When you see this symbol on the Marvair unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING, CAUTION and IMPORTANT. These words are used to identify levels of the seriousness of the hazard.

DANGER Failure to comply will result in death or severe personal injury and/or property damage.

WARNING Failure to comply could result in death or severe personal injury and/or property damage.

CAUTION Failure to comply could result in minor personal injury and/or property damage.

IMPORTANT Used to point out helpful info that will result in improved installation, reliability or operation.

⚠ WARNING

- **If the information in these instructions are not followed exactly, a fire may result causing property damage, personal injury or loss of life.**
- **Read all instructions carefully prior to beginning the installation. Do not begin installation if you do not understand any of the instructions.**
- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.**
- **Installation and service must be performed by a qualified installer or service agency in accordance with these instructions and in compliance with all codes and requirements of authorities having jurisdiction.**

INSTALLER: Affix the instructions on the inside of the building adjacent to the thermostat.
END USER: Retain these instructions for future reference.

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Chapter 1 Description & Specifications

1.1 General Description

The ICE CFH1012A line of environmental control units (ECU) is designed for the telecommunication cabinet and shelter. Below are some of the features of the unit.

- The CFH1012A is available in a cooling capacity of 12,000 BTUH.
- Cabinet has powder coated finish for long term durability.
- Dry contacts are available for remote monitoring of lockout due to a high or lower pressure.
- Low ambient operation provided by condenser fan cycle control.
- 3.6 kW electric strip heat is standard.
- The ICE CFH1012A is safety listed by ETL. All ICE air conditioners conform to UL/CSA standard 60335-1 and 60335-2-40 and CAN/CSA C22.2 No. 236-95, 4th Ed

The operating functions of the CFH1012A line are described below.

Cooling - Mechanical cooling is provided.

Heating - A 3.6 kW electric resistant heater (standard) operates to provide heating as required.

1.2 Model Identification

The model identification number is found on the data sticker. Rating plate located on side panel.

Example	C	F	H	1	0	1	2	A	A	0	3	6	A	+	+	1	+	3	D	A	+	A	1	1	+	+	+	+	+	+
Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

1	Unit Designation/Family	**C** = Industrial Climate Engineering (ICE)
2	Energy Efficiency Ratio (EER)	**F** = EER <9
3	Refrigerant Type	**H** = R-454B
4	Compressor Type/Quantity	**1** = Single
5 6 7	Unit Capacity/Nominal Cooling (BTUH)	**012** = 12,000
8	System Type	**A** = Air Conditioner
9	Power Supply (V-Ph-Hz)	**A** = 208/230-1-60
10 11 12	Heat Designation @ Rated Voltage **KW** = Kilowatt	**036** = 3.6KW
13	Ventilation Configuration	**A** = Solid Front Door
14	Dehumidification	**+** = None
15	Controls	**+** = None
16	Operating Condition	**1** = Low Ambient w/FCC

17	Indoor Air Quality Features	**+** = None
18	Air Flow	**3** = Bottom Supply/Top Return (Counter)
19	Compressor Location	**D** = Left Hand
20	Filter Option	**A** = 2" Pleated (MERV 8)
21	Corrosion Protection	**+** = None
22 23	Engineering Revision Level	A1
24	Cabinet Color	**1** = Beige
25	Sound Attenuation	**+** = None
26	Security Option	**+** = None
27	Fastener/Drain Pan Option	**+** = None
28	Unused	**+** = None
29	Unused	**+** = None
30	Special Variation	**+** = None

1.3 Serial Number Date Code

A = January	E = May	J = September	D = 2014
B = February	F = June	K = October	E = 2015
C = March	G = July	L = November	F = 2016
D = April	H = August	M = December	

1.4 Electrical Ratings and Performance Data

ELECTRIC HEAT		036 = 3.6 kW	
BASIC MODEL	VOLTAGE / PHASE / HZ	CKT #1	
		MCA	MFS
CFH1012A	208-230/1/60	19.7	20

MCA =Minimum Circuit Ampacity (Wire Sizing Amps) MFS = Max. Fuse Size or HACR circuit breaker
MCA & MFS are calculated at 230 volts on the "A" & "C" models and 460v on the "D" models. This chart should only be used as a guideline for estimating conductor size and overcurrent protection. For the requirements of specific units, always refer to the data label on the unit.

1. MFS (Maximum Fuses Size) value listed is the maximum value as per UL 60335-2-40 calculations for MOCP (branch-circuit conductor sizes in this chart are based on this MOCP). The actual factory installed Overcurrent Protective Device (Circuit Breaker) in the models may be lower than the maximum UL 60335-2-40 allowable MOCP value, but still above the UL 60335-2-40 minimum calculated value or Minimum Circuit Ampacity (MCA) listed.
2. The end user shall size conductors based on the Single Point Power Entry (SPPE) - Minimum Circuit Ampacity. The service circuit breaker shall not be sized less than the minimum circuit ampacity associated to Single Point Power Entry value provided. The service circuit breaker shall also not be sized greater than the Maximum Fuse size associated to the Single Point Power Entry Value Provided.
3. While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes

Table 1. Summary Ratings

BASIC MODEL	COMPRESSOR					OUTDOOR MOTOR				INDOOR MOTOR			
	TYPE	VOLTS-HZ-PH	RLA	LRA	MCC	VOLTS-HZ-PH	RPM	FLA	HP	VOLTS-HZ-PH	RPM	FLA	HP
CFH1012A	Rotary	208/230-60-1	6.3	29.0	9.8	208/230-60-1	1050	0.50	1/15	208/230-60-1	1600	0.95	1/8

RLA = Rated Load Amps LRA = Locked Rotor Amps MCC = Maximum Continuous Current RPM = Revolutions per Minute
FLA = Full Load Amps HP = Horsepower

Table 2. Electrical Characteristics

BASIC MODEL NUMBER	VOLTAGE HERTZ PHASE	CURRENT AMPS		LOAD OF RESISTIVE HEATING ELEMENTS ONLY (AMPS)	TOTAL MAXIMUM HEATING AMPS (STANDARD UNIT)
		AC UNIT	IBM	3.6 kW	3.6 kW
CFH1012A	208/230-60-1	7.75	0.95	15.00	15.95

IBM = Indoor Blower Motor

Table 3. Unit Load Amps

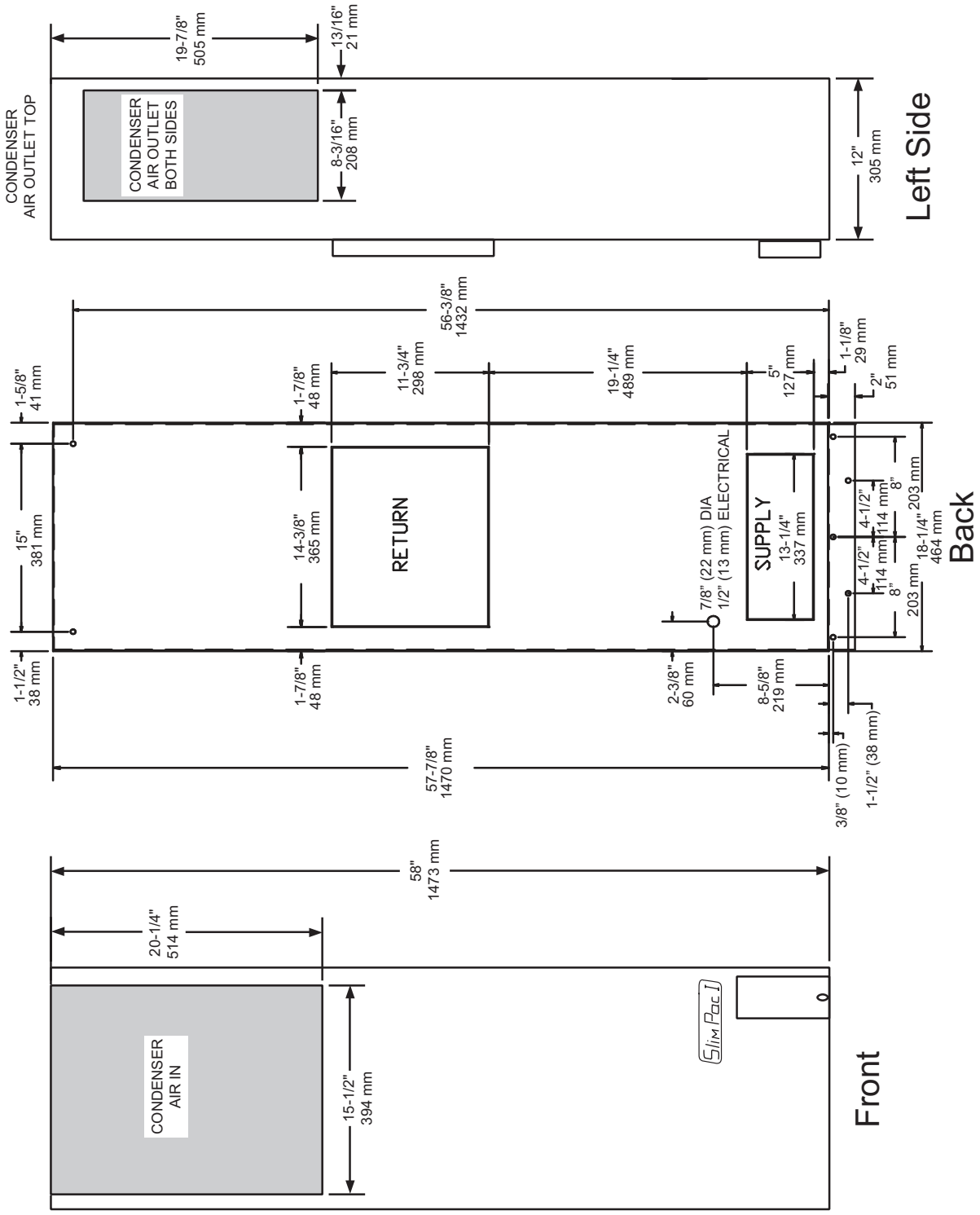
CFM @ ESP (Dry Coil)						
Model	.00	.05	.10	.15	.20	.25
CFH1012A	510	470	450	420	390	360

CFM = Cubic Feet/Minute Indoor Air Flow
ESP = External Static Pressure in Inches WG
Note: Follow local codes and standards when designing duct runs to deliver the required airflow. Minimize noise and excessive pressure drops caused by duct aspect ratio changes, bends, dampers and outlet grilles in duct runs.

Table 4. Air Flow

Data based upon 80°F Dry Bulb/ 67°F wet bulb return air temperature at Various Outdoor Temperatures. Airflow at 450 CFM											
Outdoor temperature	70°F	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°	120°F
Total cooling (BTUH)	10,570	10,370	10,170	9,975	9,788	9,600	9,165	8,730	8,105	7,480	6,860
Sensible Cooling (BTUH)	6,930	6,860	6,790	6,720	6,655	6,590	6,435	6,280	6,065	5,850	5,640
Data based upon 26.5°C Dry Bulb/ 19.5°C wet bulb return air temperature at Various Outdoor Temperatures. Airflow at 760 m3/hr.											
Outdoor temperature	21°C	24°C	26.5°C	29°C	32°C	35°C	38°C	40.5°C	43.3°C	46°	48.4°C
Total cooling (kW)	3.10	3.04	2.98	2.92	2.87	2.81	2.69	2.56	2.37	2.19	2.01
Sensible Cooling (kW)	2.03	2.01	1.99	1.97	1.95	1.93	1.89	1.84	1.78	1.71	1.65

Table 5. Total & Sensible Cooling Capacity



Weight

CFH1012A 160 lbs/73 kg

Figure 1. Dimensional Data

1.5 General Operation

Refrigerant Cycle (Cooling Mode)

The CFH1012A uses R-454B refrigerant in a conventional vapor-compression refrigeration cycle to transfer heat from air in an enclosed space to the outside. A supply blower assembly pulls indoor air across the evaporator. Liquid refrigerant passing through the evaporator is boiled into gas by heat removed from the air. The warmed refrigerant gas enters the compressor where its temperature and pressure are increased. The hot refrigerant gas condenses to liquid as heat is transferred to outdoor air drawn across the condenser by the condenser fan. Liquid refrigerant is expanded into the evaporator through the metering device to repeat the cycle.

Cooling Mode: The compressor and condenser fan are energized with a contactor controlled by a 24 VAC pilot signal (see Figures 2a and 2b). The outside fan or blower motor is controlled by the head pressure control (see head pressure control, section 1.7). The supply air blowers are energized by the blower relay.

Heating Mode: A wall-mounted thermostat controls the heating cycle of models which incorporate resistance heating elements. On a call for heat, the thermostat closes the heat relay to energize the indoor blower and the resistance elements.

1.6 Electrical Diagrams

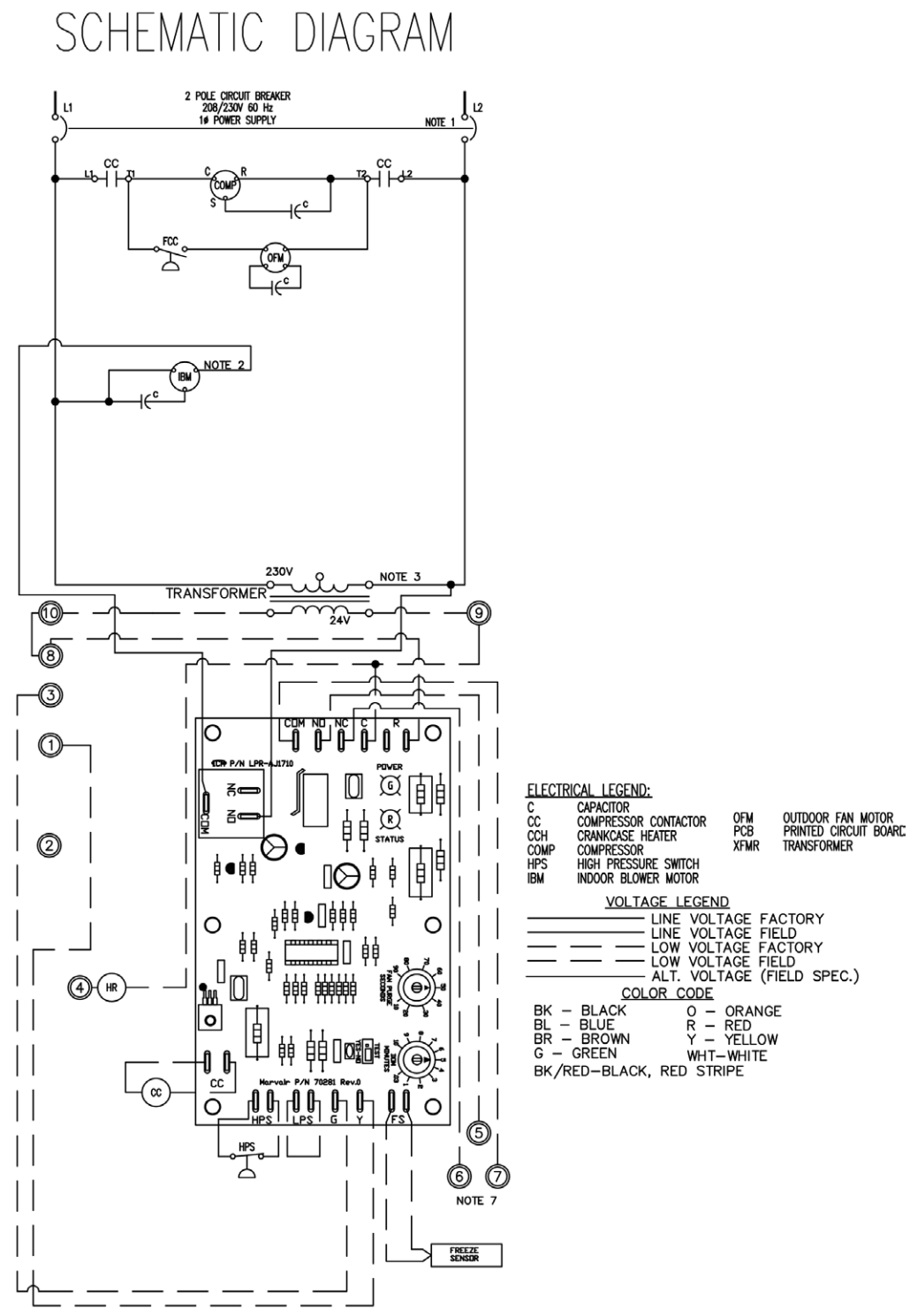


Figure 2. Typical Electrical Schematic

1.7 Electronic Control Board Mode of Operation

Normal

24 VAC power must be continuously applied to "R" and "C". Upon a call for cooling "Y" and with the high pressure switch (HPS) closed, the compressor will be energized. (Note: See the delay on make feature.) The compressor will remain energized during the 3 minute timed low pressure by-pass cycle. If the low pressure switch (LPS) is open after the 3 minute by-pass cycle, the compressor will de-energize.

Lock-out

If either of the fault conditions (LPS or HPS) occurs twice during the same call for cooling, the control board will enter into and indicate the lockout mode. In the lockout mode, the compressor is turned off. If there is a call for indoor air flow "G", the blower remains energized, the alarm output is energized and the status LED will blink to indicate which fault has occurred. When the lockout condition is cleared, the unit will reset if the demand for the thermostat is removed or when the power is reset. With the control board, the user can now have either normally closed or normally open remote alarm dry contacts. The air conditioners are factory wired to be normally open.

Delay on Break

If the compressor is de-energized due to a loss of a cooling "Y" call or the first fault, the unit re-start will be delayed 3 minutes from the time the contactor is de-energized. (Note: There is no delay on break if the lockout condition is reset.)

Delay on Make

On initial power up only, the unit will wait 0.03 to 10 minutes from the cooling "Y" call before allowing the contactor to energize. The delay can be adjusted by the DOM wheel on the board. Factory recommended wait is 3 minutes.

Low Pressure By-Pass Time

When starting, the low pressure switch (LPS) fault condition will be by-passed for 3 minutes before the contactor is de-energized.

Post Purge

Upon a call for indoor airflow "G" the blower will energize immediately. When in the cooling mode, the blower will remain energized for 10 to 90 seconds (adjustable) after the compressor has been de-energized. The time period can be changed by fan purge wheel on the board. Factory setting is 90 seconds.

LED Indicator Lights

COLOR	TYPE	STATUS	DESCRIPTION
Green	Power	Contstant On	24 VAC power has been applied
Red	Status	Contstant On	Normal operation
Red	Status	1 Blink	High pressure switch has opened twice
Red	Status	2 Blinks	Low pressure switch has opened twice

Low Ambient Control

The low ambient control permits cooling when outdoor ambient temperatures are low. The control uses a reverse-acting high pressure switch to cycle the condenser fan motor according to liquid refrigerant pressure conditions. Switch closure and fan operation occurs when the pressure reaches 400 PSIG. The switch opens again when the refrigerant pressure falls to 245 PSIG. Therefore, the outdoor fan always starts after the compressor, and **it will cycle frequently during normal operation at low outdoor conditions.**

High Pressure Switch

The high pressure switch is mounted on the liquid line. It is electrically connected to a lockout circuit on the board which shuts down the system if the refrigerant pressure rises to 650 PSIG. This protects the unit if airflow through the condenser is blocked or if the outdoor fan motor fails.

Although the contacts of the high pressure switch close when the refrigerant pressure falls to approximately 450 PSIG, the system must be manually reset once the lockout circuit is activated. A manual reset is necessary to prevent harmful short-cycling. To reset switch, turn primary power off, then back on or turn thermostat system switch off, then back on.

Low Pressure Switch

The low pressure switch is mounted on the compressor suction line. It is designed to open if the refrigerant pressure drops to 40 PSIG; it resets when the pressure rises to 60 PSIG. The switch protects the unit if airflow through the indoor blower is impeded, if the blower motor fails, or if there is a loss of refrigerant.

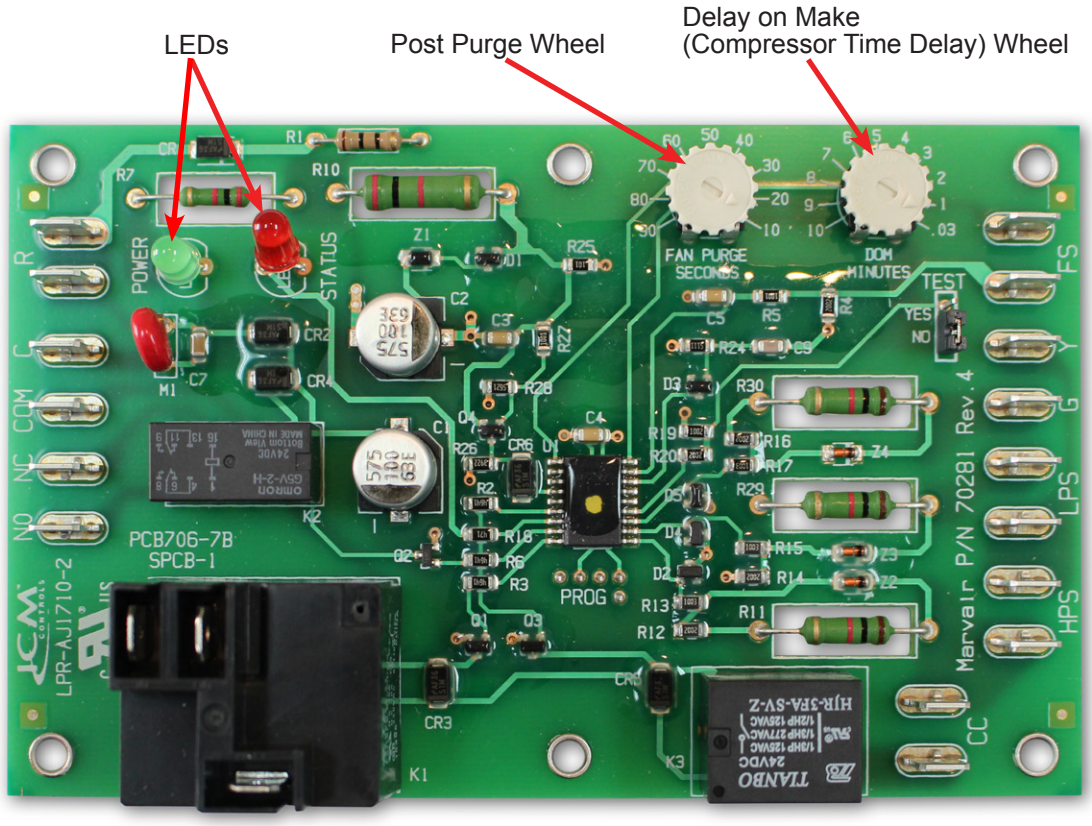
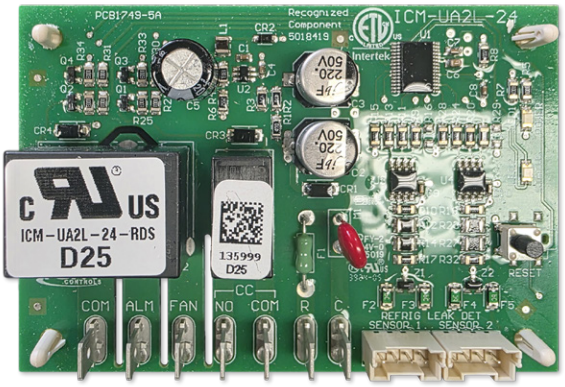


Figure 3. Control Board Detail

1.8 Mitigation Board Sequence of Operation

Mode of Operation

At power up, the A2L control enters the configuration state, a 5-second window in which the control identifies active sensor ports. If there are no active sensor ports, the control enters the communication fault state. If a sensor is detected, the control enters the sensor warm-up state. Once the detected sensor reports Run mode, the control enters normal operation and constantly monitors the mode and %LFL status of the sensor. See the table below for all respective outputs for each state.



A2L Mitigation Control Board

Once an active sensor port is established, it is required for all future operation, and cannot be substituted by connecting a sensor on the other port. Loss of communication with an active sensor will result in the communications fault state, which can only be cleared by resuming communication with a sensor on that specific port.

In the event that 2 sensors are not connected and reporting different modes / statuses, the following priority will take place: LFL Fault->Communications Fault-> Warm-up-> Run.

Note: During the Warm-up / Communication Fault / LFL Fault states, the main control board will indicate "EF" (Emergency Ventilation) on the display. While in the "EF" mode, the indoor blower will operate and the motorized damper (if equipped) will drive open 100%.

Current State	Outputs	State-Change Conditions	Next State
Configuration	**CC:** Off **Alarm:** Off **Fan:** On **Status LED:** Off	• At least 1 sensor port is active • No sensor ports are active	• Sensor Warm-Up • Communication Fault
Sensor Warm-up	**CC:** Off **Alarm:** On **Fan:** Off **Status LED:** On	• Sensor reports Run mode • Sensor reports Error mode	• Normal Operation • Communication Fault
Normal Operation	**CC:** On **Alarm:** On **Fan:** Off **Status LED:** Off	• %LFL ~ Trip point • Loss of sensor communication	• %LFL Fault • Communication Fault
Communication Fault	**CC:** Off **Alarm:** Off **Fan:** On **Status LED:** 2 Blinks	• Valid data on required sensor port(s) and lockout timer expired	• Sensor Warm-Up
%LFL Fault	**CC:** Off **Alarm:** Off **Fan:** On **Status LED:** 1 Blink	• %LFL < Recovery point and lockout timer expired • Reset button actuated*	• Normal Operation

*Only required when the Reset Mode is set to "Manual".

Note: Anytime the Fan output is "On", the system will operate in emergency ventilation mode.

Fault Code

Status LED	Mode
Off	Normal Operation
On	Sensor Warm-Up
1-Blink	LFL Fault
2-Blinks	Communication Fault

Pin Connections for Sensors

Pin	Mode	Wire Color
PIN 1	5V	Red
PIN 2	A+	White
PIN 3	B-	Green
PIN 4	GND*	Black

Replacement Parts

A2L Mitigation Control Board .....P/N 92591
A2L Sensor (Qty 2) .....P/N 70978
Sensor Harness (Qty 2).....P/N 03932

Chapter 2 Installation

⚠ WARNING

Failure to observe and follow Warnings and Cautions and these Instructions could result in death, bodily injury or property damage. Read this manual and follow its instructions and adhere to all Cautions and Warnings in the manual and on the ICE unit.

2.1 Equipment Inspection

Concealed Damage

Inspect all cartons and packages upon receipt for damage in transit Remove cartons and check for concealed damage. **Important: keep the unit upright at all times.** Remove access panels and examine component parts. Inspect refrigerant circuit for fractures or breaks. The presence of refrigerant oil usually indicates a rupture. If damage is apparent, immediately file a claim with the freight carrier.

Units that have been turned on their sides or tops may have concealed damage to compressor motor mounts or to the oil system. If the unit is not upright, immediately file a claim for concealed damages and follow these steps:

1. Set unit upright and allow to stand for 24 hours with primary power turned on.
2. Attempt to start the compressor after 24 hours.
3. If the compressor will not start, makes excessive noise, or will not pump, return the unit to the freight carrier.

2.2 Pre Checks

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

1. The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed.
2. The ventilation machinery and outlets are operating adequately and are not obstructed.
3. If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
4. Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
5. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
6. Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

2.3 Installation Requirements

General

1. Inspect unit for completeness. Check for missing parts (e.g. hardware). Refer to the installation kit information in section 2.3.
2. Remove access panels and check for loose wires. Tighten screw connections.
3. Complete and mail the warranty registration card.

You must consider all of the following when choosing the installation site:

1. **Evaporator Condensate Drainage**. Condensate produced during operation must be discharged from the evaporator pan through the primary and/or secondary drain hoses. Make sure the condensate lines are free of any restrictions.

   Condenser Pan Drainage. Water from rain will accumulate in the condenser drain pan and should discharge from the condenser pan through the drain line. Make sure the drain hole and line are not restricted due to trash or crimping.

2. **Placement.**

   A. Place the unit in a shaded area, if possible.
   B. Install it above ground for protection against flooding.
   C. Make sure the airflow from the condenser section and vent hood are not impeded by shrubbery or other obstructions.
   D. Make sure the unit is installed level.

3. **Clearances:**
   The units are designed to operate when either the left or right side (not both) on the condenser section are blocked. The open side and the top should have a minimum clearance of 24". The rear of the unit should be 60" from any obstruction to air flow.

4. **Codes:**
   Make sure your installation conforms to all applicable electrical, plumbing, building, and municipal codes.

5. **Electrical Supply:**
   The power supply must have the appropriate voltage, phase, and ampacity for the model selected. Voltage must be maintained above minimum specified values listed below. Refer to the Electrical Ratings (section 1.4) for ampacity requirements.

Electrical Rating Designations*	AC
Nominal Voltage	208/230
Phase	1
Minimum Voltage	197
Maximum Voltage	253

Table 6. Voltage Limitations

2.4 Installation Materials

Installation Kits

The CFH1012A is shipped with a **bottom mounting bracket kit.** If you have not yet unpacked the unit, follow the instructions in section 2.1.

Bottom Mounting is One 0.080 Aluminum L-Shaped Bracket:

One 0.080 Aluminum Bottom Bracket (ships mounted on unit)

Other Optional Equipment:

The package may include other factory-supplied items (optional) as follows:

PART #	DESCRIPTION
50123	Digital thermostat. 1 stage heat, 1 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Keypad lockout. Non-volatile program memory.
50218	Digital, non-programmable thermostat. 1 stage cool and 1 stage heat. Auto-changeover.
50252	Non-programmable digital thermostat with backlit display. 2 stage heat and 2 stage cool. Auto changeover.
50107	Digital thermostat. 2 stage heat, 2 stage cool. 7 day programmable. Fan switch: Auto & On. Auto-change over. Status LED's. Backlit display. Programmable fan. Non-volatile program memory.
50092	Thermostat guard for use with the 50123 and 50107 thermostats.
50186	One stage cool, one stage heat. Auto-changeover.
S/04581	CommStat 3™ Lead/Lag Controller.
70705	CommStat 6 2/4™ HVAC Controller
S/12087-04	CommStat 6 4/8™ HVAC Controller
S/12087-06	CommStat 6 6/12™ HVAC Controller
50131	Internal Thermostat w/ Temperature Range of 60°F to 140°F, Differential of 5°F.
80685	Adjustable Aluminum Supply Grille, 5" x 13-1/4"
80680	Aluminum Return Filter Grille, 12" x 14"

Additional Items Needed:

Additional hardware and miscellaneous supplies (not furnished by ICE) are needed for installation. For example, the list below contains approximate quantities of items typically needed for mounting a unit on a concrete, fiberglass or steel frame structure. Concrete and fiberglass structures have different requirements.

- **Silicone Sealer** to seal around cracks and openings. Seal all top mounting holes not used and provide a seal at the top of the unit where it meets the building to eliminate water intrusion. Provide a complete perimeter seal between the unit and cabinet. The insulation that is factory installed around the supply and return air openings is an air seal only. It is not a water or weather seal.
- **Use appropriate electrical supplies** such as **conduit, electrical boxes, fittings, wire connectors**, etc.
- **High voltage wire** sized to handle the MCA (minimum circuit ampacity) listed on the data plate and in the *Electrical Ratings* table in section 1.4.
- **Over-Current Protection Device** sized in accordance with the MFS (maximum fuse size) listed on the unit data plate and in the *Electrical Ratings* table in section 1.4.

⚠ WARNING FIRE HAZARD

Improper adjustment, alteration, service, maintenance or installation could cause serious injury, death and/or property damage.

Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities have jurisdiction.

The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.

2.5 Porting and Duct Work

General Information

Note: The following instructions are for general guidance only. Due to the wide variety of installation possibilities, specific instructions will not be given. When in doubt, follow standard and accepted installation practices, or contact ICE for additional assistance.

Minimum Airflow Requirements

The duct system must be engineered to assure sufficient air flow through the CFH1012A, even under adverse conditions such as dirty filters, etc. See table below and Table 4, CFM at External Static Pressure (Wet Coil) in section 1.4.

Model	Maximum Total Static	Minimum Filter Area
CFH1012A	0.25	2.58 Sq. Ft

Table 7. Maximum Static Pressure

2.6 Air Flow Requirements and Ducting

Ducting

Extension length should be cut flush with the inside wall for applications without duct work.

Applications using duct work should be designed and installed in accordance with all applicable safety codes and standards. ICE strongly recommends referring to the current editions of the National Fire Protection Association Standards 90A and 90B before designing and installing duct work. The duct system must be engineered to ensure sufficient air flow through the unit to prevent over-heating of the heater element. This includes proper supply duct sizing, sufficient quantity of supply registers, adequate return and filter area. Ductwork must be of correct material and must be properly insulated. Ductwork must be firmly attached, secured and sealed to prevent air leakage. Do not use duct liner on inside of supply duct within 4 feet of the unit.

Galvanized metal duct extensions should be used to simplify connections to duct work and grilles. Use fabric boots to prevent the transmission of vibration through the duct system. The fabric must be U.L. rated (UL-181) to a minimum of 197°F.

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1,292ºF (700°C) and electric switching devices.

2.7 Bottom Bracket Installation

Wall Openings

Measure the dimensions of the supply and return ports on the CFH1012A.

Cut openings in the enclosure wall for the supply and return ducts. Make the supply openings one inch larger than the duct flanges on the unit. The one inch clearance must be maintained on all sides of the supply duct to combustible material for the first three feet of the duct.

1. Remove and discard the shipping crate attached to the unit.
2. The CFH1012A is shipped with the bottom brackets easily removed.
3. Refer to Figure 4. Attach the bottom support bracket to the wall using appropriate hardware.

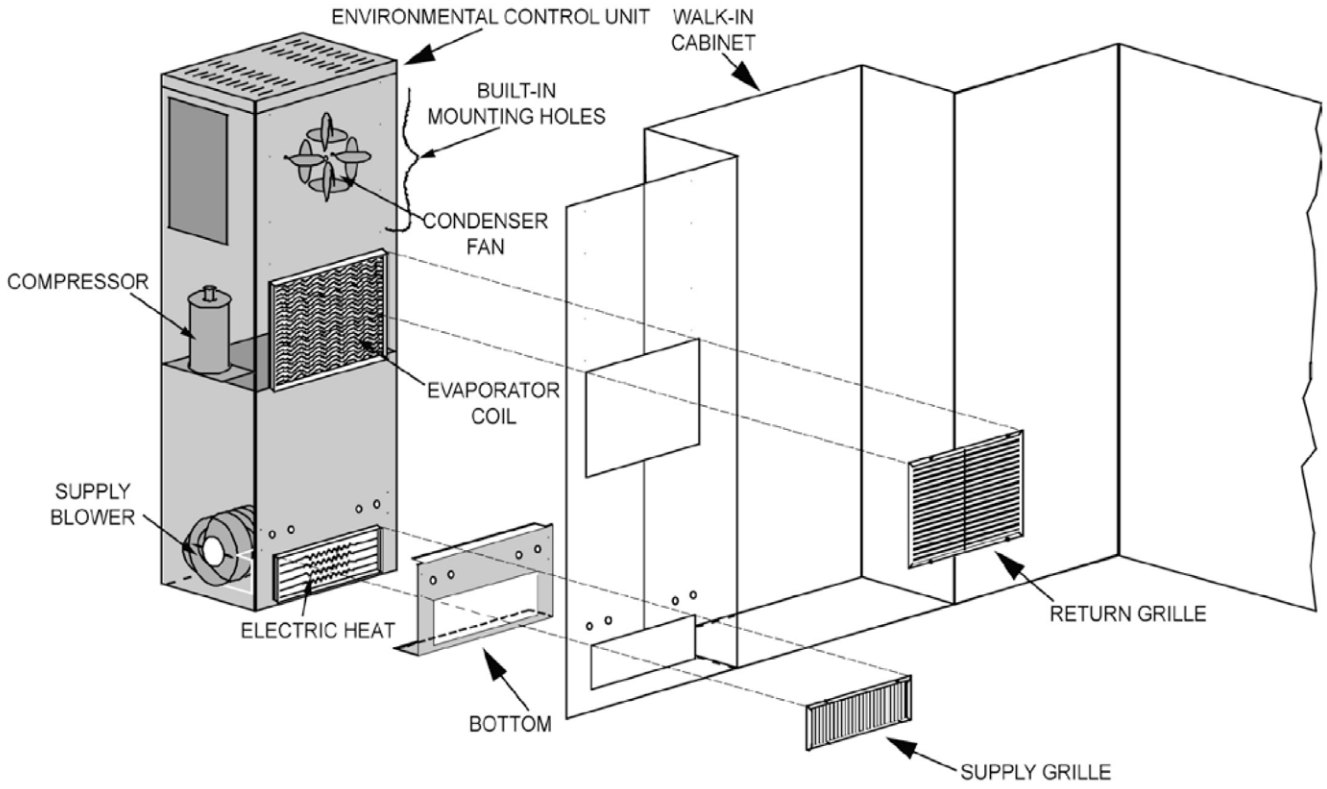


Figure 4. Wall Mounting Detail

2.8 Mounting the Unit

1. Using an appropriate and safe lifting device, set the CFH1012A on the bottom support bracket mounted on the wall. You must stabilize the unit on the bracket with the lifting device or by some other means - the bracket alone is not sufficient.
2. Make sure that the duct flanges are properly aligned with the wall opening. Adjust as necessary.
3. Apply silicone sealer to the perimeter of the unit, around the supply and return flanges, and over the unused mounting holes.
4. Bolt the top and bottom of the unit to the shelter wall.
5. Apply a silicone bead to the top and perimeter where the unit meets the cabinet.
6. Pull the power and control wires through the conduit into the cabinet.

2.9 Electrical Connections

⚠ WARNING ELECTRICAL SHOCK HAZARD

Failure to follow safety warnings exactly could result in serious injury, death, and/or property damage.

Turn off electrical power at fuse box or service panel BEFORE making any electrical connections and ensure a proper ground connection is made before connecting line voltage.

⚠ CAUTION

NOTICE TO INSTALLER/CONTRACTORS: This unit's internal control circuit/transformer is designed to power factory installed unit components only. Connecting external component loads may be done at your own risk of voiding the manufacturer's product warranty.

Important

All electrical work must meet the requirements of local codes and ordinances. Work should be done **only** by qualified persons.

The CFH1012A units are provided with labeled power leads and an eight-conductor thermostat cable.

High Voltage Wiring

The high voltage wire provided with the CFH1012A can be replaced to eliminate wire nut connections. L1, L2 and ground wires can be replaced at the circuit breaker.

The power supply(s) should have the proper voltage, phase, and ampacity for the selected models.

Low Voltage (Control) Wiring

1. Mount the sub-base on a level plane. Use a line and surface level. Connect the thermostat wire as shown in Figure 4.
2. Attach the thermostat assembly to the sub-base. Check stage one anticipator settings - should read .40.

   Note: Black and blue wires on the CFH1012A terminal block are dry contacts which can be used for remote signaling in the event of equipment shut-off on low or high pressure limits.
3. Unit shut down is available from a field provided alarm device; i.e., smoke alarm, fire stat. Install a normally closed device between red wire and the "R" terminal on the thermostat. This will disable the 24V control voltage. See Figure 4.

NOTE: THE INTERNAL TRANSFORMER IS NOT DESIGNED TO POWER OTHER EXTERNAL DEVICES.

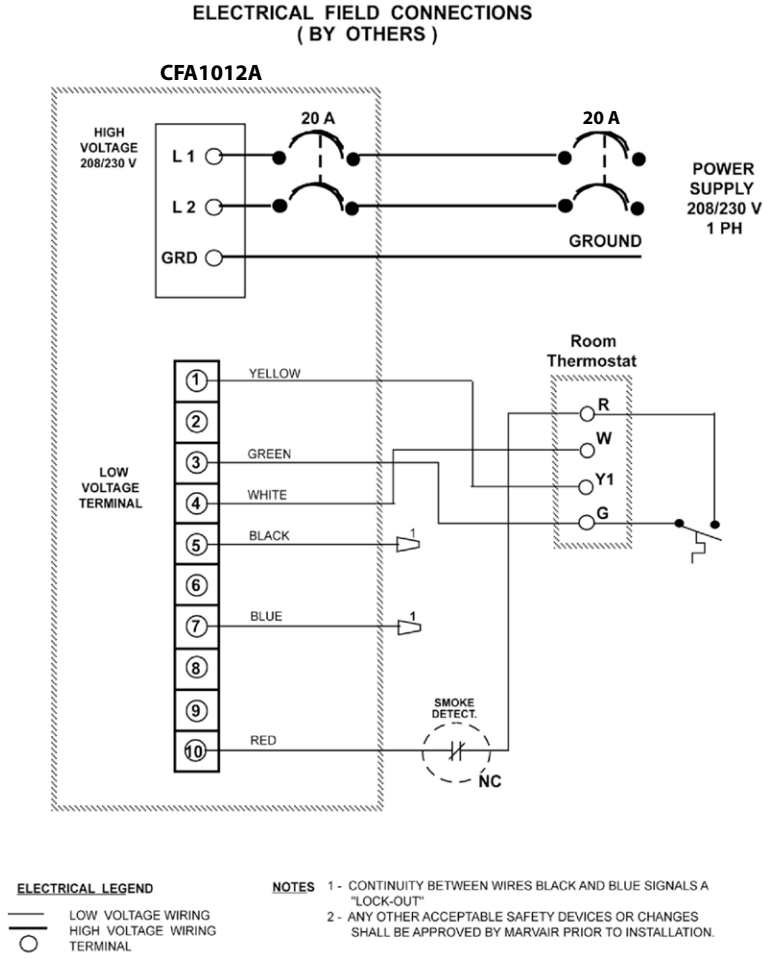


Figure 5. Thermostat Wiring Diagram

Chapter 3 Start-Up

3.1 Start-Up & Commissioning Checklist

Please complete the information on this form and return to Marvair by mail or fax. The mailing address and fax number can be found at the end of the form.

A. Equipment Information

Date: _____ Equipment Owner _____
Installing Company: _____ Installer: _____
Address: _____ State _____
City: _____

ICE Air conditioner: Model No. _____
Serial No. _____

Compressor: Model No. _____
Serial No. _____

Compressor: Model No. _____
Serial No. _____

B. Pre-Start Up

Is there any shipping damage? ❒Yes ❒No
If so, where? _____
Will this damage prevent starting the unit? ❒Yes ❒No
Check Power Supply, does it agree with data sticker on air conditioner? ❒Yes ❒No
Has the ground wire been connected? ❒Yes ❒No
Has the circuit protection been sized and installed properly? ❒Yes ❒No

Controls

Are the thermostat control wiring connections made and checked? ❒Yes ❒No
Are all wiring terminals (including main power supply) tight? ❒Yes ❒No
If unit has a crankcase heater, has it been energized for 24 hours? ❒Yes ❒No
On a 208/230 v. units is control transformer (24 AC) wired for correct voltage? ❒Yes ❒No

Condensate Section

Has water been placed in drain pan to confirm proper drainage? ❒Yes ❒No
Are correct filters in place? ❒Yes ❒No

Refrigerant Piping

If leaks are found, report any leaks to ICE Warranty Service Dept.

C. Check Rated Voltage at Terminal Block for Imbalance before starting of Unit.

❒208/230V 1 Phase ❒208/230V 3 Phase ❒460V 3 Phase

❒380V 3 Phase 50Hz. ❒575 3 Phase 60 Hz.

Measured Line to Line Volts L1&L2_____V. L1&L3 _____V. L2&L3_____V.

(L1&L2 + L1&L3 + L2&L3)/3 = Avg. Voltage = _____

Max. Deviation from avg. voltage = _____volts

Voltage imbalance = (100 x Max. Deviation)/avg. Voltage = _____%

A voltage deviation greater than 2% with the unit running should be addressed and corrected. Excess voltage deviation can cause the compressor to overheat and to operate inefficiently.

Example: Maximum Deviation from Average Voltage X 100 (for Percent)
Average voltage

Measured Voltages:

L1 & L2 = 241 Volts
L1 & L3 = 243 Volts = 717 / 3 = 239 Average Voltage
L2 & L3 = 233 Volts

239 - 233 = 6
100 x 6/239 =2.5% Voltage Unbalance

Three phase units only check fan & compressor rotation.

D. Heating Mode Check & Record Readings

	Circuit 1	Circuit 2 *(if applicable)*
Room Temperature	_____	_____
Outside Temperature	_____	_____
Evap. Entering Air DB Temp	_____	_____
Evap. Entering Air WB Temp	_____	_____
Evap. Leaving Air DB Temp	_____	_____
Evap. Leaving Air WB Temp	_____	_____
Heater Contactor Amps (L1)	_____	_____
Heater Contactor Amps (L2)	_____	_____
Heater Contactor Amps (L3)	_____	_____

E. Cooling Mode Check & Record Refrigerant Pressures

Recheck voltage imbalance in cooling mode:

Measured Line to Line Volts L1&L2_____V. L1&L3 _____V. L2&L3_____V.

(L1&L2 + L1&L3 + L2&L3)/3 = Avg. Voltage = _____

Max. Deviation from avg. voltage = _____volts

Voltage imbalance = (100 x Max. Deviation)/avg. Voltage = _____%

After 10 minutes of compressor operation, record the following:

	Circuit 1	Circuit 2 *(if applicable)*
Room Temperature	_____	_____
Outside Temperature	_____	_____
Suction Pressure	_____	_____
Suction Line Temperature	_____	_____
Discharge Pressure	_____	_____
Discharge Line Temperature	_____	_____
Entering Condenser Air	_____	_____
Leaving Condenser Air	_____	_____
Evap. Entering Air DB Temp	_____	_____
Evap. Entering Air WB Temp	_____	_____
Evap. Leaving Air DB Temp	_____	_____
Evap. Leaving Air WB Temp	_____	_____
Compressor Amps (L1)	_____	_____
Compressor Amps (L2)	_____	_____
Compressor Amps (L3)	_____	_____

Notes:

_____

_____

_____

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Chapter 4 Troubleshooting

4.1 Overview

⚠ WARNING

Failure to follow these instructions could result in death, severe personnel injury and/or property damage.

A comprehensive understanding of the operation of the CFH1012A is a prerequisite to troubleshooting. Please read the Chapter 1 for basic information about the unit.

ICE CFH1012As are thoroughly tested before they are shipped from the factory. Or course, it is possible that a defect may escape undetected, or damage may have occurred during transportation. However, the great majority of problems result from installation errors.

If you experience difficulties with the CFH1012A, please review the installation steps in Chapter 2. It may be helpful to get another person to review and check them with you.

Much time can be saved by taking a thoughtful and orderly approach to troubleshooting. Start with a visual check - are there loose wires, crimped tubing, missing parts, etc? Begin deeper analysis only after making this initial inspection.

The troubleshooting information in this manual is basic. The troubleshooting section contains problem/solution charts for general problems, followed by a compressor section.

Not every problem can be anticipated. If you discover a problem that is not covered in this manual, we would be very grateful if you would bring it to the attention of our service department for incorporation in future revisions.

As always, please exercise caution and good judgement when servicing the CFH1012A. Use only safe and proven service techniques. Use refrigeration goggles when servicing the refrigeration circuit.

The refrigerant circuit has hot surfaces, and the electrical voltages inside of the unit may be hazardous or lethal.

SERVICE MAY BE PERFORMED ONLY BY QUALIFIED AND EXPERIENCED PERSONS.

4.2 Failure Symptoms Guide

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
A. Unit does not run. **NOTE**: An internal anti-short-cycle timer will prevent the unit from starting for .2 to 8 minutes following start-up.	1. Power supply problem.	1. Check power supply for adequate phase and voltage. Check wiring to unit and external breakers or fuses.
	2. Tripped internal disconnect.	2. Check internal circuit protection devices for continuity.
	3. Shut off by external thermostat or thermostat is defective.	3. Check operation of wall-mounted thermostat.
	4. Unit off on high or low pressure limit.	4. Reset pressure switch.
	5. Internal component or connection failure.	5. Check for loose wiring. Check components for failure.

PROBLEM/SYMPTOM	LIKELY CAUSE(S)	CORRECTION
B. Unit runs for long periods or continuously; cooling is insufficient.	1. Dirty filter or reduced airflow	1. Check air filter(s). Check blower operation. Remove airflow restriction.
	2. Low refrigerant.	2. Check for proper charge and possible refrigerant leak.
	3. Component failure.	3. Check internal components, especially compressor for proper operation.
	4. Unit undersized for job.	4. Add additional units for greater capacity.
C. Unit cycles on high/low pressure limit.	1. Loss or restriction of airflow.	1. Check blower assembly for proper operation. Look for airflow restrictions, e.g.. the air filter. Check blower motor and condenser fan.
	2. Restriction in refrigerant circuit.	2. Check for blockage or restriction, especially filter drier and capillary tube assembly.
	3. Refrigerant overcharge (following field service)	3. Evacuate and recharge to factory specifications.
	4. Defective pressure control.	4. Check limit cutout pressures. Control is set to actuate at approximately 60 PSIG (low pressure) and 650 PSIG (high pressure).
D. Unit blows fuses or trips circuit breaker.	1. Inadequate circuit ampacity.	1. Note electrical requirements in Chapter 2 and correct as necessary.
	2. Short, loose, or improper connection in field wiring.	2. Check field wiring for errors.
	3. Internal short circuit. Loose or improper connection(s) in unit.	3. Check wiring in unit. See wiring and schematic diagrams. Test components (especially the compressor) for shorts.
	4. Excessively high or low supply voltage or phase loss (3ø only).	4. Note voltage range limitations specific to the compressor troubleshooting section.
E. Water on floor near unit.	1. Obstruction in condensate line.	1. Check for clog or restriction.
	2. Obstruction or leak in condensate pan.	2. Check pan for leak or blockage.
	3. Unit is not level.	3. Level unit.
F. No space heating or reduced heating (units equipped with resistance elements)	1. Defective heating element(s).	1. Check resistance element(s) for continuity.
	2. Thermal limit open.	2. Check continuity across thermal limit switch.
	3. Defective heater contactor.	3. Check relay for proper operation. Replace if defective.

4.3 Compressor Troubleshooting

NOTE: It is important to rule out other component failures before condemning the compressor.

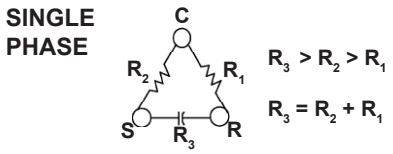
The following electrical tests will aid diagnosis:

1. **Start-Up Voltage**: Measure the voltage at the compressor contactor during start-up. The voltage must exceed the minimum shown in Table 5, section 2.2, or compressor failure is likely. A low voltage condition must be corrected.

2. **Running Amperage**: Connect a clip-on type ammeter to the (common) lead to the compressor. Turn on the supply voltage and energize the unit. The compressor will initially draw high amperage; it should soon drop to the RLA value or less. If the amperage stays high, check the motor winding resistances.

   NOTE: Feel the top of the compressor to see if it has overheated. If it is hot, the internal overload may be open. You may have to wait several hours for it to reset.

3. **Motor Winding Resistances:** Using a digital volt-ohm meter (VOM), measure the resistance across the compressor windings as shown below.



   Resistance can be measured as shown above. Any deviation from above values could indicate a defective compressor.

4. **High Voltage/Insulation Test:** Test internal leakage with a megohmeter. Attach one lead to the compressor case on a bare metal tube and to each compressor terminal to test the motor windings. A short circuit at high voltages indicates a motor defect. Do not do this test under vacuum.

Chapter 5 Maintenance

5.1 Scheduled Maintenance

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking
- That no live electrical components and wiring are exposed while charging, recovering or purging the system
- That there is continuity of earth bonding
- Sealed electrical components shall be replaced
- Intrinsically safe components must be replaced

Industrial Climate Engineering strongly recommends that the air conditioner be serviced a minimum of twice a year – once prior to the heating season and once prior to the cooling season. At this time the filters, evaporator coil, condenser coil, the cabinet, and condensate drains should be serviced as described below. Also at this time, the air conditioner should be operated in the cooling and heating cycles as described in Chapter 3, Start-Up. In addition to this seasonal check-out, the air conditioner should be maintained as follows:

Air Filter

Replace the air filter whenever it is visibly dirty. Never operate the unit without the filter in place.

Evaporator

If the evaporator becomes clogged or dirty, it may be cleaned by careful vacuuming or with a commercial evaporator cleaning spray. DO NOT use a solvent containing bleach, acetone, or flammable substances. Turn off power before cleaning. Be careful not to wet any of the electrical components. Be sure the unit has dried before restarting.

Condenser

Periodically inspect the outdoor condenser coil and the cabinet air reliefs for dirt or obstructions. Remove foreign objects such as leaves, paper, etc.

If the condenser coil is dirty, it may be washed off with a commercial solvent intended for this purpose. TURN OFF POWER BEFORE CLEANING! Be sure that all electrical components are thoroughly dry before restoring power. Use a fin comb of the correct spacing to straighten mashed or bent fins.

Cabinet

The cabinet may be cleaned with a sponge and warm, soapy water or a mild detergent. Do not use bleach, abrasive chemicals or harmful solvents.

Drains

Regularly check the primary and secondary condensate drains. The secondary drain has a stand pipe. An obstruction will force water to dump into the middle of the unit and drain out the sides of the CFH1012A unit, causing discoloration of the side panels. If discoloration is noted, service the drains.

If a commercial drain solvent is used, flush out the drain pan and system with plenty of fresh water to prevent corrosion.

Lubrication

Oiling of the condenser fan motor or the evaporator blower motor is not required.

Chapter 6 Service & Charging/Recovery

6.1 Safety Precautions

Service

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the REFRIGERATING SYSTEM, the following shall be completed prior to conducting work on the system.

1. Work shall be undertaken under a controlled procedure to minimize the risk of flammable gas or vapor being present while the work is being performed.
2. All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
3. The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection.
4. If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
5. No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
6. Ensure that the area is open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

6.2 Leak Detection

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework. ***Note:*** Examples of leak detection fluids are

1. Bubble method
2. Fluorescent method agents

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

6.3 Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed.

1. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
2. Cylinders shall be kept in an appropriate position according to the instructions.
3. Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
4. Label the system when charging is complete (if not already).
5. Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.
6. Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

6.4 Refrigerant Recovery

When removing refrigerants from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

1. Safely remove refrigerant following local and national regulations.
2. Evacuate.
3. Continuously flush or purge with inert gas when using flame to open circuit
4. Open the circuit
5. The REFRIGERANT CHARGE shall be recovered into the correct recovery cylinders. For appliances containing FLAMMABLE REFRIGERANTS other than A2L REFRIGERANTS, the system shall be purged with oxygen-free nitrogen to render the appliance safe for FLAMMABLE REFRIGERANTS. This process may need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.
6. For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place
7. The outlet for the vacuum pump shall not be close to any potential ignition sources, and
8. Ventilation shall be available.
9. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

10. The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.
11. The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
12. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Chapter 7 Decommissioning

7.1 Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task commences.

1. Become familiar with the equipment and its operation.
2. Isolate the system electrically.
3. Before attempting the procedure, ensure that:
   - Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
   - All personal protective equipment is available and being used correctly.
   - The recovery process is supervised at all times by a competent person.
   - Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down the refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80 % volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

Chapter 8 Warranty

8.1 Limited Product Warranty

Marvair Inc., warrants its products to be free from defects in materials and workmanship under normal use to the original purchaser for the period of time in the table below. If any part of your product fails within 12 months from start-up, or 18 months from shipment from the factory, whichever comes first, Marvair, Inc. will furnish without charge, EXW Cordele, Georgia, the required replacement part. The owner must provide proof of the date of the original start-up. The contractor's invoice, the certificate of occupancy, or similar documents are examples of acceptable proof of the date of the original start-up.

Marvair, ICE, Eubank Products
90 Days[1] w/Flat Rate Labor[2] *(See Marvair, ICE, Eubank Flat Rate Labor Guidelines)*
1 Year Parts[2,3]
5 Years Compressor[2]

[1]If any part of your Marvair, Inc. unit fails within 90 days of the commencement of the warranty, Marvair, Inc. will furnish without charge, EX Works, Cordele, Georgia, the required replacement part and pay for the labor to replace the part in accordance with the Marvair, Inc. Flat Rate Labor Guidelines.

[2]All OTR (over the road) applications that are moved from one location to another: Factory Warranty applies only up to the point of initial start-up and test at all OEM manufacturing locations or subsequent facility. Once it goes into OTR service, the warranty expires immediately for compressor and sealed system components. This OTR exemption does not apply to relocatable classrooms, construction or office trailers.

[3]All warranty replacement parts shall be shipped Ground only. Expedited shipping is available upon request for additional cost.

The responsibility of the equipment owner includes:

1. To operate the equipment in accordance with the manufacturer's instructions.
2. To provide easy accessibility for servicing.
3. To check and reset any circuit breaker(s) and/or disconnect(s) prior to calling for service.
4. To keep the unit clean and free of dirt and containment and replace filters as required.
5. To keep the outdoor coil clean and free of leaves, paper, or other debris.
6. To pay the charges incurred when any of the above have not been done.
7. To pay for repair or replacement of any material or part other than those within the Marvair unit or controller.

Marvair, Inc., will not be responsible for labor after 90 days, transportation costs, delays or failures to complete repairs caused by events beyond our control (labor hours incurred due to required site-specific training, time waiting to gain access, or extended drive time for remote sites). This warranty does not cover:

1. Any transportation, related service labor, diagnosis calls, filter, driers, refrigerant, or any other material charges.
2. Damages caused by shipping, accident, abuse, negligence, misuse, fire, flood, or Acts of God.
3. Damages caused by operating or staging the unit in a corrosive environment.
4. Damages caused by improper application of the product.
5. Damages caused by failing to perform proper routine maintenance.
6. Expenses incurred for erecting, disconnecting or dismantling the product or installing the replacement part(s).
7. Products not installed or operated according to the included instructions, local codes, and good trade practices.
8. Products moved from the original installation site.
9. Products lost or stolen
10. Consequential damages or incidental expenses including losses to persons, property or business.
11. Modifications to original unit after it leaves the factory, such as breaking into any part of the sealed systems unless authorized in advance in writing by Marvair, Inc..
12. Damages as a result of operating as a construction site cooler / dehumidifier.

When labor (first 90 days only) is required, it must be performed during normal working hours (8:00 AM - 5:00 PM) Monday - Friday and must be performed by Marvair, Inc., personnel or a designated Service Representative.

The owner of the product may ship the allegedly defective or malfunctioning product or part to Marvair, Inc.,, at such owner's expense, and Marvair, Inc., will diagnose the defect and, if the defect is covered under this warranty, Marvair, Inc., will honor its warranty and furnish the required replacement part. All costs for shipment and risk of loss during shipment of the product to Marvair, Inc., and back to the owner shall be the responsibility and liability of the owner. Upon written request by an owner, Marvair, Inc., may arrange for remote diagnosis of the allegedly defective or malfunctioning product or part but all costs for transportation, lodging and related expenses with regard to such diagnostic services shall be the responsibility and liability of the owner.

An owner requesting performance under this Warranty shall provide reasonable access to the allegedly defective or malfunctioning product or part to Marvair, Inc., and its authorized agents and employees.

THIS WARRANTY CONSTITUTES THE EXCLUSIVE REMEDY OF ANY PURCHASER OF A MARVAIR HEAT PUMP OR AIR CONDITIONER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE, TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE EXCEED THE TERMS OF THE APPLICABLE WARRANTY STATED ABOVE AND MARVAIR SHALL HAVE NO OTHER OBLIGATION OR LIABILITY. IN NO EVENT SHALL MARVAIR BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR MONETARY DAMAGES.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE-TO-STATE. Some states do not allow limitations or exclusions, so the above limitations and exclusions may not apply to you.

Notes