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Dallas, Texas, USA

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed professional installer (or equivalent) or a service agency.

NOTICE

A thermostat is not included and must be ordered separately.

- The Lennox icomfort Touch® thermostat must be used in communicating applications.
- In non-communicating applications, the Lennox ComfortSense® 7000 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 11.

Shipping and Packing List

Check unit for shipping damage. Consult last carrier immediately if damage is found.

Package 1 of 1 contains the following:

- 1 — Assembled air handler unit

INSTALLATION INSTRUCTIONS

Dave Lennox Signature® Collection CBX40UHV Units

AIR HANDLER
506275-01
01/11
Supersedes 12/10



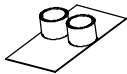
Table of Contents

Shipping and Packing List	1
Model Number Identification	4
Upflow Unit Dimensions	2
Horizontal LH/RH Unit Dimensions	3
General	4
Installation Clearances	4
Requirements	5
Installing the Unit	5
Brazing Connections	8
Installing the Condensate Drain	9
Inspecting and Replacing Filters	10
Sealing the Unit	11
Field Control Wiring	11
Air Handler Control Button, Display and Jumpers	18
Target CFM Tables	22
Configuring Unit	25
Error Code Recall Mode	32
Indoor Blower Test	33
Checkout Procedures	33
Operation	34
Maintenance	34
Cabinet Insulation	34

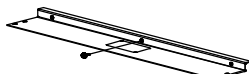
IMPORTANT INFORMATION TO INSTALLER

CHECK FOR AND REMOVE ITEMS A THROUGH E BEFORE OPERATING UNIT.

A BLOWER HOUSING SUPPORT PAD.



B TOP CAP SHIPPING BRACKET (REPLACE SCREWS IN TOP CAP AFTER REMOVAL).

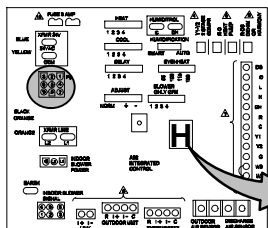


C HORIZONTAL DRAIN PAN (SEE UPFLOW APPLICATIONS ON PAGE 5 AND DOWNFLOW APPLICATIONS ON PAGE 5)

D REFRIGERANT LINE PLUGS (SEE BRAZING CONNECTION ON PAGE 8).

E MERV16 AIR FILTER IS ENCLOSED IN PLASTIC BAG. REMOVE FROM BAG BEFORE OPERATING EQUIPMENT.

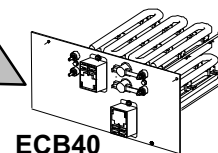
FOR PROPER OPERATION THE ELECTRIC HEAT (IF APPLICABLE) MUST BE CONFIGURED (SET-UP) THROUGH THE AIR HANDLER CONTROL (AHC)



WHENEVER ELECTRIC HEAT IS INSTALLED THE AHC MUST BE MANUALLY CONFIGURED. SEE JUMPERS AND LINKS GUIDE ON PAGE 17.

CONFIGURE ELECTRIC HEAT

H ELECTRIC HEAT SECTIONS MUST BE CONFIGURED. IF INSTALLED SEE PROCEDURE IN FIGURE 19 ON PAGE 27.



Upflow Unit Dimensions — Inches (Millimeters)

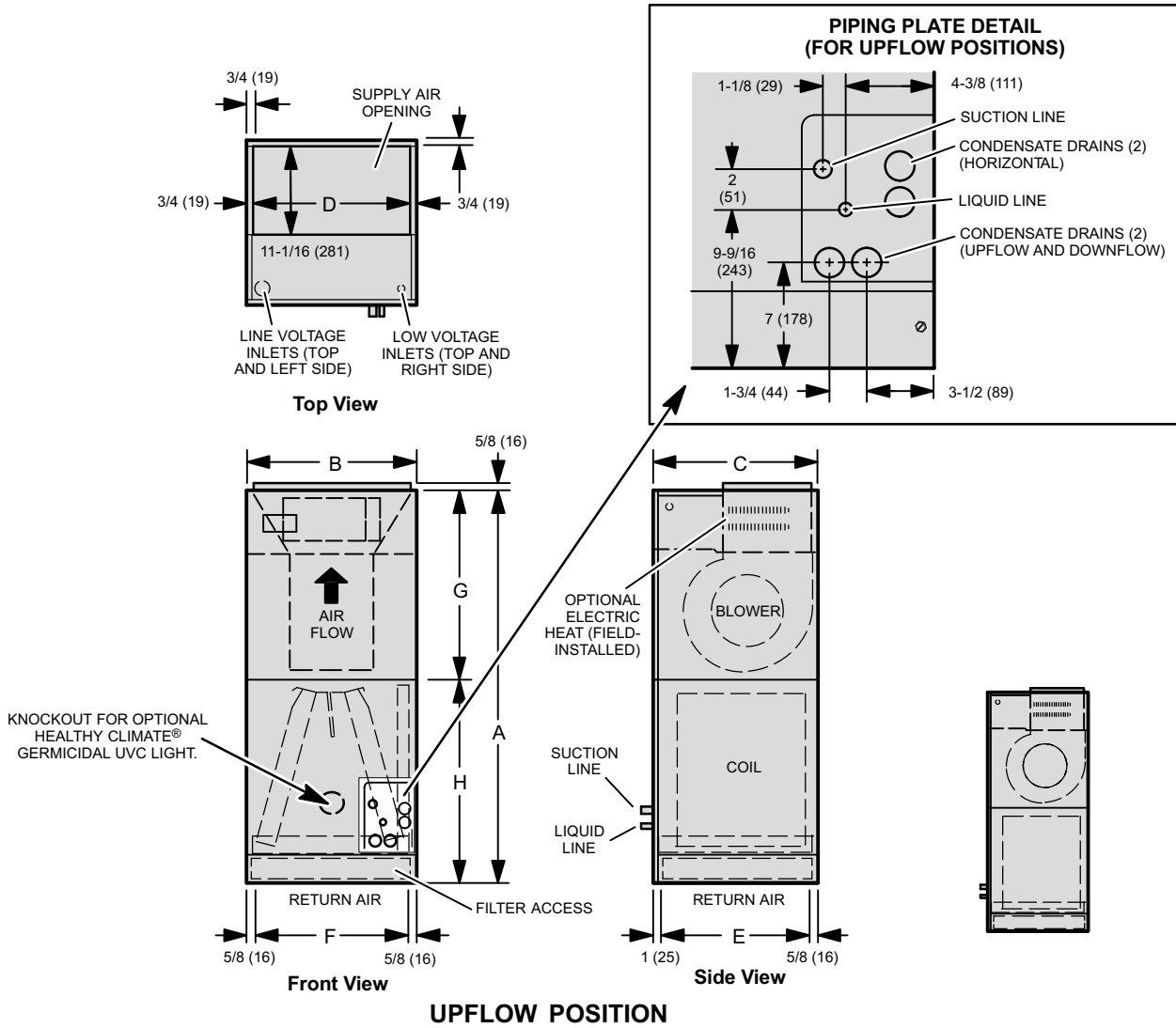
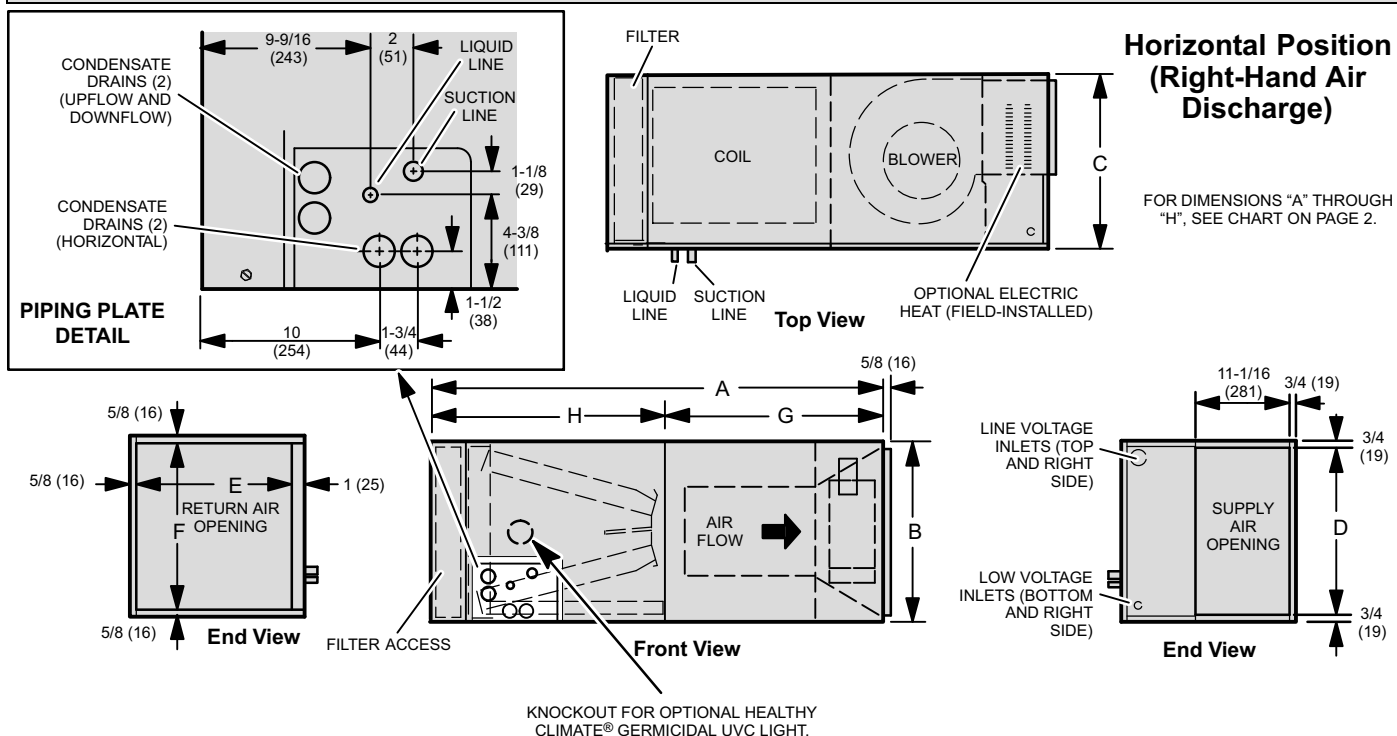


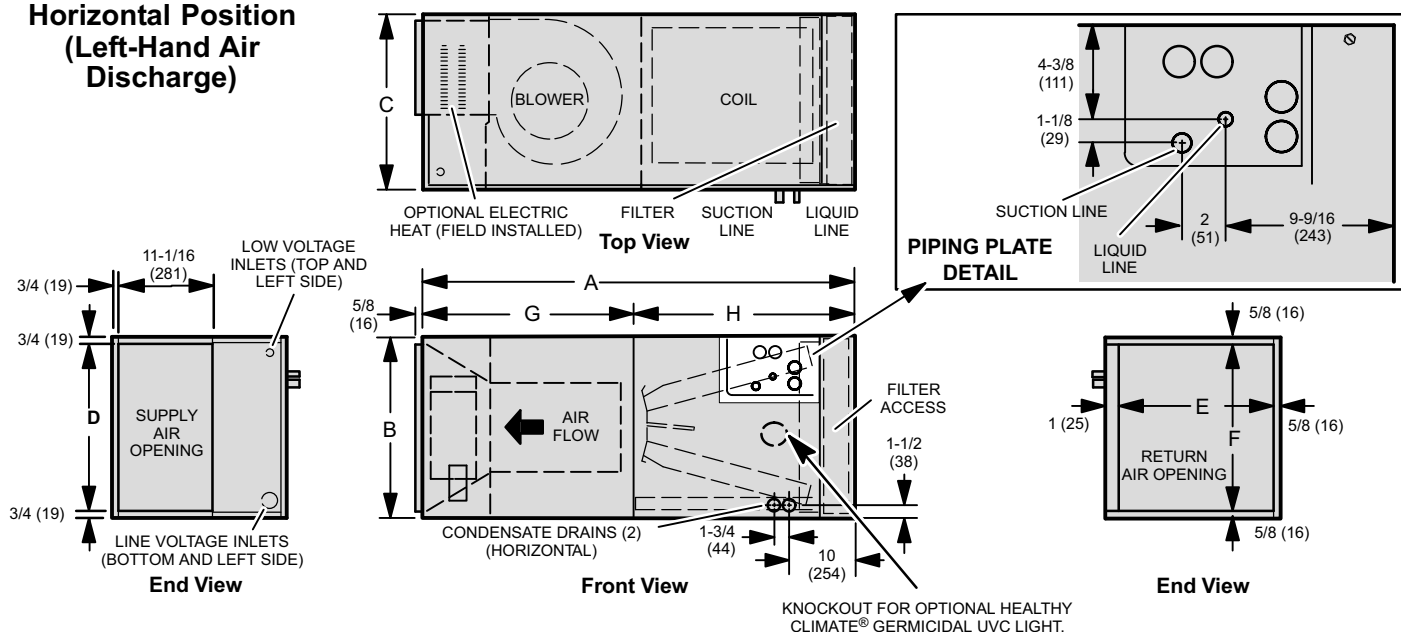
Table 1. Model Dimensions (Upflow, LH and RH Horizontal Applications)

Dim.	-024/-030/-036	-042/-048/-060
	in. (mm)	in. (mm)
A	55-1/4 (1403)	62-3/4 (1594)
B	21-1/4 (540)	21-1/4 (540)
C	22-5/8 (575)	25-5/8 (575)
D	19-3/4 (502)	19-3/4 (502)
E	21 (533)	23 (584)
F	20 (508)	21 (533)
G	26-3/8 (670)	27-7/8 (708)
H	28-7/8 (733)	34-7/8 (886)

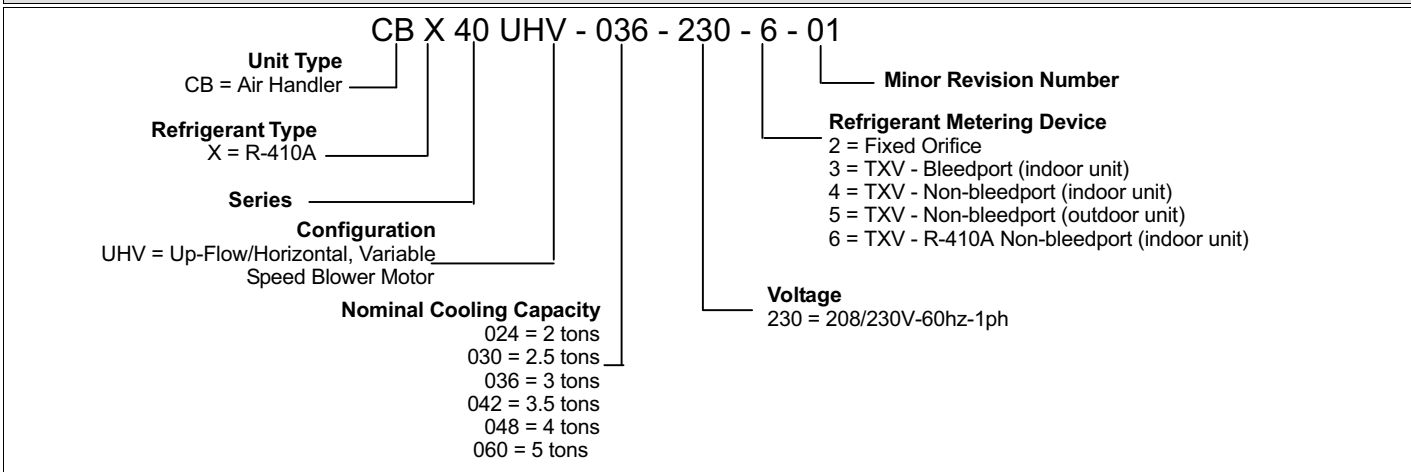
Horizontal Left- and Right-Hand Unit Dimensions — Inches (mm)



Horizontal Position (Left-Hand Air Discharge)



Model Number Identification



General

The Dave Lennox Signature® Collection CBX40UHV air handler units are designed for installation with optional field-installed electric heat and a matched remote outdoor unit that is charged with HFC-410A refrigerant. These units, designed for indoor installation in multiple positions, are completely assembled for upflow and horizontal right-hand air discharge before being shipped from the factory.

All CBX40UHV air handlers are equipped with a factory-installed, internally mounted check expansion valve (CTXV), which is suitable for use in HFC-410A applications.

This air handler is compatible with the ComfortSense® 7000 non-communicating thermostat and non-communicating outdoor units. In addition, this unit has the enhance capability of communicating with the icomfort Touch® Communicating thermostat 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. Check equipment for shipping damage; if found, immediately report damage to the last carrier.

Installation Clearances

Cabinet	0 inch (0 mm)
To Plenum	1 inch (25 mm)
To Outlet Duct within 3 feet (914 mm)	1 inch (25 mm)
Floor	See Note #1
Service / Maintenance	See Note #2

¹ Units installed on combustible floors in the downflow position with electric heat require optional downflow additive base.

² Front Service Access - 24 inches (610mm) minimum.

NOTE — If cabinet depth is more than 24 inches (610 mm), allow a minimum of the cabinet depth plus 2 inches (51 mm).

WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900

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.

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.

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

Requirements

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 the following National Fire Protection Association (NFPA) standards:

- NFPA No. 90A — Standard for Installation of Air Conditioning and Ventilation Systems
- NFPA No. 90B — Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems

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.

Installing the Unit

DISASSEMBLE AND REASSEMBLE AIR HANDLER UNIT

This unit consists of two sections which are shipped assembled from the factory. If necessary, the unit may be disassembled to facilitate setting the unit. Follow the steps below:

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.

DOWNFLOW APPLICATION

Use the installation instructions provided with the downflow kit.

Table 2. Optional Downflow Conversion Kits (Downflow Only)

Model/Size	Kit Numbers
CBX40UHV-024, -030, and -036	83M57
CBX40UHV-042, -048, and -060	43W10

In downflow applications when used with a ECB40 heat section, a Downflow Additive Base Kit (44K15) will be required. Installation instructions are included with the reference kit.

UPFLOW APPLICATION

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

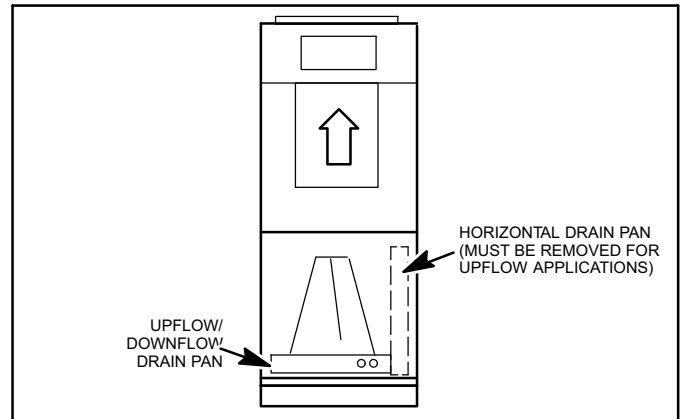


Figure 1. Upflow Configuration

1. The horizontal drain pan must be removed when the coil blower is installed in the upflow position. Removing horizontal drain pan will improve airflow.
2. After removing horizontal drain pan, place the unit in 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.
3. Install units that have no return air plenum on a stand that is at least 14" (356 mm) from the floor to allow for proper air return. Lennox offers an optional upflow unit stand as listed in table 3.

Table 3. Optional Side Return Stand (Upflow Only)

Model/Size	Kit Number
CBX40UHV-All Sizes	45K32

HORIZONTAL RIGHT-HAND AIR DISCHARGE APPLICATION

NOTE — When air handler is located above a finished space, the secondary drain pan must have a larger footprint 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.

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

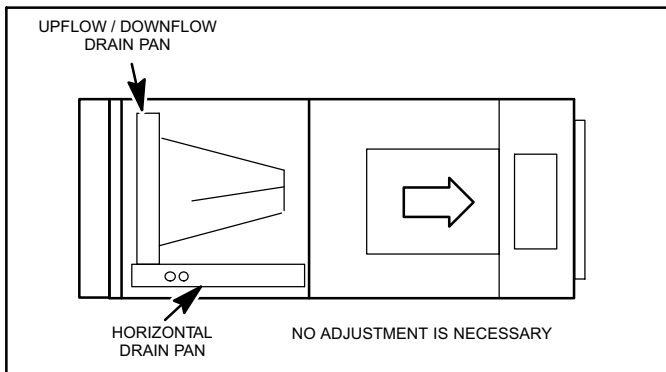


Figure 2. Right-Hand Air Discharge Configuration

1. No further adjustment is necessary. Set unit so that it is sloped 1/4" (6.35 mm) 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" (12.7mm) to avoid damaging the coil or filter as illustrated in figure 3. Use sheet metal screws to connect the return and supply air plenums as required.

HORIZONTAL RIGHT-HAND AIR DISCHARGE APPLICATION IN HIGH HUMIDITY AREAS

For horizontal applications in high humidity areas, seal around the drain pan connections plus liquid and suction lines, to prevent humid air from infiltrating into the unit.

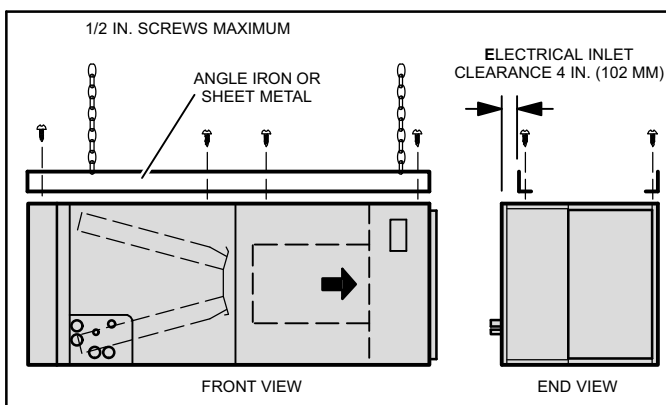


Figure 3. Suspending Horizontal Unit

⚠ 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 AIR DISCHARGE APPLICATION

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

1. Pull the coil assembly from unit. Remove 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.

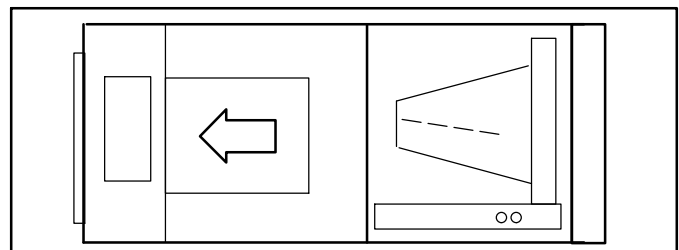


Figure 4. Left-Hand Discharge Configuration

3. Rotate drain pan 180° front-to-back and install it on the opposite side of the coil.
4. Remove screws from top cap as illustrated in figure 5, detail A.
5. Remove horizontal drip shield screw located in the left center of the back coil end seal as illustrated in figure 5, detail A.
6. Rotate horizontal drip shield 180° front to back.
7. Remove plastic plug from hole located on the left center of front coil end seal and reinstall plug in back hole on rear coil end seal.

8. Reinstall horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.
 9. Rotate top cap 180° front-to-back and align with unused screw holes. Holes must align with front and back coil end plates. The top cap has a 45° bend on one side and a 90° bend on the other. The 90° bend must be on the same side as the horizontal drain pan as illustrated in figure 5, detail B.
- NOTE** — Be very careful when you reinstall the screws into coil end plate engaging holes. Misaligned screws may damage the coil.
10. From the upflow position, flip cabinet 90° to the left and set into place. Replace coil assembly. Replace coil assembly. Install drain pan between exterior inner wall and tab as illustrated in figure 5, detail C.
 11. Knock out drain seal plate from access door. Secure plate to cabinet front flange with screw provided.
 12. Flip access door and replace it on the unit.
 13. Set unit so that it is sloped 1/4 inch (6.35mm) toward the drain pan end of the unit. Connect return and supply air plenums as required using sheet metal screws.
 14. 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" (12.7mm) to avoid damage to coil or filter as illustrated in figure 3. Connect return and supply air plenums as required using sheet metal screws.

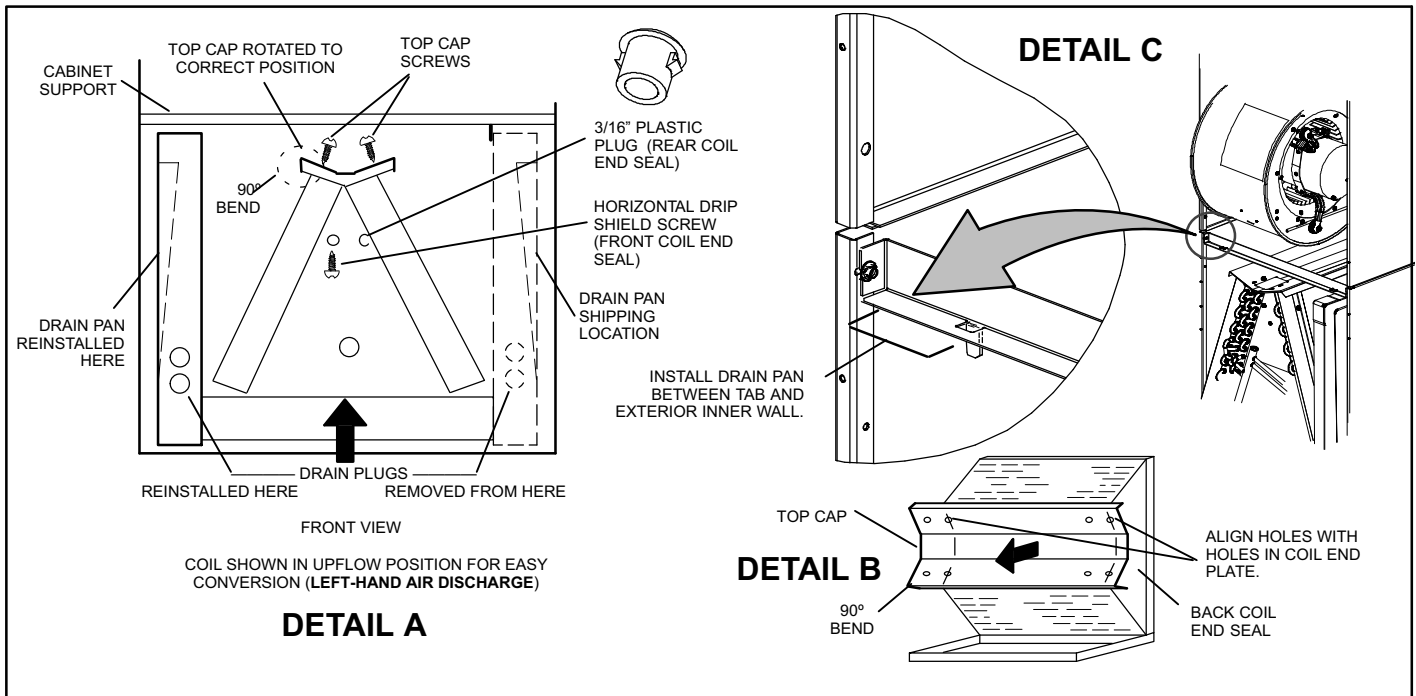


Figure 5. Field Modification for Left-Hand Air Discharge

Brazing Connections

PLEASE READ IMPORTANT ISSUES CONCERNING BRAZING OPERATIONS ON PAGE 7 BEFORE PROCEEDING.

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 — CBX40UHV 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.

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 CONNECTION ON THE OUTDOOR UNIT LIQUID LINE SERVICE VALVE AND OUT OF THE VALVE STEM PORT CONNECTION ON THE SUCTION SERVICE VALVE.

NITROGEN

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.

REFER TO INSTRUCTIONS PROVIDED WITH OUTDOOR UNIT FOR LEAK TESTING, EVACUATING AND CHARGING PROCEDURES

Figure 6. Brazing Connections

⚠ IMPORTANT

To prevent the build up of high levels of nitrogen when purging, be sure it is 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 a system.

⚠ WARNING

Polyol ester (POE) oils used with HFC-410A 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 the low side shell and suction tubing being pressurized. Application of a brazing torch while pressurized may result in ignition of the refrigerant and oil mixture - check the high and low pressures before unbrazing.

⚠ WARNING



When using a high pressure gas such as dry 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.

Table 4. CBX40UHV Refrigerant Connections and Line Set Requirements

Models	Liquid Line	Vapor/Suction Line	L15 Line Set
-024, -030, and -036	3/8 (10)	3/4 (19)	L15 line set sizes are dependent on unit matchups. See CBX32MV Engineering Handbook to determine correct line set sizes.
-042, and -048	3/8 (10)	7/8 (22)	
-060	3/8 (10)	7/8 (22)	

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. To obtain the correct information from Lennox, be sure to communicate the following information:

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 8 for typical drain trap configuration.

OVERFLOW DRAIN

It is recommended that the overflow drain is connected to a 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 8 for main and overflow drain locations based on coil orientation.

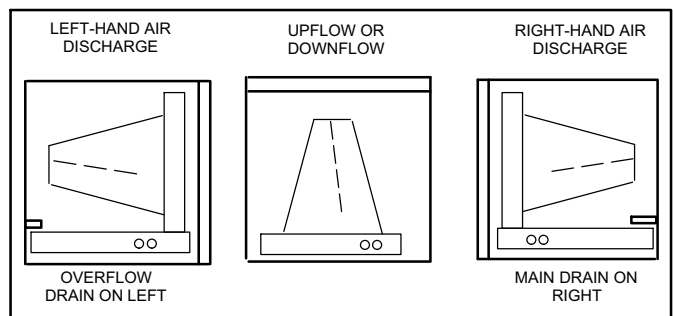


Figure 7. Main and Overflow Drain Locations based on Coil Orientation

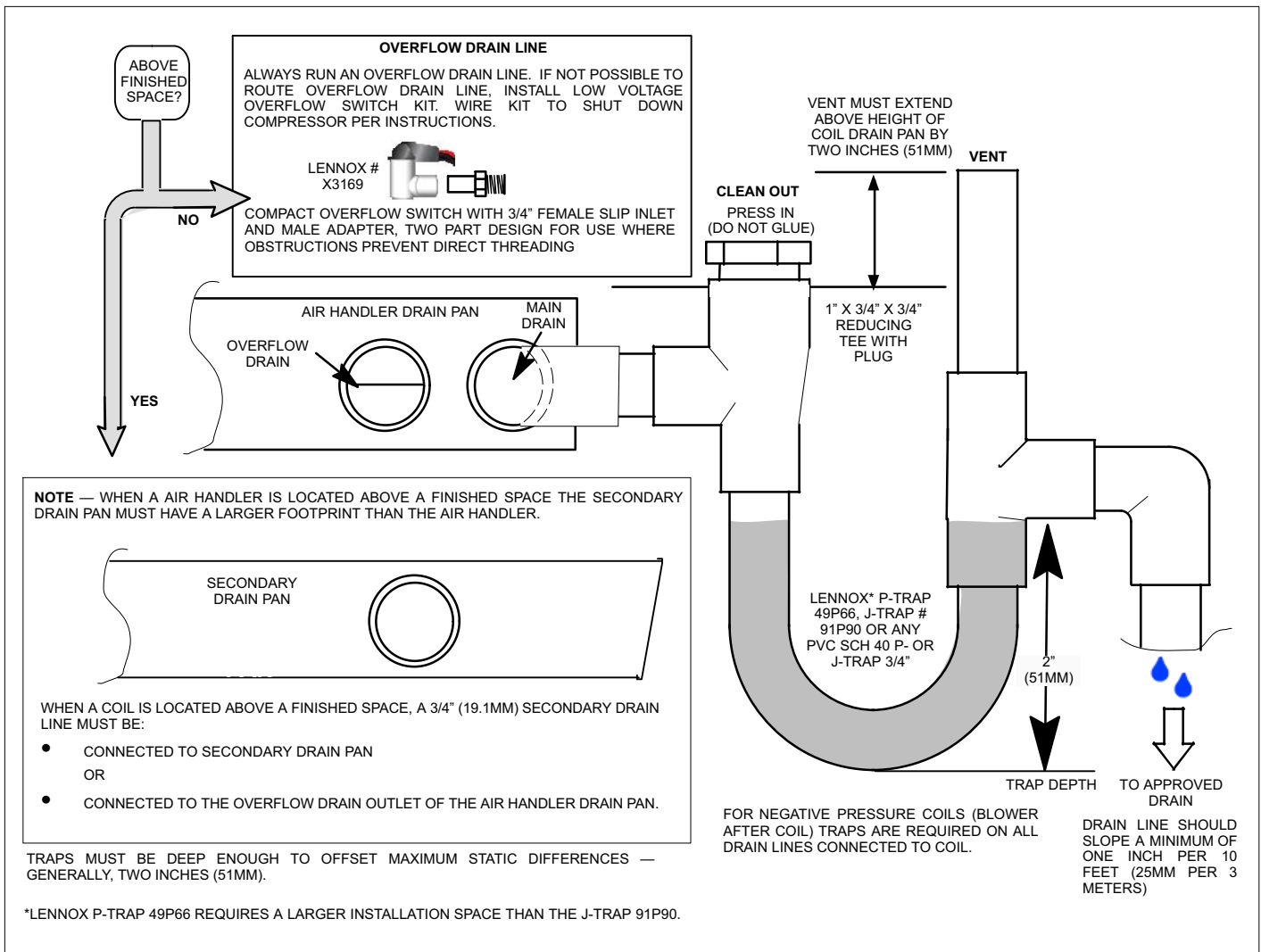


Figure 8. Typical Main and Overflow Drain

BEST PRACTICES

The following best practices are recommended to ensure better condensate removal:

- 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.

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. The air handler comes from the factory with an installed 5" (127mm) MERV 16 filter in a **sealed plastic bag**. Plastic bag **MUST** be remove before unit operation start up. Note

that filter access door fits over access panel. Air will leak if the access panel is placed over the filter door.

! IMPORTANT

Plastic bag must be removed from filter.

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

To replace filter:

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

Air Handler comes from factory with 5" (127mm) — MERV 16 filter. Filter section can be modified to accept a 1" (25.4mm) filter as illustrated in figure 9. See table below for replacement filter sizes.

Table 5. MERV16 Disposable Filter (five inch) Dimensions (CBX40UHV)

Unit Model No.	Filter Size Inches (mm)	Catalog #
CBX40UHV-024, -030 and -036	20 x 20 x 5 (508 x 508 x 127)	X7935
-CBX40UHV-048, -042, and -060	20 x 25 x 5 (508 x 635 x 127)	X6675

Table 6. Disposable Filter (one inch) Dimensions (CBX40UHV)

Unit Model No.	Filter Size Inches (mm)	Catalog #
CBX40UHV-024, -030 and -036	20 x 20 x 1 (508 x 508 x 25)	X1963
-CBX40UHV-048, -042, and -060	20 x 25 x 1 (508 x 635 x 25)	X1970

NOTE — To use one inch filter bend tabs up as illustrated in figure 9.

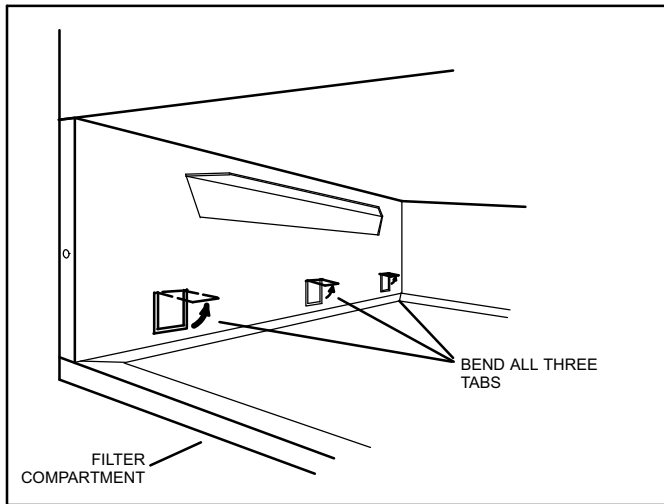


Figure 9. One Inch Filter Tabs

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 from the unconditioned space 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*, *Permagum* or equivalent). Any of the previously mention materials may be used to seal around the main and auxiliary drains, and around open areas of electrical inlets.

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 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 electric shock hazard that could cause personal injury or death.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY.

⚠ 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.

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.

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.

This unit is provided with knockout holes for conduit. Refer to figure 10 for unit schematic wiring diagram. Refer to figures 12 through 13 on page 14 for typical field wiring.

Separate openings have been provided for 24V low voltage and line voltage. Refer to the dimension illustration of specific location.

WIRING CONNECTIONS

1. Install line voltage power supply to unit from a properly 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 control wiring gauge per the charts on page 16.

KEY	DESCRIPTION
A92	CONTROL-INTEGRATED
B3	MOTOR-BLOWER
J48	JACK-MOTOR, VARIABLE SPEED
J49	JACK-MOTOR, VARIABLE SPEED
P8	PLUG-ELECTRIC HEAT
P48	PLUG-MOTOR, VARIABLE SPEED
P49	PLUG-MOTOR, VARIABLE SPEED
T1	TRANSFORMER-CONTROL

BLOWER COIL	RECOMMENDED BLOWER SPEED TAP SELECTION			
	COOL		HEAT	
-018 -024 -030 -036	COOL PIN #3	HEAT PUMP COOL PIN #3	CONDENS- ING UNIT WITH ELECTRIC HEAT ONLY HEAT PIN #4	HEAT PUMP WITH ELECTRIC HEAT HEAT PIN #4
-042	COOL PIN #3	COOL PIN #3	HEAT PIN #3	HEAT PIN #3
-048	COOL PIN #2	COOL PIN #2	HEAT PIN #1	HEAT PIN #1
-060	COOL PIN #3	COOL PIN #3	HEAT PIN #1	HEAT PIN #1
-068	COOL PIN #3	COOL PIN #3	HEAT PIN #4	HEAT PIN #4

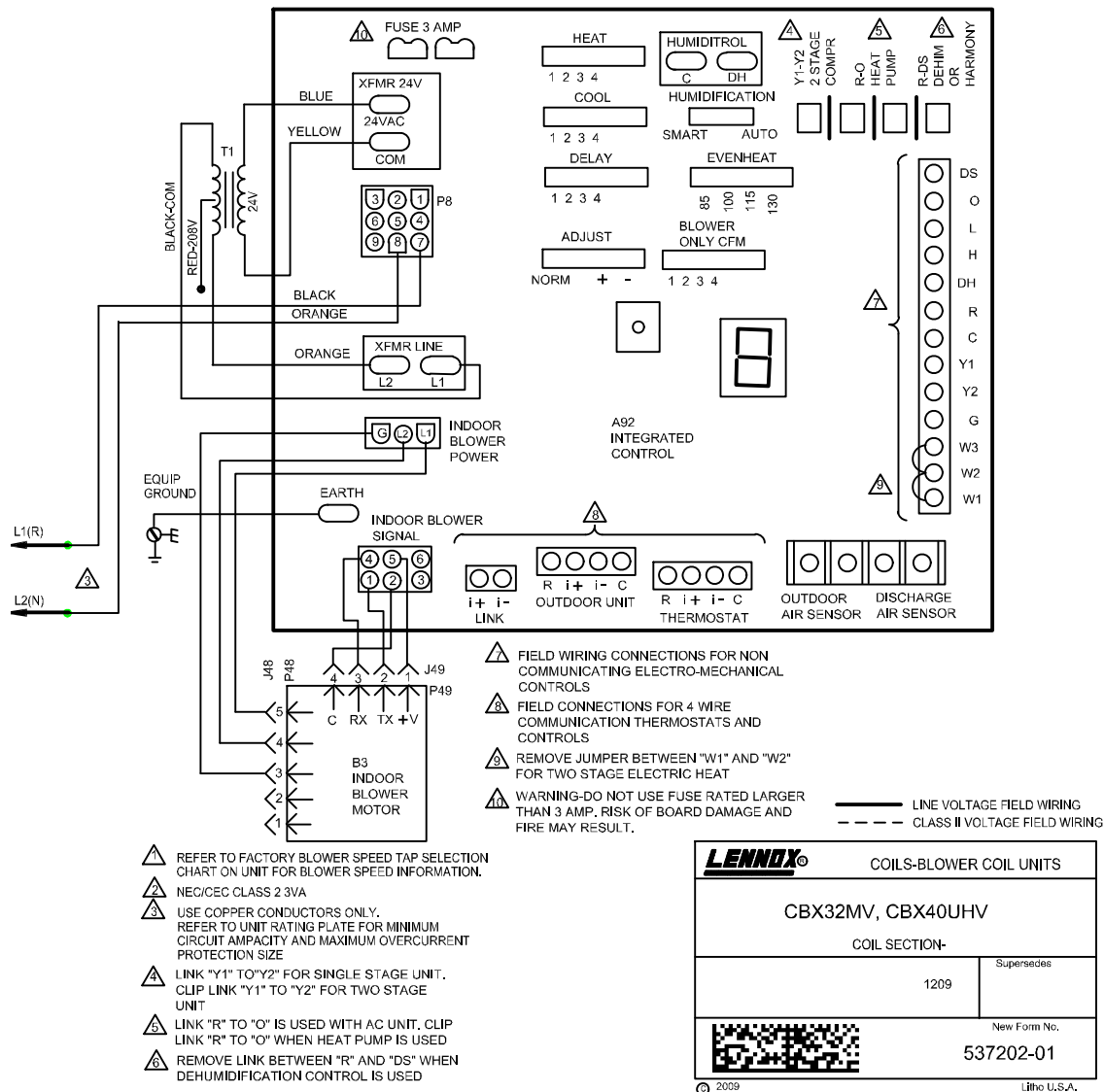


Figure 10. CBX40UHV Air Handler Unit Typical Wiring Diagram

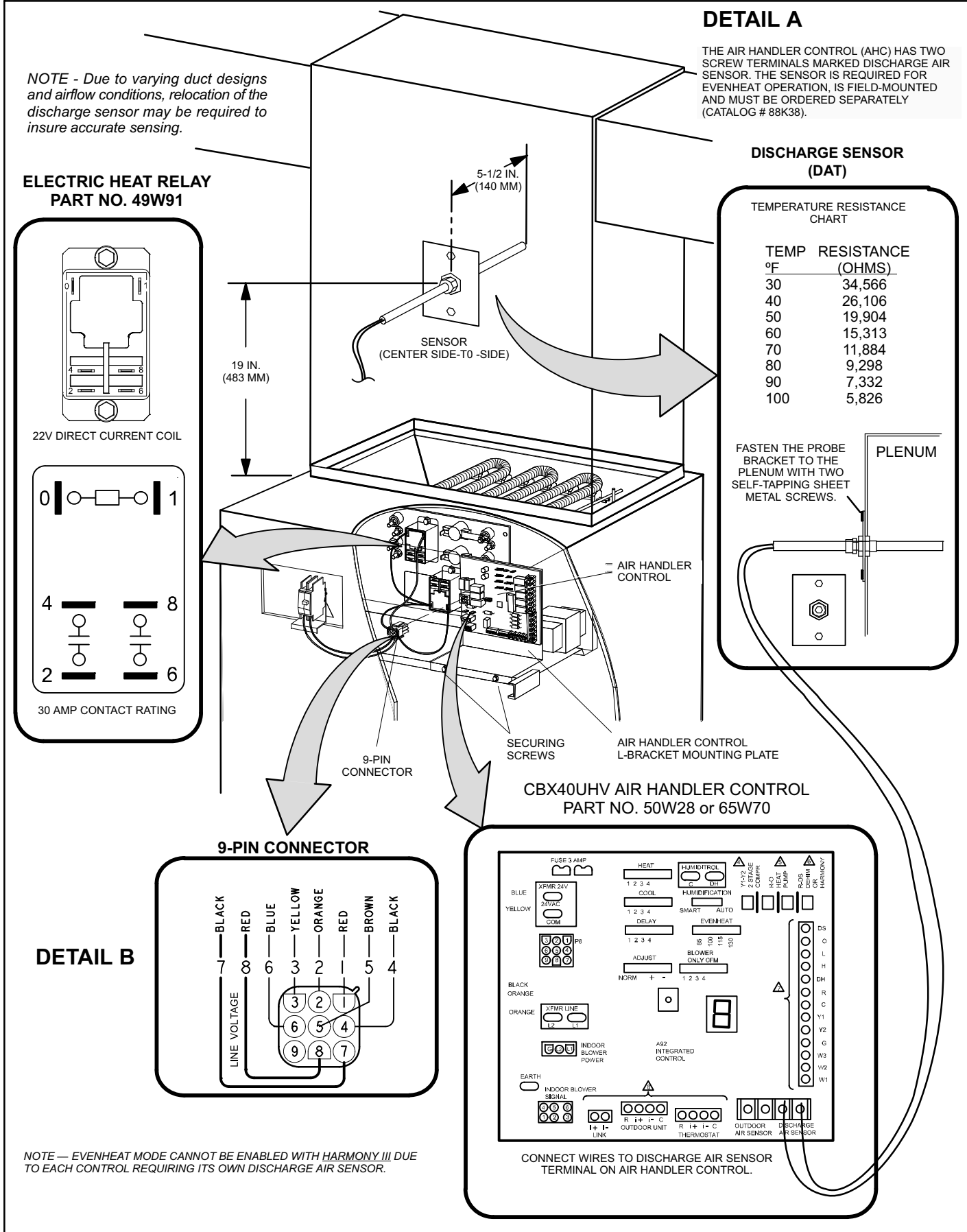


Figure 11. Component Connections

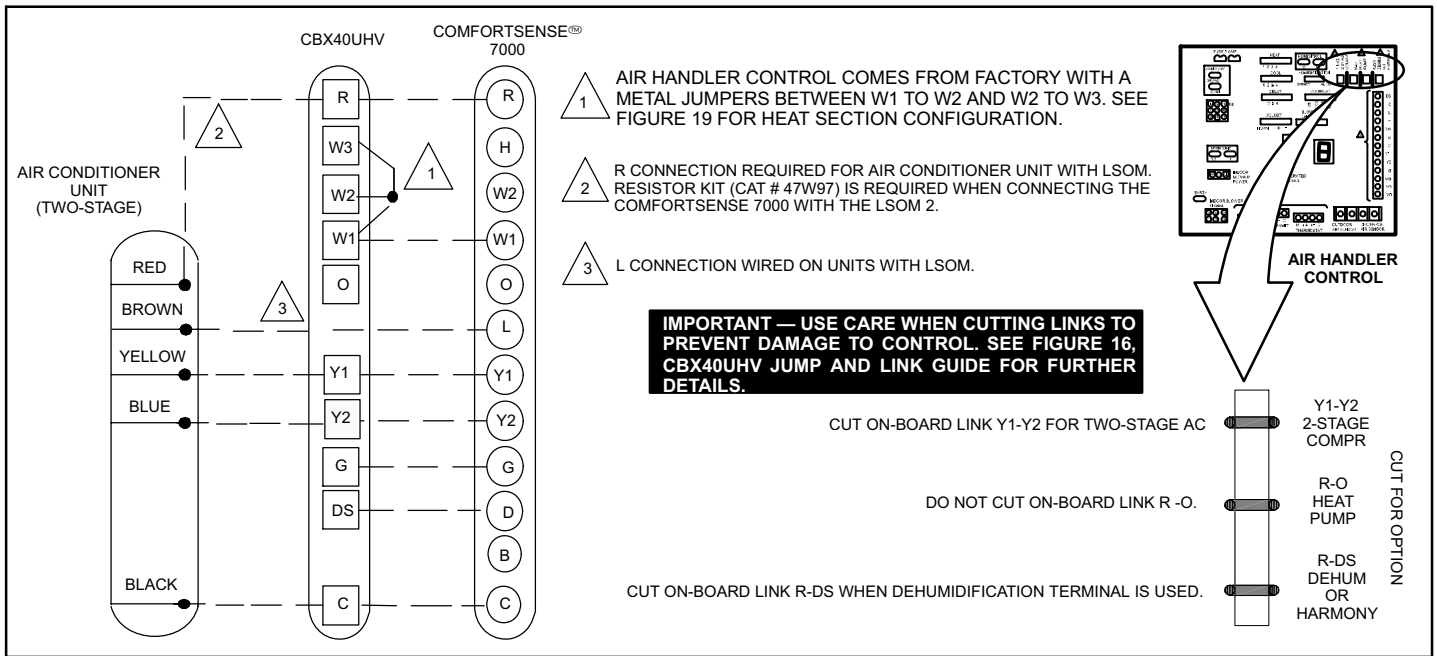


Figure 12. Field Wiring — Cooling Application (Non-Communicating)

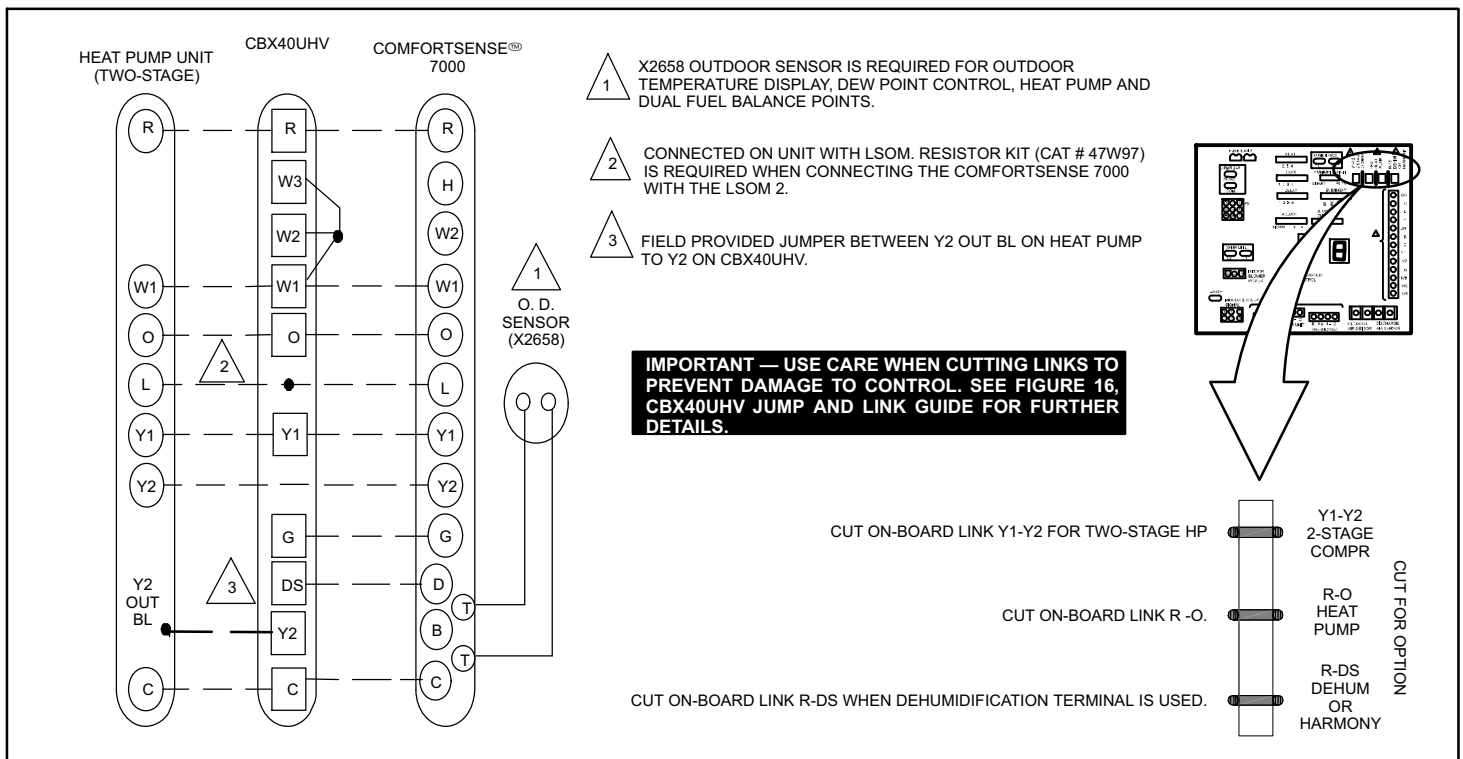


Figure 13. Field Wiring — Heat Pump (Non-Communicating)

CAUTION

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

Electrostatic discharge can affect electronic components. Take precautions 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. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure

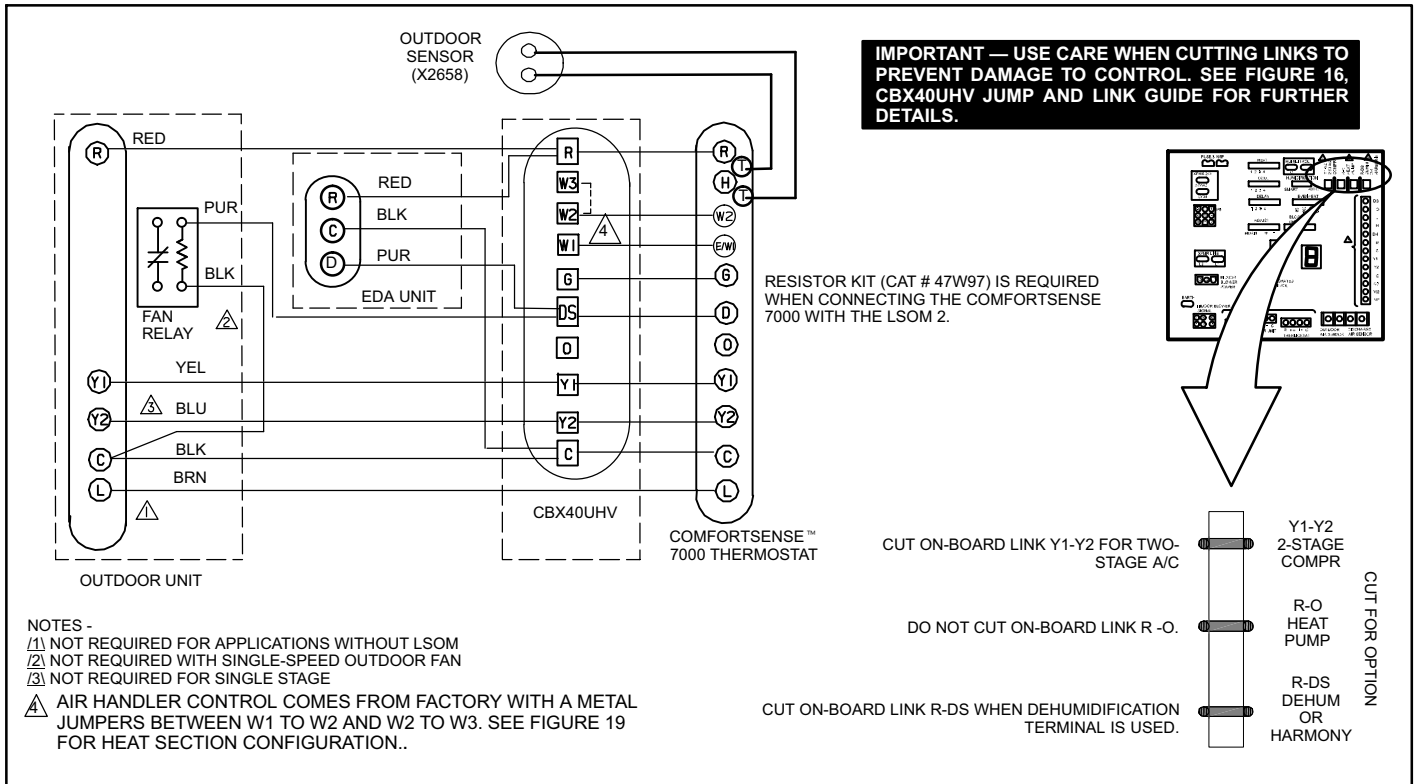


Figure 14. Cooling Application — Humiditrol® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

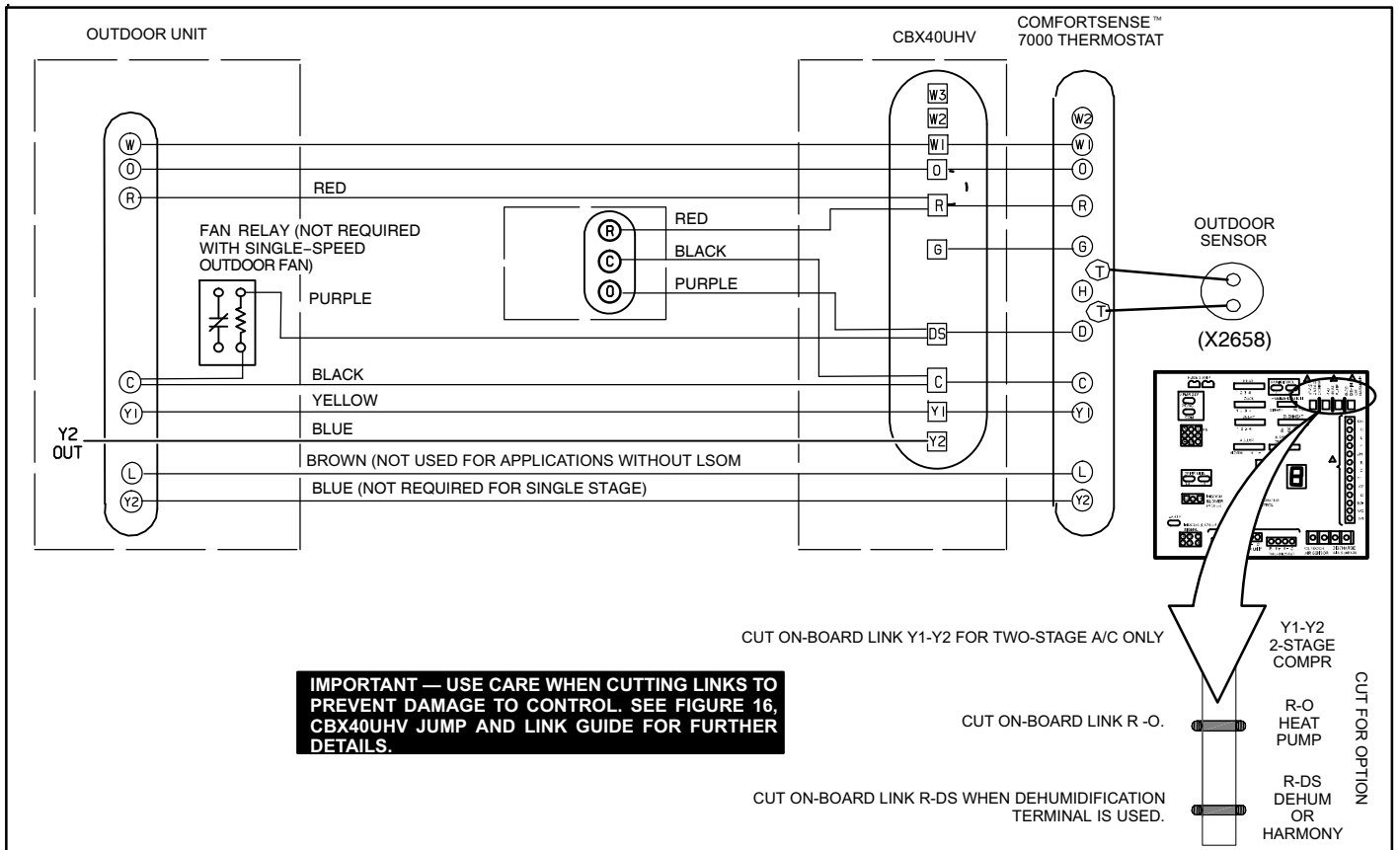


Figure 15. Heat Pump Application — Humiditrol® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

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 11, 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)

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 position are wired as noted in table 7).

NOTE — See figure 11, 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 230 VAC supply from heater kit
9	Not Used

CONTROL CONNECTIONS AND WIRING REQUIREMENTS

This sections 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)
Link	i+	Not used.
	i-	

Table 9. Run Length — Communicating

Wire Run Length	AWG #	Insulation/Core Types
Maximum length of 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. Air Handler Control Connections — Non-Communicating

Label	Function
W1	First-stage heating demand.
W2	Second stage heating demand. W1 input must be active to recognize second stage heat demand. .
W3	Third stage heating demand. W1 and W2 inputs must be active to recognize third stage heat demand.
G	24VAC signal indicates the presence of a demand.
Y1 and Y2	First and second stage cooling inputs.
C	24VAC common.
R	24VAC power.
DH	Use in communicating system only
H	24VAC output for humidification.
L	Use in communicating system only
O	Reversing Valve input. (Energized by thermostat in cooling mode.)
DS	Blower speed control input for Harmony Zoning or thermostat de-humidification control.

Table 11. 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	

CBX32MV / CBX40UHV JUMPER & LINK GUIDE

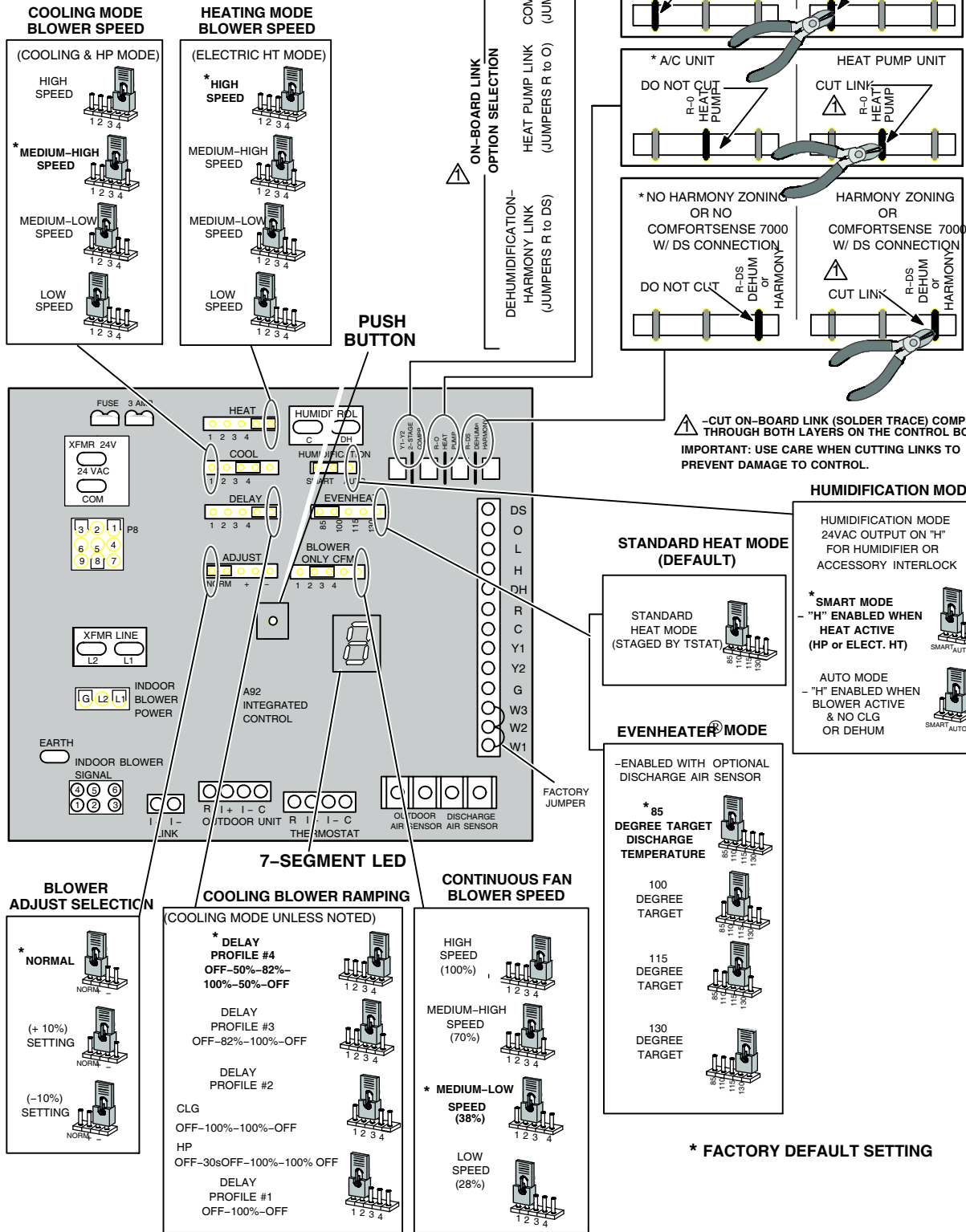


Figure 16. Air Handler Configuration

Air Handler Control Button, Display and Jumpers

Use figure 16 as reference for jumper settings. If any of the reference jumpers are missing, the Air Handler Control will display Error Code **130** as per table 10, and the Air Handler Control will automatically use the **factory default** setting show in figure 16)

⚠ 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).

JUMPERS

Jumpers are used for non-communicating mode only.

- 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.
- 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.

- Blower Only CFM** — Used to select Indoor blower CFM for continuous operation.
- 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 tables 15 through 19.
- 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 tables 15 through 19
- 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.

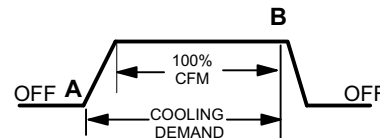
If the jumper is missing, the Air Handler Control will activate the *Configuration Jumper is Missing* alarm in and will automatically use the default factory setting in table 10. See figure 16 for jumper configurations. Actual CFM values for different air handler sizes are shown in tables 15 through 19.

- Delay** — Indoor blower cooling profile, delay for cooling and heat pump operations.
 - When operating a heat pump, delay profiles 1 and 2 are only applicable.
 - When operating a heat pump, and profiles 3 and 4 are selected, the Air Handler Control will default to profile 1.

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 16 for jumper configurations.

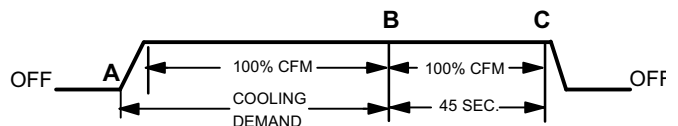
Delay Profile 1

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



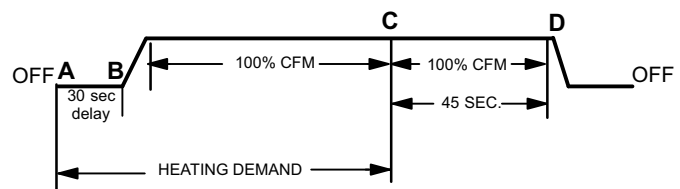
Delay Profile 2

Cooling — Air Conditioner and Heat Pump:



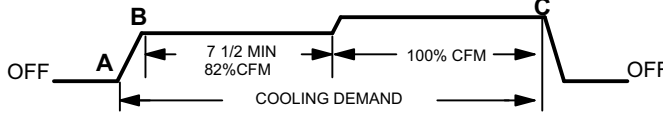
- When cool demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds.
- Motor ramps down to stop.

Heating — Heat Pump only:



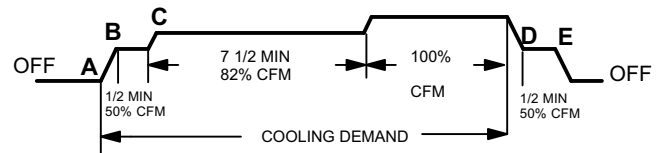
- A. When heat demand is initiated, 30 seconds motor on delay starts
- B. After the motor on delays expires, motor ramps up to 100% and runs at 100% until demand is satisfied.
- C. Once demand is met, motor runs at 100% for 45 seconds.
- D. Motor ramps down to stop.

Delay Profile 3



- A. When cool demand is initiated, motor ramps up to 82%
- B. Motor runs at 82% for approximately 7.5 minutes and then ramp 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 cool 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 ramp 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

AHC CHARACTER DISPLAY

An on-board single character LED display (see figure 16 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 12. AHC System Status Codes

AHC Single Character Display	Action
Letter or Number	Unit Size Code (number or letter) displayed represents air handler model size and capacity. See <i>Configuring Unit Size Codes</i> in figure 18.
≡	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 18.
.	Idle mode (decimal point / no unit operation)
<i>A</i>	Delivered CFM. Example: <i>A 1200</i>
[Stage Cooling (Shows active cooling stages) <i>1</i> or <i>2</i>
<i>d</i>	Dehumidification mode (Unit in dehumidification mode only)
<i>d F</i>	Shown only while in active defrost (Y, W and O call)
<i>H</i>	Stage heating (Shows number of active electric heat pilot relays) <i>H1</i> or <i>H2</i> or <i>H3</i>
<i>h</i>	Stage heat pump (shows active heat pump stages) <i>h1</i> or <i>h2</i>
<i>U</i>	Discharge air sensor temperature (indoor blower must be operating) <i>U 105</i>

Table 13. 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. Display will blink.
Blinking	-	Push and hold button until required symbol displays. <i>H A</i> or <i>P</i>
CONFIGURING ELECTRIC HEAT SECTIONS		
Solid	<i>H</i>	Release push button - control will cycle the indoor blower motor on to the selected heat speed and stage the electric heat relays on and off to automatically detect number of electric heat sections. Control will store the number of electric heat sections. Control will automatically exit current active mode .
INDOOR BLOWER TEST		
Solid	<i>R</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"> When the correct Unit Sized Code is displayed, RELEASE push button. Selected code will flash for 10 second period. During ten second period, HOLD push button until code stops blinking (three seconds minimum). 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		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. Display will blink.
Blinking	<i>c</i>	Push button to confirm command to delete codes. Error codes are cleared.

Table 14. AHC Single Character Display — Error Codes (Communicating and Non-Communicating)

Error Codes	Status of Air Handler
E 105	Equipment is unable to communicate. Indicates numerous message errors. In most cases errors are related to electrical noise.
E 114	Possible issue with main power frequency (control requires 60 Hertz power).
E 115	Low 24 volts (18 or less volts) - Control will restart if the error recovers.
E 120	Usually caused by delay in outdoor unit responding to indoor unit.
E 124	Active Subnet Controller Missing for > 180 seconds. This indicates a data connection has been lost between a communicating device and the communicating thermostat. Device (indoor or outdoor unit) sends the alarm if no communication is established between device and thermostat within three minutes.
E 130	Configuration jumper(s) is missing on AHC.
E 131	Non-volatile data corruption.
E 132	Recycle power. If failure re-occurs, replace AHC. System reset is required to recover.
E 180	Outdoor air temperature sensor (OAS) out of range.
E 201	Indoor Blower communication failure - (includes indoor blower power outage)
E 202	Incorrect air handler model size and capacity selected or wrong motor. Check for proper configuring under <i>Configuring Unit Size Codes</i> .
E 203	No air handler model size and capacity selected. Check for proper configuring under <i>Configuring Unit Size Codes</i> .
E 292	Indoor blower motor unable to start (seized bearing, stuck wheel, etc.).
E 295	Indoor blower motor over temperature (motor trip on internal protector)
E 310	Discharge air sensor (DATS) out of range, open or shorted. Code is only active in evenheat mode setting or on communicating systems with icomfort room thermostat.
E 312	Restricted airflow — Indoor blower motor is running at a reduced CFM (cutback mode **)
E 313	Indoor and outdoor unit capacity mismatch.
E 331	Global network connection error. This usually indicates there is a short or overladed resistance is to low) condition between communicating indoor and thermostat units.
E 345	Second-stage cooling link not cut. AHC Y1-Y2 link not cut for non-communicating heat pump.
E 346	Heat pump link not cut. AHC R-O link not cut for non- communicating heat pump. Only on AHC Rev 2.4 or earlier.
E 347	Relay Y1 failure. AHC relay activated, but not respond back .
E 348	Relay Y2 failure. AHC relay activated, but not respond back .
E 350	Heat call with non-configured or mis-configured electric heat. Check for proper configuring under <i>Configuring Electric Heat Stages</i> .
E 351	Heat section / Stage 1 failed (Pilot relay contacts did not close or the relay coil in electric heat did not energizing)
E 352	Heat section / Stage 2 failed.
E 353	Heat section / Stage 3 failed.
E 354	Heat section / Stage 4 failed.
E 355	Heat section / Stage 5 failed.
E 420	When in icomfort® mode with non-communicating HP, defrost cycle running greater than 20 minutes in duration.
Error codes 401 through 409 are only displayed when the AHC L terminal is connected to a non-communicating outdoor unit's LSOM device..	
E 401	Compressor ran more than 18 hours in air conditioning mode.
E 402	Compressor system pressure trip.
E 403	Compressor short-cycling - running less than four minutes.
E 404	Compressor rotor locked.
E 405	Compressor open circuit.
E 406	Compressor open start circuit.
E 407	Compressor open run circuit.
E 408	Compressor contactor is welded.
E 409	Compressor low voltage.
** Cutback Mode — The variable speed motor has pre-set speed and torque limiters to protect the motor from damage caused by operating out of its designed parameters (0 through 0.80 in. w.g. total external static pressure).	

Target CFM Tables

Table 15. CBX40UHV-024 CFM Targets

COOL/HEAT PUMP TABLE (C00L)					ELECTRIC HEAT TABLE (HEAT)				
JUMPER SELECTION					JUMPERS SELECTION				
1	2	3	4	(ADJUST)	1	2	3	4	(ADJUST)
465	690	900	1050	“+”	715	855	1000	1130	“+”
425	620	825	950	NORM	670	770	900	1035	NORM
385	560	735	850	“-”	580	700	800	930	“-”

Low Cool CFM = 70% of Cool table.

Table 16. CBX40UHV-030 CFM Targets

COOL/HEAT PUMP TABLE (C00L)					ELECTRIC HEAT TABLE (HEAT)				
JUMPER SELECTION					JUMPERS SELECTION				
1	2	3	4	(ADJUST)	1	2	3	4	(ADJUST)
660	880	1100	1320	“+”	800	935	1070	1210	“+”
600	800	1000	1200	NORM	725	850	975	1100	NORM
540	720	900	1080	“-”	580	765	880	990	“-”

Low Cool CFM = 70% of Cool table.

Table 17. CBX40UHV-036 CFM Targets

COOL/HEAT PUMP TABLE (C00L)					ELECTRIC HEAT TABLE (HEAT)				
JUMPER SELECTION					JUMPERS SELECTION				
1	2	3	4	(ADJUST)	1	2	3	4	(ADJUST)
1090	1225	1380	1545	“+”	1230	1335	1445	1545	“+”
975	1125	1275	1400	NORM	1120	1215	1315	1400	NORM
900	1000	1135	1265	“-”	1010	1185	1200	1265	“-”

Low Cool CFM = 70% of Cool table.

Table 18. CBX40UHV-042 CFM Targets

COOL/HEAT PUMP TABLE (C00L)					ELECTRIC HEAT TABLE (HEAT)				
JUMPER SELECTION					JUMPERS SELECTION				
1	2	3	4	(ADJUST)	1	2	3	4	(ADJUST)
1100	1320	1540	1760	“+”	1100	1320	1540	1760	“+”
1000	1200	1400	1600	NORM	1000	1200	1400	1600	NORM
900	1080	1260	1440	“-”	900	1080	1260	1440	“-”

Low Cool CFM = 70% of Cool table.

Table 19. CBX40UHV-048/-060 CFM Targets

COOL/HEAT PUMP TABLE (C00L)					ELECTRIC HEAT TABLE (HEAT)				
JUMPER SELECTION					JUMPERS SELECTION				
1	2	3	4	(ADJUST)	1	2	3	4	(ADJUST)
1625	1820	2055	2145	“+”	1850	1960	2090	2150	“+”
1425	1625	1805	2005	NORM	1705	1800	1900	2005	NORM
1205	1375	1555	1725	“-”	1560	1625	1720	1770	“-”

Low Cool CFM = 70% of Cool table.

Unit Operating Sequences

This section details unit operating sequence for non-communicating systems. For communicating systems, see the icomfort Touch® thermostat installation instruction.

Table 20. CBX40UHV with ComfortSense™ 7000 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™ 7000 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™ 7000 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 21. CBX40UHV, with ComfortSense™ 7000 Thermostat and Two-Stage Outdoor Unit Operating Sequence

Operating Sequence		System Demand								System Response			
System Condition	Step	Thermostat Demand						Relative Humidity		Compr	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™ 7000 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™ 7000 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™ 7000 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™ 7000 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>	

Configuring Unit

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

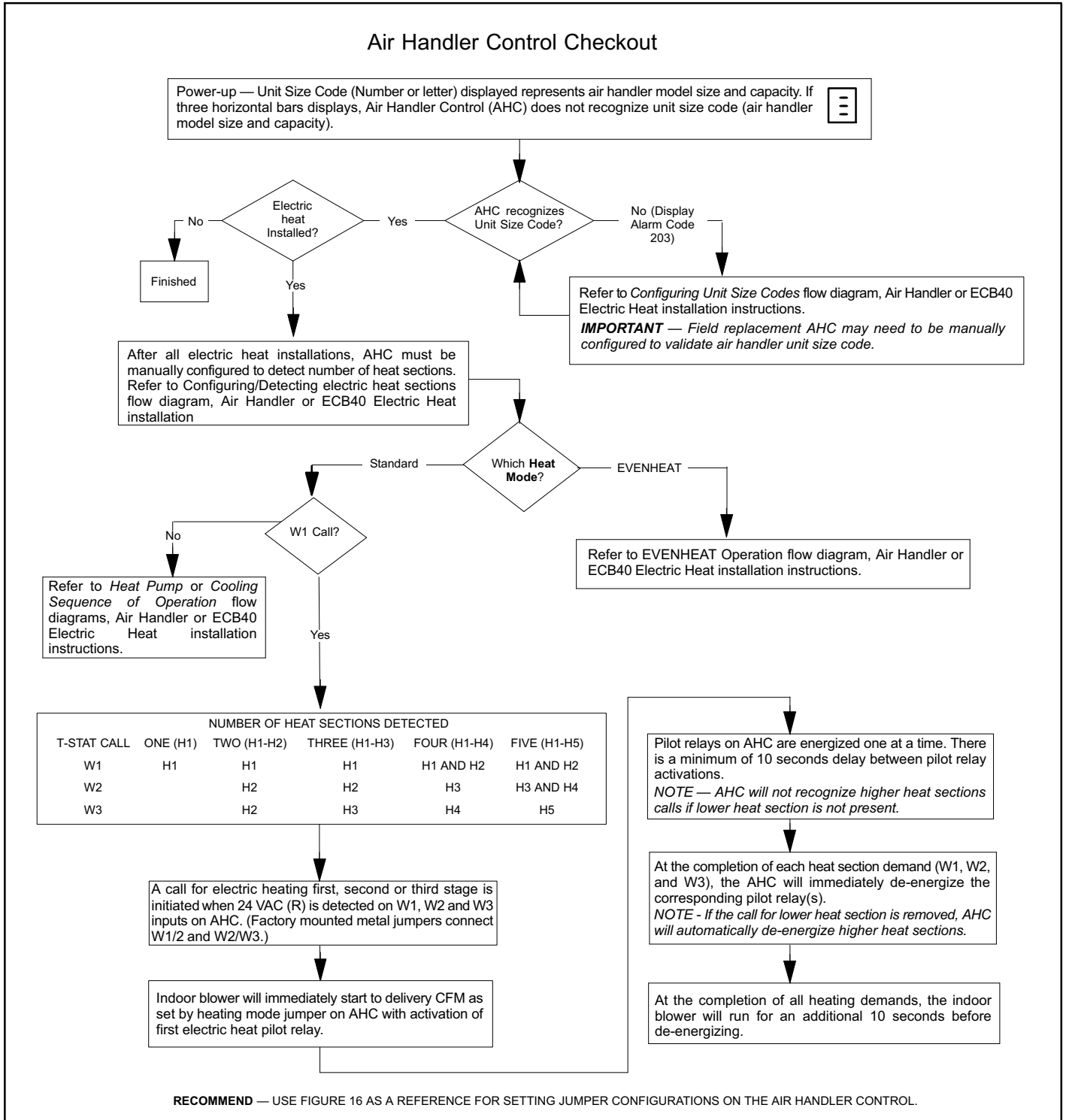


Figure 17. Air Handler Control Checkout

Configuring Unit Size Codes (Model Number)

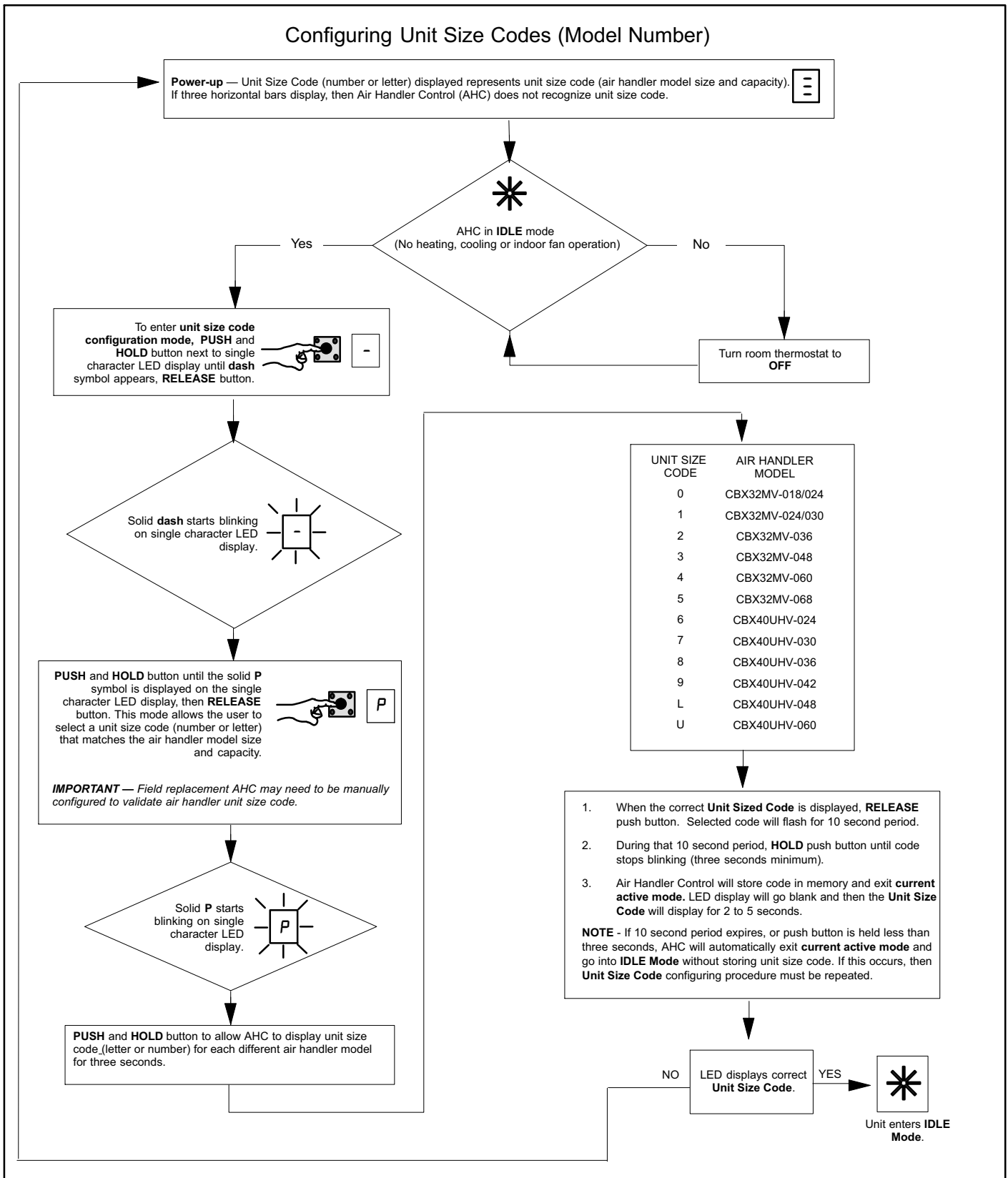


Figure 18. Configure Unit Size Codes

Configuring/Detecting Electric Heat Sections

IMPORTANT — All electric heat installations require the Air Handler Control (AHC) to be manually configured to detect number of heat sections.

NOTE — All field replacement AHC will require configuring/detecting electric heat sections.

RECOMMEND — USE FIGURE 16 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.

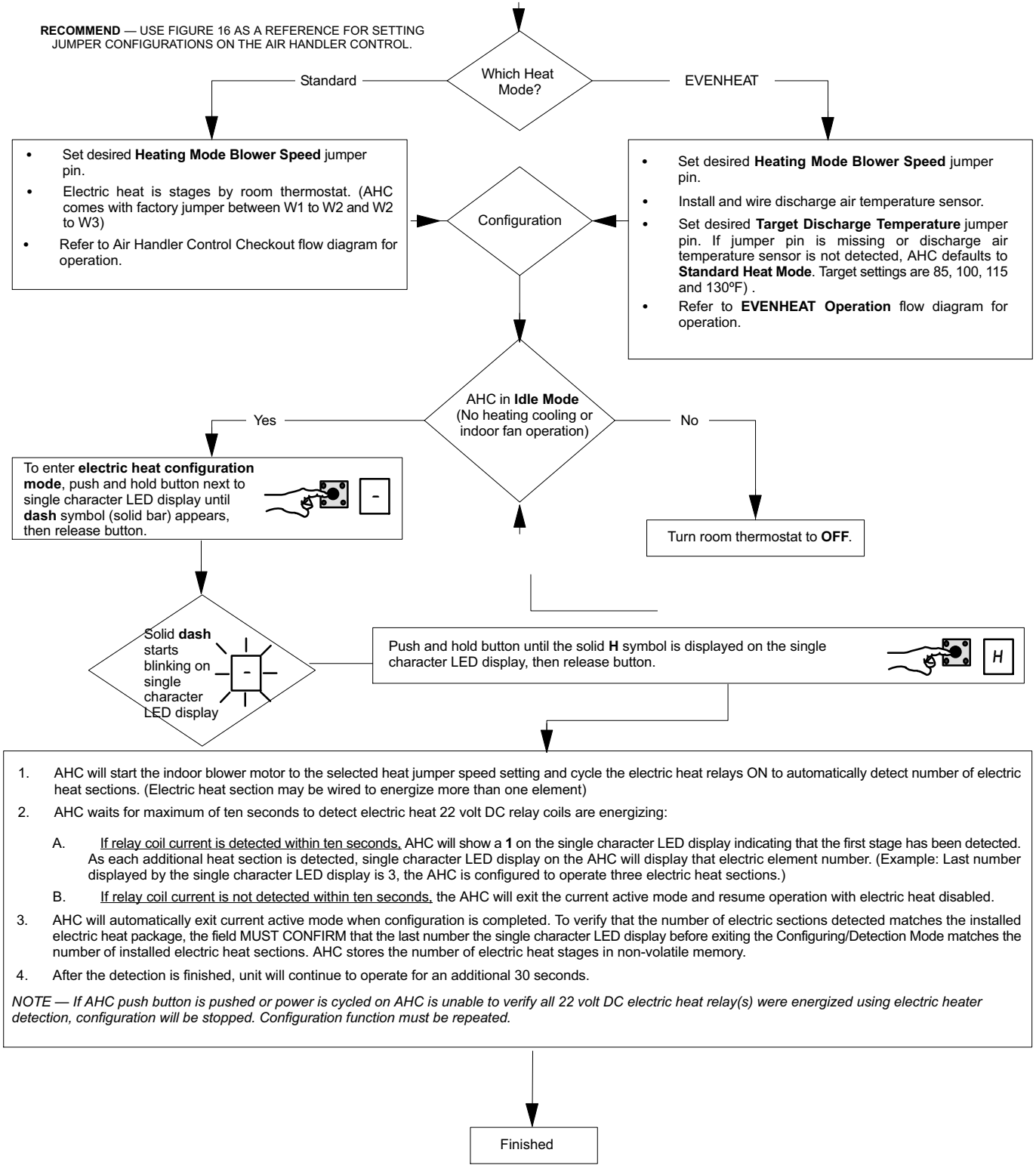


Figure 19. Heat Mode Selection

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.

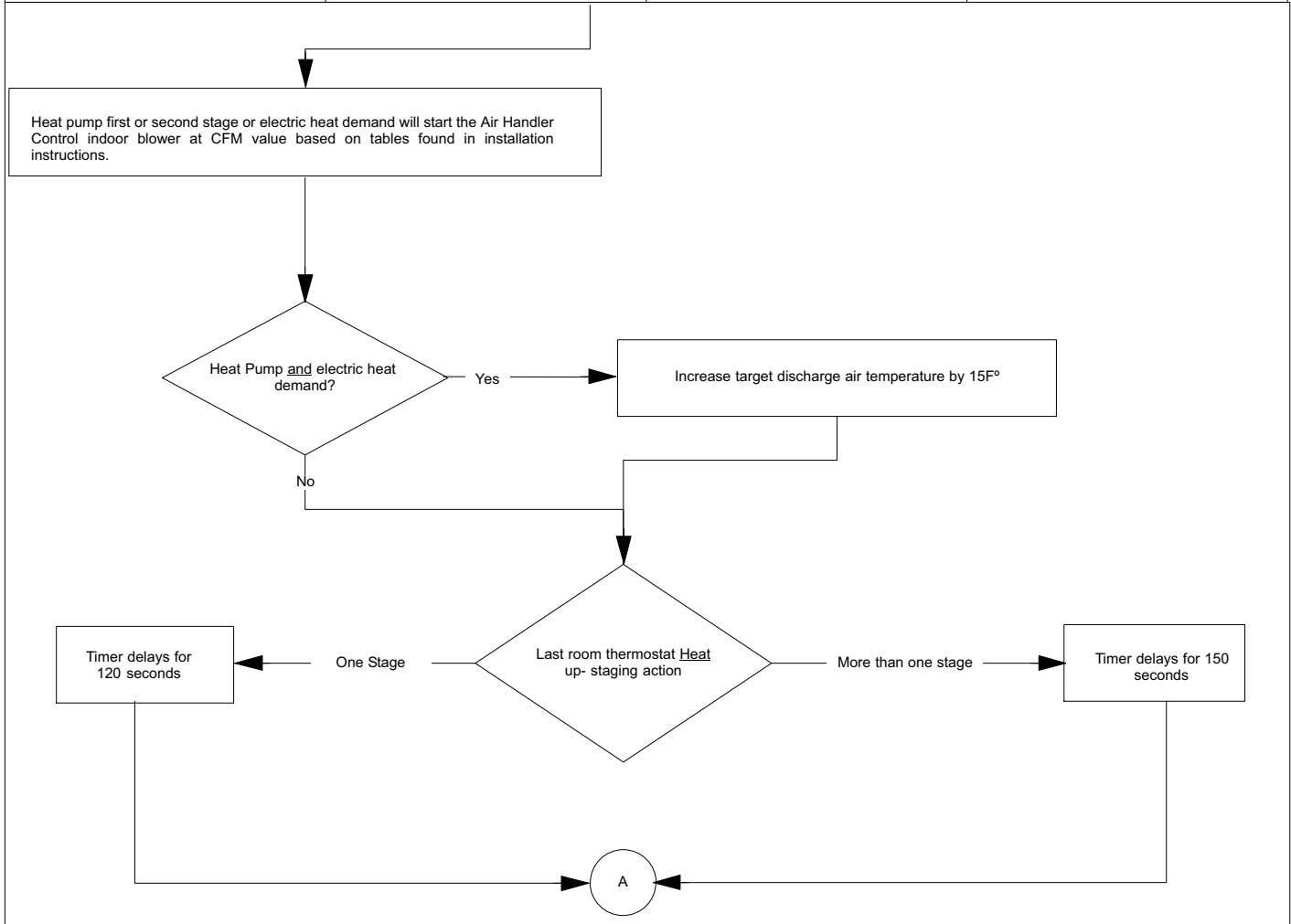


Figure 20. EVENHEAT Operation (1 of 2)

EvenHeat Operation (continued)

Note 1 Activation delay

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

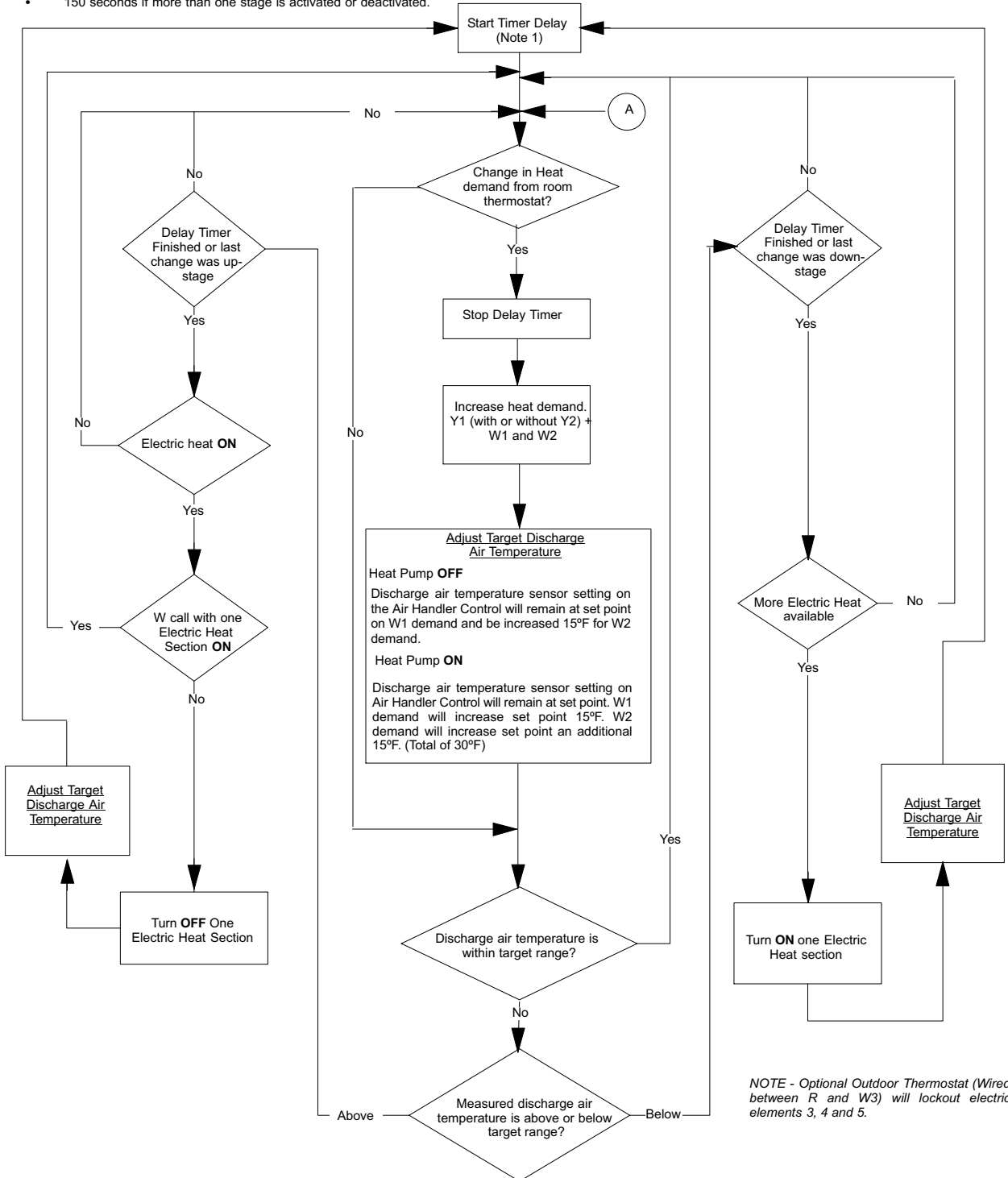


Figure 21. EVENHEAT Operation (2 of 2)

Heat Pump Operation (Heating and Cooling)

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

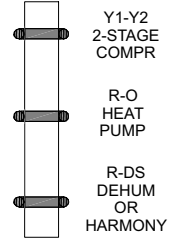
- Set **Cooling Mode Blower Speed** jumper pin . (Low and high indoor blower CFM settings are identical for cooling and heat pump)
- Set Blower Adjust Selection jumper pin.
- Set Cooling Mode Blower Ramping jumper pin (Cooling calls — All ramping profiles are active). (Heating calls — Only ramping profiles 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-board link must be cut between Y1 and Y2 to allow two stage cooling operation.
- AHC on-board link must be cut between R and O to allow heat pump operation.

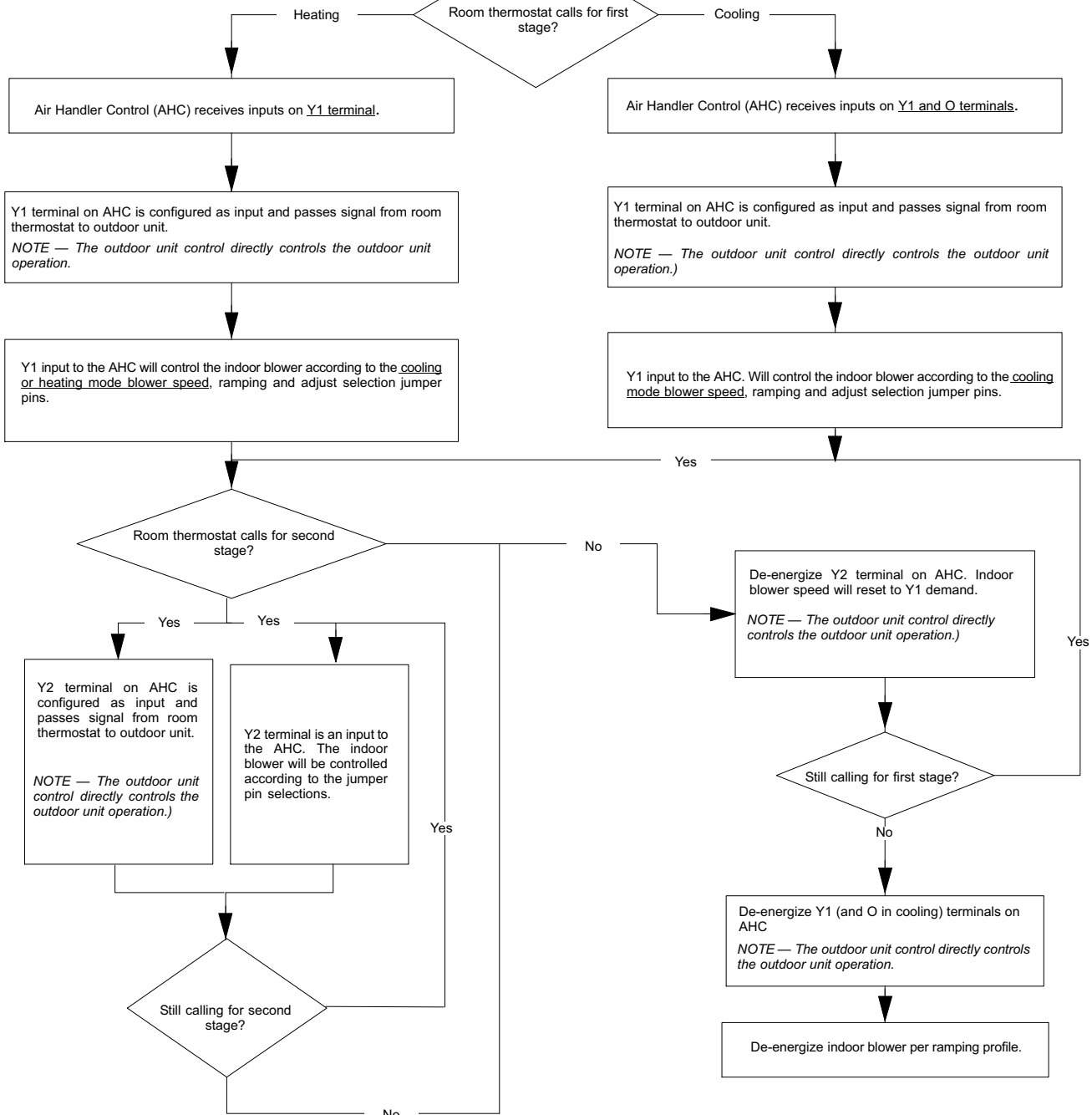
CUT ON-BOARD LINK Y1-Y2 FOR TWO-STAGE A/C

CUT ON-BOARD LINK R -O.



IMPORTANT — USE CARE WHEN CUTTING LINKS TO PREVENT DAMAGE TO CONTROL. SEE FIGURE 16, CBX40UHV JUMP AND LINK GUIDE FOR FURTHER DETAILS.

RECOMMEND — USE FIGURE 16 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

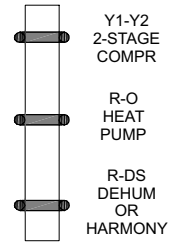
1. Set **Cooling Mode Blower Speed** jumper pin.
2. Set **Cooling Mode Blower Ramping** jumper pin.
3. Set **Blower Adjust Selection** jumper pin.

Single or Two-Stage Unit

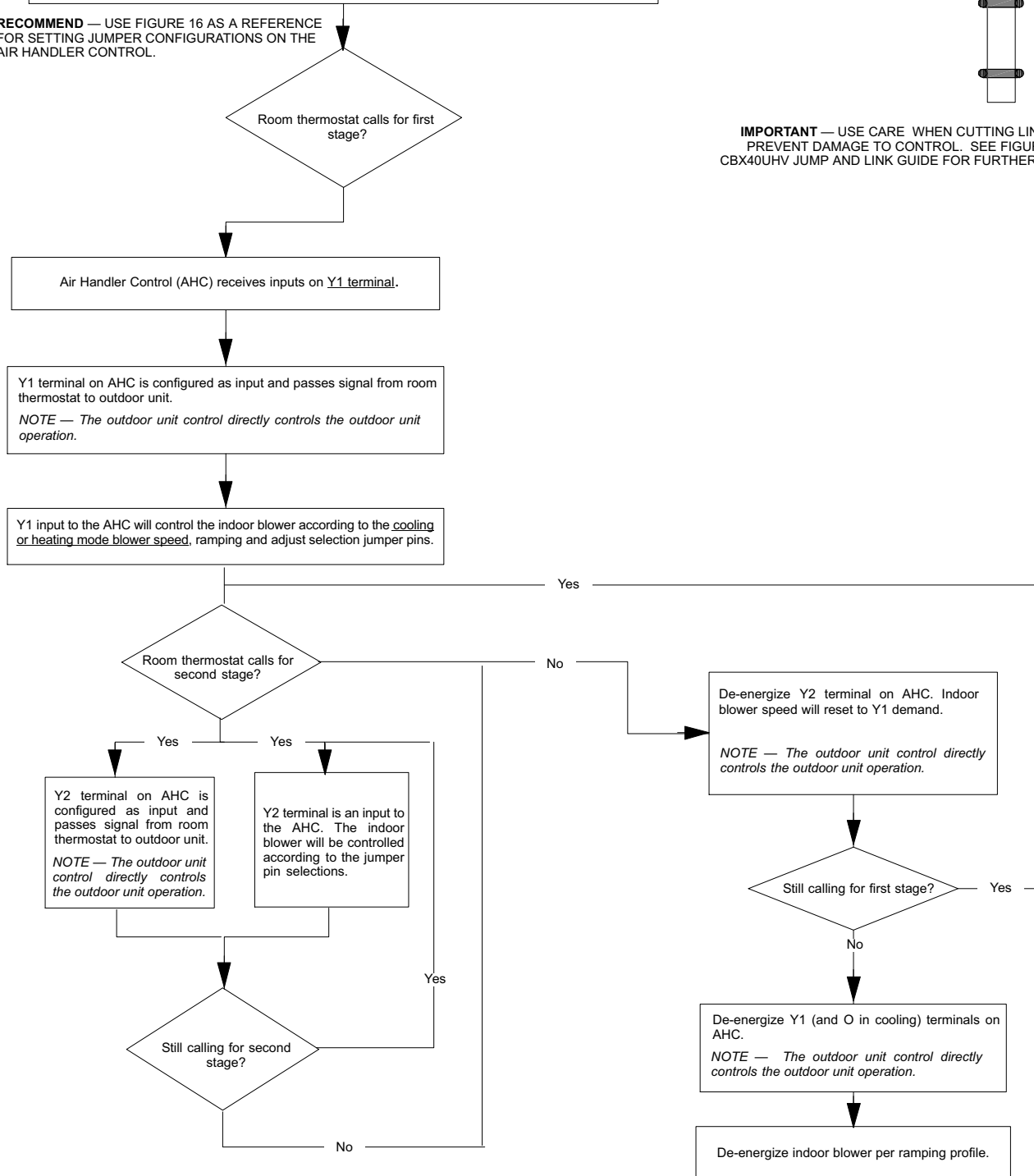
AHC on-board link must be cut between Y1 and Y2 to allow 2 stage cooling operation.

RECOMMEND — USE FIGURE 16 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.

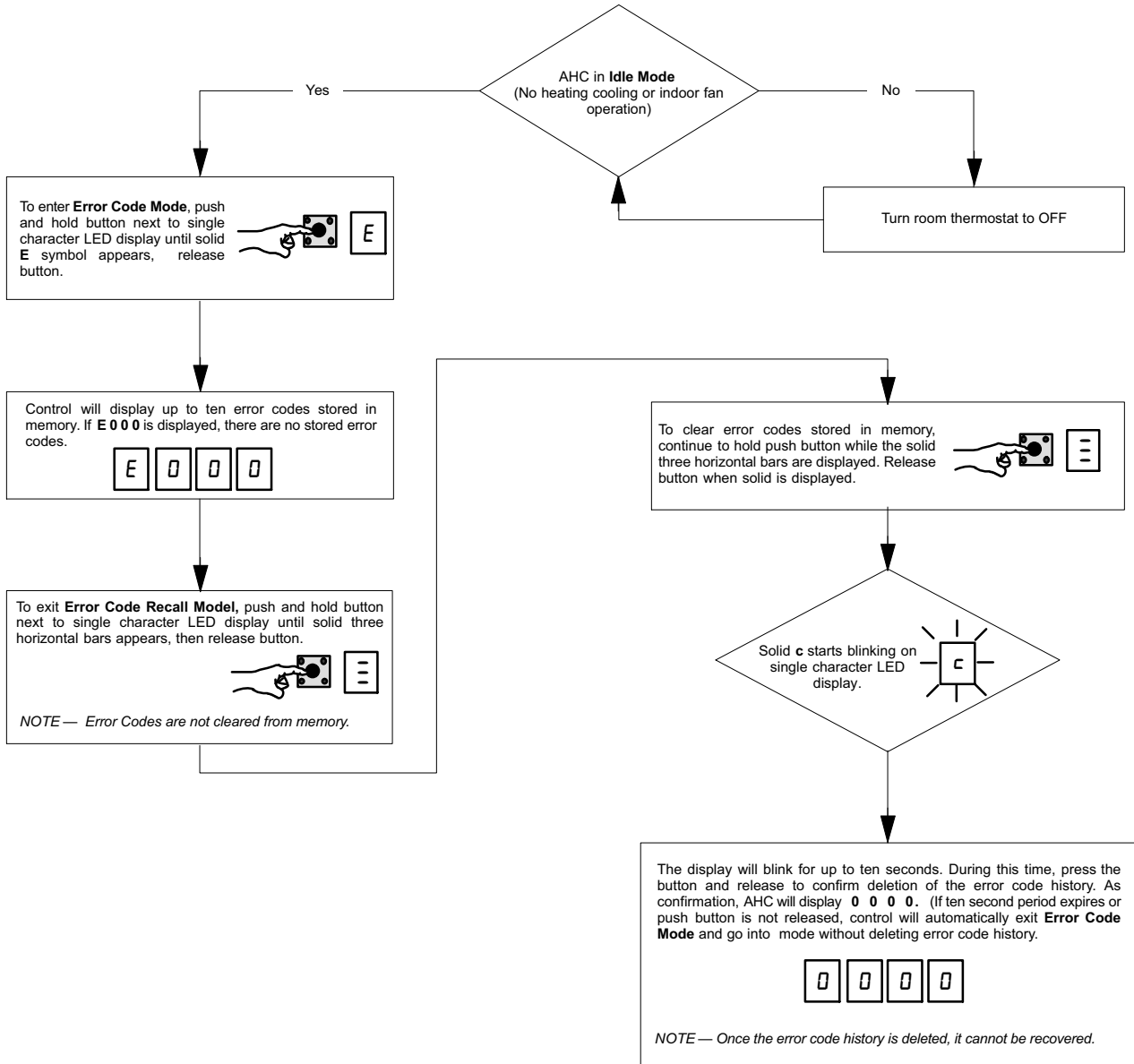
CUT ON-BOARD LINK Y1-Y2 FOR TWO-STAGE A/C



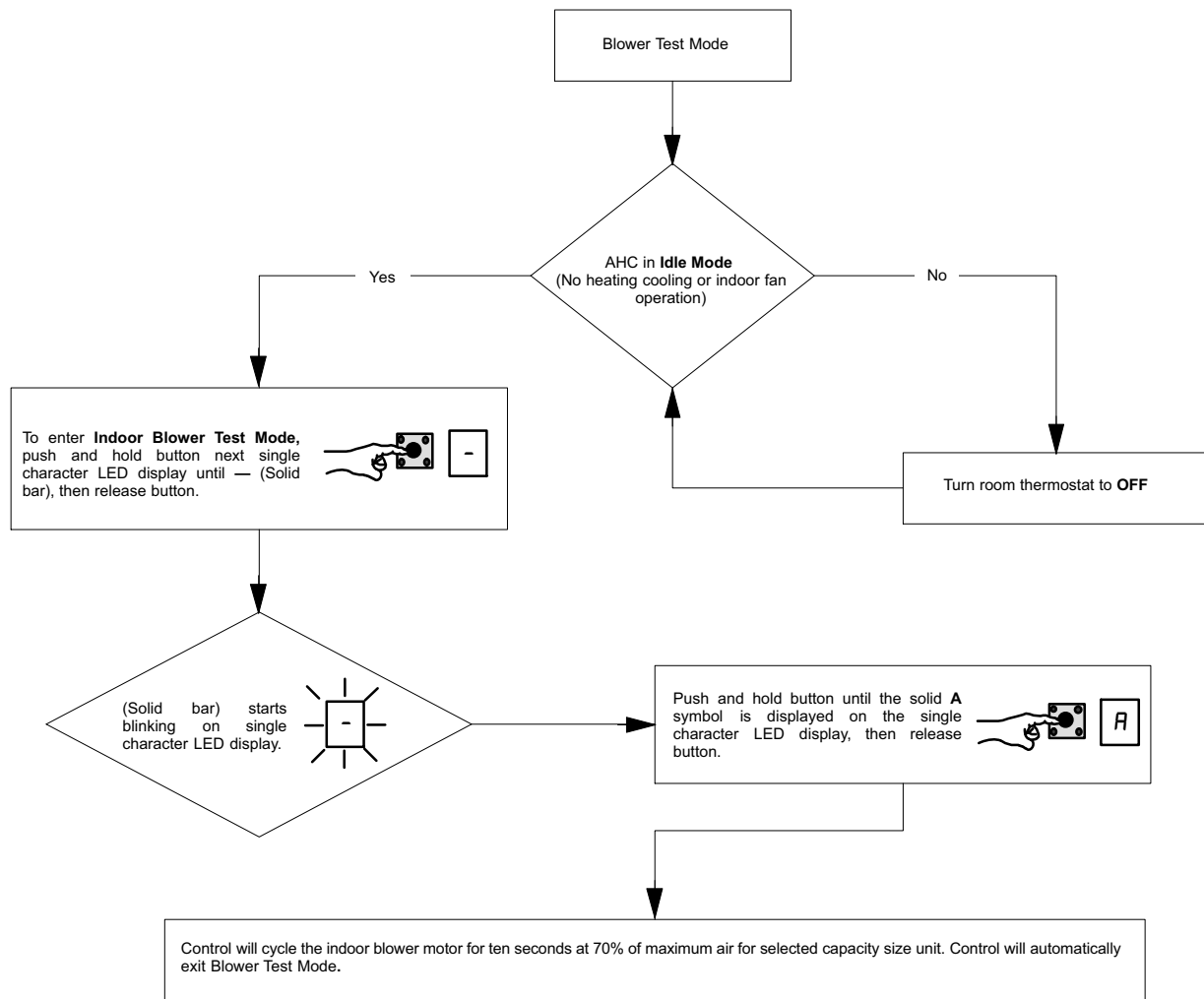
IMPORTANT — USE CARE WHEN CUTTING LINKS TO PREVENT DAMAGE TO CONTROL. SEE FIGURE 16, CBX40UHV JUMP AND LINK GUIDE FOR FURTHER DETAILS.



Error Code / Recall Mode



Indoor Blower Test



Checkout Procedures

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 airflow 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 HEATER (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.

Operation

COOLING (COOLING ONLY OR HEAT PUMP)

When the thermostat calls for cooling, 24 volts is put on 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 W1 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 put on 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 should continue to fall, 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.

Maintenance

DEALER

⚠ WARNING	
	Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠ WARNING	
Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.	
Installation and service must be performed by a licensed professional installer (or equivalent) or a service agency.	

Maintenance and service must be performed by a qualified installer or service agency. At the beginning of each cooling season, the system should be checked as follows:

Outdoor Unit

1. Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
2. Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
3. Check all wiring for loose connections.
4. Check for correct voltage at unit (unit operating).
5. Check amp draw on outdoor fan motor.

Motor Nameplate: _____ **Actual:** _____.

6. Inspect drain holes in coil compartment base and clean if necessary.

NOTE - If insufficient cooling occurs, the unit should be gauged and refrigerant charge should be checked.

Outdoor Coil

Clean and inspect outdoor coil (may be flushed with a water hose). Ensure power is off before cleaning.

NOTE — It may be necessary to flush the outdoor coil more frequently if it is exposed to substances which are corrosive or which block airflow across the coil (e.g., pet urine, cottonwood seeds, fertilizers, fluids that may contain high levels of corrosive chemicals such as salts)

Sea Coast — Moist air in ocean locations can carry salt, which is corrosive to most metal. Units that are located near the ocean require frequent inspections and maintenance. These inspections will determine the necessary need to wash the unit including the outdoor coil. Consult your installing contractor for proper intervals/procedures for your geographic area or service contract.

Indoor Unit

1. Clean or change filters.
2. Lennox blower motors are prelubricated and permanently sealed. No more lubrication is needed.
3. Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.
4. *Belt Drive Blowers* - Check belt for wear and proper tension.
5. Check all wiring for loose connections.
6. Check for correct voltage at unit. (blower operating)
7. Check amp draw on blower motor.

Motor Nameplate: _____ **Actual:** _____.

Indoor Coil

1. Clean coil if necessary.
2. Check connecting lines, joints and coil for evidence of oil leaks.
3. Check condensate line and clean if necessary.

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.

Matt- 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.

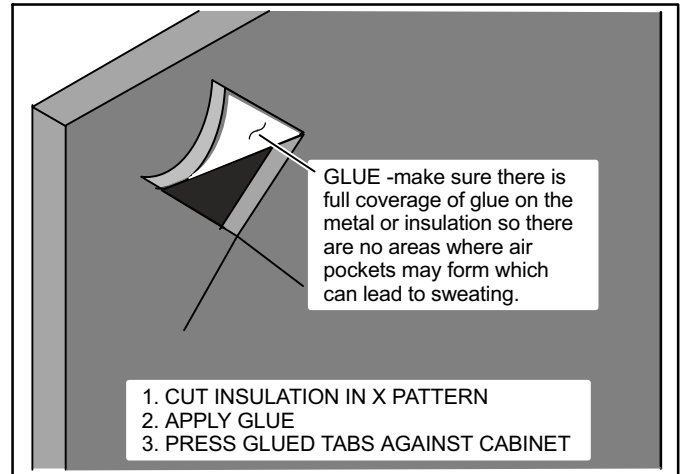


Figure 22. Repairing Insulation

⚠️ 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 a 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 electric shock hazard that could cause personal injury or death.

HOMEOWNER

Cleaning of the outdoor unit's coil should be performed by a trained service technician. Contact your dealer and set up a schedule (preferably twice a year, but at least once a year) to inspect and service your outdoor unit. The following maintenance may be performed by the homeowner.

CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

IMPORTANT

Sprinklers and soaker hoses should not be installed where they could cause prolonged exposure to the outdoor unit by treated water. Prolonged exposure of the unit to treated water (i.e., sprinkler systems, soakers, waste water, etc.) will corrode the surface of steel and aluminum parts and diminish performance and longevity of the unit.

Outdoor Coil

The outdoor unit must be properly maintained to ensure its proper operation.

- Please contact your dealer to schedule proper inspection and maintenance for your equipment.
- Make sure no obstructions restrict airflow to the outdoor unit.
- Grass clippings, leaves, or shrubs crowding the unit can cause the unit to work harder and use more energy.
- Keep shrubbery trimmed away from the unit and periodically check for debris which collects around the unit.

Routine Maintenance

In order to ensure peak performance, your system must be properly maintained. Clogged filters and blocked airflow prevent your unit from operating at its most efficient level.

1. **Air Filter** — Ask your Lennox dealer to show you where your indoor unit's filter is located. It will be either at the indoor unit (installed internal or external to the cabinet) or behind a return air grille in the wall or ceiling. Check the filter monthly and clean or replace it as needed.
2. **Disposable Filter** — Disposable filters should be replaced with a filter of the same type and size.

NOTE — If you are unsure about the filter required for your system, call your Lennox dealer for assistance.

3. **Reusable Filter** — Many indoor units are equipped with reusable foam filters. Clean foam filters with a mild soap and water solution; rinse thoroughly; allow filter to dry completely before returning it to the unit or grille.

NOTE — The filter and all access panels must be in place any time the unit is in operation.

4. **Electronic Air Cleaner** — Some systems are equipped with an electronic air cleaner, designed to remove airborne particles from the air passing through the cleaner. If your system is so equipped, ask your dealer for maintenance instructions.
5. **Indoor Unit** — The indoor unit's evaporator coil is equipped with a drain pan to collect condensate formed as your system removes humidity from the inside air. Have your dealer show you the location of the drain line and how to check for obstructions. (This would also apply to an auxiliary drain, if installed.)

Thermostat Operation

See the ComfortSense® 7000 or icomfort Touch® thermostat homeowner manual for instructions on how to operate your thermostat.

Preservice Check

If your system fails to operate, check the following before calling for service:

- Verify room thermostat settings are correct.
- Verify that all electrical disconnect switches are ON.
- Check for any blown fuses or tripped circuit breakers.
- Verify unit access panels are in place.
- Verify air filter is clean.
- If service is needed, locate and write down the unit model number and have it handy before calling.

Accessories

For update-to-date information, see any of the following publications:

- Lennox CBX40UHV Engineering Handbook
- Lennox Product Catalog
- Lennox Price Book