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**THIS MANUAL MUST BE LEFT WITH THE
HOMEOWNER FOR FUTURE REFERENCE**

WARNING

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 licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

NOTICE

A thermostat is not included and must be ordered separately.

- A Lennox communicating thermostat must be used in communicating applications.
- In non-communicating applications, the Lennox ComfortSense® thermostat may be used, as well as other non-communicating thermostats.

In all cases, setup is critical to ensure proper system operation.

Field wiring for both communicating and non-communicating applications is illustrated in diagrams, which begin on page 4.

WARNING

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used 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 use of the appliance by a person responsible for their safety. Children should be supervised to ensure they do not play with the appliance.

CAUTION

Leak Detection System installed. Unit must be powered except for service.

WARNING

Maximum Altitude of application is 3200m above sea level.

Disponible en español en LennoxPros.com

Disponible en Français sur le LennoxPros.com site

INSTALLATION INSTRUCTIONS

Dave Lennox Signature® Collection CBK48MVT Units – R454B

MULTI-POSITION AIR HANDLERS

508444-01

06/2024

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NOTE – This unit is a **PARTIAL UNIT AIR CONDITIONER**, complying with **PARTIAL UNIT** requirements of this Standard, and must only be connected to other units that have been confirmed as complying to corresponding **PARTIAL UNIT** requirements of this Standard, UL 60335-2-40/CSA C22.2 No. 60335-2-40, or UL 1995/CSA C22.2 No. 236. Partial units shall only be connected to an appliance suitable for the same refrigerant.

WARNING

Ducts connected to an appliance shall not contain a potential ignition source

IMPORTANT: Special procedures are required for cleaning the all-aluminum coil in this unit. See page 49 in this instruction for information.



508444-01

WARNING

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 700°C and electric switching devices.

WARNING

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- 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).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor.

WARNING

For appliances using A2L refrigerants connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

CAUTION

Servicing shall be performed only as recommended by the manufacturer.

CAUTION

Any service personnel installing, decommissioning, or performing maintenance on the unit must be properly trained with A2L refrigerants

NOTE – Multiply values in T_{Amin} table by the Altitude Adjustment Factors to correct T_{Amin} based on installed altitude.

Altitude Adjustment Factor

Altitude (m)	0	200	400	600	800	1000	1200	1400	1600
Altitude (ft)	0	660	1310	1970	2620	3280	3940	4590	5250
Adj. Factor	1	1	1	1	1.02	1.05	1.04	1.1	1.12
Altitude (m)	1600	1800	2000	2200	2400	2600	2800	3000	3200
Altitude (ft)	5250	5910	6560	7220	7870	8530	9190	9840	10500
Adj. Factor	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.4

General Information

This indoor unit **with all-aluminum coil** is designed for installation with optional field-installed electric heat and a matched outdoor unit that is charged with R454B refrigerant. These units, designed for indoor installation in multiple positions, are completely assembled for upflow and horizontal right-hand discharge before being shipped from the factory.

All CBK48MVT air handlers are equipped with a factory-installed, internally mounted check / expansion valve, which is suitable for use in R454B applications.

WARNING

For duct connected appliances, false ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

WARNING

If this appliance is conditioning a space with an area smaller than T_{Amin}, then that space must be without continuously operating open flames (e.g. an operating gas appliance) or other potential ignition sources (e.g. an operating electric heater or similar hot surface). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest system.

NOTE – R454B is an A2L refrigerant. The system installation must meet the following parameters based upon total refrigerant charge (line set included). T_{Amin} (Total minimum conditioned area) is the minimum allowable conditioned area based upon the total system charge at sea level. Values must be multiplied by altitude adjustment factor at installed altitude.

See tables below.

T_{Amin} Table

Charge (lb)	10.0	15.0	20.0	25.0	30.0
Charge (kg)	4.5	6.8	9.1	11.3	13.6
Minimum Conditioned Area (ft ²)	149.9	224.9	299.9	374.8	449.8
Minimum Conditioned Area (m ²)	13.9	20.9	27.9	34.8	41.8

This air handler is compatible with the ComfortSense® non-communicating thermostat and non-communicating outdoor units. In addition, this unit has the enhanced capability of communicating with the communicating thermostats and communicating outdoor units using the Lennox RSBus protocols.

NOTE - For downflow or horizontal left-hand air discharge, certain field modifications are required.

These instructions are intended as a general guide and do not supersede local or national codes in any way. Consult authorities having jurisdiction before installation.

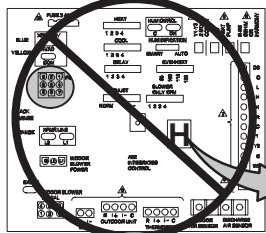
IMPORTANT INFORMATION FOR INSTALLER

CHECK FOR AND REMOVE THE FOLLOWING ITEMS BEFORE OPERATING UNIT.

- A** BLOWER HOUSING SUPPORT PAD. **B** HORIZONTAL DRAIN PAN (SEE UPFLOW APPLICATIONS ON PAGE 5 AND DOWNFLOW APPLICATIONS ON PAGE 8) **C** REFRIGERANT LINE PLUGS (SEE BRAZING CONNECTION ON PAGE 9) .



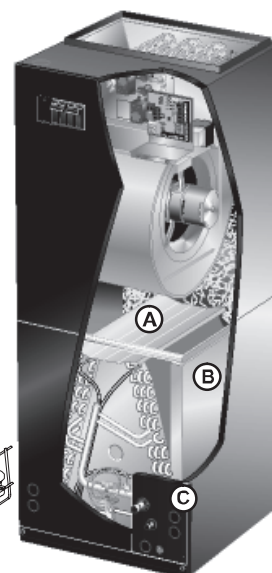
NOTE: The CBK48MVT Air Handler Control (AHC) is enhanced to automatically configure (set-up) the electric heat when the ECB48 electric heat harness is connected to CBK48MVT air handler. Manual Configuration of the electric heat using the push button is not required.



CONFIGURE ELECTRIC HEAT



ECB48



Model Number Identification

CB K 48 M V T - 036 - 230 - 71

Unit Type
CB = Air Handler

Refrigerant Type
K = R-454B

Series

Configuration
M = Multi-Position

Blower Motor
V = Variable Speed

Minor Revision Number

Voltage
230 = 208/230V-1 phase-60hz

Nominal Cooling Capacity
018/24 = 1.5 to 2 tons
030 = 2.5 tons
036 = 3 tons
042 = 3.5 tons
048 = 4 tons
060 = 5 tons

Metering Device
T = Factory installed Check/Expansion Valve for R-454B refrigerant (non-bleed port)

Shipping and Packing List

Package 1 of 1 contains:

- 1 – Assembled air handler unit
- 1 – Pipe nipple (Sch80, 3/4" I.D. x 5")
- 1 – Downflow shields and foam tapes (required for downflow configuration only)

- 1 – Horizontal drip shield (CBK48MVT-060 only)
- 1 – Downflow Air Baffle Kit (required for -048 and -060 downflow configuration only)
- 1 – Warranty card

Check the air handler for shipping damage; if found, immediately contact the last carrier.

Field Control Wiring

WARNING

Electric Shock Hazard.

Can cause injury or death.

Foil-faced insulation has conductive characteristics similar to metal. Be sure there are no electrical connections within a ½" of the insulation. If the foil-faced insulation comes in contact with electrical voltage, the foil could provide a path for current to pass through to the outer metal cabinet. While the current produced may not be enough to trip existing electrical safety devices (e.g. fuses or circuit breakers), the current can be enough to cause an electric shock hazard that could cause personal injury or death.

Wiring must conform to the current National Electric Code ANSI/NFPA No. 70, or Canadian Electric Code Part I, CSA Standard C22.1, and local building codes. Refer to following wiring diagrams. See unit nameplate for minimum circuit ampacity and maximum over-current protection size.

WARNING

Run 24V Class II wiring only through specified low voltage opening. Run line voltage wiring only through specified high voltage opening. Do not combine voltage in one opening

If installed in an unconditioned space, sealant should be applied around the electrical wires, refrigerant tubing, and condensate lines where they enter the cabinet.

WARNING



Electric shock hazard! - Disconnect all power supplies before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

WARNING



Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes.

Line voltage is present at all components when unit is not in operation on units with single-pole contactors. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies.

Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the air handler rating plate for maximum over-current protection, minimum circuit ampacity, as well as operating voltage. Select the proper supply circuit conductors in accordance with tables 310-16 and 310-17 in the National Electric Code, ANSI/NFPA No. 70 or tables 1 through 4 in the Canadian Electric Code, Part I, CSA Standard C22.1.

CAUTION

USE COPPER CONDUCTORS ONLY.

WIRING CONNECTIONS

- 1 - Install line voltage power supply to unit from a properly installed circuit breaker.
- 2 - Ground unit at unit disconnect switch or to an earth ground.

NOTE – Connect conduit to the unit using a proper conduit fitting. Units are approved for use only with copper conductors. A complete unit wiring diagram is located on the back side of the unit's access panel.

- 3 - Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit.

NOTE – For proper voltages, select thermostat wire gauge per the following chart:

CAUTION

ELECTROSTATIC DISCHARGE (ESD)

Precautions and Procedures

Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.

The power supply must be sized and protected according to the specifications supplied on the product.


This air handler is factory-configured for 240 volt, single phase, 60 cycles. For 208-volt applications, see “208 Volt Conversion” later in this section.

This unit is provided with holes for conduit. Use provided caps to seal holes not used.

Typical unit wiring (as well as wiring of optional field-installed electric heat) is shown in figure 2. Refer to the instructions provided with the electric heat section for proper installation.

208 VOLT CONVERSION

- 1 - Disconnect all power supplies.
- 2 - Remove the air handler access panel.
- 3 - Using the wiring diagram located on the unit access panel as a reference, move the 2 connected black transformer leads from the 240 volt terminal on the transformer to the 208 volt terminal on the transformer.

⚠ WARNING	
	<p>Electrically ground air handler. Connect ground wire to ground terminal marked “GND”.</p> <p>Failure to do so can result in death or electrical shock.</p>

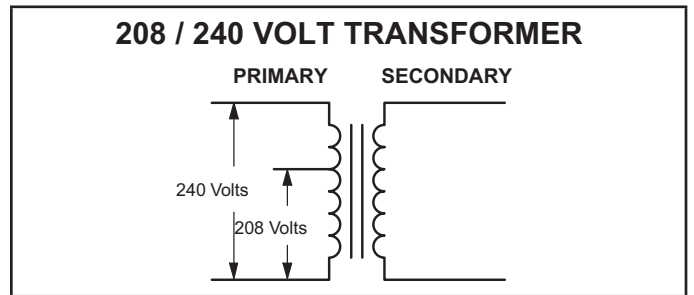


FIGURE 1. Converting Unit from 240VAC to 208VAC

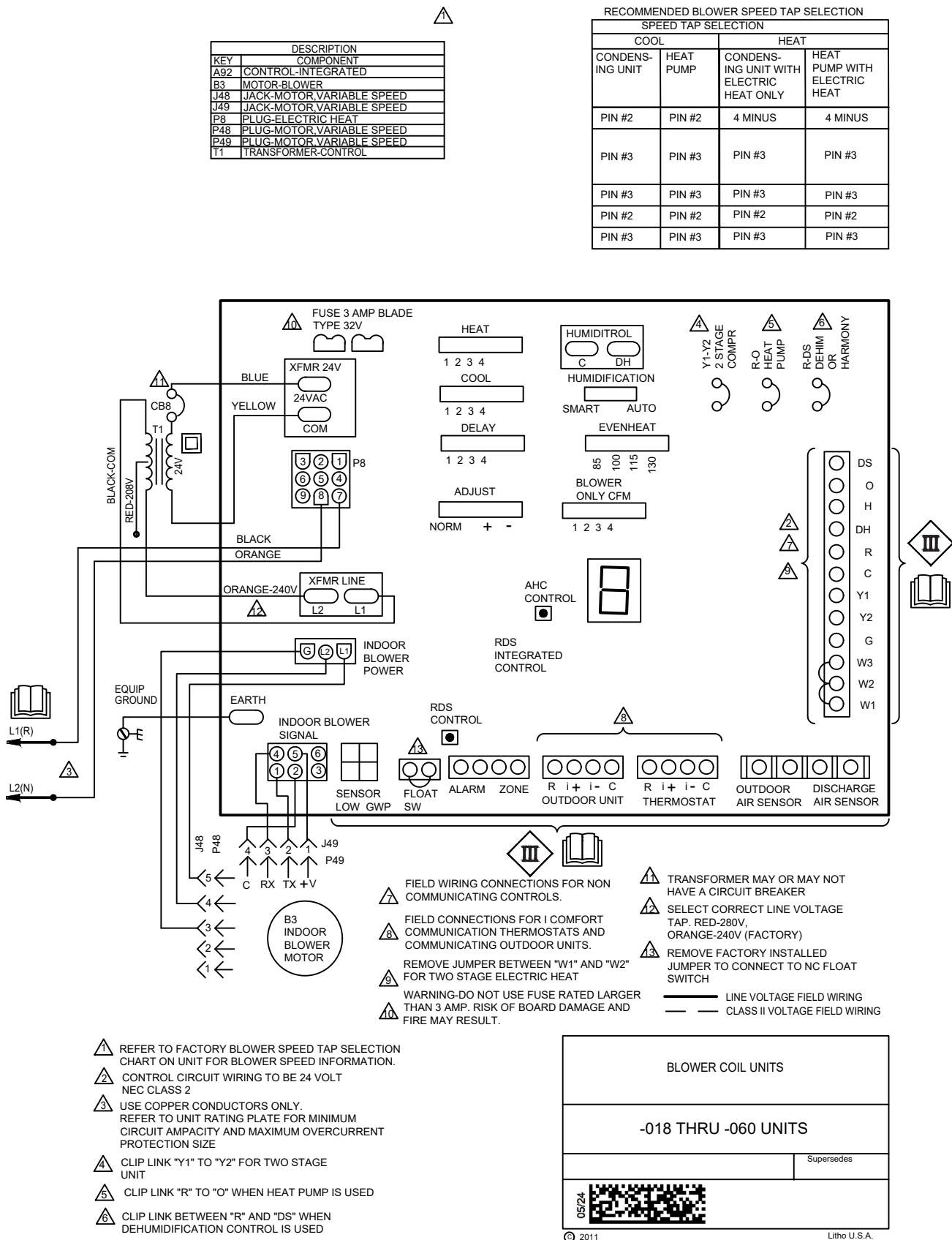


FIGURE 2. CBK48MVT Air Handler Unit Typical Wiring Diagram

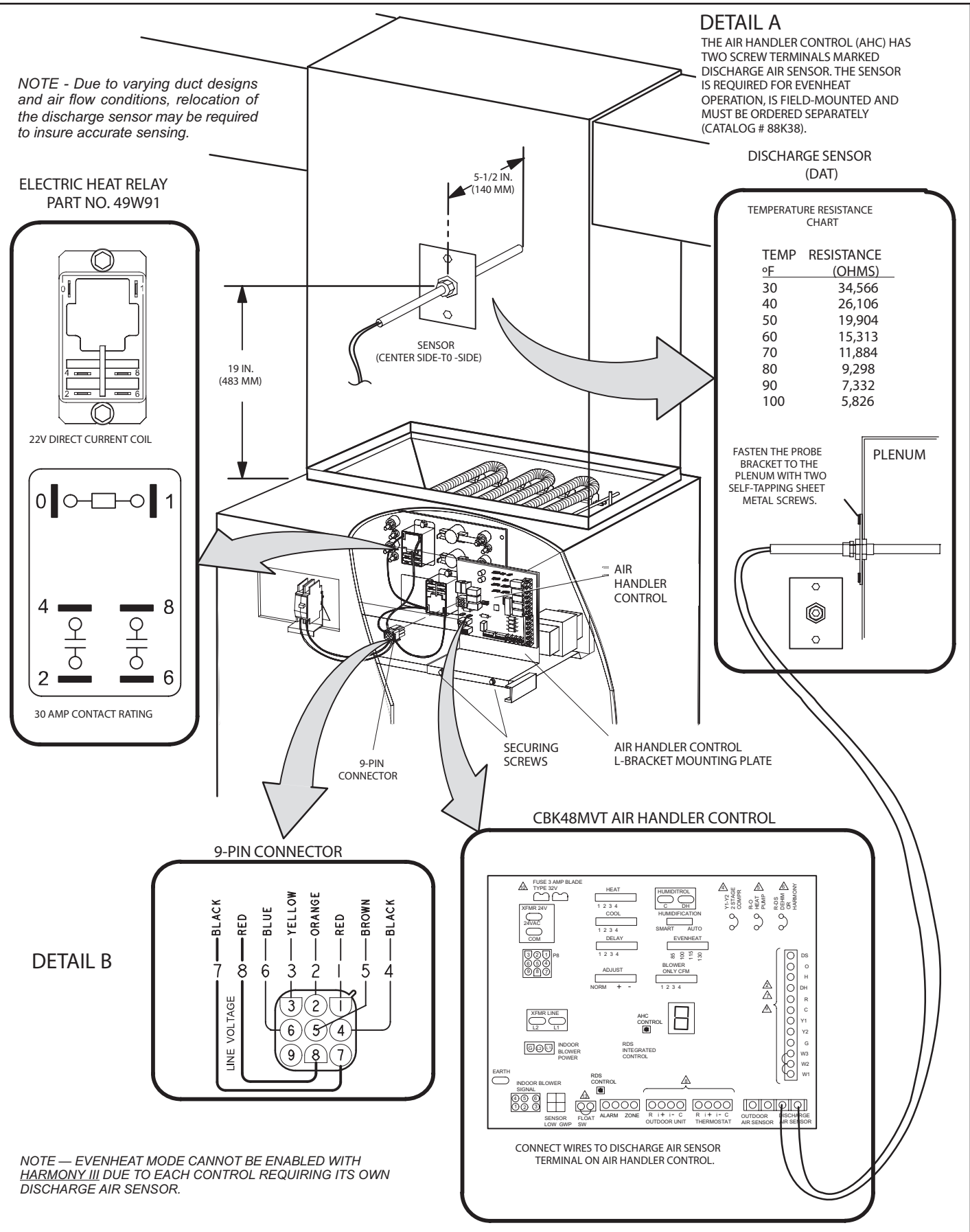


FIGURE 3. Component Connections

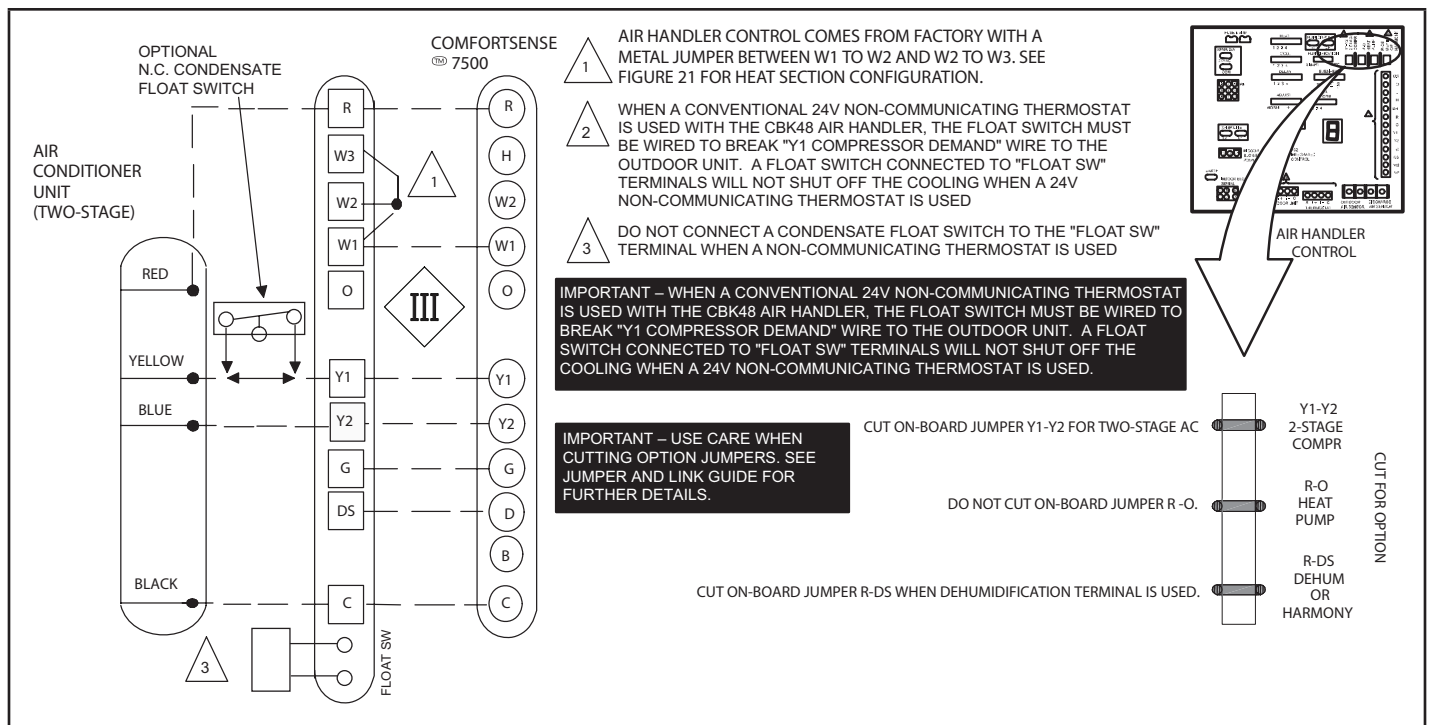


FIGURE 4. Control (Field Wiring) – Cooling Application (Non-Communicating)

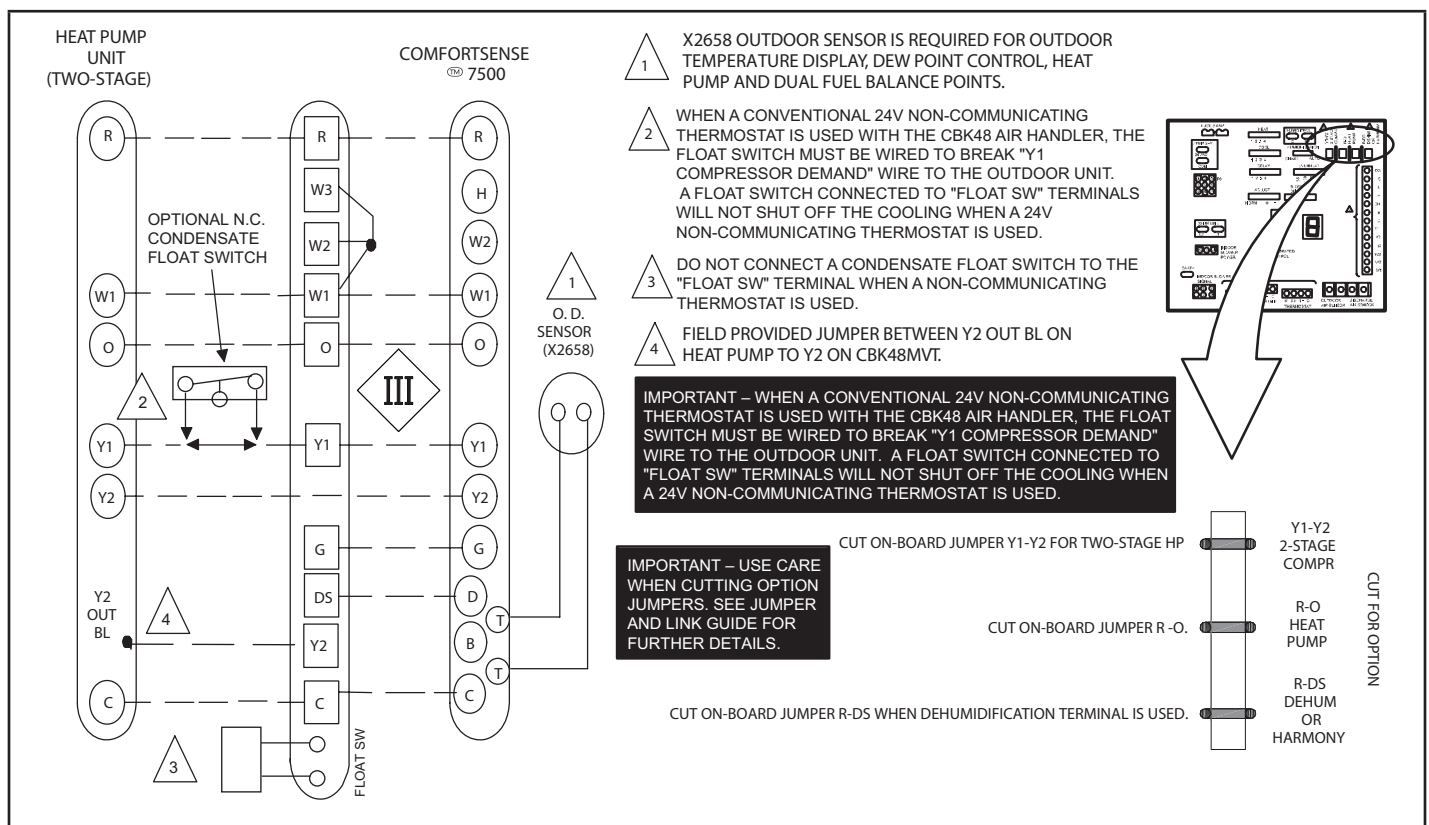


FIGURE 5. Control (Field Wiring) – Heat Pump (Non-Communicating)

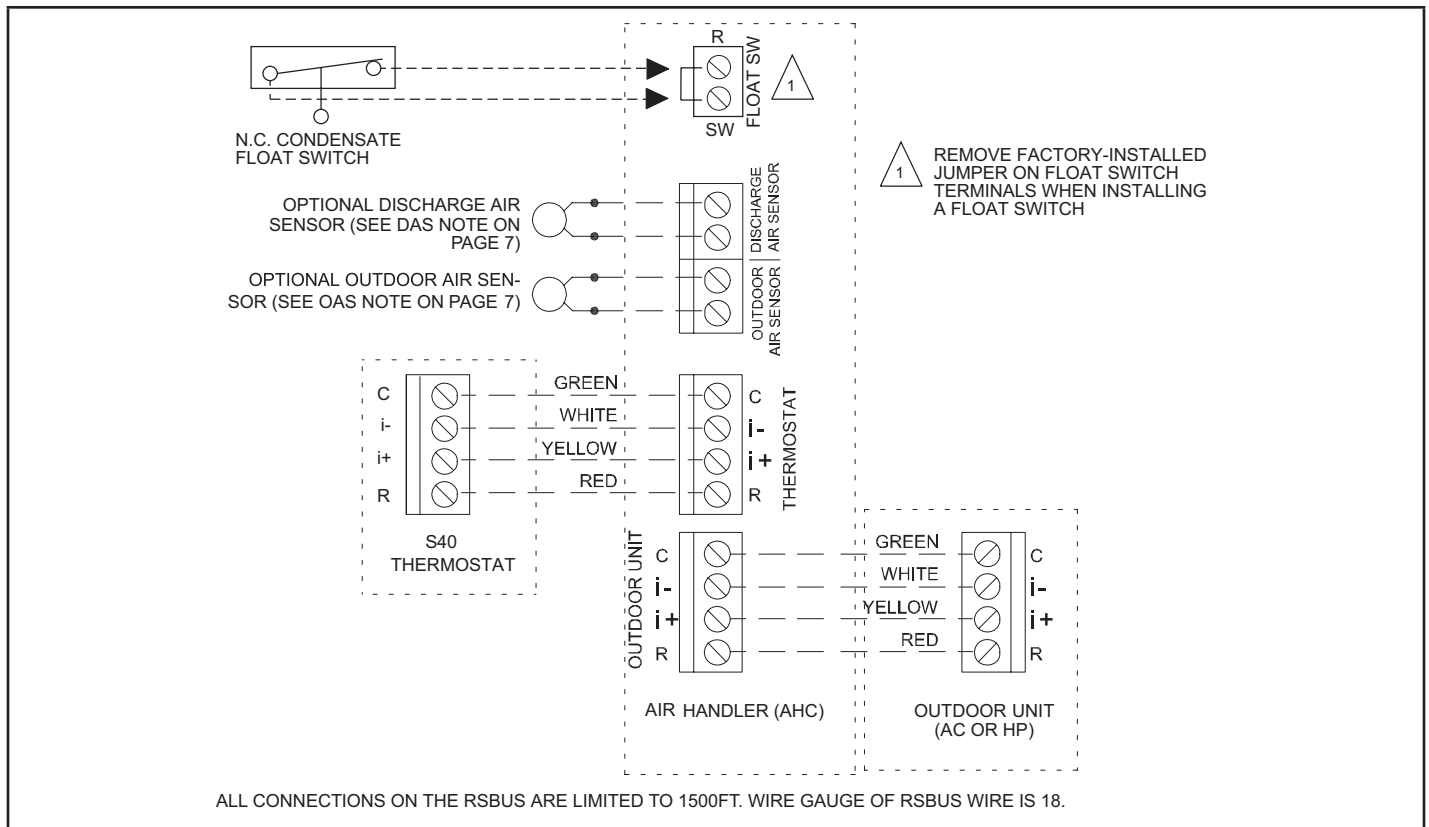


FIGURE 6. Communicating System Wiring

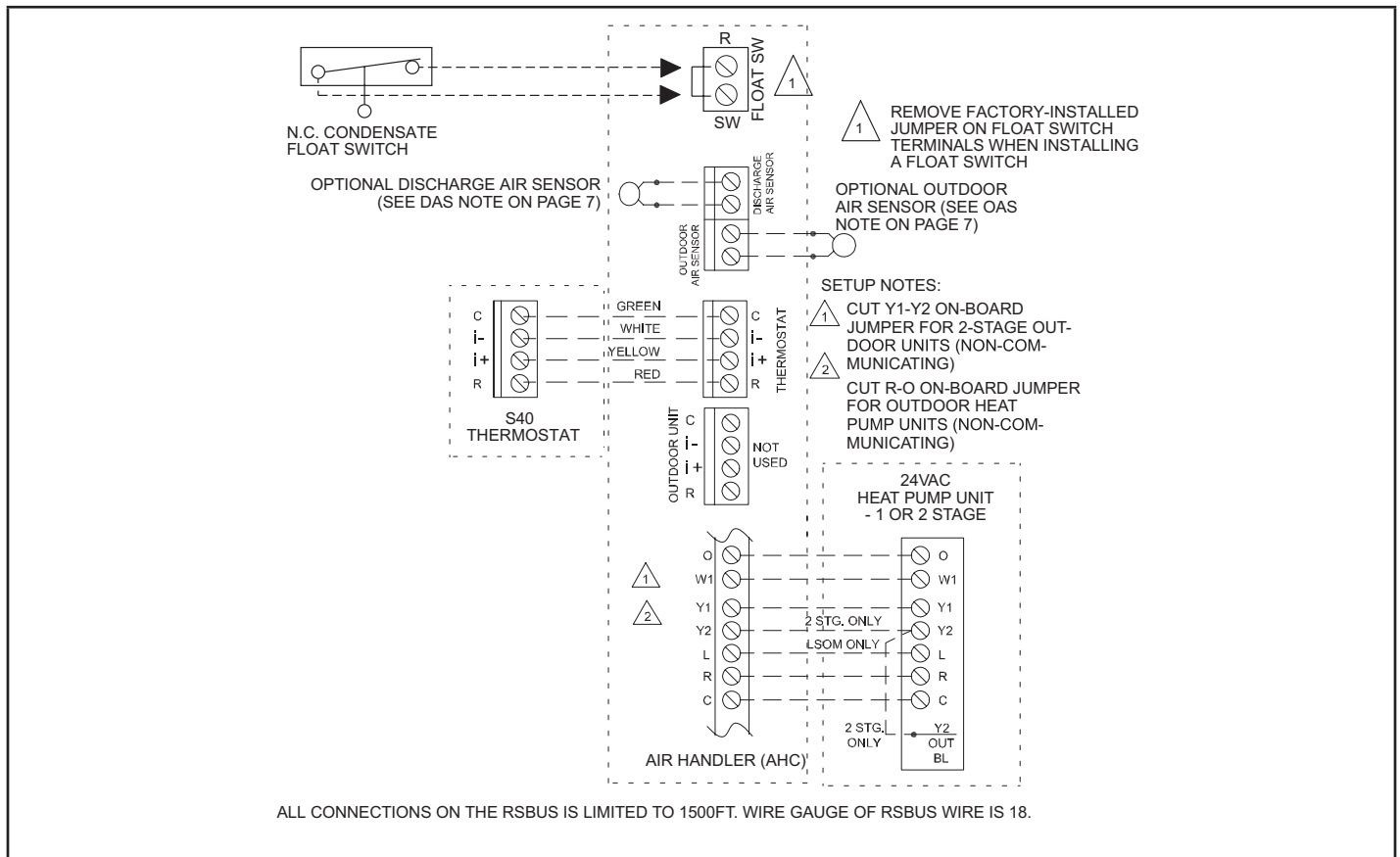


FIGURE 7. Communicating Indoor / Non-Communicating Outdoor (HP) System Wiring

Air Handler Control Button, Display and Jumpers

Use figure 20 as a reference for jumper settings. If any of the referenced jumpers are missing, the Air Handler Control will display Error Code **130** as per table 3, and the Air Handler Control will automatically use the **factory default** setting.

IMPORTANT

Before changing any clippable links or jumper settings, make sure the motor has completely stopped. Any changes will not take place while the motor is running.

PUSH BUTTON

An on-board push button is provided for the purpose of placing the Air Handler Control in different operation modes and can be used to recall stored error codes. When button is pushed and held, Air Handler Control will cycle through a menu of options depending on current operating mode. Every three seconds a new menu item will be displayed. If the button is released while that item is shown on the display, Air Handler Control will enter displayed operating mode, or execute defined operation sequence for that menu option. Once all items on menu have been displayed the menu resumes from the beginning (if button is still held).

- 1 - Press the diagnostic push button and hold it to cycle through a menu of options. Every three seconds a new menu item will be displayed. Release the button when the desired mode is displayed.
- 2 - When the solid "E" is displayed, the control enters the Error Code Recall mode. Error Code Recall mode menu options: Display will cycle through Error Codes and will automatically exit Error Code recall once the last error code has been reached; solid "≡" exits Error Code Recall mode; and solid "c" clears the error history. Must press button while flashing "c" is displayed to clear error codes. Cycling power to AHC will clear stored error codes.
- 3 - When the solid "-" is displayed, the control enters the applicable mode. Field configuration mode menu options: "H" electric heat stages detected; the AHC automatically detects the electric heat when power is applied and does not require "manual electric heat detection" using the push button, "A" Blower Test Mode or "P" programming or configuring unit size code. Releasing the button when solid "-" is displayed exits current active mode.

JUMPERS

Jumpers are used for non-communicating mode only.

- 1 - **Humidification** – Controls the status of **H** terminal on the thermostat block. Configurations are as follows:
 - If jumper is installed in **SMART** Humidification position (Default), **H** terminal is active if heat demand is present and indoor blower is running.

- If jumper is installed in **AUTO** Humidification position, **H** terminal is energized whenever indoor blower is running.

- 2 - **EvenHeat** – Target Discharge Air Temperature selection is used to set discharge air temperatures for EvenHeat operation.

NOTE - Optional Discharge Air Temperature Sensor, Lennox Catalog # 88K38 is **REQUIRED** for **EVENHEAT** operation and must be ordered separately.

- 3 - **Blower Only CFM** – Used to select Indoor blower CFM for continuous operation.
 - 4 - **Heat** – Used to select Indoor blower CFM for electrical heat by placing the jumper in proper position. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on page 18.
 - 5 - **Cool** – Used to select cooling indoor blower CFM by placing the jumper in proper position. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on page 18.
 - 6 - **Adjust** - Used to select the indoor blower CFM adjustment value by placing the jumper in appropriate position.
- If **NORM** is selected, indoor blower runs at normal speeds.
 - If + is selected, indoor blower runs at approximately 10% higher speed than **NORM** setting.
 - If - is selected, indoor blower runs at approximately 10% lower speed than **NORM** setting.

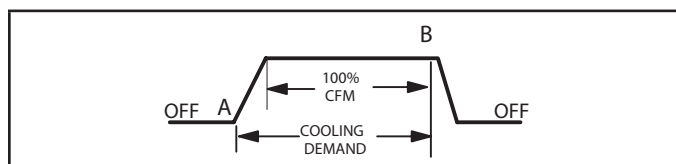
If the jumper is missing, the Air Handler Control will activate the *Configuration Jumper is Missing* alarm in and will automatically use the default factory setting in table 10. See figure 21 for jumper configurations. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on page 15.

- 7 - **Delay** – Indoor blower cooling profile, delay for cooling and heat pump operations.
- For heat pump **heating** operation only delay profiles 1 and 2 are applicable. If profiles 3 or 4 have been selected, heat pump operation will use profile 1 only.
 - For heat pump **cooling** operation all 4 profiles are operational.

If the jumper is missing, the Air Handler Control will activate the *Configuration Jumper is Missing* alarm and will automatically use the default factory setting in table 10. See figure 21 for jumper configurations.

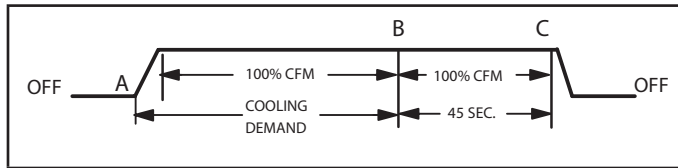
Delay Profile 1

- A - When cool or heat demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
- B - Once demand is met, motor ramps down to stop.



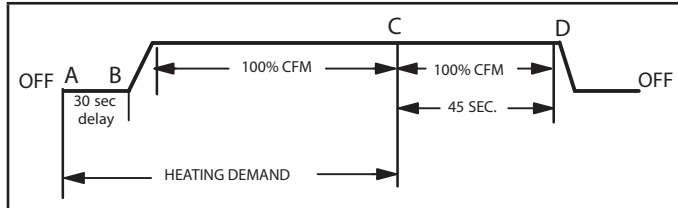
Delay Profile 2

Cooling – Air Conditioner and Heat Pump



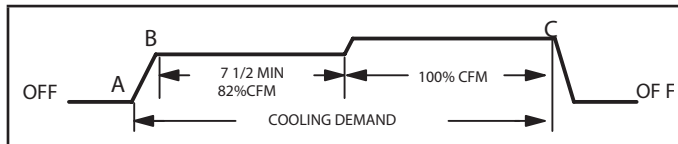
- A - When cool demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
- B - Once demand is met, motor runs at 100% for 45 seconds.
- C - Motor ramps down to stop.

Heating – Heat Pump Only



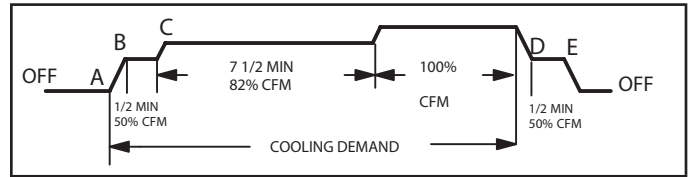
- A - When heat demand is initiated, 30 seconds **motor on** delay starts.
- B - After the **motor on** delay expires, motor ramps up to 100% and runs at 100% until demand is satisfied.
- C - Once demand is met, motor runs at 100% for 45 seconds.
- D - Motor ramps down to stop.

Delay Profile 3



- A - When cooling demand is initiated, motor ramps up to 82%.
- B - Motor runs at 82% for approximately 7.5 minutes and then ramps up to 100% (unless the demand has been satisfied) and motor runs at 100% until demand is satisfied.
- C - Once demand is met, motor ramps down to stop.

Delay Profile 4



- A - When cooling demand is initiated, motor ramps up to 50%.
- B - Motor runs at 50% for 30 seconds and ramps up to 82%.
- C - Motor runs at 82% for approximately 7.5 minutes and then ramps up to 100% (unless the demand has been satisfied) and motor runs at 100% until demand is satisfied.
- D - Once demand is met, motor runs at 50% for 30 seconds.
- E - Motor ramps down to stop.

DISPLAY

An on-board single character LED display (see figure 20 for LED display location) indicates general system status information such as mode of operation, indoor blower CFM and error codes. Multi-character strings are displayed with character ON for one second, OFF for 0.5 seconds and one second pause between the character groups.

TABLE 1. AHC System Status Codes

AHC Single Character Display	Action
Letter or Number	Unit Size Code displayed represents air handler model size and capacity . See <i>Configuring Unit Size Codes</i> in figure 22.
≡	If three horizontal bars are displayed, AHC does not recognize air handler model size and capacity. See <i>Configuring Unit Size Codes</i> in Figure 22.
.	Idle mode (decimal point / no unit operation)
A	Cubic feet per minute (cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed . Example: A 1200
C	Cooling Compressor Capacity (1 second ON, 0.5 second OFF) / % of input rate displayed/ Pause/cfm setting displayed/ Pause/ Repeat codes on systems with iComfort communicating outdoor unit. C1 or C2 displayed /Pause/cfm setting displayed/ Pause/ Repeat when installed with a non-communicating outdoor unit. Example C70 or C100 with communicating outdoor unit or C1 or C2 with non-communicating outdoor units
d	Dehumidification mode (1 second ON) / 1 second OFF) / cfm setting displayed / Pause / Repeat Codes)
d F	Defrost mode. (Y, W and O call)
H	Electric Heat Stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes. Example: H0 or H1 or H2 or H3
h	Compressor Heating Capacity (1 second ON, 0.5 second OFF) / % of input rate displayed/ Pause/cfm setting displayed/ Pause/ Repeat codes on systems with iComfort communicating outdoor unit. h1 or h2 displayed /Pause/cfm setting displayed/ Pause/ Repeat when installed with a non-communicating outdoor unit. Example h70 or h100 with communicating outdoor unit or h1 or h2 with non-communicating outdoor units
U	Discharge air sensor temperature (indoor blower must be operating) U 105

TABLE 2. AHC Configuration, Test and Error Recall (Fault and Lockout) Function

NOTE — AHC MUST BE IN IDLE MODE)		
Single Character LED Display		Action
Solid	-	Push and hold button until solid appears, release button.
Solid	-	Press and hold Solid “-” until required symbol displays . <i>H A</i> or <i>P</i>
CONFIGURING ELECTRIC HEAT SECTIONS – AHC will automatically configure electric heat when 240V power is applied.		
Solid	<i>H</i>	Air Handler Control has been enhanced to automatically configure electric heat when the electric heat harness in connected to the air handler and 240 volt power is applied. The air handler will not energize the blower and heat stages during the automatic electric heat detection process. Releasing the push button when "H" is displayed will display the stages of electric heat that were automatically detected upon power up. Example HO, H1, H2, H3, H4, H5. H2 indicates 2 stage of electric heat were detected.
INDOOR BLOWER TEST		
Solid	<i>A</i>	Release push button - control cycles indoor blower on for ten seconds at 70% of maximum air for selected capacity size unit. Control will automatically exit current active mode.
CONFIGURING UNIT SIZE CODES		
Single Character LED Display		Action
Solid	<i>P</i>	RELEASE push button - This mode allows the field to select a unit size code (number or letter) that matches the air handler model size and capacity. IMPORTANT — All field replacement controls may be manually configured to confirm air handler model size and capacity.
Blinking	<i>P</i>	<ol style="list-style-type: none"> 1. When the correct Unit Size Code is displayed, RELEASE push button. Selected code will flash for 10 second period. 2. During ten second period, HOLD push button until code stops blinking (three seconds minimum). 3. Air Handler Control will store code in memory and exit current active mode. LED display will go blank and then the Unit Size Code will display for 2 to 5 seconds. <p>NOTE - If ten second period expires, or push button is held less than 3 seconds, control will automatically exit current active mode and go into IDLE Mode without storing unit size code. If this occurs, then Unit Size Code configuring procedure must be repeated.</p>
ERROR CODE RECALL MODE (NOTE — CONTROL MUST BE IN IDLE MODE)		
Solid	<i>E</i>	To enter Error Code Recall Mode — PUSH and HOLD button until solid E appears, then RELEASE button. Control will display up to ten error codes stored in memory. If E000 is displayed, there are no stored error codes.
Solid	<i>≡</i>	Error Code Recall will automatically exit after the last stored code is displayed. To exit Error Code Recall Mode — PUSH and HOLD button until solid three horizontal bars appear, then RELEASE button. <i>NOTE - Error codes are not cleared</i>
Solid	<i>c</i>	To clear error codes stored in memory, continue to HOLD push button while the three horizontal bars are displayed. Release push button when solid c is displayed. Error codes are automatically cleared when 240V power is cycled off and then back on.
Blinking	<i>c</i>	Push and hold for one (1) second, release button. Seven-segment will display 0000 and exit error recall mode.

TABLE 3. AHC Single Character Display Alert Codes (Communicating and Non-Communicating)

Alert Code	Priority	Alert	How to Clear
E 105	Critical	The air-handler has lost communication with the rest of the system.	Equipment is unable to communicate. This may indicate the existence of other alarms / codes. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBus. Check for mis-wired and/or loose connections between the thermostat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. Generally, this is a self-recoverable error.
E 114	Critical	There is a frequency/distortion problem with the power to the air-handler.	This alarm/code may indicate transformer overloading. Check the voltage and line power frequency. Check the generator operating frequency, if the system is running on back-up power. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E 115	Critical	The 24VAC to the air-handler control is lower than the required range of 18 to 30VAC.	24-volt power low (range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. This alarm / code may require the installation of an additional or larger VA transformer.
E 120	Moderate	There is a delay in the air-handler responding to the system.	Typically, this alarm/code does not cause any issues and will clear on its own. The alarm/code is usually caused by a delay in the outdoor unit responding to the thermostat. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.
E 124	Critical	The iComfort™ thermostat has lost communication with the air-handler for more than 3 minutes.	Equipment lost communication with the icomfort™ thermostat. Check the wiring connections, ohm wires and cycle power. The alarm stops all associated HVAC operations and waits for a heartbeat message from the unit that's not communicating. The alarm/fault clears after communication is re-established.
E 125	Critical	There is a hardware problem with the air-handler control.	There is a control hardware problem. Replace the control if the problem prevents operation and is persistent. The alarm / fault is cleared 300 seconds after the fault recovers.
E 130	Moderate	An air-handler configuration jumper is missing.	Configuration jumper(s) missing on control (applicable in non-communicating applications only). Replace the jumper or put wire between terminals on control. Cleared after jumper is connected.
E 131	Critical	The air-handler control parameters are corrupted.	Reconfigure the system. Replace the control if heating or cooling is not available.
E 132	Critical	The air-handler control software is corrupted.	Recycle power. If failure re-occurs, replace the control. System reset is required to recover.
E 150	Critical	A leak of refrigerant has been detected by the refrigerant detection system.	This may indicate the presence of a leak at or in the indoor unit coil of the equipment, that will need to be repaired for proper and safe system operation. Additionally it may indicate that proper refrigerant charge will need to be verified. This fault cannot be cleared while the refrigerant detection system sensor is reporting the presence of a leak.
E 151	Critical	The refrigerant detection system sensor is reporting a fault.	The refrigerant detection sensor in the indoor unit is reporting an issue that prevents it from functioning properly, and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition.
E 154	Critical	Communications with the refrigerant detection sensor has been lost or interrupted.	There may be an issue with the wiring harness connecting the sensor of the refrigerant detection system to the indoor unit control board, either with the wiring itself or with the connector (see figure 2). Check the wiring and the connector for damage or improper connectivity. Check the sensor for damage or signs that it must be replaced. This fault clears when communications with the sensor has been reestablished, but latches for a minimum of 5 minutes. Retest of the presence of fault can be effected by pressing the RDS test button on the indoor unit control board.
E 160	Critical	The refrigerant detection system sensor is of an incorrect type.	The sensor of the refrigerant detection system is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the refrigerant detection system, but will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the RDS test button on the indoor unit control board.
E 163	Critical	The refrigerant detection system controller has failed.	There appears to be an issue with the refrigerant detection system controller on the indoor unit control board, preventing the refrigerant detection system from operating properly. This may require the replacement of the indoor unit control board. This fault clears when the refrigerant detection system controller operates normally.

TABLE 3. AHC Single Character Display Alert Codes (Communicating and Non-Communicating) (cont'd)

E 180	Critical	The iComfort™ thermostat has found a problem with the air-handler outdoor sensor.	In normal operation after control recognizes sensors, the alarm will be sent if valid temperature reading is lost. Compare outdoor sensor resistance to temperature/resistance charts in unit installation instructions. Replace sensor pack if necessary. At the beginning of (any) configuration, the air-handler control will detect the presence of the sensor(s). If detected (reading in range), appropriate feature will be set as installed and shown in the 'About' screen. The alarm / fault will clear upon configuration, or sensing normal values.
E201	Critical	The system has lost communication with the air-handler indoor blower motor.	Lost communication with indoor blower motor. Possible causes include power outage, brown-out, motor not powered, loose wiring, condensation on air handler control without cover on breaker. Problem may be on control or motor side. Cleared after communication is restored.
E202	Critical	The unit size code for the air-handler and the size of blower motor do not match.	Incorrect appliance unit size code selected. Check for proper configuring under unit size codes for air handler on configuration guide or in installation instructions. The alarm / fault clears after the correct match is detected following a reset. Remove the thermostat from the system while applying power and reprogramming.
E203	Critical	The unit size code for the air-handler has not been selected.	No appliance unit size code selected. Check for proper configuring under: Unit size codes for air handler on configuration guide or in installation instructions. Critical Alert. The alarm / fault clears after the correct match is detected following a reset. Remove the thermostat from the system while applying power and reprogramming.
E292	Critical	The air-handler's blower motor will not start.	The system will go into watchdog mode. Indoor blower motor unable to start. This could be due to seized bearing, stuck wheel, obstruction etc. Replace motor or wheel if assembly does not operate or meet performance standards. The alarm / fault clears after the indoor blower motor starts successfully.
E295	Minor	The indoor blower motor is over heating.	Indoor blower motor over temperature (motor tripped on internal protector). Check motor bearings and amps. Replace if necessary. The alarm / fault clears after blower demand is satisfied.
E310	Critical	There is a problem with air-handler discharge air sensor.	Compare outdoor sensor resistance to temperature/resistance charts in installation instructions. Replace sensor if necessary. The alarm/fault is cleared 30 seconds after fault is detected as recovered.
E312	Minor	The blower cannot provide the requested CFM due to high static.	Warning Only. Restricted airflow - Indoor blower is running at a reduced CFM (cutback mode). The variable-speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating outside of design parameters (0 to 0.8" e.g., total external static pressure). Check filter and duct system. To clear, replace filter if needed or repair/add duct. The alarm/fault is cleared after the current service demand is satisfied.
E313	Minor	The indoor and outdoor unit capacities do not match.	Check for proper configuring in installation instructions. Alarm is just a warning. The system will operate, but might not meet efficiency and capacity parameters. The alarm will clear after commissioning is complete.

TABLE 4. AHC Single Character Display Alert Codes (Communicating and Non-Communicating) (cont'd)

Alert Code	Priority	Alert	How to Clear
E345	Critical	The O relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	O relay failed. Pilot relay contacts did not close or the relay coil did not energize. Replace control. The alarm clears after a reset
E346	Critical	The R to O jumper was not removed on the air-handler control.	Configuration link(s) not removed on control. Cut / remove R to O jumper. Applicable with non communicating outdoor unit with communicating indoor unit. The fault clears after the R to O jumper is cut/removed.
E347	Critical	The Y1 relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y1 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y1 input sensed.
E348	Critical	The Y2 relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y2 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y2 input sensed.
E350	Critical	The air-handler's electric heat is not configured.	Heat call with no configured or mis-configured electric heat. Configure electric heat in the air-handler. The fault clears electrical heat is successfully detected.
E351	Critical	There is a problem with the air-handler's first stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize.	Heat section / stage 1 failed. Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The alarm clears after stage 1 relay is detected.
E352	Moderate ¹	There is a problem with the air-handler's second stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 2 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E353	Moderate ¹	There is a problem with the air-handler's third stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 3 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E354	Moderate ¹	There is a problem with the air-handler's fourth stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 4 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E355	Moderate ¹	There is a problem with the air-handler's fifth stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 5 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E371	Moderate/ Critical	Float switch sensed open. The cooling is disabled when installed with an iComfort communicating thermostat. The condensate drain line needs maintenance. The condensate drain pan float safety switch is open.	The float switch terminals on the AHC control sensed an open float switch and will shut off cooling when installed with an iComfort Communicating thermostat. After 10 minutes the Alert Code will escalate from a moderate code to a Critical code and will be displayed on the thermostat home screen. Alert clears when float switch contacts close.
E409	Moderate	The secondary voltage for the air-handler has fallen below 18VAC. If this continues for 10 minutes, the icomfort™ thermostat will turn off the air-handler.	Secondary voltage is below 18V AC. After 10 minutes, operation is discontinued. Check the indoor line voltage, transformer output voltage. The alarm clears after the voltage is higher than 20VAC for 2 seconds or after a power reset.

Target CFM Tables

BLOWER DATA

CBK48MVT-018/024 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	460	685	885	1050	460	685	885	1050
NORM	400	575	795	940	400	575	795	940
–	365	515	715	830	365	515	715	830

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 250 cfm.

BLOWER DATA

CBK48MVT-030 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	630	875	1095	1315	630	875	1095	1315
NORM	545	785	995	1195	545	785	995	1195
–	510	700	890	1075	510	700	890	1075

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 250 cfm.

BLOWER DATA

CBK48MVT-036 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	920	1255	1410	1580	920	1255	1410	1580
NORM	815	1165	1315	1435	815	1165	1315	1435
–	720	1010	1155	1285	720	1010	1155	1285

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 250 cfm.

Target CFM Tables (cont'd)

BLOWER DATA

CBK48MVT-042 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	1100	1320	1540	1760	1100	1320	1540	1760
NORM	1000	1200	1400	1600	1000	1200	1400	1600
–	900	1080	1260	1440	900	1080	1260	1440

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 450 cfm.

BLOWER DATA

CBK48MVT-048 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	1670	1870	2100	2200	1670	1870	2100	2200
NORM	1460	1670	1870	2100	1460	1670	1870	2100
–	1230	1410	1600	1800	1230	1410	1600	1800

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 450 cfm.

BLOWER DATA

CBK48MVT-060 BLOWER PERFORMANCE

0 through 0.80 in. w.g. External Static Pressure Range

"ADJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1 cfm	2 cfm	3 cfm	4 cfm	1 cfm	2 cfm	3 cfm	4 cfm
+	1695	1890	2140	2210	1695	1890	2140	2210
NORM	1525	1680	1850	2075	1525	1680	1850	2075
–	1300	1450	1630	1800	1300	1450	1630	1800

NOTES - The effect of static pressure, filter and electric heater resistance is included in the air volumes listed.

First stage cooling air volume is 70% of COOL speed setting. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.

Lennox iHarmony® Zoning System applications - minimum blower speed is 450 cfm.

IMPORTANT

Minimum Air Flow when RDS initiates mitigation is factory set at 350 CFM Per Ton.

Requirements

WARNING

Excessive Weight Hazard - Use two or more people when moving and installing the unit. Failure to do so can result in back or other type of injury.

IMPORTANT

CBK48MVT units include a factory-installed check/expansion valve which will provide optimal refrigerant control and system performance with outdoor units of varying capacities. These units must be installed as a part of a matched system as outlined in the CBK45UHVT Product Specification bulletin (EHB).

These instructions are intended as a general guide and do not supersede local or national codes in any way. Consult authorities having jurisdiction before installation.

Compliance with all local, state, or national codes pertaining to this type of equipment should be determined prior to installation. Read this instruction manual, as well as the instructions supplied in separate equipment, before starting the installation.

In addition to conforming to manufacturer's installation instructions and local municipal building codes, installation of Lennox air handler units (with or without optional electric heat), MUST conform with National Fire Protection Association (NFPA) standards: "Standard for Installation of Air Conditioning and Ventilation Systems" (NFPA No. 90A) and "Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems" (NFPA No. 90B).

All models are designed for indoor installation only. The installation of the air handler, field wiring, duct system, etc. must conform to the requirements of the National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States, and any state laws, and local ordinances (including plumbing or waste water codes).

Local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual.

Install the conditioned air plenum, ducts and air filters (provided) in accordance with NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems (latest edition).

The air handler is shipped from the factory completely assembled. The unit is provided with flanges for the connection of the duct system.

Do not remove the cabinet knockouts until it has been determined which knockouts will need to be removed for the installation.

Select the air discharge position which best suits the site conditions. Consider required clearances, space, routing requirements for refrigerant line, condensate disposal, filters, duct system, wiring, and accessibility for service. Refer to the rating plate on the air handler for specific information.

WARNING



Danger of explosion. Keep flammable materials and vapors, such as gasoline, away from air handler. Place air handler so that heating elements are at least 18 inches (46 cm) above the floor for a garage installation. Failure to follow these instructions can result in death, explosion, or fire.

IMPORTANT

Excessive condensation may occur if the unit is installed in a warm, humid place. When the unit is installed in an unconditioned space, apply sealant around electrical wires, refrigerant piping and condensate lines at the point where they enter the cabinet.

Apply sealant on the inside of the cabinet at the point where the electrical wires exit through the conduit opening. This will also keep warm and moist unconditioned air out of the air handler cabinet where it will form condensate on the cooler control box and electrical controls.

NOTES –

During cooling operation, excessive sweating may occur if the air handler is installed in a warm and humid space.

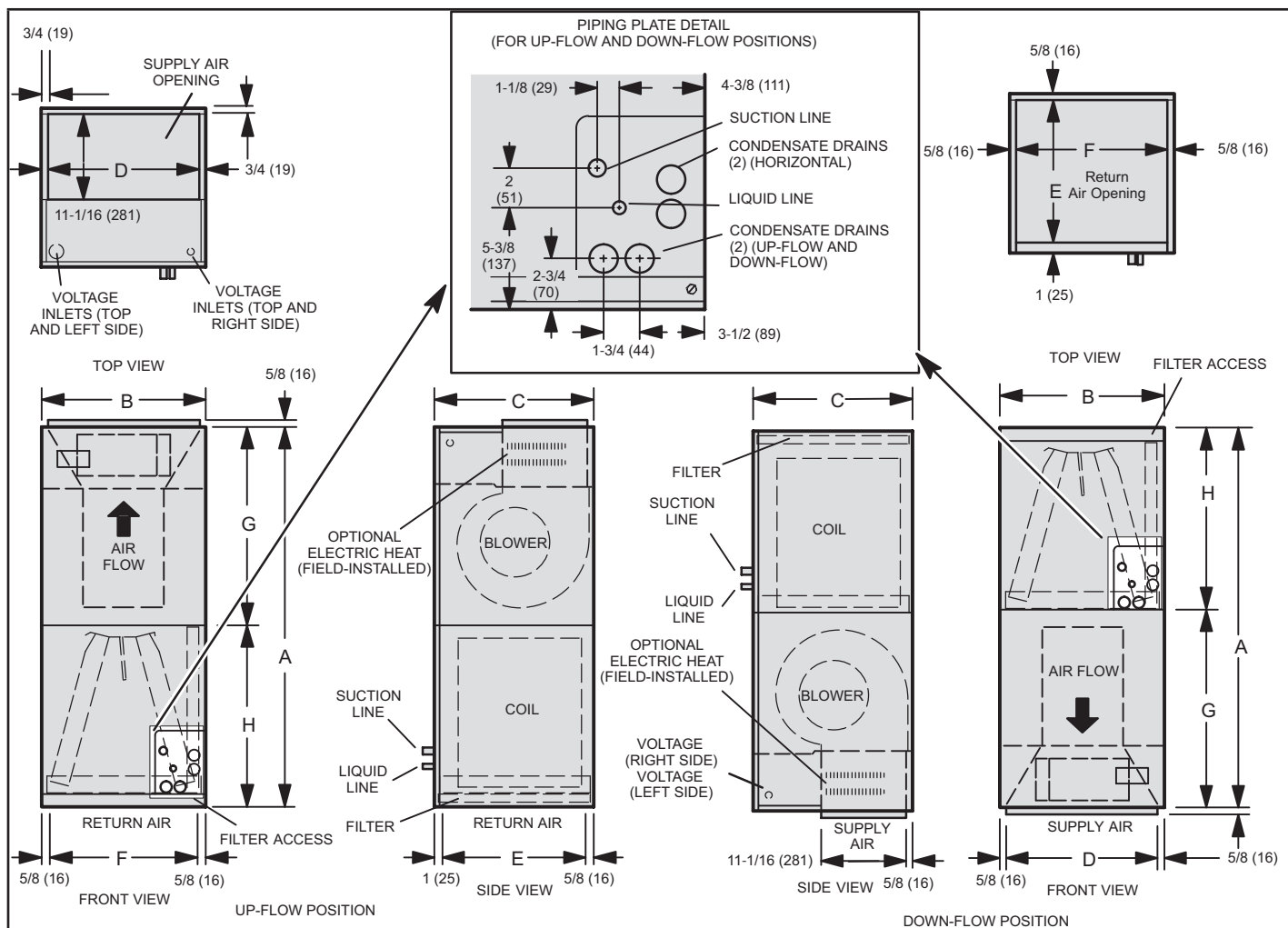
If installed in an unconditioned space, sealant should be applied around the electrical wires, refrigerant tubing, and condensate lines where they enter the cabinet.

Electrical wires should be sealed on the inside where they exit the conduit opening. Sealant is required to prevent air leakage into, and condensate from forming inside of, the air handler, the control box, and on the electrical controls.

This unit is approved for installation clearance to combustible material as stated on the unit rating plate. Accessibility and service clearances must take precedence over combustible material clearances.

The air handler must be installed so that free access is allowed to the coil/filter compartment and blower/control compartment.

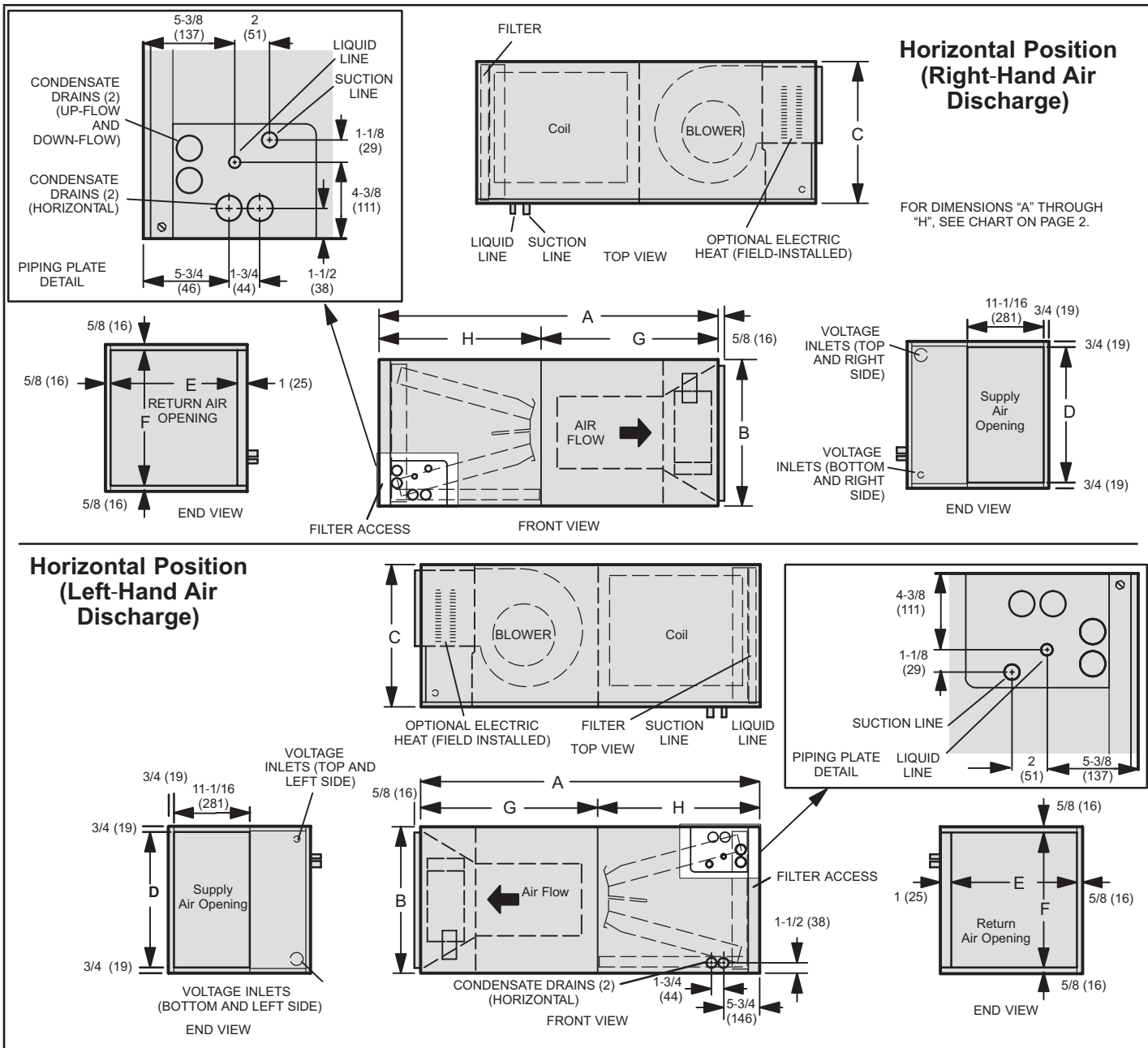
Upflow and Downflow Unit Dimensions



CBK48MVT Common Dimensions - Inches (mm)

Dim.	-018/024	-030/-036	-042/-048	-060
A	49-1/4 (1251)	51 (1295)	58-1/2 (1486)	62-1/2 (1588)
B	21-1/4 (540)	21-1/4 (540)	21-1/4 (540)	21-1/4 (540)
C	20-5/8 (524)	22-5/8 (575)	24-5/8 (625)	24-5/8 (625)
D	19-3/4 (502)	19-3/4 (502)	19-3/4 (502)	19-3/4 (502)
E	19 (483)	21 (533)	23 (584)	23 (584)
F	20 (508)	20 (508)	20 (508)	20 (508)
G	24-5/8 (625)	26-3/8 (670)	27-7/8 (708)	27-7/8 (708)
H	24-5/8 (625)	24-5/8 (625)	30-5/8 (778)	34-5/8 (879)

Horizontal Left- and Right-Hand Discharge Unit Dimensions



CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

Installation Clearances

NON-DUCTED RETURN CLOSET INSTALLATION

The air handler can be installed in a closet with a false bottom to form a return air plenum. It may also be installed with a return air plenum under the air handler.

Louvers or return air grilles are field-supplied. Local codes may limit application of systems without a ducted return to single-story buildings.

When a CBK48MVT unit is installed in a closet with a louvered return opening, the minimum open area for the louvers will be:

- 380 square inches for -018 and -024 models;
- 420 square inches for -030 and -036 models;
- 460 square inches for -042 thru -060 models

If the free area is not known, assume a 25% free area for wood or a 75% free area for metal louvers or grilles. Using the louver dimensions and the 25% or 75% assumption, determine if the open area meets the minimum open area listed above.

If a return air plenum is used, the return air grille should be immediately in front of the opening in the plenum to allow for the free flow of return air. When not installed in front of the opening, there must be adequate clearance around the air handler to allow for the free flow of return air.

WARNING

During blower operation, the ECM motor emits energy that may interfere with pacemaker operation. Interference is reduced by both the sheet metal cabinet and distance.

WARNING

Improper installation of the air handler can result in personal injury or death.

Do not allow external combustion products or other contaminants to enter the return air system or to be mixed with air that will be supplied to the living space. Use sheet metal screws and joint tape or duct mastic to seal return air system to air handler. In platform installations, the air handler should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the air handler. Allow absolutely no sagging, cracks, gaps, etc.

For no reason should return and supply air duct systems ever be connected to or from other heating devices such as a fireplace or stove, etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

Installing the Unit

WARNING

To prevent serious injury or death:

1. Lock-out/tag-out before performing maintenance.
2. If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the "OFF" position before performing maintenance.
3. Always keep hands, hair, clothing, jewelry, tools, etc. away from moving parts.

These units are factory-configured for upflow and horizontal right-hand discharge installation. For downflow or horizontal left-hand discharge, certain field modifications are required.

Every working procedure that affects safety means shall only be carried out by competent persons. This appliance is not to be used 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 use of the appliance by a person responsible for their safety. Examples of such working procedures are breaking into the refrigerating circuit, opening of sealed components, and opening of ventilated enclosures.

- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- 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 equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, the appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- 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.
- Ensure that the area is in the 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.

- Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards
- All field joints shall be accessible for inspection prior to being covered or enclosed
- 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 as applicable:
 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. Markings on the equipment should 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.
- For systems containing refrigerant, all repair and maintenance to electrical components shall include initial safety checks and component inspection procedures such as that capacitors are discharged 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, and that there is continuity of earth bonding. 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 that is reported to the owner of the equipment, so all parties are advised.

NOTE –*Sealed electrical components shall be replaced, not repaired.*

NOTE –*Intrinsically safe components must be replaced, not repaired.*

NOTE –*All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out with work in confined spaces being avoided.*

- 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 ac-

ceptable 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 that 12.5 % refrigerant 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 pipe-work. 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.

- 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 and, since flammability is a consideration, procedures such as safely remove refrigerant following local and national regulations, purging the circuit with inert gas, evacuating (optional for A2L), purging with inert gas (optional for A2L), or opening the circuit by cutting or brazing be adhered to. The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. 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 be able to perform the required work. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and working area is well ventilated.

DISASSEMBLE/REASSEMBLE AIR HANDLER UNITS

The air handler units consists of two factory-assembled sections. It may be necessary to disassemble the sections when positioning the unit for installation.

To disassemble:

- 1 - Remove access panels.
- 2 - Remove both blower and coil assemblies. This will lighten the cabinet for lifting.

- 3 - Remove one screw from the left and right posts inside the unit. Remove one screw from each side on the back of the unit. Unit sections will now separate.

To reassemble:

- 1 - Align cabinet sections together.
- 2 - Reinstall screws.
- 3 - Replace blower and coil assemblies.
- 4 - Replace access panel.

UPFLOW APPLICATION

Use the following procedures to configure the unit for up-flow operations:

- 1 - Remove access panels.
- 2 - Remove and discard the horizontal drip shield (-060 model, used only on horizontal applications) and the corrugated padding between the blower and coil assembly.
- 3 - The horizontal drain pan must be removed when the coil blower is installed in the upflow position. Removing the horizontal drain pan will allow proper air flow and increased efficiency.
- 4 - After removing the horizontal drain pan, place the unit in the desired location. Set unit so that it is level. Connect return and supply air plenums as required using sheet metal screws as illustrated in figure 1.
- 5 - Install units that have no return air plenum on a stand that is at least 14" from the floor to allow for proper air return. Lennox offers an optional upflow unit stand as listed in table 5.

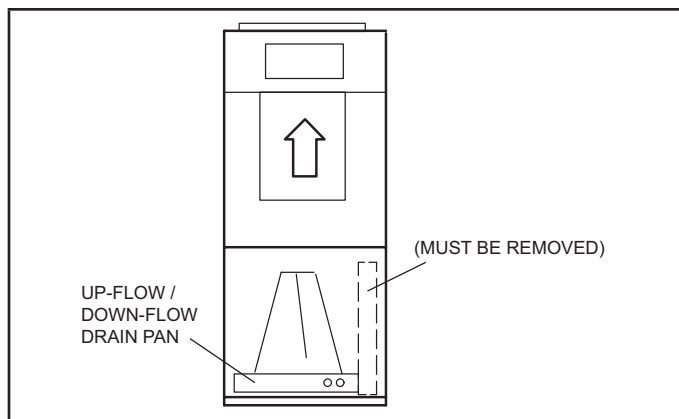


FIGURE 8. Upflow Configuration

TABLE 5. Optional Side-Return Unit Stand (Upflow Only)

Model	Kit Number
All unit sizes	45K32

HORIZONTAL RIGHT-HAND DISCHARGE APPLICATION

Use the following procedures to configure the unit for horizontal right-hand discharge operations:

NOTE – For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

NOTE – When air handler is located above a finished space, the secondary drain pan must have a larger foot-print than the air handler. In addition, a 3/4" (19.1mm) overflow drain line must be:

- Connected to secondary drain pan

or

- Connected to the overflow drain outlet of the air handler drain pan.

NOTE - (-060 Model Only) Before operating the unit, remove access panels and the horizontal drip shield and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields.

NOTE - (-060 Model Only) Install the horizontal shield on the front edge of the horizontal drain pan as illustrated in figure 2.

- 1 - No further adjustment is necessary. Set unit so that it is sloped 1/4" towards the drain pan end of the unit.
- 2 - If the unit is suspended, the entire length of the cabinet must be supported. If you use a chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) to support the length of the cabinet. Use securing screws no longer than 1/2" to avoid damaging the coil or filter as illustrated in figure 10. Use sheet metal screws to connect the return and supply air plenums as required.

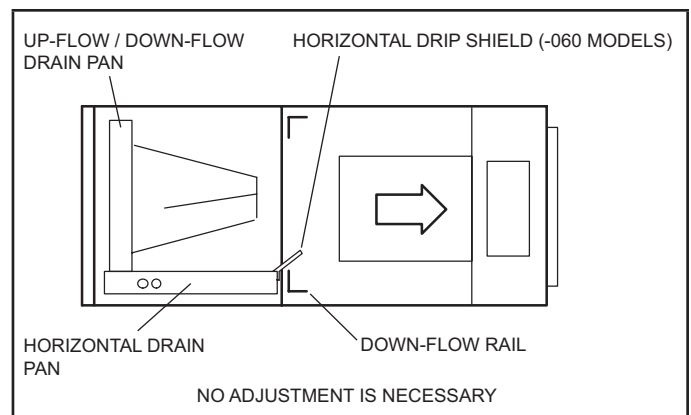


FIGURE 9. Right-Hand Discharge Configuration

HORIZONTAL RIGHT-HAND DISCHARGE APPLICATION IN HIGH-HUMIDITY AREAS

For horizontal applications in high humidity areas, remove the downflow rail closest to the drain pan.

To remove rail:

- 1 - Remove the screws from the rail at the back of unit and at the cabinet support rail.
- 2 - Remove the downflow rail then replace screws.
- 3 - Seal around the exiting drain pipe, liquid line, and suction line to prevent humid air from infiltrating into the unit.

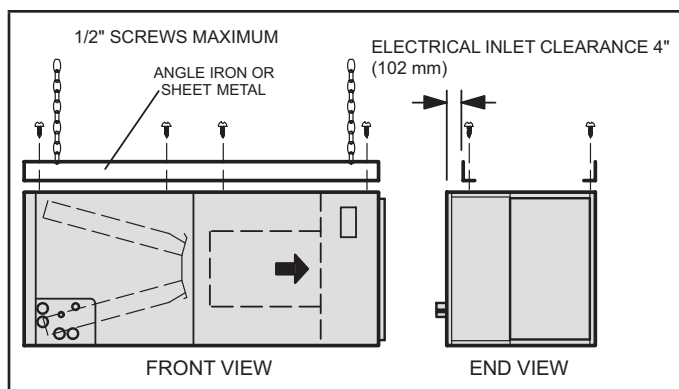


FIGURE 10. Suspending Horizontal Unit

! IMPORTANT

When removing the coil, there is possible danger of equipment damage and personal injury. Be careful when removing the coil assembly from a unit installed in right- or left-hand applications. The coil may tip into the drain pan once it is clear of the cabinet. Support the coil when removing it.

HORIZONTAL LEFT-HAND DISCHARGE APPLICATION

NOTE – For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

NOTE - (-060 Model Only) Before operating the unit, remove access panels and the horizontal drip shield and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields. (The shields are used for downflow applications only.)

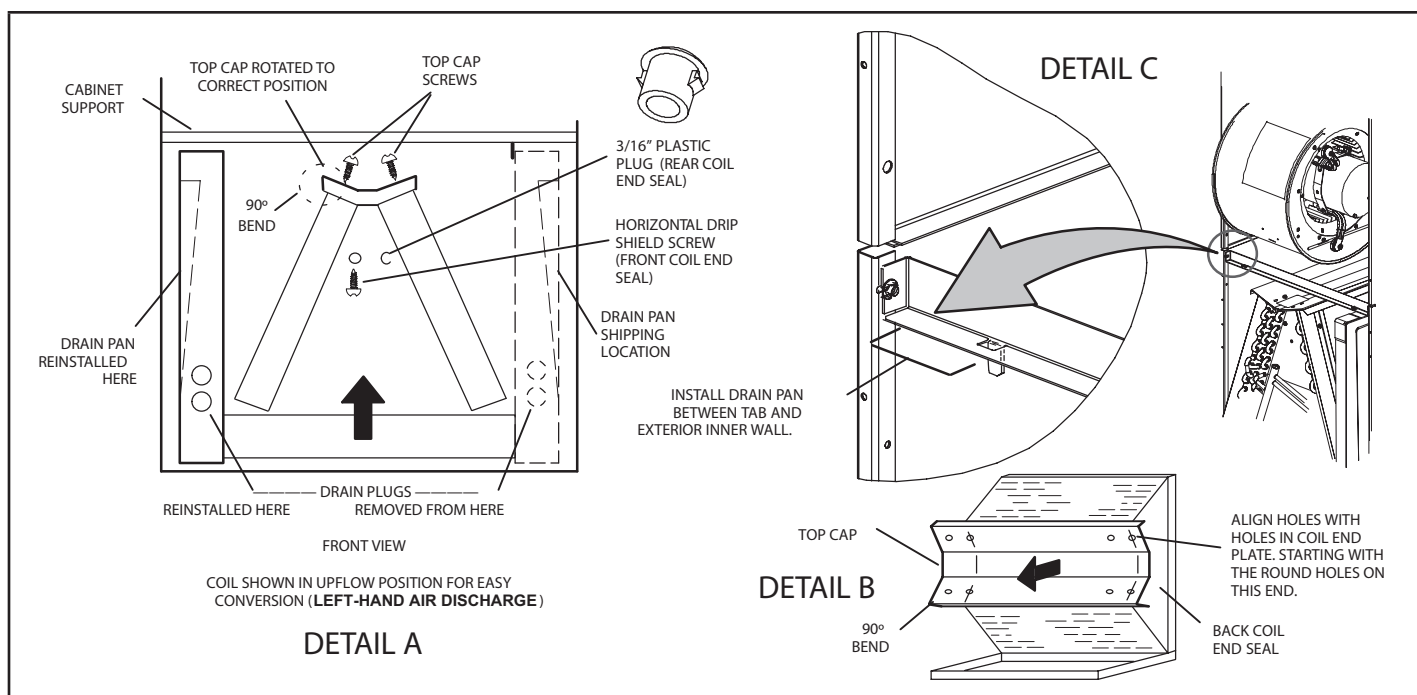


FIGURE 11. Field Modification for Left-Hand Discharge

Use the following procedures to configure the unit for horizontal left-hand discharge operations:

- 1 - Pull the coil assembly from unit. Pull off the horizontal drain pan.
- 2 - Remove the drain plugs from back drain holes on horizontal drain pan and reinstall them on front holes.

! IMPORTANT

After removal of drain pan plug(s), check drain hole(s) to verify that drain opening is fully open and free of any debris. Also check to make sure that no debris has fallen into the drain pan during installation that may plug up the drain opening.

- 3 - Rotate drain pan 180° front-to-back and install it on the opposite side of the coil.
- 4 - Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal as illustrated in figure 14 on page 26.
- 5 - Rotate horizontal drip shield 180° front-to-back.
- 6 - Remove plastic plug from left hole on coil front end seal and reinstall plug in back hole. Reinstall horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.

NOTE – Be very careful when reinstalling the screws into the coil end plate engaging holes. Misaligned screws may damage the coil.

- 7 - From the upflow position, flip cabinet 90° to the left and set into place. Replace blower assembly. Secure coil in place by bending down the tab on the cabinet support rail as illustrated in figure 11.

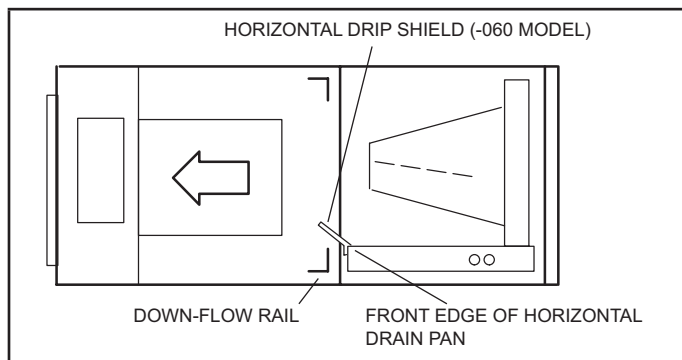


FIGURE 12. Left-Hand Discharge Configuration

- 8 - Install the horizontal shield (-060 model) on the front edge of the horizontal drain pan as illustrated in figure 12.

NOTE – For horizontal applications in high humidity areas, remove the downflow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.

- 9 - Knock out drain seal plate from access door. Secure plate to cabinet front flange with screw provided.
- 10 - Flip access door and replace it on the unit.
- 11 - Set unit so that it is sloped 1/4" toward the drain pan end of the unit. Connect return and supply air plenums as required using sheet metal screws.
- 12 - If suspending the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" to avoid damage to coil or filter, as illustrated in figure 10. Connect return and supply air plenums as required using sheet metal screws.

DOWNFLOW APPLICATION

Use the following procedures to configure the unit for downflow operations:

IMPORTANT

If electric heat section with circuit breakers (ECB48) is installed in a CBK48MVT unit in a downflow application, the circuit breakers must be rotated 180° to the UP position. See ECB48 installation instructions for more details.

Table 6 outlines the sizes of the various drip shields.

NOTE - (-060 Model Only) Remove access panels and horizontal drip shield from the corrugated padding between the blower and coil assembly.

- 1 - Remove the coil assembly from the unit.
- 2 - For best efficiency and air flow, remove the horizontal drain pan from the units in downflow positions as illustrated in figure 13.
- 3 - Rotate cabinet 180° from the upright position. See figure 13. You may need to first remove the blower assembly to lighten the cabinet for lifting.
- 4 - Foam tape that is provided creates a seal between the drip shield and the coil so that water does not leak into the air stream. The foam tape pieces are precut. Apply the tape to the drip shields as illustrated in figure 14 and specified as follows:
 - Apply two pieces of foam tape provided down both ends of each shield. The tape should measure 4-3/4" X 2" (120 X 25 mm). Ensure that the tape covers both sides of the shield equally.
 - Apply the longer piece of 1 inch wide foam tape between the end pieces of tape.
- 5 - From the underside of the coil, install the downflow drip shield firmly in place as illustrated in figure 18.

NOTE – (-048-060 Models Only): Steps 6 and 7 are only applicable for -048-060 models. For other models, proceed to next step.

- 6 - Remove wide top cap from the coil assembly ONLY if unit is a -048, -060.
- 7 - Install narrow top cap ONLY if unit is a -048, -060.

TABLE 6. Downflow Drip Shields (Tape Required)		
Units	Length	Width
-018/024	Not Required	Not Required
-030	15-7/8"	4-11/16"
-036, -042	17-7/8"	4-11/16"
-048, -060	19-7/8"	4-11/16"

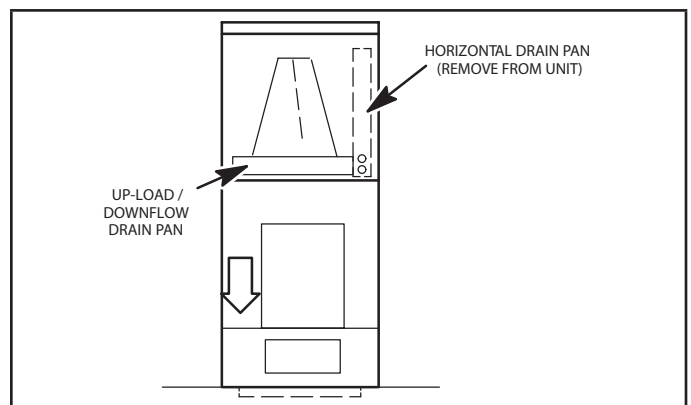


FIGURE 13. Downflow Discharge Position

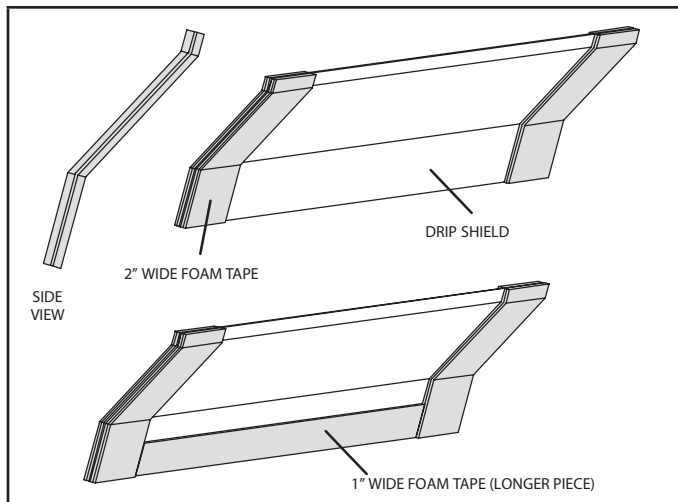


FIGURE 14. Applying Foam Tape to Drip Shield

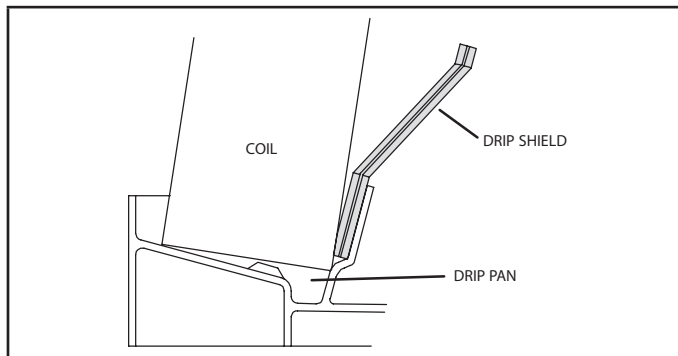


FIGURE 15. Downflow Drip Shields

- 8 - Replace the coil assembly and blower if you have removed it. Replace the coil access panel.
- 9 - Set the unit so that it is level. Using sheet metal screws, connect the return and supply air plenums as required.

NOTE - For downflow application, metal or Class I supply and return air plenums must be used.

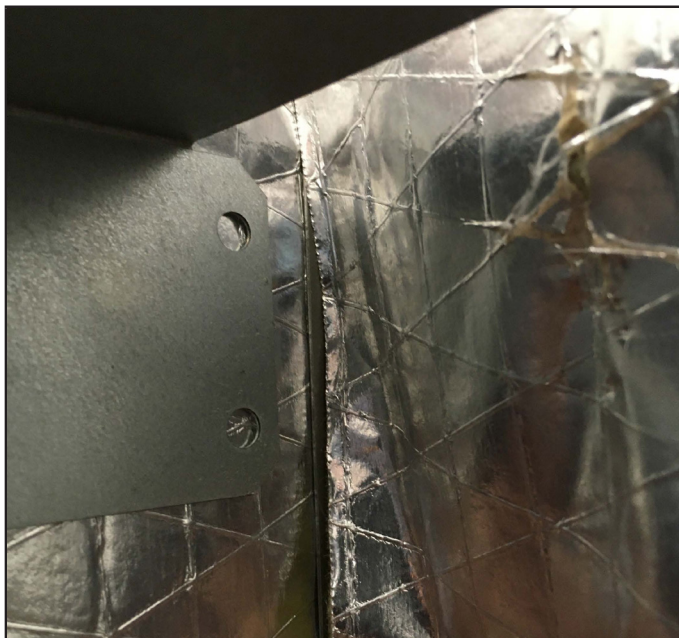


FIGURE 16. Location of AHU Cabinet Back Flange

⚠ IMPORTANT

Downflow air baffles are required for -048 and -060 models only in Downflow position. Please follow the steps below for proper installation. These must be performed after the downflow conversion has taken place.

- 1 - Insert downflow air baffles. Make sure longer flanges are facing towards the fin pack of the AHU evaporator coil. Distance from longer flange of the downflow air baffles from the bottom of the drain pan should be 16 1/4".
 - 2- Slide the back lip of the downflow air baffle under the flange located at the back of the AHU cabinet. No screws are required at back.
 - 3- Check that downflow air baffles are leveled.
- Before proceeding with step 4, please make sure distance measure is 16 1/4". and downflow air baffles are leveled. If not, repeat steps 1-4.
- 4- Attach the downflow air baffles with self-tapping screws. Line up the screws with the two holes provided in the air baffles.
 - 5- Secure the downflow air baffles in place by attaching two screws in the holes drilled in the previous step.



FIGURE 17. Downflow Baffle Installation

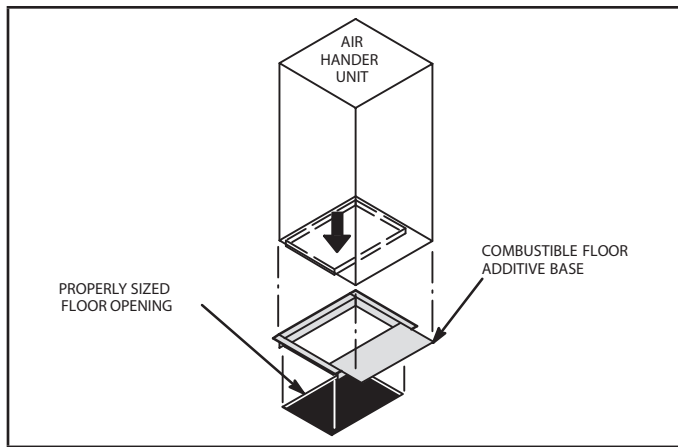


FIGURE 18. Downflow Combustible Flooring Base

- 10 - For downflow installation on combustible flooring with a 25KW Electric Heater Only, an additive base must be used as illustrated in figure 18. See CBK48MVT Unit Nameplate or Product Specifications (EHB) for Downflow Combustible Flooring Base Kit available for this air handler.
- 11 - Cut an opening appropriately sized for combustible base. Base dimensions are illustrated in figure 19. After opening has been cut, set the additive base into opening. Connect outlet air plenum to the additive base. Set the unit on the additive base so flanges of the unit drop into the base opening and seal against the insulation strips. The unit is now locked in place. Install return air plenum and secure with sheet metal screws.

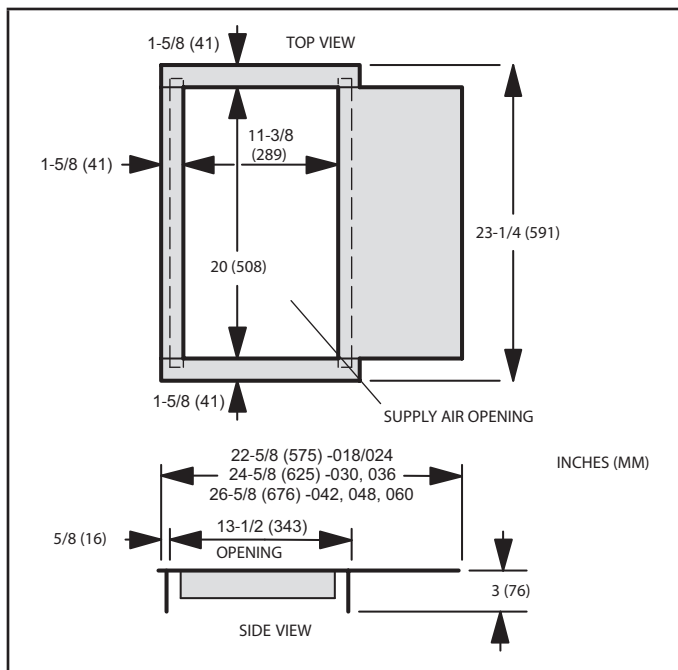


FIGURE 19. Downflow Combustible Base Dimensions

Sensor Connections and Wiring Requirements

The following are sensor connections and wiring requirements for the discharge air and outdoor air sensors.

Discharge Sensor (DAT)

The Air Handler Control has two screw terminals marked **Discharge Air Sensor**. The sensor is **REQUIRED** for **EVENHEAT** operation and is field mounted and ordered separately using Lennox Catalog # 88K38.

In the **EVENHEAT** mode, the discharge air sensor cycles the electric heating elements as needed to maintain the Air Handler control **EVENHEAT** jumper selected discharge setpoint.

The discharge air sensor should be mounted downstream of the electric heat elements as illustrated in figure 15, detail A. It must be placed in a location with unobstructed airflow, where other accessories (such as humidifiers, UV lights, etc.) will not interfere with its accuracy.

Wiring distance between the Control and the discharge air sensor should not exceed 10 feet (3 meters) when wired with 18-gauge thermostat wire.

Outdoor Air Sensor

This is a two screw terminal for connection to a Lennox X2658 outdoor temperature sensor. The Control takes no action on the sensor status other than to communicate the temperature to the RSBus network. Wiring distance between the AHC and outdoor temperature sensor should not exceed 200 feet when wired with 18-gauge thermostat wire.

- Minimum temperature: -40°F (-40°C)
- Maximum temperature: 70°F (158°C)

Float Switch

IMPORTANT – The float switch connection to monitor the condensate float switch and shut down cooling when an open float switch is detected, only applies to systems with communicating thermostats. Air handlers controlled by a conventional 24VAC thermostat must have the float switched wired in series with the the "Y" wire to the outdoor unit.

The air handler control has two screw connections for connection to a normally closed (N.C.) condensate drain float switch. When the N.C. condensate float switch contacts open, the cooling will be disabled for systems controlled by a thermostat. Alert Code E371 "Float switch Sensed open" will be displayed indicating Maintenance is required on condensate drain line. After 10 minutes, the homeowner will be alerted with a critical alert message on thermostat home screen. The alert will automatically clear when the float switch contacts close.

AIR HANDLER CONTROL 9-PIN CONNECTOR (P8)

- 1 - Air Handler (no electric heat) – Two wire factory harness (wired to pins 7 and 8) which provides 230 VAC power to Air Handler Control.
- 2 - Air Handler (with electric heat) – Eight wire factory harness (all pin positions are wired as noted in table 7).

NOTE - See figure 3, detail B for wire colors.

TABLE 7. Electric Heat Connection (P8)

Position	Function / Description
1	Heat stage 1 relay coil
2	Heat stage 2 relay coil
3	Relay coil return
4	Heat stage 3 relay coil
5	Heat stage 4 relay coil
6	Heat stage 5 relay coil
7	L1 230VAC supply from heater kit
8	L2 230VAC supply from heater kit
9	Not used

CONTROL CONNECTIONS AND WIRING REQUIREMENTS

This section provides information on communicating and non-communicating control connections and wire run lengths.

TABLE 8. Air Handler Control Connections – Communicating

Label	Label	Function
Thermostat	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Outdoor Unit	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Zone	C	For Connection to Harmony RVS (Remote Vacation Switch)
	N/C	See Harmony Zoning Instruction Manual for details
Alarm	C	RDS mitigation will close the connection between the two terminals to control an external alarm.
	N/C	
Float SW	R	N.C. condensate float switch connections
	SW	(Systems with communicating thermostats only)

TABLE 9. Run Length – Communicating

Wire Run Length	AWG #	Insulation / Core Types
Maximum length or wiring for all connections on the RSbus is limited to 1500 feet (457 meters)	18	Color-coded, temperature rating 95°F (35°C) minimum, solid core. (Class II Rated Wiring)

TABLE 10. Run Length – Non-Communicating

Wire Run Length	AWG #	Insulation / Core Types
Less than 100' (30m)	18	Color-coded, temperature rating 95°F (35°C) minimum, solid core. (Class II Rated Wiring)
More than 100' (30m)	16	

TABLE 11. Air Handler Control Connections

Indoor Control Terminal Label	Function		
	Non-Communicating Room Thermostat (Indoor and Outdoor -24 volts)	Indoor Communicating Outdoor Non-Communicating	Full Communication (Indoor & Outdoor)
W1 (Input)	Indicates a first-stage heating demand. This input is an anticipator for the thermostat.	N/A	N/A
W2 (Input)	Indicates a second-stage heating demand. W1 input must be active to recognize second-stage heat demand.	N/A	N/A
W3 (Input)	Indicates a third-stage heating demand. W1 and W2 inputs must be active to recognize third-stage heat demand.	N/A	N/A
Y1 & Y2 (Input/ Output)	Room thermostat inputs 24 volts to the Y1 and Y2 terminals on the indoor control. The 24 volt signal is then passed through to the outdoor unit. During a second-stage demand, both Y1 and Y2 are active. The Y1 terminal is connected to Y2 by link (Solid jumper on control that would be cut for 2 stage applications)	The room thermostat communicated with the indoor control. The indoor control outputs 24 volts on its Y1 and Y2 terminals which are hard wired to the non-communicating outdoor unit.	In a full communicating system, no wiring is required on Y1 and Y2 terminals.
G (Input)	Indicates a 24 volt indoor blower demand.	In a communicating system, "G" input to indoor control is used by non-communicating IAQ devices (such as LVCS, HRV or ERV) to ensure indoor blower demand.	In communicating system "G" input to indoor control is used by non-communicating IAQ devices (such as LVCS, HRV or ERV) to ensure indoor blower demand.
C	The C terminal shall interconnect the signal ground of the room thermostat with secondary transformer ground (TR) and chassis ground (GND)		
R	The R terminal shall be capable of providing the power to the thermostat and all the associated loads.		
O (Input/Output)	Room thermostat inputs 24 volts to the O terminal on the indoor control. The O terminal is connected to R by link (Solid jumper on control that would be cut if unit was a heat pump)	The room thermostat communicated with the indoor control. The indoor control outputs 24 volts on its O terminals which are hard wired to the non-communicating outdoor unit. If there is 24 volts on O, the reversing valve will be energized and the outdoor unit will run in the cooling mode. If O does not have 24 volts, the outdoor unit will run in heating mode.	In a full communicating system, O terminal is not wired.
DS (Input)	Used for Harmony III zoning systems, or thermostat with dehumidification capability. The DS terminal is connected to R by link (Solid jumper on control that would be cut if for the above applications). Harmony III control - This will allow the control to vary the voltage signal to the indoor blower motor to control required CFM. Dehumidification - Allow a 24 volt signal on the DS to turn off and on the dehumidification mode.	N/A	N/A
DH (Output)	The DH terminal provides a 24VAC output for dehumidification needs in communicating systems.		
H (Output)	The H terminal provides a 24VAC output for humidification needs in both communicating and non-communicating mode.		
L (Input)	The L terminal is provided for connection to devices with Lennox System Operation Monitor (LSOM) capabilities. The control interprets the fault signals and transmits them as an alarm message on the communication line. There are ten (10) identified LSOM fault codes. Each is mapped to the communication Alarm codes.		

JUMPER & LINK GUIDE

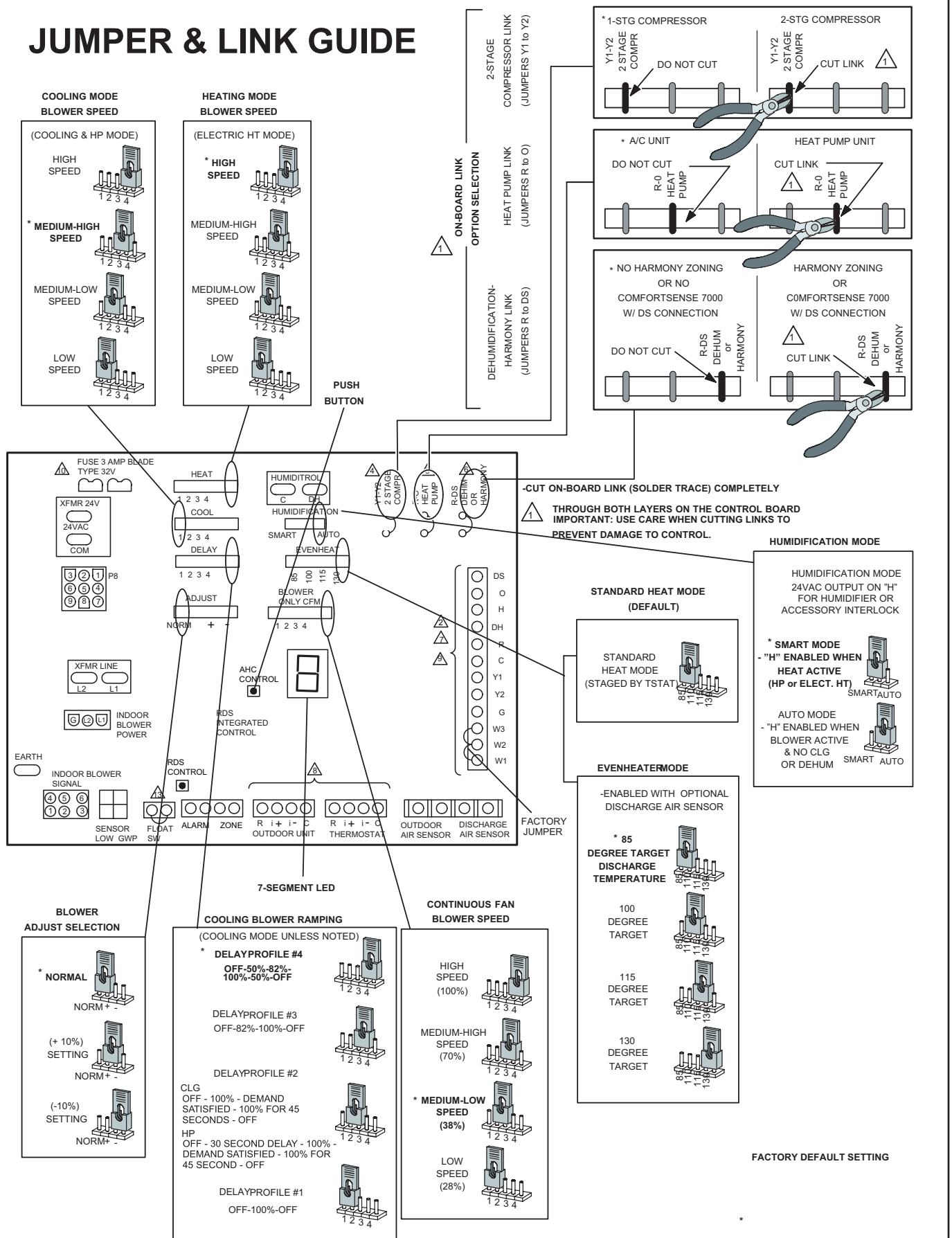


FIGURE 20. Air Handler Configuration

Sensor / Bracket Installation

Vertical Configuration

Leak detection sensor and bracket are factory-installed for vertical installation. No sensor relocation is required if installing in vertical configuration.

NOTE – The leak detection sensor needs to be relocated for horizontal right, horizontal left, and downflow configurations.

Horizontal Right Configuration

- 1 - Remove sensor bracket assembly from vertical position (shown in figure 21). Do not remove sensor from bracket, and do not disconnect or reroute sensor wire from the control panel area.



FIGURE 21

- 2 - Follow instructions for right-hand discharge as outlined in previous section.
- 3 - With air handler unit panels removed, install sensor bracket assembly to the unit by lining up holes in the center support bracket as shown in figure 22. Note: sensor should be facing toward the inside of the unit.

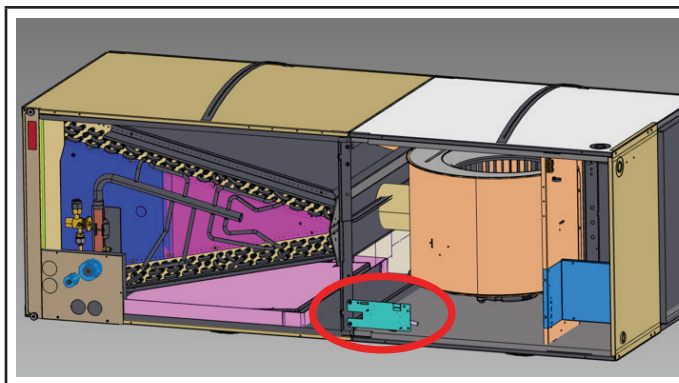


FIGURE 22

- 4 - Loop any excess wire through the plastic “M” wire clips located on the inside of the center support bracket.

Horizontal Left Configuration

- 1 - Remove sensor bracket assembly from vertical position. Do not remove sensor from bracket, and do not disconnect or reroute sensor wire from the control panel area. Set the sensor bracket assembly aside.
- 2 - Follow instructions for left-hand discharge as outlined in previous section. Instructions are also located on sticker on top of coil assembly.
- 3 - After coil assembly and center support bracket are reinstalled into unit, with air handler unit panels removed, install sensor bracket assembly to the center support bracket by lining up the holes as shown in figure 23.

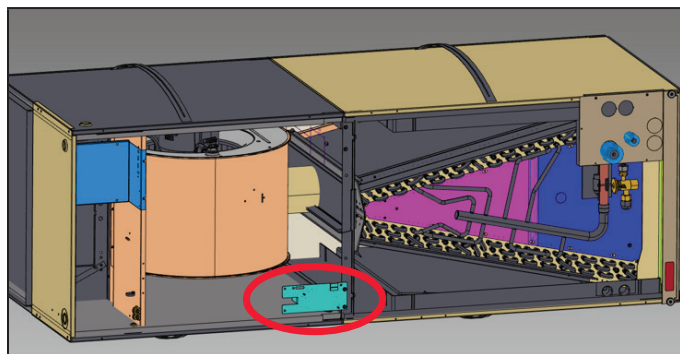


FIGURE 23

- 4 - Loop any excess wire through the plastic “M” wire clips located on the inside of the center support bracket.

Downflow Configuration

- 1 - Remove sensor bracket assembly from vertical position. Do not remove sensor from bracket, and do not disconnect or reroute sensor wire from the control panel area. Set the sensor bracket assembly aside.
- 2 - Follow the downflow conversion installation instructions located in the downflow installation kit (ordered separately).

NOTE – Refer to the downflow kit installation instructions for more details on unit configuration.

- 3 - With air handler access panels removed, install sensor bracket assembly to the side of the cabinet by lining up holes as shown in figure 24.

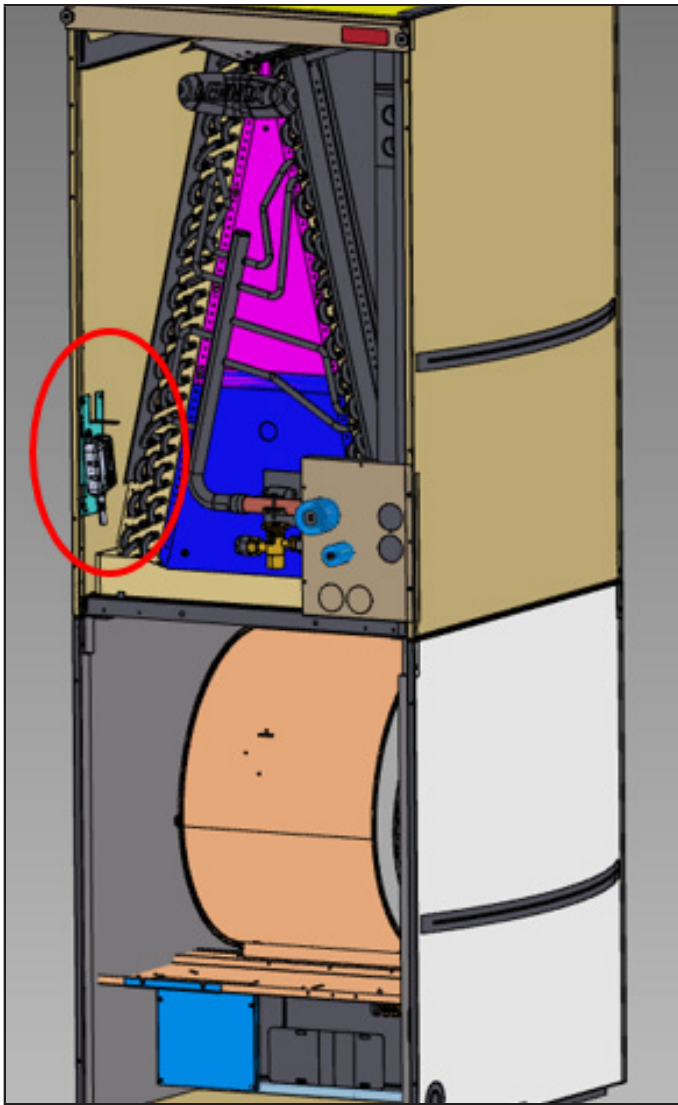


FIGURE 24

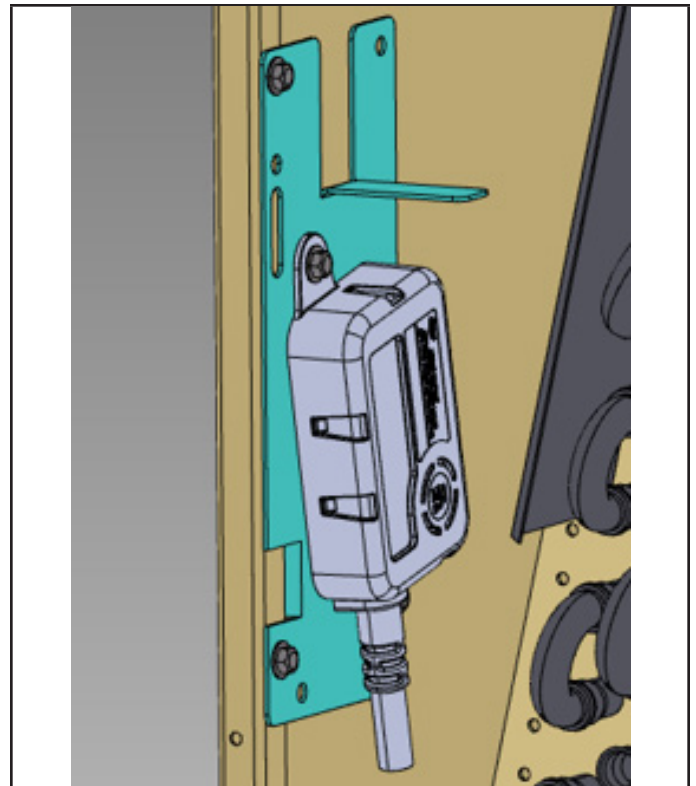


FIGURE 24 (Detail)

- 4 - Loop and bundle any excess sensor wire with a wire tie.

Brazing Connections

IMPORTANT

Braze-free fittings must conform with UL207 or ISO14903 (latest edition).

Refrigerant lines must be connected by a qualified technician in accordance with established procedures.

IMPORTANT

Refrigerant lines must be clean, dry, refrigerant-grade copper lines. Air handler coils should be installed only with specified line sizes for approved system combinations.


Handle the refrigerant lines gently during the installation process. Sharp bends or kinks in the lines will cause a restriction.

Do not remove the caps from the lines or system connection points until connections are ready to be completed.

WARNING

Poly vinyl ether (PVE) oils used with R-454B refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

WARNING

 Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture. Check the high and low pressures before applying heat.

WARNING



Danger of explosion!

Can cause equipment damage, injury, or death.

When using a high pressure gas such as nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

WARNING



When using a high pressure gas such as nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas.

Wear gloves and protective goggles or face shield to protect against burns.

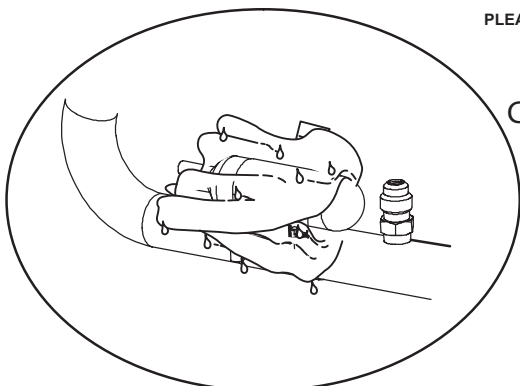
Wash hands with soap and water after handling brazing alloys and flux.

IMPORTANT

To prevent the build-up of high levels of nitrogen when purging, it must be done in a well-ventilated area. Purge low-pressure nitrogen (1 to 2 psig) through the refrigerant piping during brazing. This will help to prevent oxidation and the introduction of moisture into the system.

Refrigerant system installations shall be installed and tested per ASHRAE Standard 15.2, Section 10.0 (latest edition).

PLEASE READ IMPORTANT ISSUES CONCERNING BRAZING

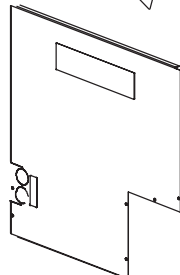


C USE A WET RAG TO PROTECT CTXV SENSING BULB WHEN BRAZING SUCTION LINE CONNECTIONS.

NOTE — REFER TO OUTDOOR UNIT INSTALLATION INSTRUCTIONS FOR REFRIGERANT PIPING SIZE REQUIREMENTS

NOTE - Use silver alloy brazing rods with five or six percent minimum silver alloy for copper-to-copper brazing, 45 percent alloy for copper-to-brass and copper-to-steel brazing.

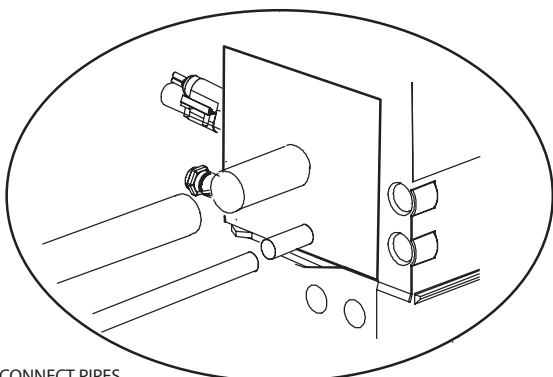
A REMOVE ACCESS PANEL



B REMOVE RUBBER PLUG FROM BOTH LIQUID AND SUCTION LINES

NOTE — CBK48MVT SERIES UNITS USE NITROGEN OR DRY AIR AS A HOLDING CHARGE. IF THERE IS NO PRESSURE WHEN THE RUBBER PLUGS ARE REMOVED, CHECK THE COIL FOR LEAKS BEFORE INSTALLING.

D EITHER REMOVE OR PUSH PIPE WRAPPING BACK THROUGH HOLE IN PIPING PLATE BEFORE LINE SET CONNECTION AND BRAZING.



E CONNECT PIPES

NOTE — REFRIGERANT LINE SETS SHOULD BE ROUTED TO ALLOW FILTER ACCESSIBILITY.

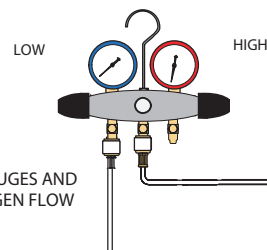
G PLACE A WET RAG AGAINST PIPING PLATE AND AROUND THE SUCTION LINE CONNECTION. A

H BRAZE CONNECTION. ALLOW PIPE TO COOL BEFORE REMOVING WET RAG FROM CTXV SENSING BULB AND PIPING PANEL AREA.

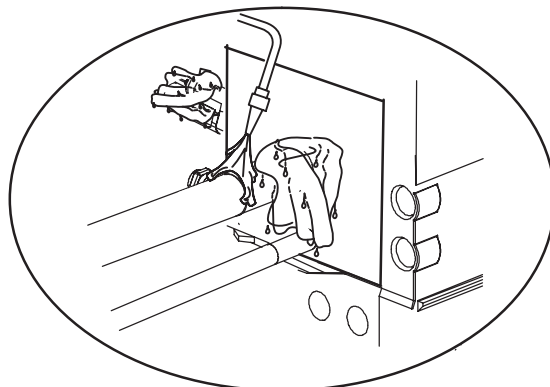
I REPEAT PREVIOUS PROCEDURE FOR LIQUID LINE.

F CONNECT GAUGES AND START NITROGEN FLOW

FLOW REGULATED NITROGEN (AT 1 TO 2 PSIG) THROUGH THE REFRIGERATION GAUGE SET INTO THE VALVE STEM PORT T CONNECTION ON THE OUTDOOR UNIT LIQUID LINE SERVICE VALVE AND OUT OF THE VALVE STEM PORT CONNECTION ON THE SUCTION SERVICE VALVE.



NITROGEN



REFER TO INSTRUCTIONS PROVIDED WITH OUTDOOR UNIT FOR LEAK TESTING, EVACUATING AND CHARGING PROCEDURES
REFRIGERANT SYSTEM INSTALLATIONS SHALL BE INSTALLED AND TESTED PER ASHRAE STANDARD 15.2, SECTION 10.0 (LATEST EDITION)

FIGURE 25. Brazing Connections

TABLE 12. CBK48MVT Refrigerant Connections and Line Set Requirements

Model	Liquid Line	Vapor Line	L15 Line Sets
-018/ 024	3/8" (10mm)	3/4" (19mm)	L15 line set sizes are dependant on unit match-up. See Product Specifications (EHB) for outdoor unit to determine correct line set sizes
-030 -036	3/8" (10mm)	3/4" (19mm)	
-042 -048	3/8" (10mm)	7/8" (22mm)	
-060	3/8" (10mm)	7/8" (22mm)	
			Field fabricated
NOTE - Some applications may require a field-provided 7/8" to 1-1/8" adapter.			

NOTE - When installing refrigerant lines longer than 50 feet, see the Lennox Refrigerant Piping Design and Fabrication Guidelines, CORP. 9351-L9, or contact Lennox Technical Support Product Applications for assistance.

- 1 - Route the suction and liquid lines from the fittings on the indoor coil to the fittings on the outdoor unit. Run the lines in a direct path, avoiding unnecessary turns and bends.
- 2 - Make sure that the suction line is insulated over the entire exposed length and that neither suction nor liquid lines are in direct contact with floors, walls, duct system, floor joists, or other piping.
- 3 - To avoid damaging the rubber grommets in the cabinet while brazing, slide the rubber grommets over the refrigerant lines until they are away from the heat source.

NOTE - Place wet rags against piping plate, piping stubs and expansion valve.

- 4 - Connect the suction and liquid lines to the evaporator coil. Take care to protect the cabinet and internal components as detailed in figure 25.
- 5 - Braze using an alloy of silver or copper and phosphorus with a melting point above 1,100°F (593°C).

NOTE - Do not use soft solder.

- 6 - Allow refrigerant pipes to cool to room temperature.

NOTE - Make sure to route copper refrigerant tubing away from sharp edges and make sure that it does not touch other metal surfaces. This prevents damage caused by vibration or metal-on-metal contact.

- 7 - Reinstall the rubber grommets into the refrigerant piping panel.

NOTE - Make sure expansion valve capillary tube is not touching metal edges or copper tubing.

- 8 - Make sure outdoor unit has been placed according to the Installation Instructions and is connected to the refrigerant lines.

Braze-Free Applications

1. Remove bell from the stubbed connection using a tubing cutter.
2. Position the refrigerant piping and follow the assembly instructions provided with the braze free connector.

! IMPORTANT

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements;

– Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure marked on unit nameplate.

No leak shall be detected.

Installing the Condensate Drain

! IMPORTANT

After removal of drain pan plug(s), check drain hole(s) to verify that drain opening is fully open and free of any debris. Also check to make sure that no debris has fallen into the drain pan during installation that may plug up the drain opening.

MAIN DRAIN

Connect the main drain and route downward to drain line or sump. Do not connect drain to a closed waste system. See Figure 27 for typical drain trap configuration.

OVERFLOW DRAIN

It is recommended that the overflow drain is connected to an overflow drain line for all units. If overflow drain is not connected, it must be plugged with provided cap.

For downflow orientation, the overflow drain **MUST** be connected and routed to a overflow drain line. See Figure 26 for main and overflow drain locations based on coil orientation.

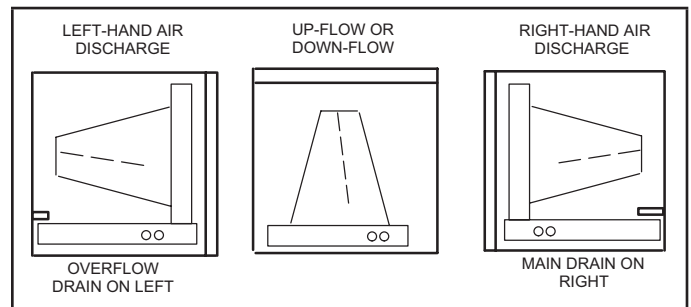


FIGURE 26. Main and Overflow Drain Locations Based on Coil Orientation

BEST PRACTICES

The following best practices are recommended for the condensate removal process:

- Main and overflow drain lines should **NOT** be smaller than both drain connections at drain pan.
- Overflow drain line should run to an area where homeowner will notice drainage.
- It is recommended that the overflow drain line be vented and a trap installed. Refer to local codes.
- Condensate drain lines must be configured or provided with a cleanout to permit the clearing of blockages and for maintenance without requiring the drain line to be cut.

Condensate Drain

⚠ IMPORTANT

On units of this type, where the blower “draws” rather than “blows” air through the coil, traps must be installed in the condensate drain lines (primary and auxiliary, if used). Traps prevent the blower from drawing air through the drain lines into the air supply.

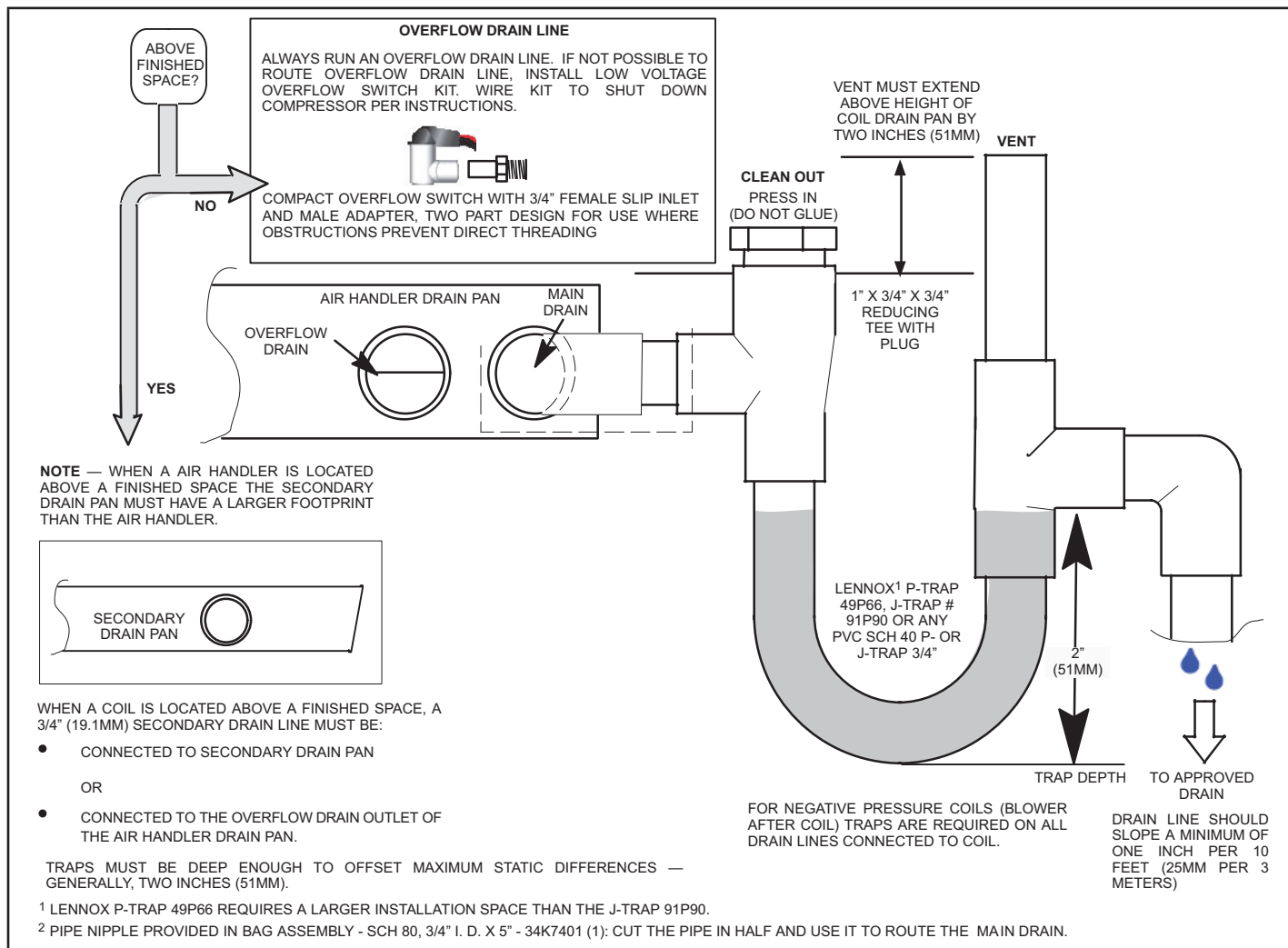


FIGURE 27. Typical Main and Overflow Drain Installations

⚠ IMPORTANT

A field-fabricated secondary drain pan, with a drain pipe to the outside of the building, is required in all installations over a finished living space or in any area that may be damaged by overflow from the main drain pan. In some localities, local codes may require a secondary drain pan for any horizontal installation.

SLOPING THE UNIT

Make sure the unit is sloped (similar to the slope shown in figure 28) so that the drain pan will empty completely without water standing in the pan.

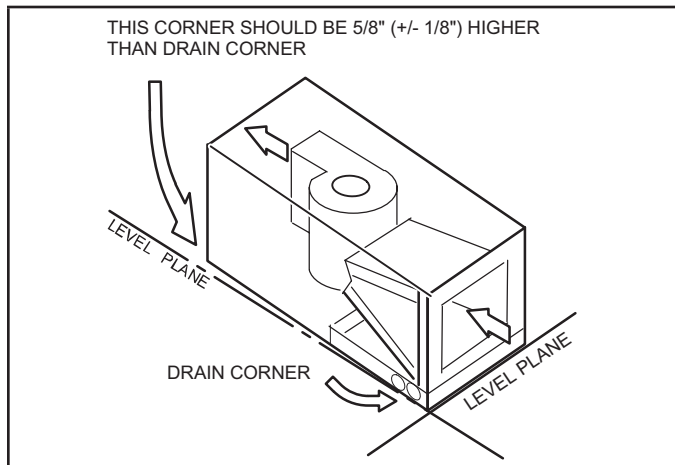


FIGURE 28. Sloping the Unit for Proper Drainage

INSTALL CONDENSATE DRAIN

The air handler is provided with 3/4" NPT condensate drain connections.

! IMPORTANT

Confirm primary and secondary drains are open.

- 1 - CBK48MVT units are equipped with a drain pan, which includes green (main drain) and red (secondary drain) plugs. Unscrew the plugs to remove them before inserting condensate drain fittings.

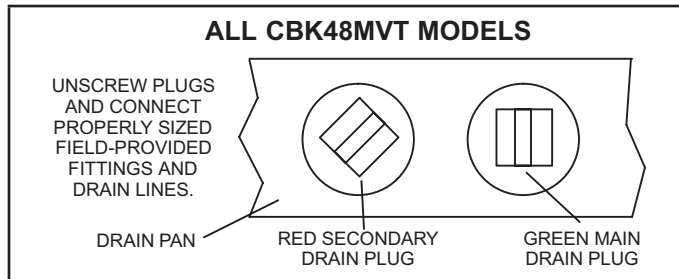


FIGURE 29. Drain Line Connections

- 2 - Install properly sized, field-provided connection fittings and connect primary drain line to the main drain pan connection.

NOTE - When installing drain line connection fittings to the drain pan, hand tighten the fitting and use a thread sealant. Over-tightening the fittings can split connections on the drain pan.

- 3 - If the secondary drain line is to be used, remove the plug or the knockout and route the drain line so that water draining from the outlet will be easily noticed by the homeowner. Refer to local codes for drain trap requirements on the secondary drain line.
- 4 - Check again to ensure drain ports and drain pan are free of all debris.
- 5 - Plug and check any unused drain pan openings for tightness. Torque plugs to 36 in. lb. to prevent water leaks or seepage from the drain pan.
- 6 - Install a 2" trap in the main (primary) drain lines as close to the unit as practical (see figure 27). Make sure the top of the trap is below the connection to the drain pan to allow complete drainage of the pan.

NOTE - Horizontal runs must have an anti-siphon air vent (standpipe) installed ahead of the horizontal run. See figure 31. An extremely long horizontal run may require an oversized drain line to eliminate air traps.

NOTE - Do not operate air handler without a trap in the main (primary) drain. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will not allow positive drainage without a proper trap.

- 7 - Route the drain line to the outside or to an appropriate drain. Drain lines must be installed so they do not block service access to the front of the air handler. A 24" clearance is required for filter, coil, or blower removal and service access.

NOTE - Check local codes before connecting the drain line to an existing drainage system. Insulate the drain lines where sweating could cause water damage.

TEST CONDENSATE DRAIN

Test the drain pan and drain line after installation:

- 1 - Pour several quarts of water into drain pan. Use enough water to fill both the drain trap and the line.
- 2 - Check the installed drain pan. Drain pan must be draining completely. Drain line fittings must not be leaking. Water must be draining from the end of the primary drain line.
- 3 - Correct any leaks found.

Inspecting and Replacing Filters

! IMPORTANT

Filter access door must be in place during unit operation. Excessive warm air entering the unit from unconditioned space may result in water blow-off problems.

Filters may be duct-mounted or installed in the cabinet. A filter is installed at the factory. Note that filter access door fits over access panel. Air will leak if the access panel is placed over the filter door.

Filters should be inspected monthly and must be cleaned or replaced when dirty to assure proper furnace operation.

To replace filter:

- 1 - Loosen the thumbscrews holding the filter panel in place.
- 2 - Slide the filter out of the guides on either side of cabinet.
- 3 - Insert new filter.
- 4 - Replace panel.

See table 13 for replacement filter sizes.

TABLE 13. Filter Dimensions

CBK48MVT	Filter Size – In. (mm)
-018/024, -030, -036	20 x 20 x 1 (508 x 508 x 25)
-042, -048, -060	20 x 24 x 1 (508 x 610 x 25)

Sealing the Unit

! WARNING

There must be an airtight seal between the bottom of the air handler and the return air plenum. Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the air handler cabinet to ensure a tight seal. Return air must not be drawn from a room where this air handler or any gas-fueled appliance (i.e., water heater), or carbon monoxide-producing device (i.e., wood fireplace) is installed.

Seal the unit so that warm air is not allowed into the cabinet. Warm air introduces moisture, which results in water blow-off problems. This is especially important when the unit is installed in an unconditioned area.

Make sure the liquid line and suction line entry points are sealed with either the provided flexible elastomeric thermal insulation, or field provided material (e.g. Armaflex, Permagem or equivalent). Any of the previously mentioned materials may be used to seal around the main and auxiliary drains, and around open areas of electrical inlets.

Unit Operating Sequences

This section details unit operating sequence for non-communicating systems.

NOTE - For communicating systems, see the thermostat installation instruction.

TABLE 14. CBK48MVT with ComfortSense™ 7500 Thermostat and Single-Stage Outdoor Unit Operating Sequence

Operating Sequence		System Demand								System Response		
System Condition	Step	Thermostat Demand						Relative Humidity		Comp	Air Handler CFM (COOL)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
NO CALL FOR DEHUMIDIFICATION												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Compressor and indoor air handler follow thermostat demand
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	ComfortSense™ 7500 thermostat energizes Y1 and de-energizes D on a call for dehumidification. <i>NOTE - No over cooling.</i>
Dehumidification Call	2	On		On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On		On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On		On	On			Demand	0 VAC	High	70%	ComfortSense™ 7500 will keep outdoor unit energized after cooling temperature setpoint has been reach in order to maintain room humidity setpoint. <i>NOTE - Allow to over cool 2°F from cooling set point.</i>

**TABLE 15. CBK48MVT with ComfortSense™ 7500 Thermostat and Two-Stage Outdoor Unit
Operating Sequence**

Operating Sequence		System Demand								System Response		
System Condition	Step	Thermostat Demand						Relative Humidity		Compressor	Air Handler CFM (COOL)	Comments
		Y1	Y2	O	G	W1	W2	Status	D			
No Call for Dehumidification												
Normal Operation - Y1	1	On		On	On			Acceptable	24 VAC	Low	70%	Compressor and indoor air handler follow thermostat demand
Normal Operation - Y2	2	On	On	On	On			Acceptable	24 VAC	High	100%	
Room Thermostat Calls for First-Stage Cooling												
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	ComfortSense™ 7500 thermostat energizes Y2 and de-energizes D on a call for dehumidification <i>NOTE - No over cooling.</i>
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On		On	On			Acceptable	24 VAC	Low	70%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense™ 7500 thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint. <i>NOTE — Allow to over cool 2°F from cooling set point.</i>
Room Thermostat Calls for First- and Second-Stage Cooling												
BASIC MODE (Only active on a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	ComfortSense™ 7500 thermostat energizes Y2 and de-energizes D on a call for dehumidification <i>NOTE — No over cooling.</i>
Dehumidification Call	2	On	On	On	On			Demand	0 VAC	High	70%	
PRECISION MODE (Operates independent of a Y1 thermostat demand)												
Normal Operation	1	On	On	On	On			Acceptable	24 VAC	High	100%	Dehumidification mode begins when humidity is greater than set point
Dehumidification call	2	On	On	On	On			Demand	0 VAC	High	70%	
Dehumidification call ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	ComfortSense™ 7500 thermostat will keep outdoor unit energized after cooling temperature setpoint has been reached in order to maintain room humidity setpoint. <i>NOTE — Allow to over cool 2°F from cooling set point.</i>

Unit Operating Sequences (cont'd)

This section identifies the requirements for configuring the air handler unit for unit size, heat mode selection and EvenHeat.

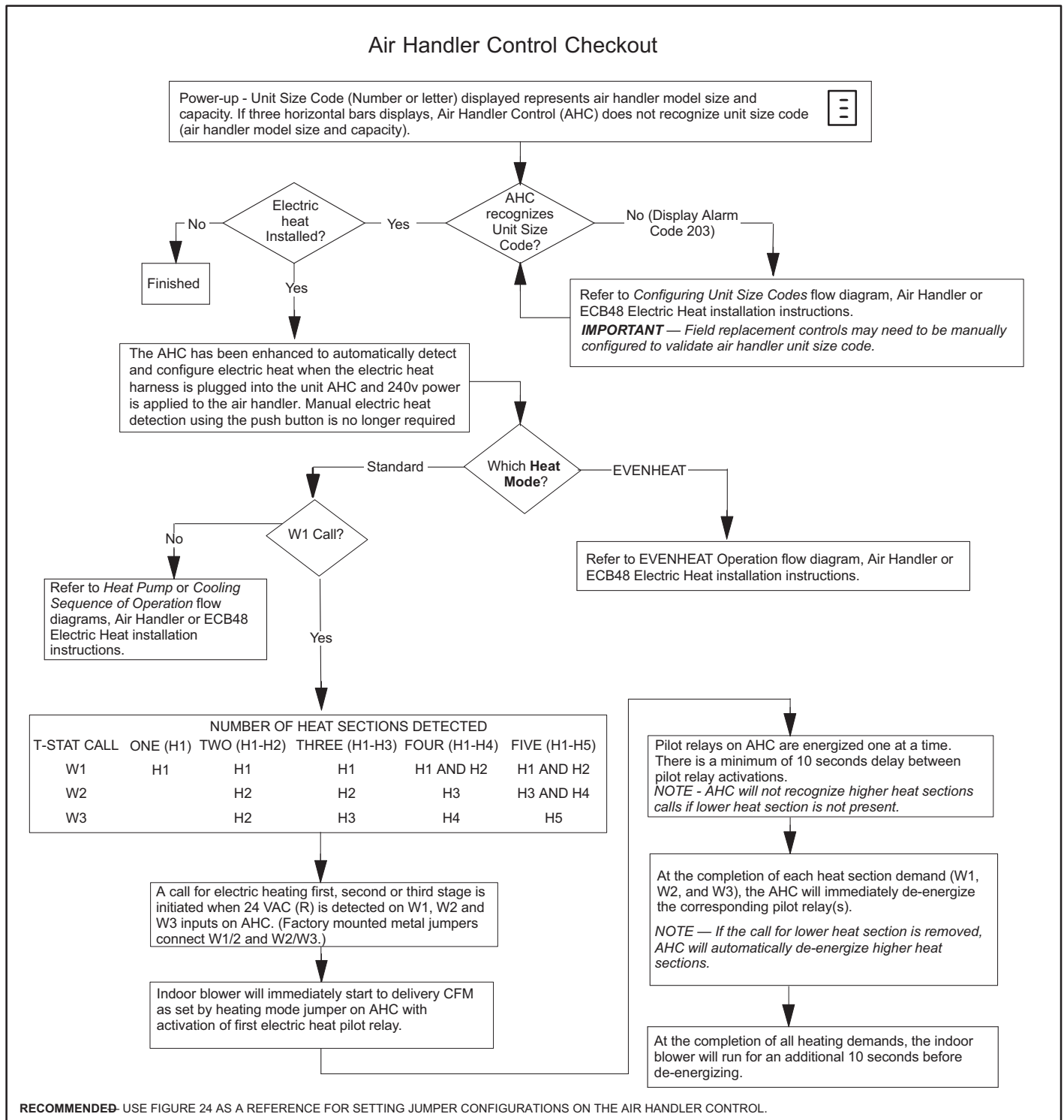


FIGURE 30. Air Handler Control Checkout

Configuring Unit Size Codes (Model Number)

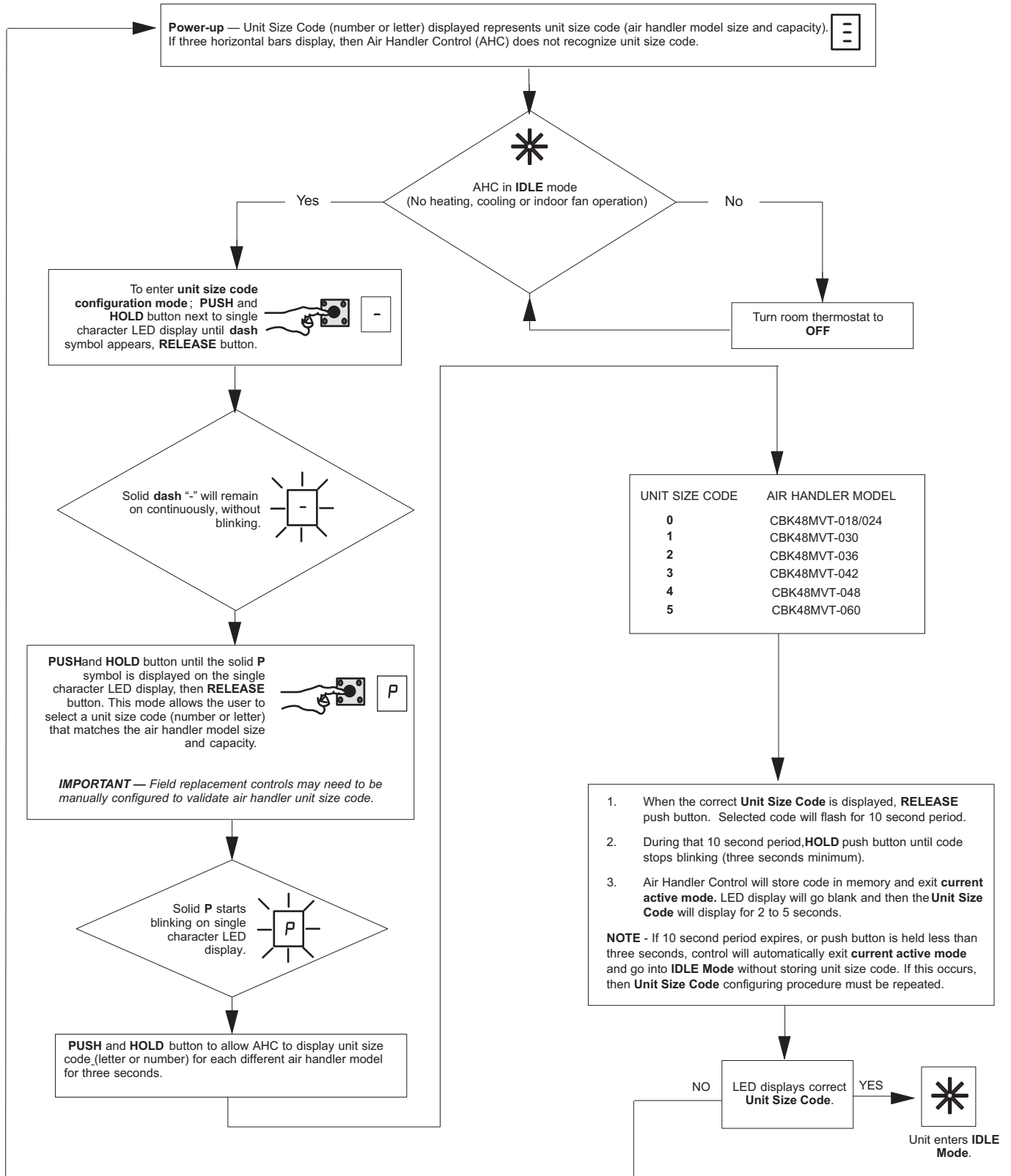
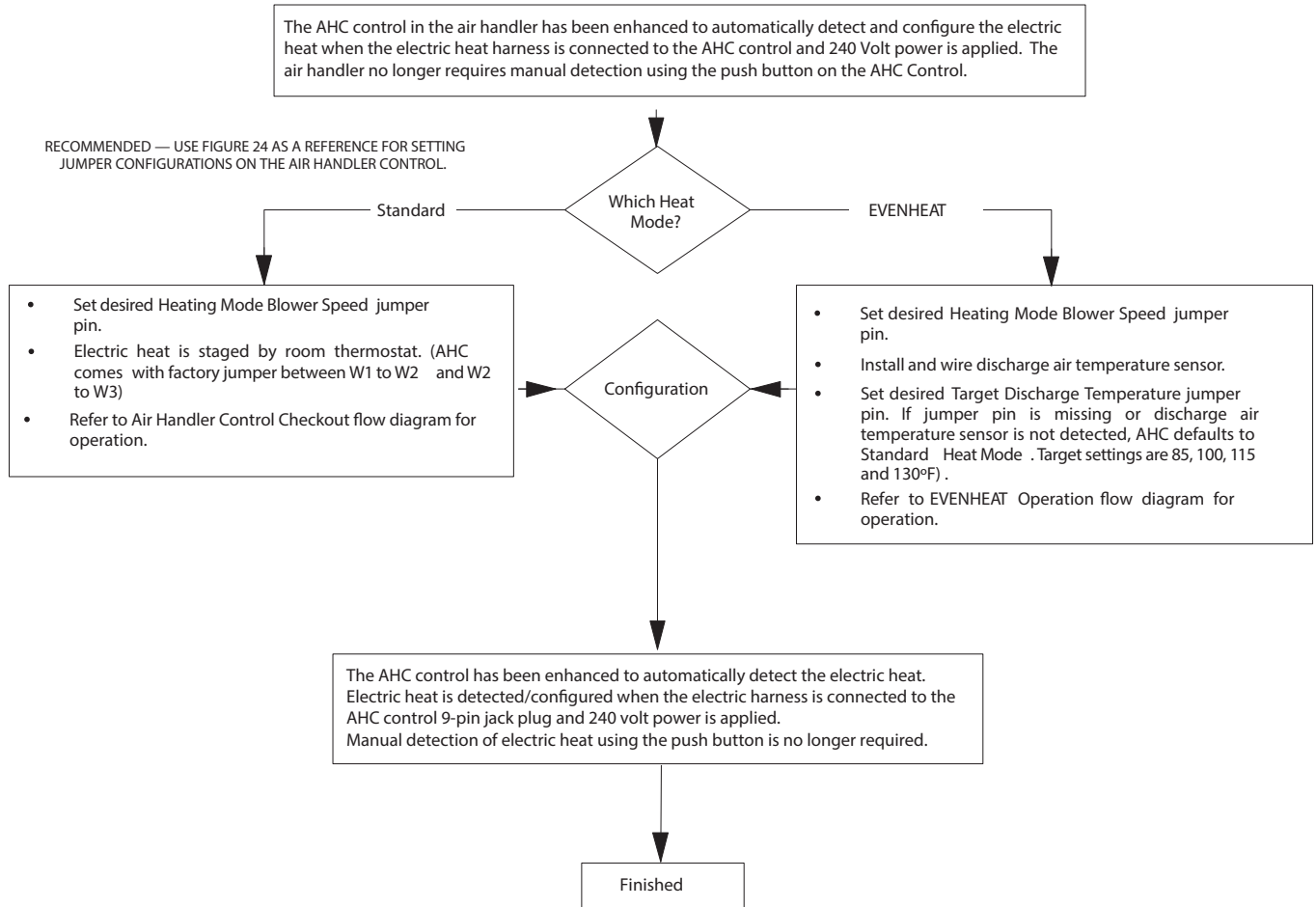


FIGURE 31. Configure Unit Size Codes

Configuring/Detecting Electric Heat Sections



Automatic Electric Heat Detection/Configuration Notes

1. The AHC has been enhanced to automatically detect/configure the electric heat. Automatic electric heat detection occurs when the electric heat harness is connected to the AHC 9-pin jack plug and 240V power is applied to the air handler.
2. During automatic electric heat detection/configuration process, the AHC will NOT bring on the blower or electric heat relays.
3. Manual electric heat detection using the push button is no longer required.
4. The number of electric heat stages automatically detected can be verified by pressing the push button until "H" is displayed and then releasing the button. The display will show H0, H1, H2, H3, H4 or H5 which is the number of electric heat stages detected. Example H2 indicates 2-stages of electric heat were detected. The electric heat stages automatically detected can also be verified using iComfort thermostat>advanced settings,>dealer control center>equipment>air handler>about>Number of heating stages
5. On iComfort systems, if the air handler was installed and connected to an iComfort thermostat prior to electric heat installation, the system may need to be reconfigured using the iComfort thermostat to recognize the change in the electric heat installation.

FIGURE 32. Heat Mode Selection

EVENHEAT OPERATION

INPUTS	OUTPUTS		
Room Thermostat Demand	Target Discharge Air Temperature Set at 85°F	Target Discharge Air Temperature Set at 100°F	Target Discharge Air Temperature Set at 115°F/130°F
Y1	Heat Pump First Stage	Heat Pump First Stage	Heat Pump First + First Electric Heat Section (H1)
Y1 + Y2	Heat Pump First and Second Stage	Heat Pump First and Second Stage + First Electric Heat Section (H1)	Heat Pump First and Second Stage + First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
Y1 + W1 and/or W2	Heat Pump First Stage + First Electric Heat Section (H1)	Heat Pump First Stage + First Electric Heat Section + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	Heat Pump First Stage + First Electric Heat Section (H1) Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
Y1 and Y2 + W1 and/or W2	Heat Pump First and Second Stage + First Electric Heat Section (H1)	Heat Pump First and Second Stage + First Electric Heat Section + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	Heat Pump First and Second Stage + First Electric Heat Section (H1) Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.
W1 and/or W2	First Electric Heat Section (H1)	First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.	First Electric Heat Section (H1) + Second Electric Heat Section (H2) if number of electric heater sections detected is more than two.

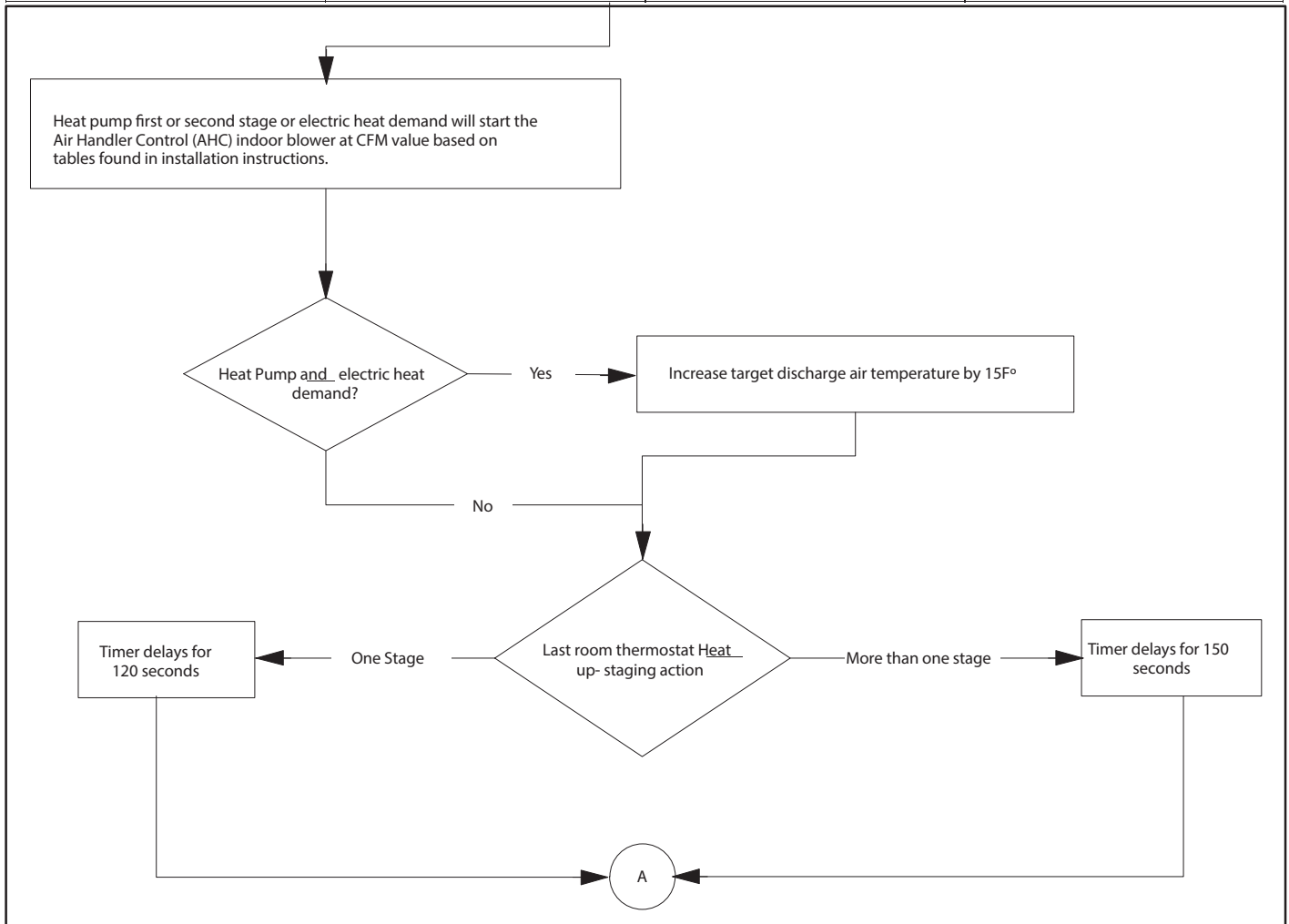


FIGURE 33. EVENHEAT Operation (1 of 2)

Note 1 Activation delay

- 120 seconds if one heat stage is or deactivated
- 150 seconds if more than one stage is activated or deactivated.

EVENHEAT Operation

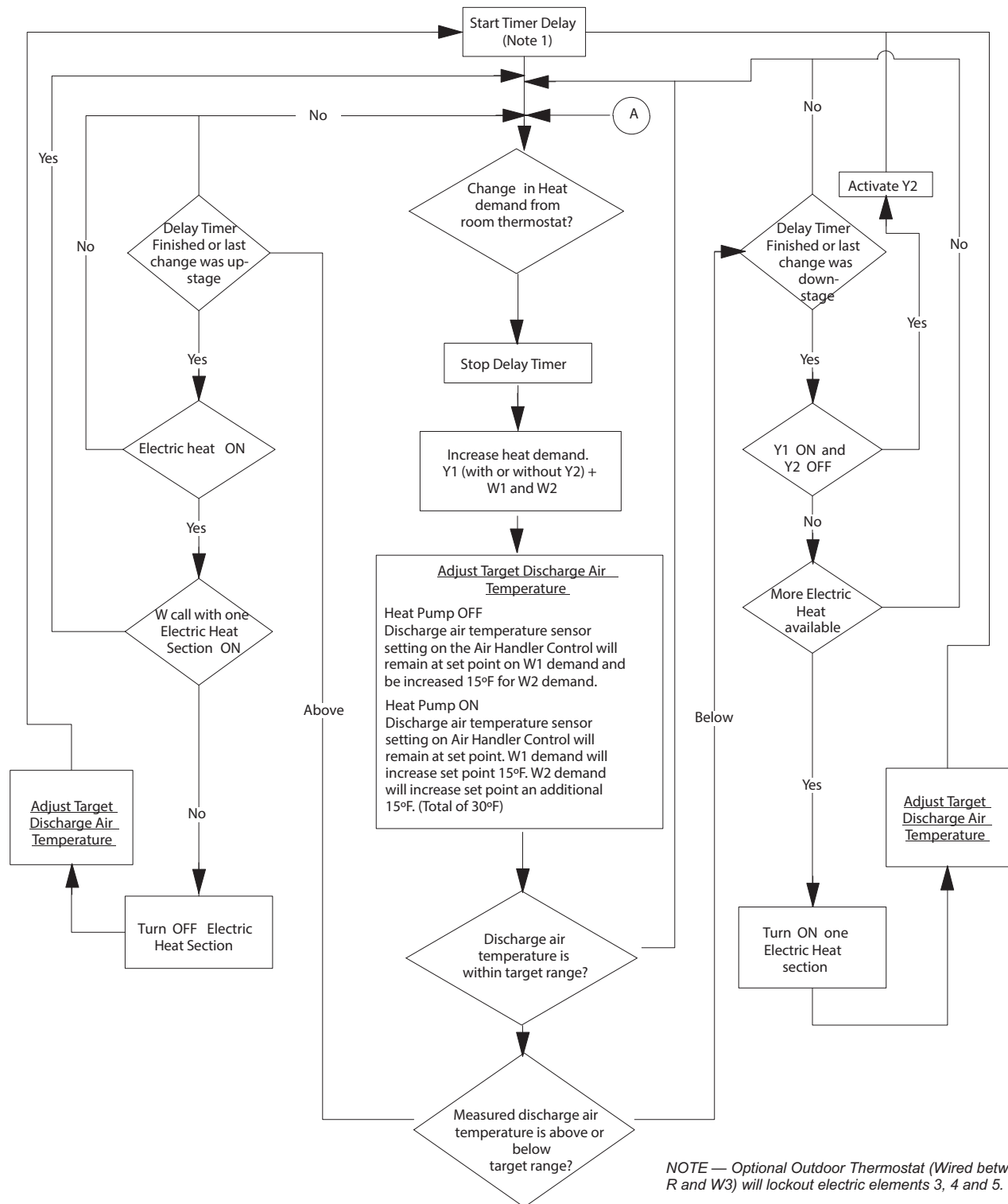


FIGURE 34. EVENHEAT Operation ((2 of 2))

Heat Pump Operation (Heating and Cooling)

Air Handler Control (AHC) Indoor Blower Mode Speed and Profiles settings

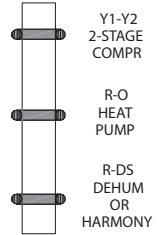
- Set Cooling Mode Blower Speed jumper pin. (Low and high indoor blower CFM settings are identical for cooling and heat pump)
- Set Blower Adjust Selection jumper pin.
- Set Cooling Mode Blower Ramping jumper pin (Cooling calls - All ramping profiles are active) (Heating calls - Only ramping profiles 1 and 2 are active. If profiles 3 or 4 are selected, AHC will default to profile 1)
 - Profile 1 does not provide any ramping profiles.
 - Profile 2 provides a 30 second indoor blower ON delay at the start of a heat pump heating demand. (45 second indoor blower OFF delay)
- Simultaneous Heat Pump and electric heat call: Indoor Blower will operate at the highest CFM requested by the heat pump or the electric heat blower speed selection.

Single or Two-Stage Unit

- AHC on-AHC jumper must be cut between Y1 and Y2 to allow two stage cooling operation.
- AHC on-AHC jumper must be cut between R and O to allow heat pump operation.

CUT ON-BOARD JUMPER
Y1-Y2 FOR
TWO-STAGE A/C

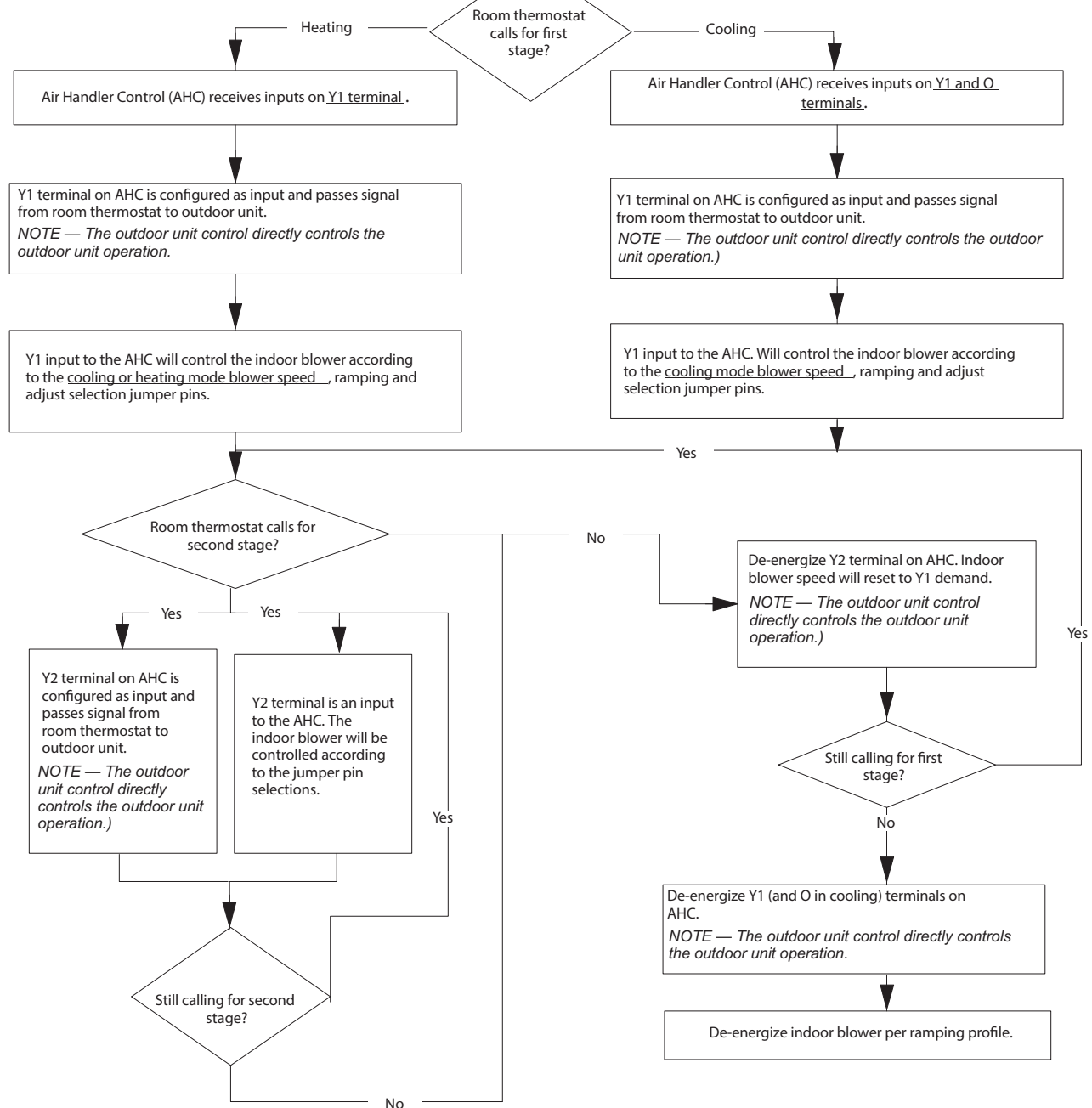
CUT ON-BOARD
JUMPER R-O.



CUT FOR OPTION

IMPORTANT — USE CARE WHEN CUTTING JUMPERS TO PREVENT DAMAGE TO CONTROL. SEE FIGURE 23, CBK48MVT JUMPER AND OPTION JUMPER GUIDE FOR FURTHER DETAILS.

RECOMMENDED — USE FIGURE 23 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.



Cooling Operation

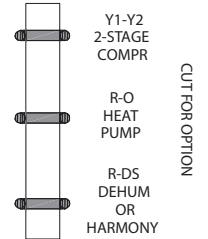
Air Handler Control (AHC) Indoor Blower Mode Speed and Profiles settings

1. Set Cooling Mode Blower Speed jumper pin.
2. Set Cooling Mode Blower Ramping jumper pin.
3. Set Blower Adjust Selection jumper pin.

Single or Two-Stage Unit

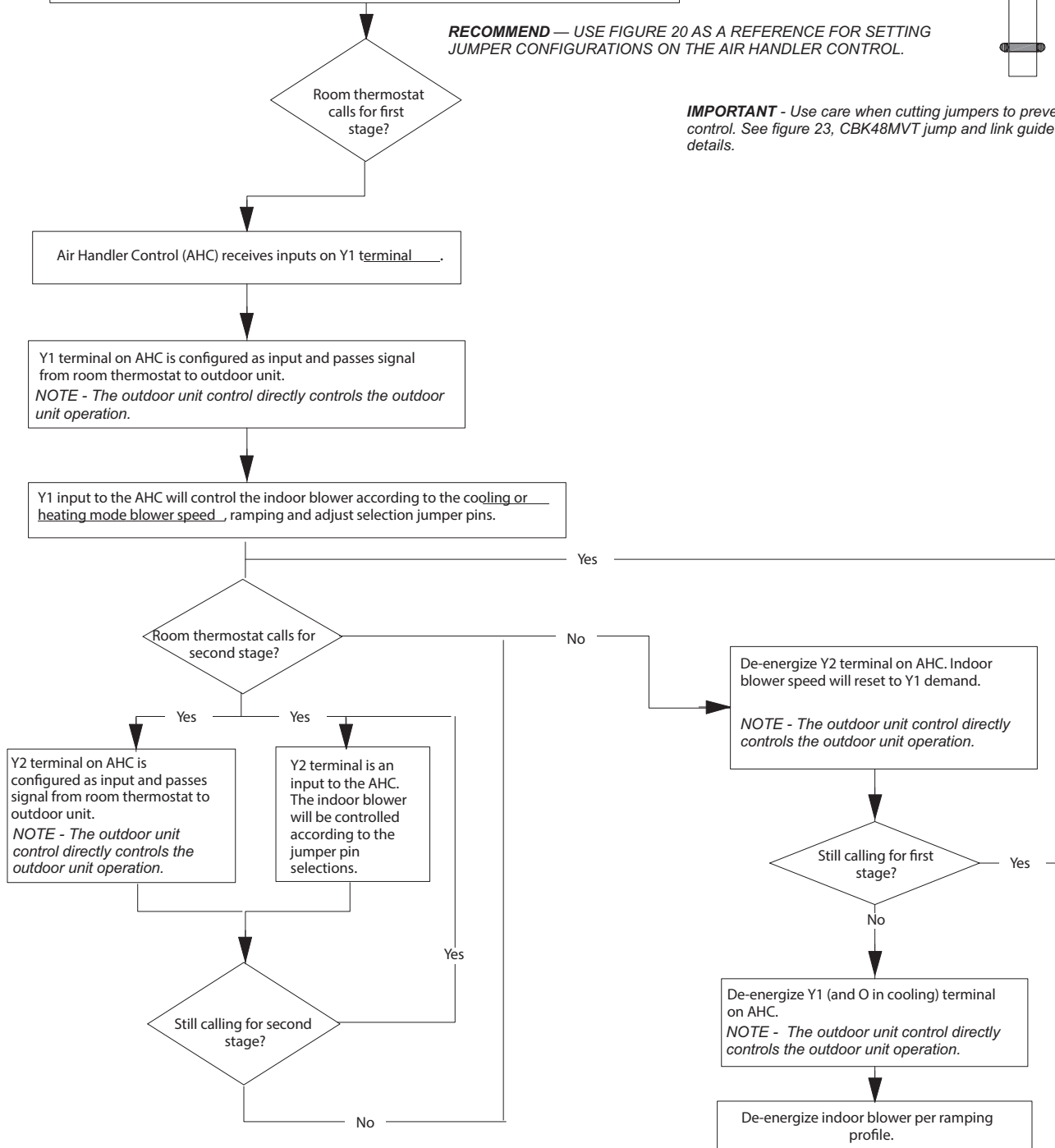
AHC on-board jumper must be cut between Y1 and Y2 to allow 2 stage cooling operation.

CUT ON-BOARD JUMPER Y1-Y2 FOR TWO-STAGE A/C

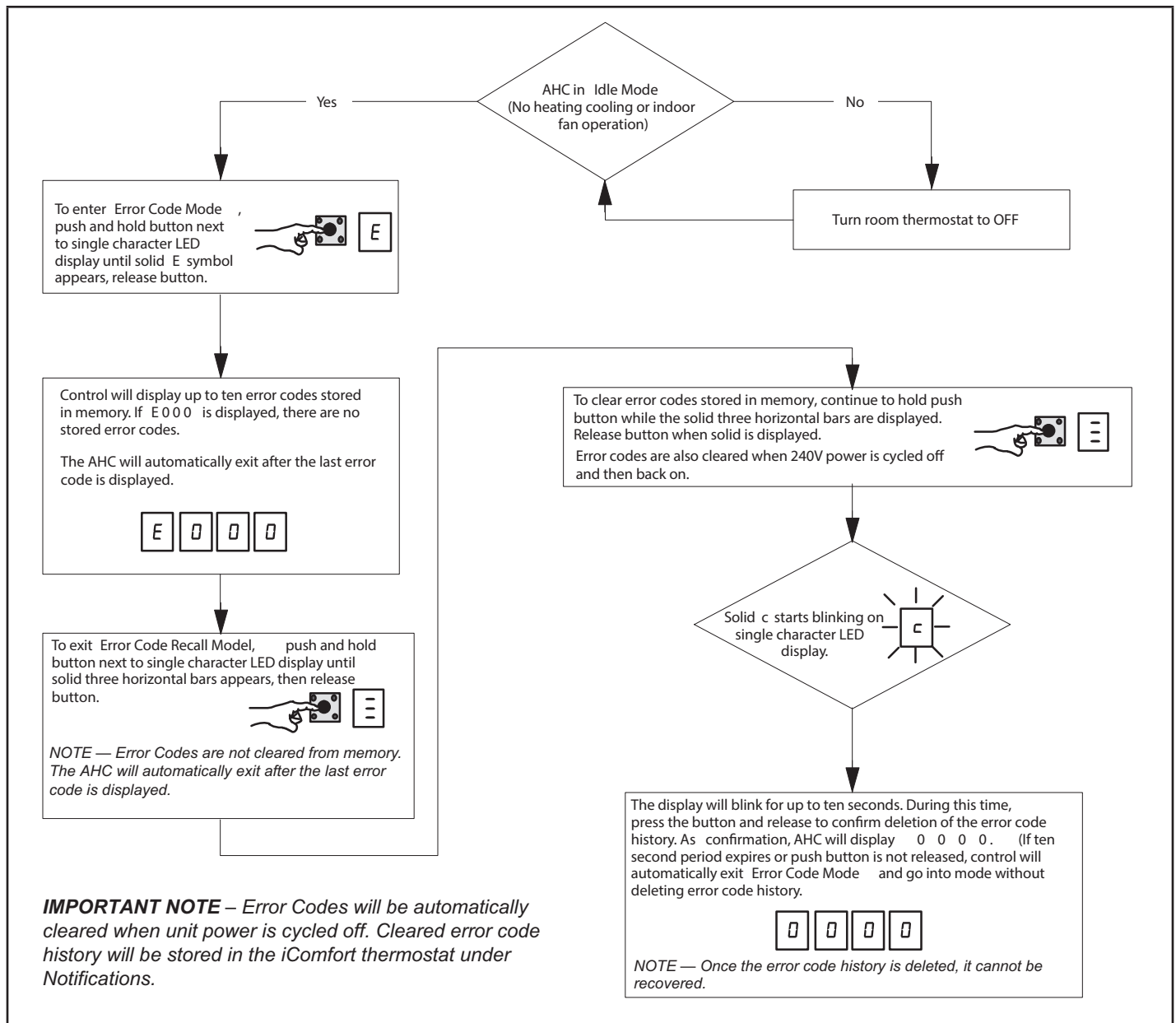


RECOMMEND — USE FIGURE 20 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.

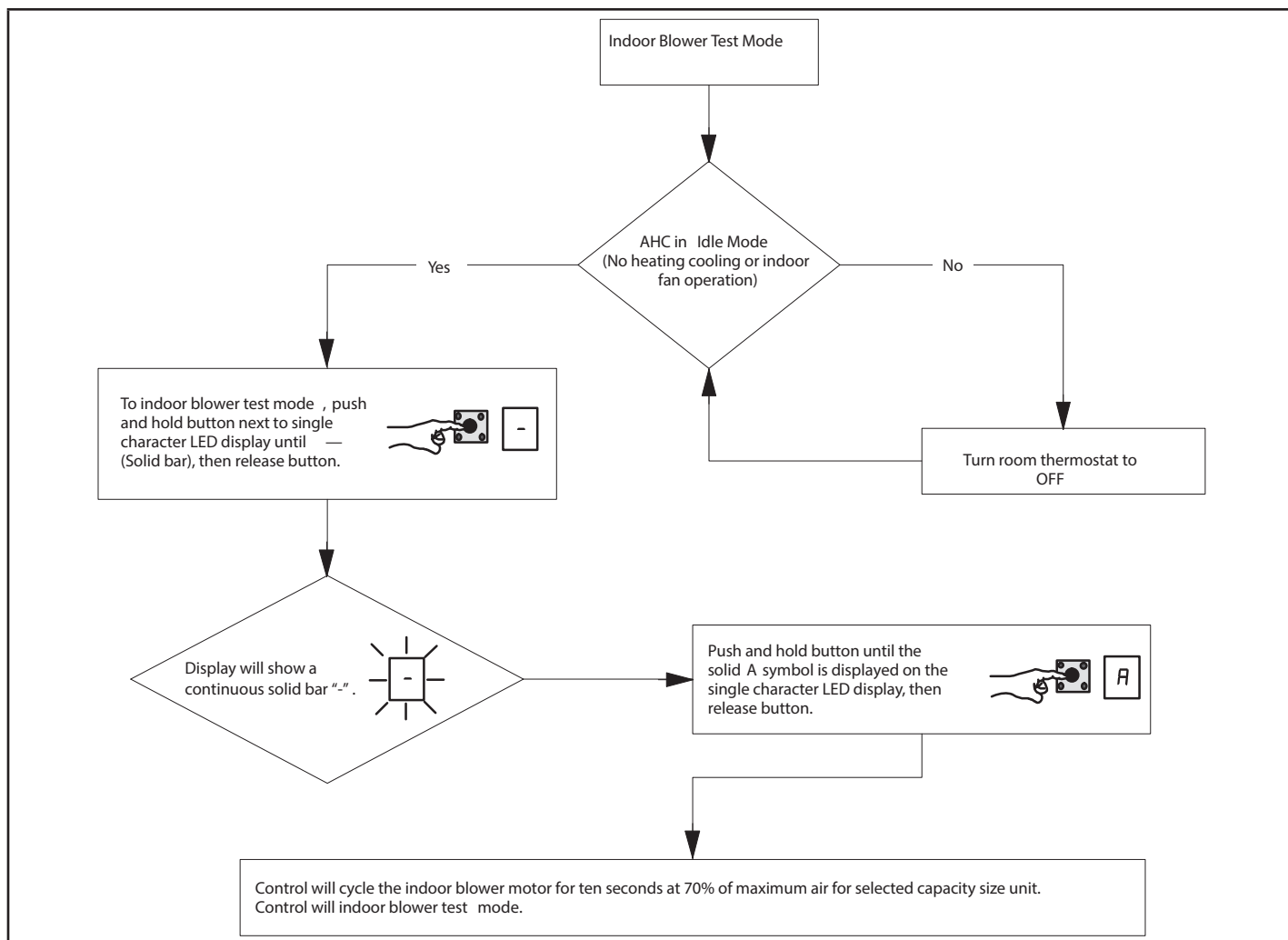
IMPORTANT - Use care when cutting jumpers to prevent damage to control. See figure 23, CBK48MVT jump and link guide for further details.



Error Code / Recall Mode



Indoor Blower Test



Operation

COOLING (COOLING ONLY OR HEAT PUMP)

When the thermostat calls for cooling, 24 volts is applied to the blower time-delay relay coil. After a delay, the indoor blower relay energizes. The normally open contacts close, causing the indoor blower motor to operate. The circuit between R and Y is completed, closing the circuit to the contactor in the outdoor unit, starting the compressor and outdoor fan motor.

On heat pumps, circuit R and O energizes the reversing valve, switching the valve to the cooling position. (The reversing valve remains energized as long as the thermostat selector switch is in the COOL position.)

At the completion of the cooling demand and after the relay's time-delay, the compressor and outdoor fan will cycle off.

HEATING (ELECTRIC HEAT ONLY)

When the thermostat calls for heat, the circuit between R and W is completed, and the heat sequencer is energized. A time delay follows before the heating elements and the indoor blower motor come on.

Units with a second heat sequencer can be connected with the first sequencer to W on the thermostat subbase, or they may also be connected to a second stage on the subbase.

HEATING (HEAT PUMP)

When the thermostat calls for heating, 24 volts is applied to the blower time-delay relay coil. After a delay, the normally open contacts close, causing the indoor blower motor to operate. The circuit between R and Y is completed, closing the circuit to the contactor in the outdoor unit, starting the compressor and outdoor fan motor. Circuit R and G energizes the blower relay, starting the indoor blower motor.

If the room temperature continues to decrease, the circuit between R and W1 is completed by the second-stage heat room thermostat. Circuit R-W1 energizes a heat sequencer. The completed circuit will energize supplemental electric heat (if applicable). Units with a second heat sequencer can be connected with the first sequencer to W1 on the thermostat. They may also be connected to a second heating stage W2 on the thermostat subbase.

EMERGENCY HEAT (HEATING HEAT PUMP)

If the selector switch on the thermostat is set to the emergency heat position, the heat pump will be locked out of the heating circuit, and all heating will be electric heat (if applicable). A jumper should be placed between W2 and E on the thermostat subbase so that the electric heat control will transfer to the first-stage heat on the thermostat. This will allow the indoor blower to cycle on and off with the electric heat when the fan switch is in the AUTO position.

Repairing or Replacing Cabinet Insulation

! IMPORTANT

DAMAGED INSULATION MUST BE REPAIRED OR REPLACED before the unit is put back into operation. Insulation loses its insulating value when wet, damaged, separated or torn.

Matte- or foil-faced insulation is installed in indoor equipment to provide a barrier between outside air conditions (surrounding ambient temperature and humidity) and the varying conditions inside the unit. If the insulation barrier is damaged (wet, ripped, torn or separated from the cabinet walls), the surrounding ambient air will affect the inside surface temperature of the cabinet. The temperature/humidity difference between the inside and outside of the cabinet can cause condensation on the inside or outside of the cabinet which leads to sheet metal corrosion and subsequently, component failure.

REPAIRING DAMAGED INSULATION

Areas of condensation on the cabinet surface are an indication that the insulation is in need of repair.

If the insulation in need of repair is otherwise in good condition, the insulation should be cut in an X pattern, peeled open, glued with an appropriate all-purpose glue and placed back against the cabinet surface, being careful to not overly compress the insulation so the insulation can retain its original thickness. If such repair is not possible, replace the insulation. If using foil-faced insulation, any cut, tear, or separations in the insulation surface must be taped with a similar foil-faced tape.

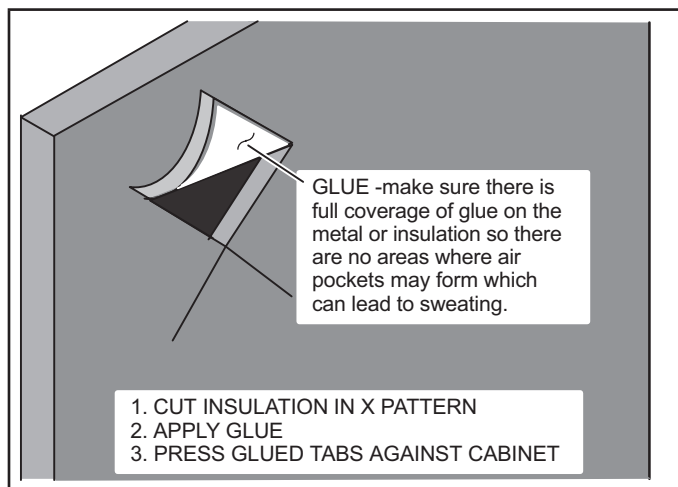


FIGURE 35. Repairing Insulation

! WARNING



Electric Shock Hazard.

Can cause injury or death.

Foil-faced insulation has conductive characteristics similar to metal. Be sure there are no electrical connections within 1/2" of the insulation. If the foil-faced insulation comes in contact with electrical voltage, the foil could provide a path for current to pass through to the outer metal cabinet. While the current produced may not be enough to trip existing electrical safety devices (e.g., fuses or circuit breakers), the current can be enough to cause an electrical shock hazard that could cause personal injury or death.

Homeowner Maintenance

! IMPORTANT

Do not operate system without a filter. A filter is required to protect the coil, blower, and internal parts from excessive dirt and dust. The filter is placed in the return duct by the installer.

- Inspect air filters at least once a month and replace or clean as required. Dirty filters are the most common cause of inadequate heating or cooling performance.
- Replace disposable filters. Cleanable filters can be cleaned by soaking in mild detergent and rinsing with cold water.
- Install new/clean filters with the arrows on the side pointing in the direction of airflow. Do not replace a cleanable (high velocity) filter with a disposable (low velocity) filter unless return air system is properly sized for it.
- If water should start coming from the secondary drain line, a problem exists which should be investigated and corrected. Contact a qualified service technician.

Professional Maintenance

NOTICE !

Failure to follow instructions will cause damage to the unit.

This unit is equipped with an aluminum coil. Aluminum coils may be damaged by exposure to solutions with a pH below 5 or above 9. The aluminum coil should be cleaned using potable water at a moderate pressure (less than 50psi). If the coil cannot be cleaned using water alone, Lennox recommends use of a coil cleaner with a pH in the range of 5 to 9. The coil must be rinsed thoroughly after cleaning.

In coastal areas, the coil should be cleaned with potable water several times per year to avoid corrosive buildup (salt).

Sensor Maintenance

It is recommended to check the state of the sensor every 6 months, at the beginning of each cooling and heating season.

- Ensure that the sensor opening is clear and free of debris.
- Check that the sensor cable is in good condition.
- DO NOT use abrasive cleaning solutions or detergents to clean sensor opening.
- DO NOT use flammable compressed air solutions to clean the sensor opening.
- DO NOT vacuum sensor inlet opening, as this could cause damage to the sensor internal components.
- Replace sensor if the opening is not clean or free of debris
- When cleaning the evaporator coil, remove sensor from the coil. Follow recommended coil cleaning guidelines as described in installation instructions.

Check-out Procedures

IMPORTANT

During installation, service or maintenance, make sure that copper tubing does not rub against metal edges or other copper tubing. Care should also be taken to ensure that tubing does not become kinked. Use wire ties to secure tubing to prevent movement.

Do not secure electrical wires to tubing that carries hot refrigerant gas. Heat from the tubing may melt the wiring insulation, causing a short circuit.

NOTE – Refer to outdoor unit installation instructions for system start-up instructions and refrigerant charging instructions.

PRE-START-UP CHECKS

- Is the air handler properly and securely installed?
- If horizontally configured, is the unit sloped up to 1/4 inch toward drain lines?
- Will the unit be accessible for servicing?
- Has an auxiliary pan been provided under the unit with separate drain for units installed above a finished ceiling or in any installation where condensate overflow could cause damage?
- Have ALL unused drain pan ports been properly plugged?
- Has the condensate line been properly sized, run, trapped, pitched, and tested?
- Is the duct system correctly sized, run, sealed, and insulated?
- Have all cabinet openings and wiring been sealed?
- Is the indoor coil factory-installed TXV properly sized for the outdoor unit being used?

- Have all unused parts and packaging been disposed of?
- Is the filter clean, in place, and of adequate size?
- Is the wiring neat, correct, and in accordance with the wiring diagram?
- Is the unit properly grounded and protected (fused)?
- Is the thermostat correctly wired and in a good location?
- Are all access panels in place and secure?

CHECK BLOWER OPERATION

- Set thermostat to FAN ON.
- The indoor blower should come on.

CHECK COOLING OPERATION

- Set thermostat to force a call for cooling (approximately 5°F lower than the indoor ambient temperature).
- The outdoor unit should come on immediately and the indoor blower should start between 30 - 60 seconds later.
- Check the air flow from a register to confirm that the system is moving cooled air.
- Set the thermostat 5°F higher than the indoor temperature. The indoor blower and outdoor unit should cycle off.

CHECK ELECTRIC HEAT (IF USED)

- Set thermostat to call for auxiliary heat (approximately 5°F above ambient temperature). The indoor blower and auxiliary heat should come on together. Allow a minimum of 3 minutes for all sequencers to cycle on.
- Set the thermostat so that it does not call for heat. Allow up to 5 minutes for all sequencers to cycle off.

RDS Verification Test

The RDS Communicating Blower Control Board is equipped with a RDS Control Test/Reset button, see “RDS Control Button Functionality” on page 51. When power is applied to the Air Handler Control Board, the system will then run through a purge sequence for five (5) minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

Cooling Demand

- 1 - Prompt a cooling demand at the thermostat.
- 2 - Press the Test button on the RDS Communicating Blower Control Board. The system then executes a leak detection response.
- 3 - Observe the following sequence:
 - a. The blower powers up.
 - b. The outdoor compressor powers down.
- 4 - Press the RDS Control button to terminate the simulated Leak Detected mode upon test completion.

Heating Demand

- 1 - Prompt a heating demand at the thermostat.
- 2 - Press the RDS Control button on the RDS Communicating Blower Control Board. The system then executes a leak detection response.
- 3 - Observe the following sequence:
 - a. The blower powers up.
 - b. The electric heat powers down.
 - c. The outdoor compressor powers down.
- 4 - Press the RDS Control button to terminate the simulated Leak Detected mode upon test completion.

RDS Control Button Functionality

The RDS Communicating Blower Control Board is equipped with a RDS Control Test/Reset button. The RDS Control button can be used to complete several functions, depending on the mode of operation of the RDS Communicating Blower Control Board.

Table 16 lists the functions of the Test button during each mode of operation.

TABLE 16. RDS Control Button Function

Mode of Operation	Press the Test Button to...
Normal	Trigger a leak detection response. Verify all equipment is wired correctly into the RDS Communicating Blower Control Board.
Leak Detected	Reset the RDS Communicating Blower Control Board to a normal mode of operation after a previous leak has been detected and purged from the HVAC system.
Fault	Reset the RDS Communicating Blower Control Board after troubleshooting and resolving a fault condition. If the fault is not resolved, the RDS Communicating Blower Control Board will enter the Fault mode again.

RDS Control Button – Additional Functions

Table 17 lists the additional functions of the RDS Control Button while the RDS Communicating Blower Control Board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault.

TABLE 17. Additional Button Functions

State	Press	Action
Initializing	Short	Skips remaining pre-purge after sensors are recognized by the RDS Communicating Blower Control Board
Initializing	Long	Reset control
Monitoring	Short	Clear purge-counter if prior mitigation has occurred; Test mitigation
Monitoring	Long	Reset control
Mitigating	Short	If testing mitigation, end test
Servicing	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Servicing	Long	Reset control

TABLE 17. Additional Button Functions

State	Press	Action
Fault	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Fault	Long	Reset control

Use of Air Handler During Construction

Lennox does not recommend the use of its air handler unit during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

Air handler units may be used for heating (heat pumps) or cooling of buildings under construction, if the following conditions are met:

- A room thermostat must control the air handler. The use of fixed jumpers is not allowed.
- Air filter must be installed in the system and must be maintained during construction.
- Air filter must be replaced upon construction completion.
- The air handler evaporator coil, supply fan assembly and duct system must be thoroughly cleaned following final construction clean-up.
- All air handler operating conditions must be verified according to these installation instructions.
- Ensure that sensor opening is clear and free of debris.



FIGURE 36. Example of Clear, Unobstructed Sensor Inlet

Decommissioning

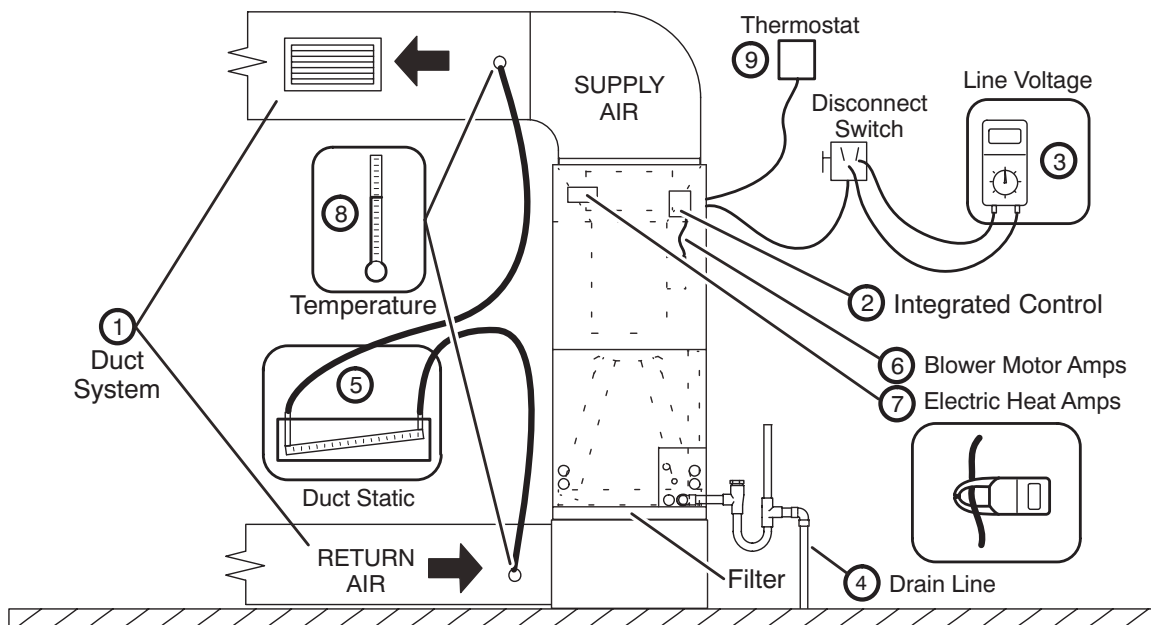
Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

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 starting decommissioning.

- a) Become familiar with the equipment and its operation.
- b) Isolate system electrically.
- c) 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.

- d) Pump down refrigerant system, if possible.
- e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f) Make sure that cylinder is situated on the scales before recovery takes place.
- g) Start the recovery machine and operate in accordance with instructions.
- h) Do not overfill cylinders (no more than 80% volume liquid charge).
- i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j) 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.
- k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Installing Contractor's Name _____ Installing Date _____
 Installing Contractor's Phone _____ Air Handler Model # _____
 Job Address _____

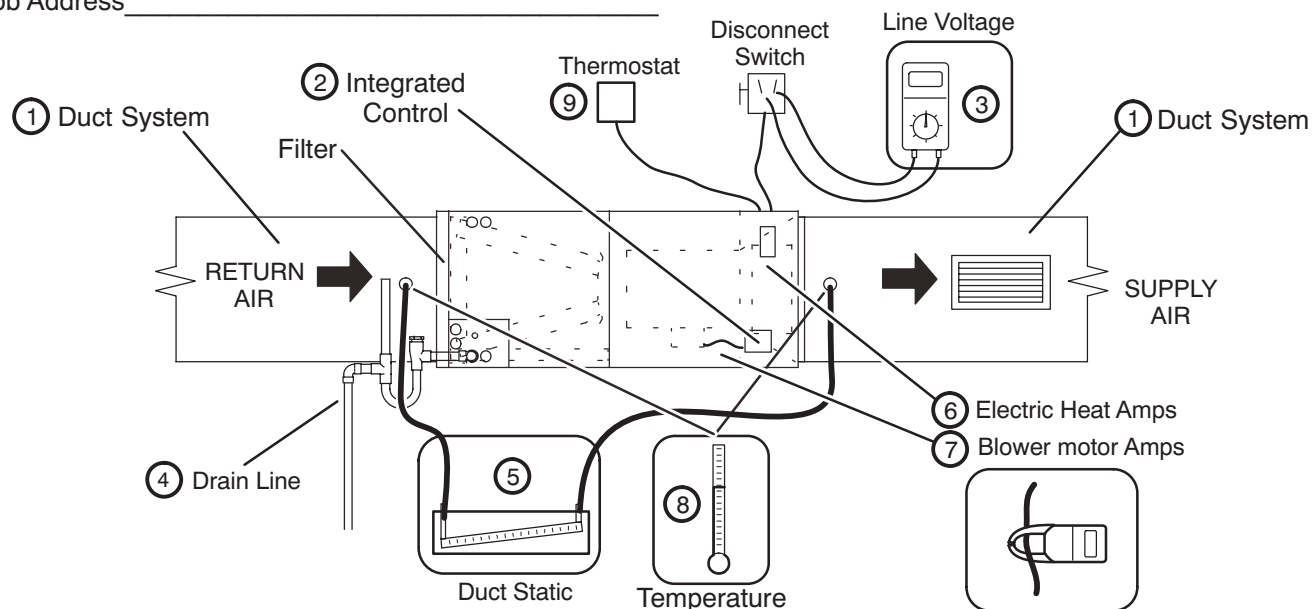


- | | |
|--|---|
| <p>① DUCT SYSTEM</p> <p>SUPPLY AIR DUCT</p> <p><input type="checkbox"/> Sealed</p> <p><input type="checkbox"/> Insulated (if necessary)</p> <p><input type="checkbox"/> Registers Open and Unobstructed</p> <p>RETURN AIR DUCT</p> <p><input type="checkbox"/> Sealed</p> <p><input type="checkbox"/> Filter Installed and Clean</p> <p><input type="checkbox"/> Registers Open and Unobstructed</p> <p>② INTEGRATED CONTROL</p> <p><input type="checkbox"/> Jumpers Configured Correctly (if applicable)</p> <p><input type="checkbox"/> Appropriate Links in Place (if applicable)</p> <p>③ VOLTAGE CHECK</p> <p><input type="checkbox"/> Supply Voltage _____</p> <p><input type="checkbox"/> Low Voltage _____</p> <p><input type="checkbox"/> Electrical Connections Tight</p> <p>④ DRAIN LINE</p> <p><input type="checkbox"/> Leak Free</p> <p><input type="checkbox"/> Explained Operation of System to Homeowner</p> | <p>⑤ TOTAL EXTERNAL STATIC (dry coil)</p> <p style="text-align: right;">dry coil wet coil</p> <p>Supply External Static _____</p> <p>Return External Static _____</p> <p>Total External Static = _____</p> <p>⑥ ELECTRIC HEAT AMPS _____</p> <p>⑦ INDOOR BLOWER AMPS _____</p> <p>INDOOR BLOWER CFM _____</p> <p>⑧ TEMPERATURE DROP (Cooling Mode)</p> <p>Return Duct Temperature _____</p> <p>Supply Duct Temperature - _____</p> <p>Temperature Drop = _____</p> <p>⑧ TEMPERATURE RISE (Heating Mode)</p> <p>Return Duct Temperature _____</p> <p>Supply Duct Temperature - _____</p> <p>Temperature Rise = _____</p> <p>⑨ THERMOSTAT</p> <p><input type="checkbox"/> Adjusted and Programmed</p> <p><input type="checkbox"/> Operation Explained to Owner</p> |
|--|---|

Technician's Name: _____ Date Start-Up & Performance Check Completed _____

FIGURE 37. Start-up and Performance Checklist (Upflow Configuration)

Installing Contractor's Name _____ Installing Date _____
 Installing Contractor's Phone _____ Air Handler Model # _____
 Job Address _____



① DUCT SYSTEM

SUPPLY AIR DUCT

- ☐ Sealed
- ☐ Insulated (if necessary)
- ☐ Registers Open and Unobstructed

RETURN AIR DUCT

- ☐ Sealed
- ☐ Filter Installed and Clean
- ☐ Registers Open and Unobstructed

② INTEGRATED CONTROL

- ☐ Jumpers Configured Correctly (if applicable)
- ☐ Appropriate Links in Place (if applicable)

③ VOLTAGE CHECK

- ☐ Supply Voltage _____
- ☐ Low Voltage _____
- ☐ Electrical Connections Tight

④ DRAIN LINE

- ☐ Leak Free

⑤ TOTAL EXTERNAL STATIC (dry coil)

dry coil wet coil

Supply External Static _____
 Return External Static _____
 Total External Static = _____

⑥ ELECTRIC HEAT AMPS _____

⑦ INDOOR BLOWER AMPS _____

INDOOR BLOWER CFM _____

⑧ TEMPERATURE DROP (Cooling Mode)

Return Duct Temperature _____
 Supply Duct Temperature - _____
 Temperature Drop = _____

⑧ TEMPERATURE RISE (Heating Mode)

Return Duct Temperature _____
 Supply Duct Temperature - _____
 Temperature Rise = _____

⑨ THERMOSTAT

- ☐ Adjusted and Programmed
- ☐ Operation Explained to Owner

☐ Explained Operation of System to Homeowner

Technician's Name: _____ Date Start-Up & Performance Check Completed _____

FIGURE 38. Start-Up and Performance Checklist (Horizontal Configuration)