INSTALLATION INSTRUCTIONS

Dave Lennox Signature® Collection CBX40UHV Units

THIS MANUAL MUST BE LEFT WITH THE HOMEOWNER FOR FUTURE REFERENCE

AIR HANDLER
506275-01
11/2016

⚠WARNING

This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

NOTICE

A thermostat is not included and must be ordered separately.

- A Lennox iComfort® 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.

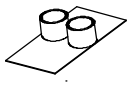
In all cases, setup is critical to ensure proper system operation. Field wiring for both communicating and non-communicating applications is illustrated in diagrams, which begin on page 11.

Table of Contents

IMPORTANT INFORMATION TO INSTALLER

CHECK FOR AND REMOVE ITEMS **A** THROUGH **D** BEFORE OPERATING UNIT.

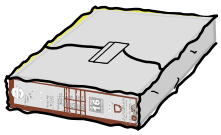
A BLOWER HOUSING SUPPORT PAD.

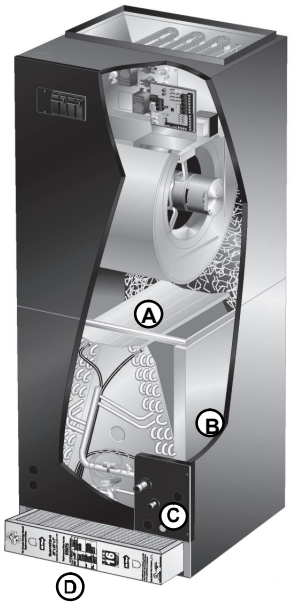


B HORIZONTAL DRAIN PAN (SEE *UPFLOW APPLICATIONS* ON PAGE 5 AND *DOWNFLOW APPLICATIONS* ON PAGE 5)

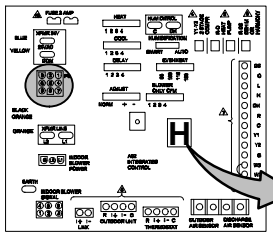
C REFRIGERANT LINE PLUGS (*SEE BRAZING CONNECTION ON PAGE 8]* .

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





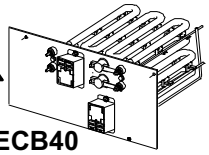
FOR PROPER OPERATION THE ELECTRIC HEAT (IF APPLICABLE) MUST BE CONFIGURED (SET-UP) THROUGH THE AIR HANDLER CONTROL (AHC)



IMPORTANT: PRIOR TO RUNNING THE iComfort WiFi® OR iComfort® S30 INSTALLER SETUP, ELECTRIC HEAT MUST BE MANUALLY CONFIGURED.

CONFIGURE ELECTRIC HEAT

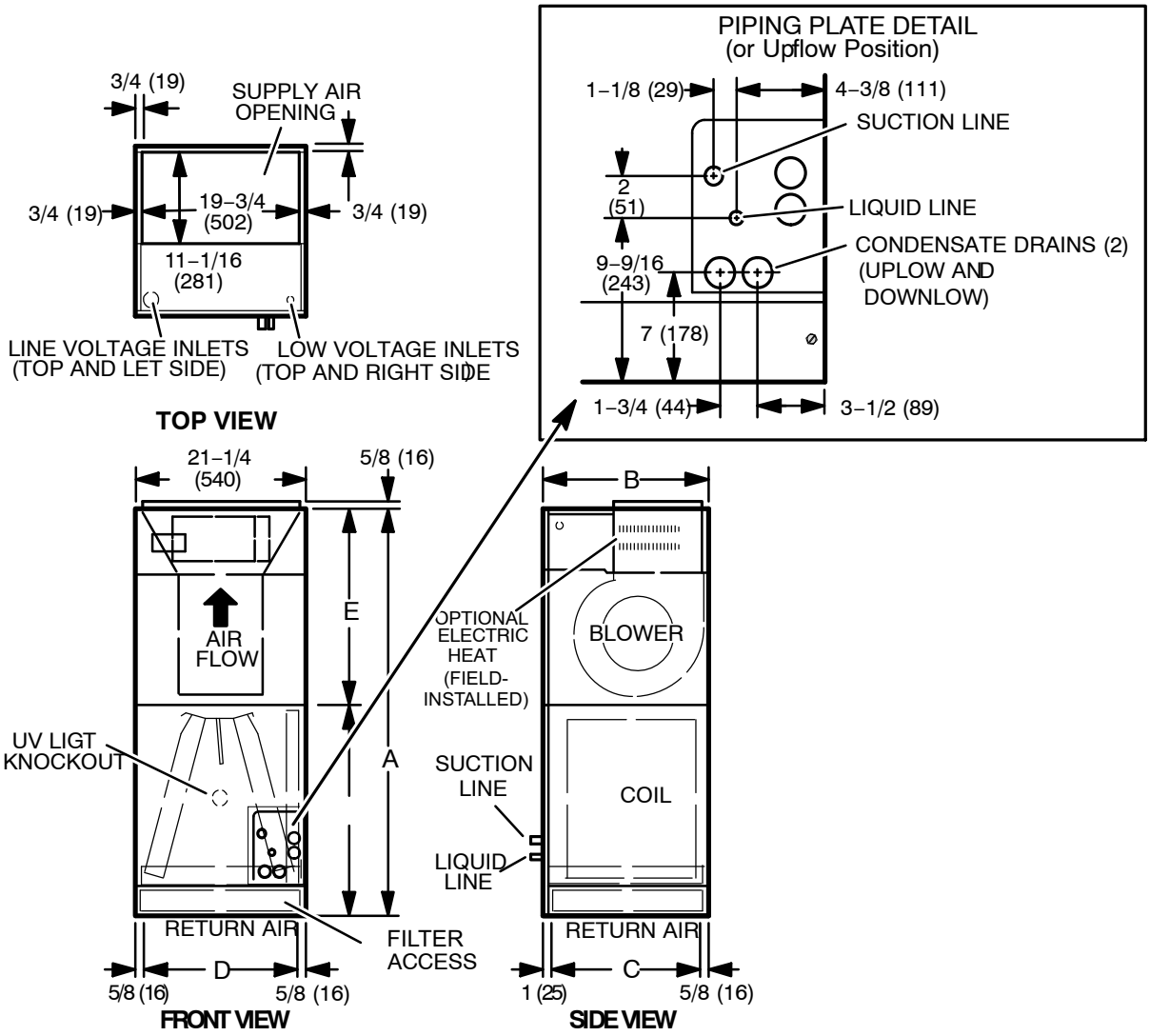
H ELECTRIC HEAT SECTIONS MUST BE CONFIGURED. IF INSTALLED SEE PROCEDURE IN **FIGURE 19** ON **PAGE 30**.



ECB40

1116
506275-01

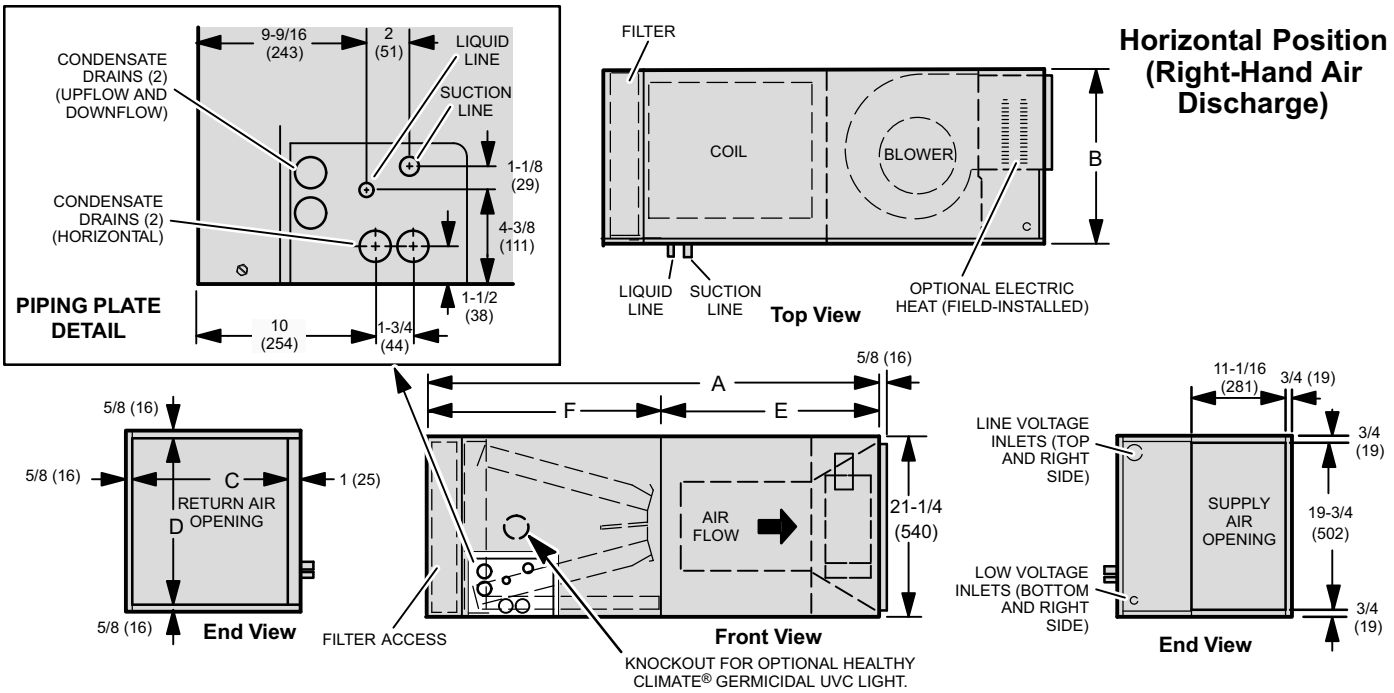
Upflow Unit Dimensions — Inches (mm)



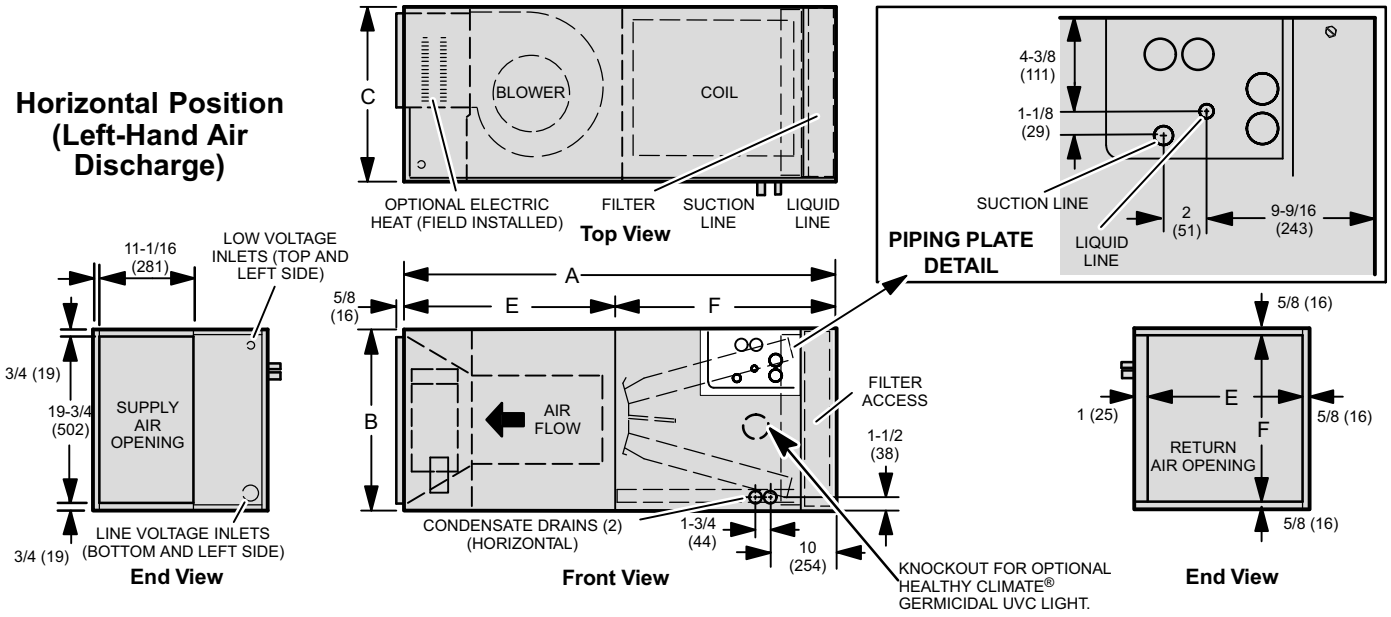
Model Size	A		B		C		D		E		F	
	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
-024	55-1/4	1403	22-5/8	575	21	533	20	508	26-3/8	670	28-7/8	733
-030												
-036												
-042	62-3/4	1594	25-5/8	651	24	610	20	508	27-7/8	708	34-7/8	866
-048												
-060												

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

Horizontal Position (Right-Hand Air Discharge)



Horizontal Position (Left-Hand Air Discharge)



Model Size	A		B		C		D		E		F	
	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm
-024	55-1/4	1403	22-5/8	575	21	533	20	508	26-3/8	670	28-7/8	733
-030												
-036												
-042	62-3/4	1594	25-5/8	651	24	610	20	508	27-7/8	708	34-7/8	866
-048												
-060												

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

1 — Pipe nipple (Sch 80, 3/4" I. D. x 5")

1 — Warranty card

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 a ComfortSense® non-communicating thermostat and non-communicating outdoor units. In addition, this unit has the enhanced capability of communicating with an iComfort® thermostat and iComfort®-enabled outdoor units.

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

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.

⚠ 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

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.

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 1. 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:

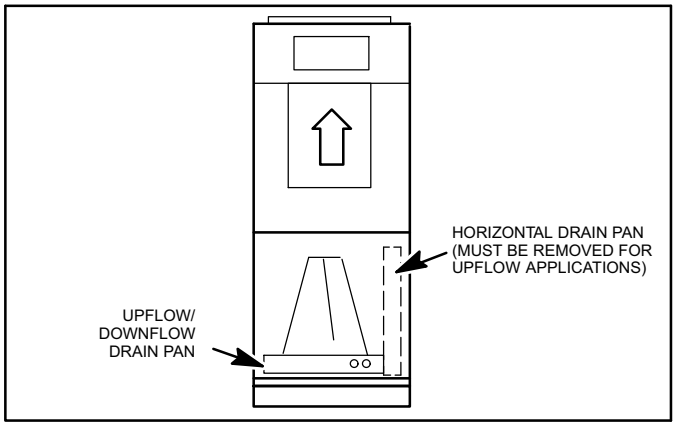


Figure 1. Upflow Configuration

1. The horizontal drain pan must be removed when the coil blower is installed in the upflow position. Removing horizontal drain pan will improve air flow.
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 2.

Table 2. 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:

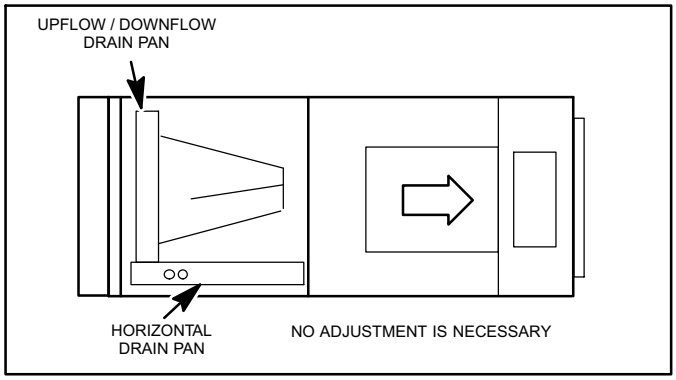


Figure 2. Right-Hand Air Discharge Configuration

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.

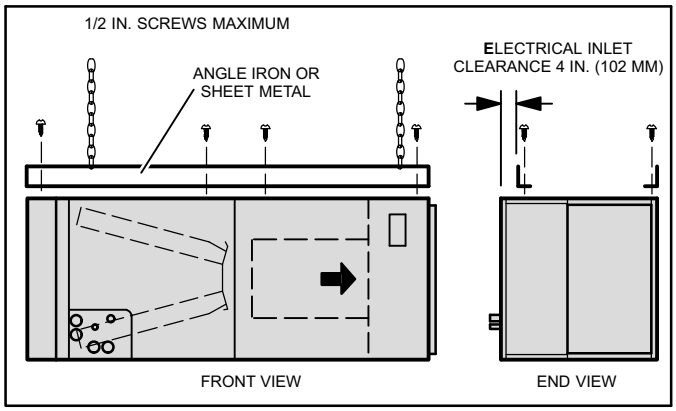


Figure 3. Suspending Horizontal Unit

⚠ 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.

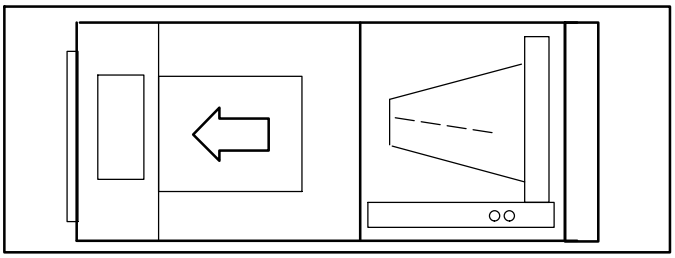


Figure 4. Left-Hand Discharge Configuration

3. Rotate drain pan 180º 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 180º 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 180º front-to-back and align with unused screw holes. Holes must align with front and back coil end plates. The top cap has a 45º bend on one side and a 90º bend on the other. The 90º 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 90º 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.

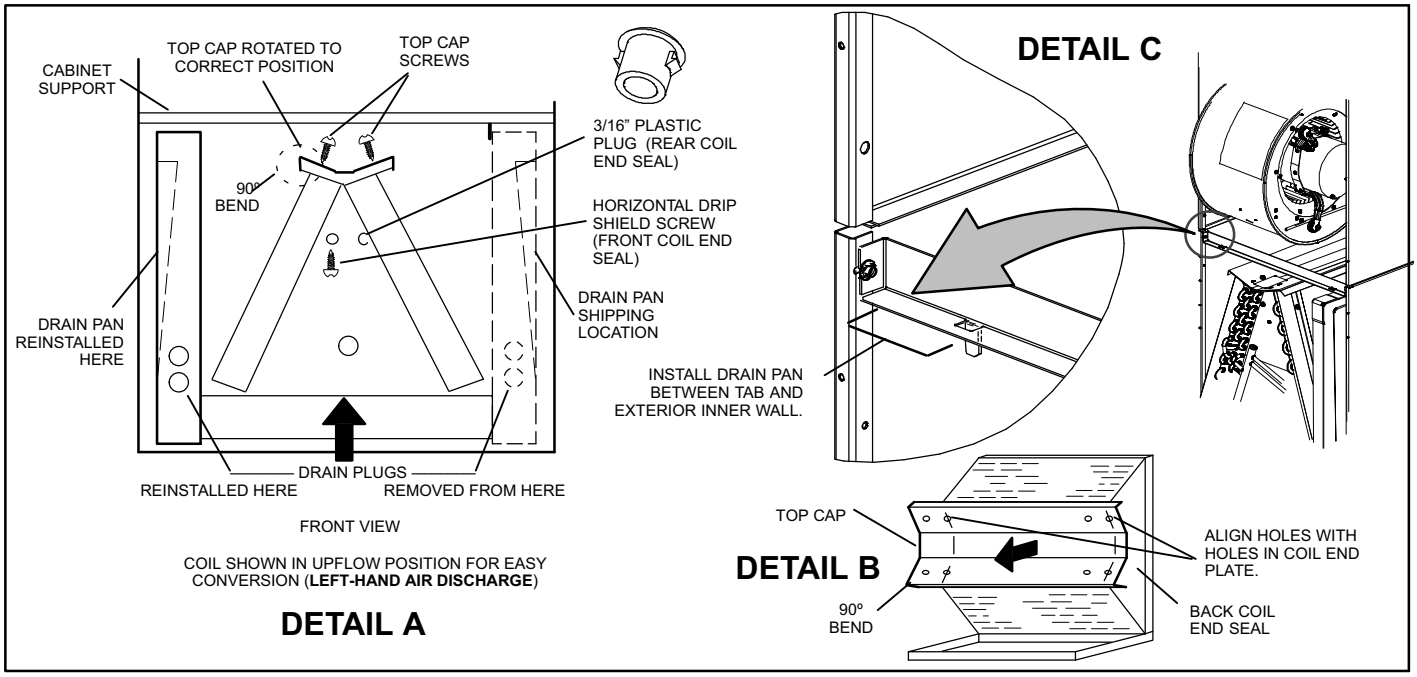
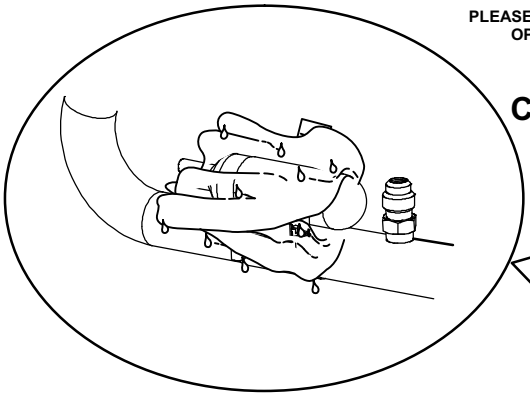


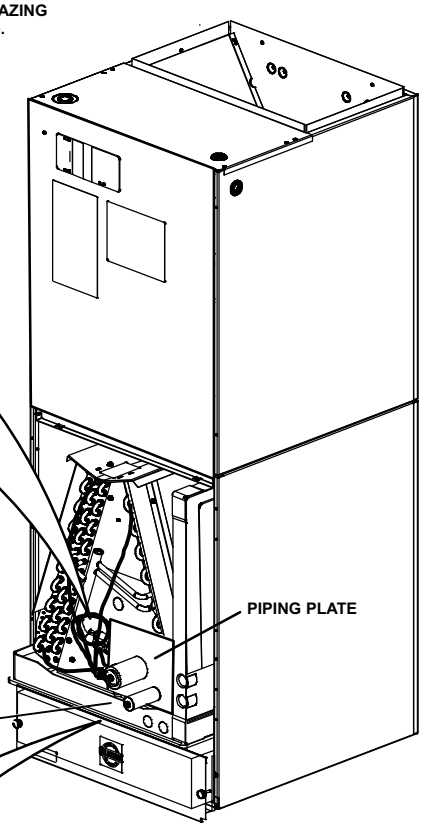
Figure 5. Field Modification for Left-Hand Air Discharge

Brazing Connections

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

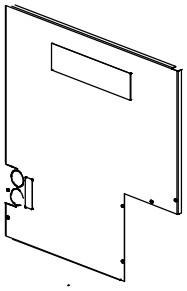


C USE A WET RAG TO PROTECT CTXV SENSING BULB WHEN BRAZING SUCTION LINE CONNECTIONS.



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.

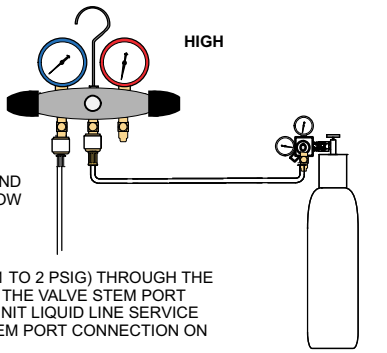


A REMOVE ACCESS PANEL

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.

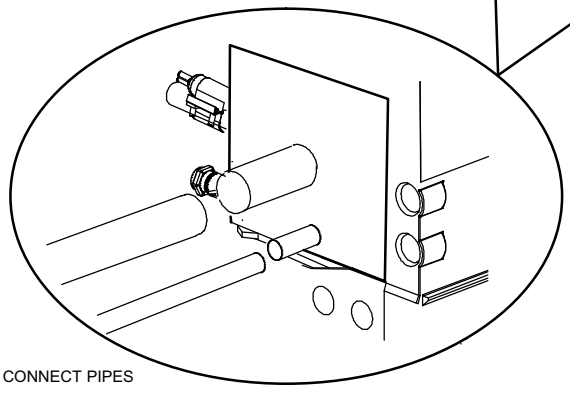
D EITHER REMOVE OR PUSH PIPE WRAPPING BACK THROUGH HOLE IN PIPING PLATE BEFORE LINE SET CONNECTION AND BRAZING.



F CONNECT GAUGES AND START NITROGEN FLOW

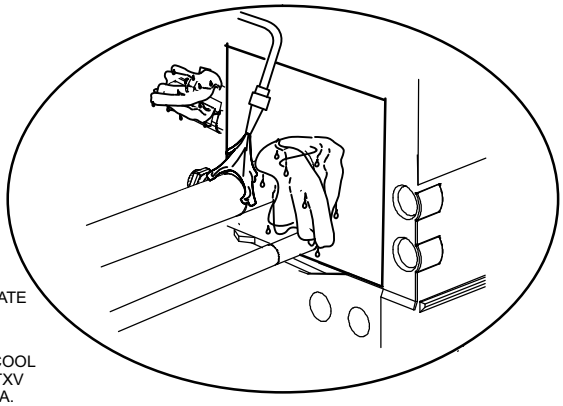
FLOW REGULATED NITROGEN (AT 1 TO 2 PSIG) THROUGH THE REFRIGERATION GAUGE SET INTO THE VALVE STEM PORT CONNECTION ON THE OUTDOOR UNIT LIQUID LINE SERVICE VALVE AND OUT OF THE VALVE STEM PORT CONNECTION ON THE SUCTION SERVICE VALVE.

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 3. 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.

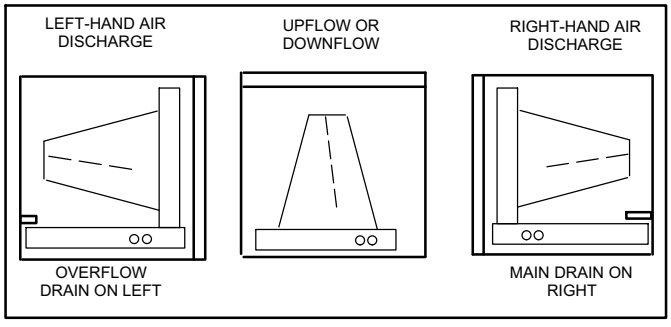


Figure 7. Main and Overflow Drain Locations based on Coil Orientation

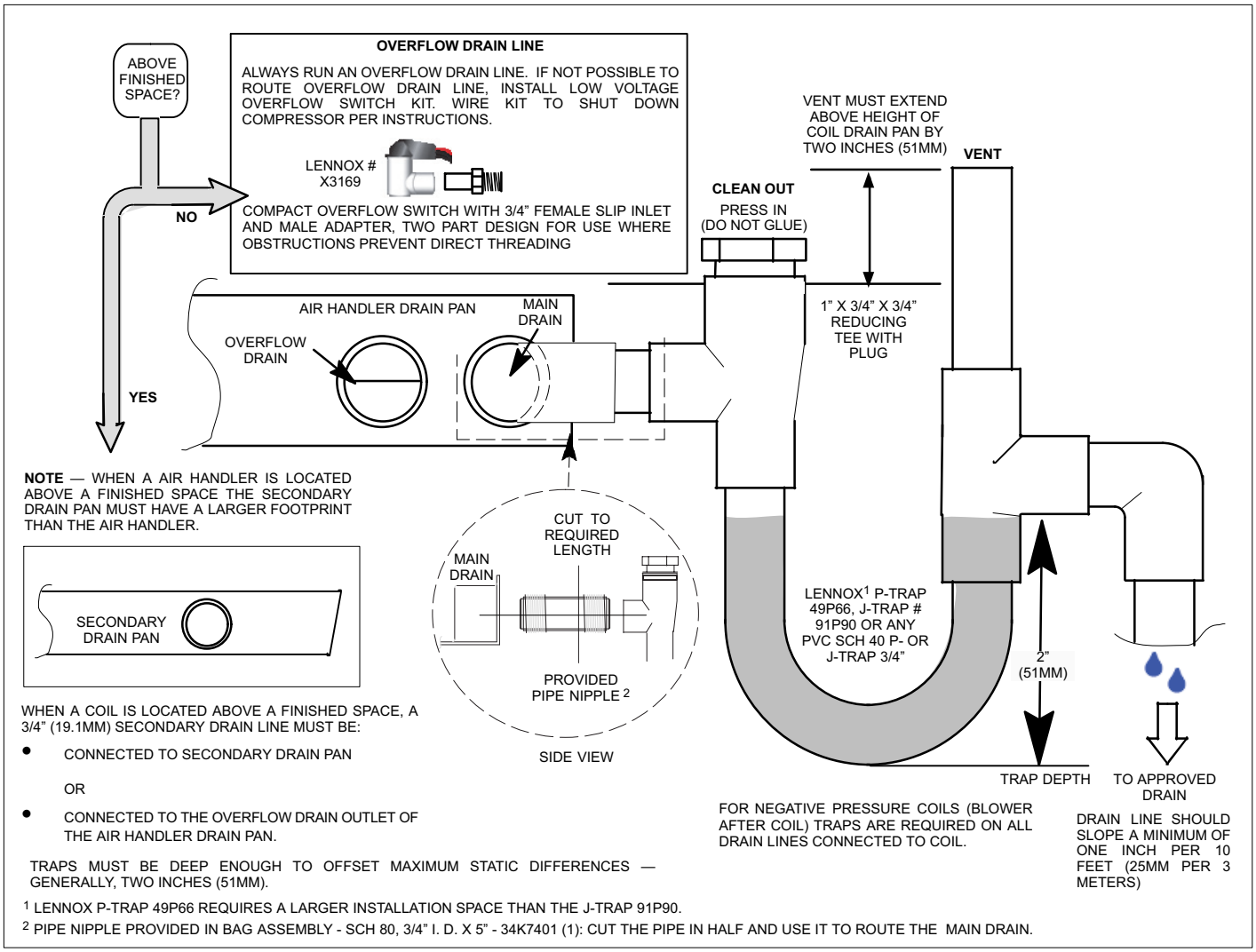


Figure 8. Typical Main and Overflow Drain

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. Remove dirty filter. 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 4. 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 5. 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.*

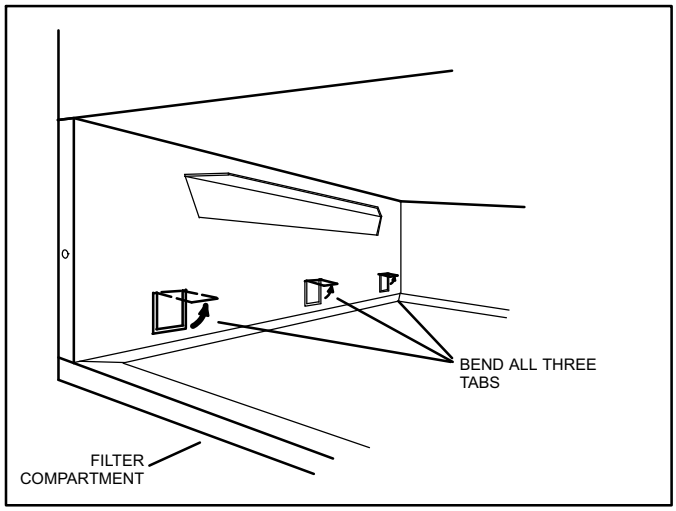


Figure 9. One Inch Filter Tabs

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 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.

⚠ 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 proper circuit breaker. Confirm line voltage. Check that correct transformer line tap is connected (208 or 240V).
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.*

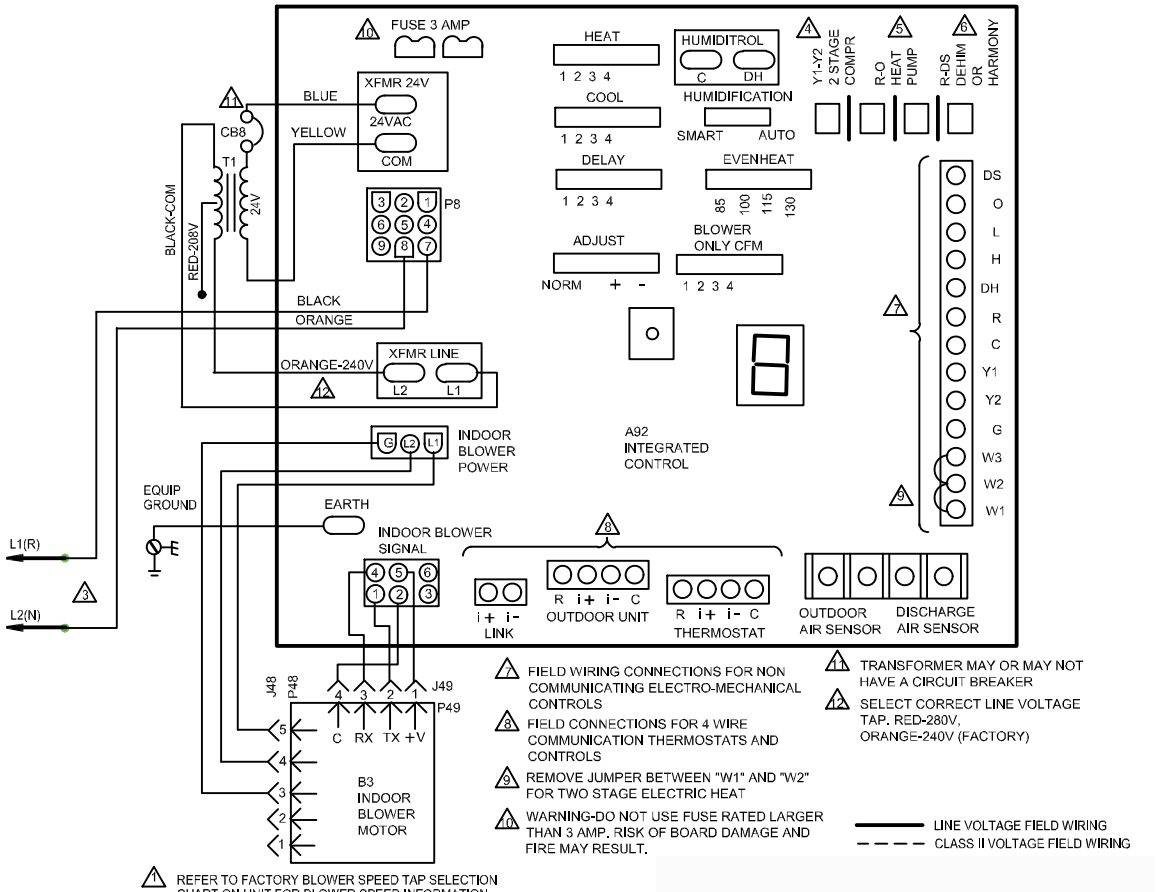
3. Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit.

NOTE - *For proper voltages, select control wiring gauge per the charts on page 16.*

DESCRIPTION	
KEY	COMPONENT
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

△1 RECOMMENDED BLOWER SPEED TAP SELECTION

SPEED TAP SELECTION				
	COOL		HEAT	
BLOWER COIL	CONDENS-ING UNIT	HEAT PUMP	CONDENS-ING UNIT WITH ELECTRIC HEAT ONLY	HEAT PUMP WITH ELECTRIC HEAT
-018 -024 -030 -036	COOL PIN #3	COOL PIN #3	HEAT PIN #4	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



△7 FIELD WIRING CONNECTIONS FOR NON COMMUNICATING ELECTRO-MECHANICAL CONTROLS

△8 FIELD CONNECTIONS FOR 4 WIRE COMMUNICATION THERMOSTATS AND CONTROLS

△9 REMOVE JUMPER BETWEEN "W1" AND "W2" FOR TWO STAGE ELECTRIC HEAT

△10 WARNING-DO NOT USE FUSE RATED LARGER THAN 3 AMP. RISK OF BOARD DAMAGE AND FIRE MAY RESULT.

△11 TRANSFORMER MAY OR MAY NOT HAVE A CIRCUIT BREAKER

△12 SELECT CORRECT LINE VOLTAGE TAP. RED-280V, ORANGE-240V (FACTORY)

LINE VOLTAGE FIELD WIRING

CLASS II VOLTAGE FIELD WIRING

△1 REFER TO FACTORY BLOWER SPEED TAP SELECTION CHART ON UNIT FOR BLOWER SPEED INFORMATION.

△2 NEC/CEC CLASS 2 3VA

△3 USE COPPER CONDUCTORS ONLY. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE

△4 LINK "Y1" TO"Y2" FOR SINGLE STAGE UNIT. CLIP LINK "Y1" TO "Y2" FOR TWO STAGE UNIT

△5 LINK "R" TO "O" IS USED WITH AC UNIT. CLIP LINK "R" TO "O" WHEN HEAT PUMP IS USED

△6 REMOVE LINK BETWEEN "R" AND "DS" WHEN DEHUMIDIFICATION CONTROL IS USED

Figure 10. CBX40UHV Air Handler Unit Typical Wiring Diagram

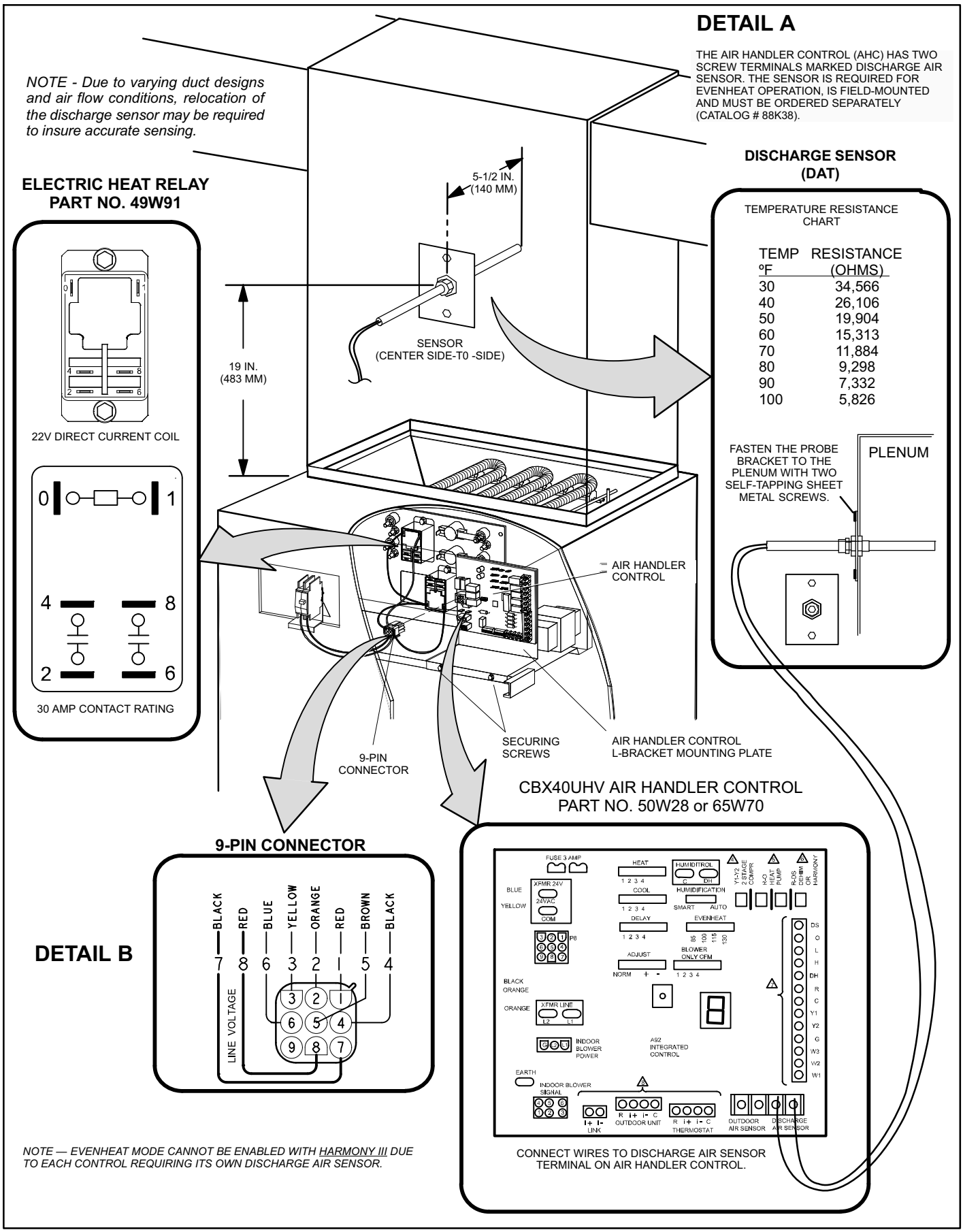


Figure 11. Component Connections

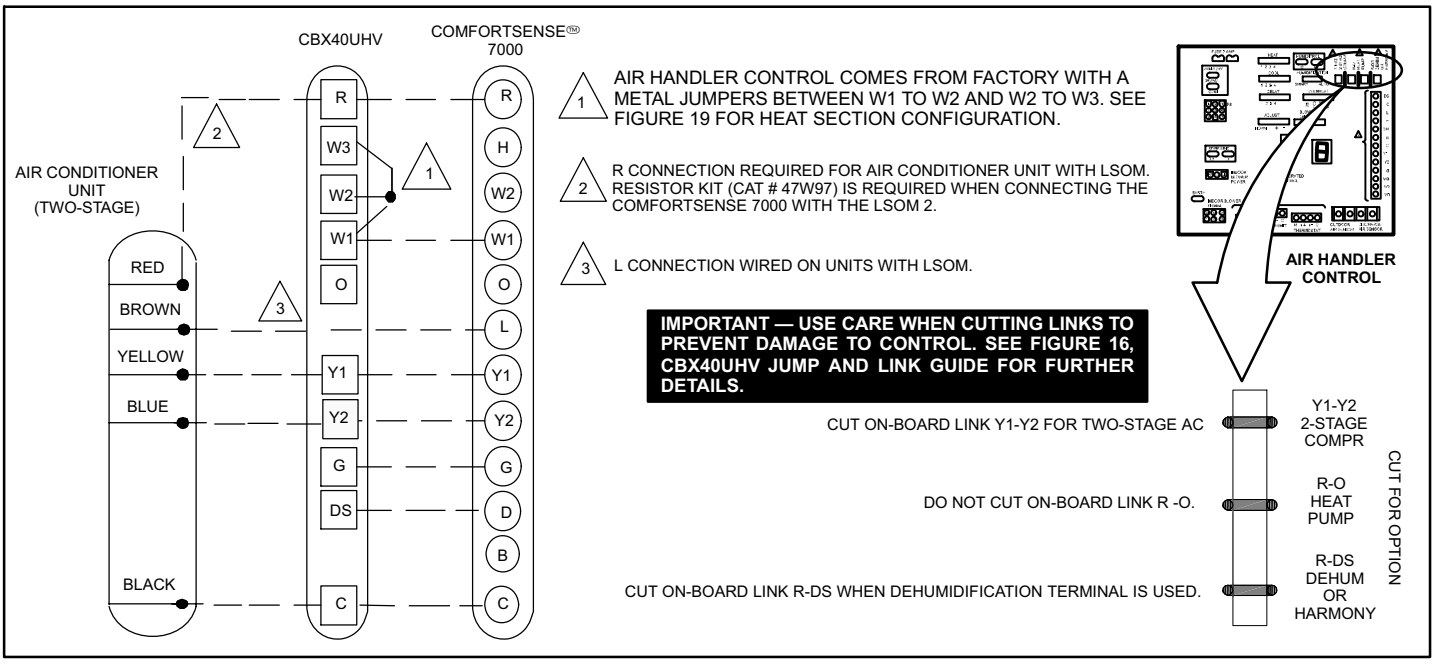


Figure 12. Field Wiring — Cooling Application (Non-Communicating)

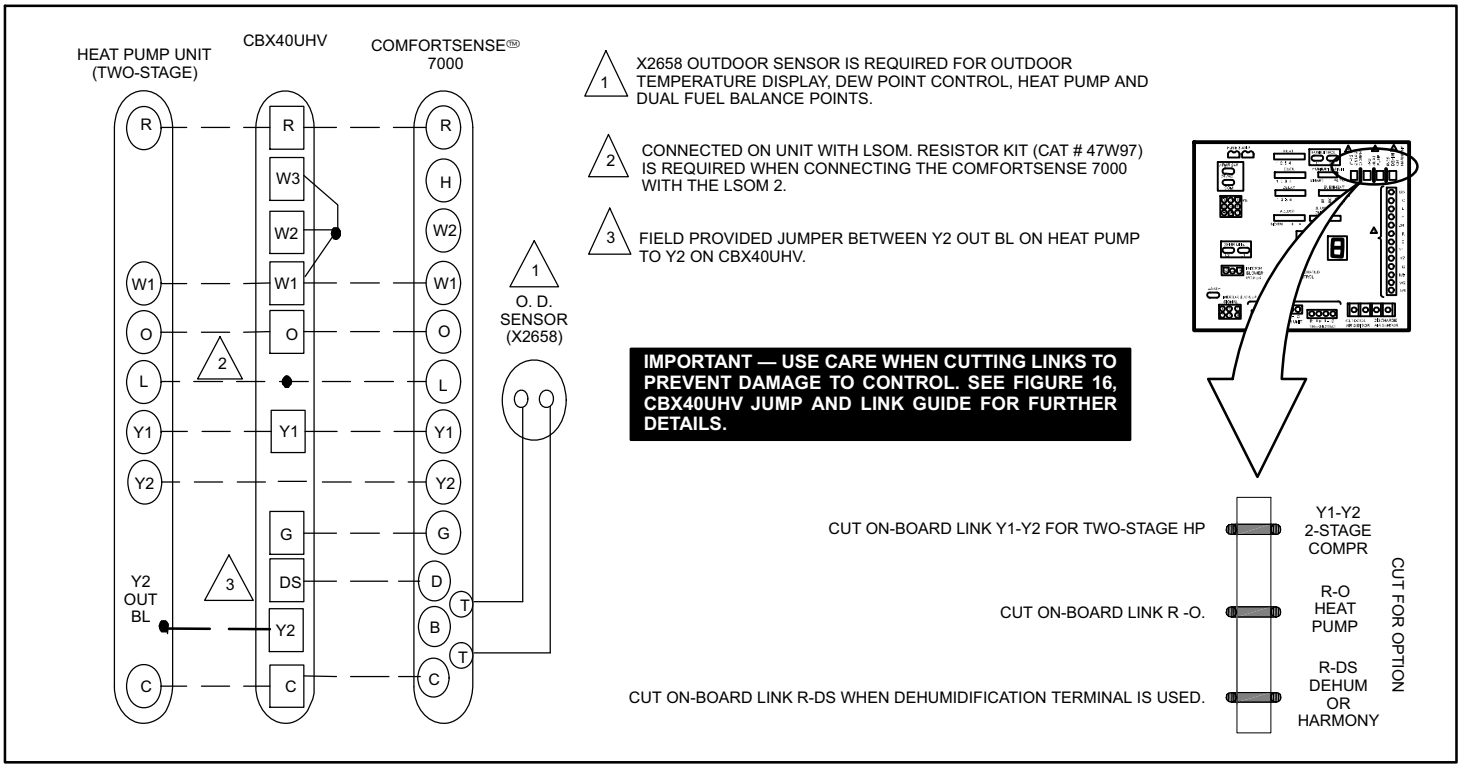


Figure 13. Field Wiring — Heat Pump (Non-Communicating)

⚠ 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

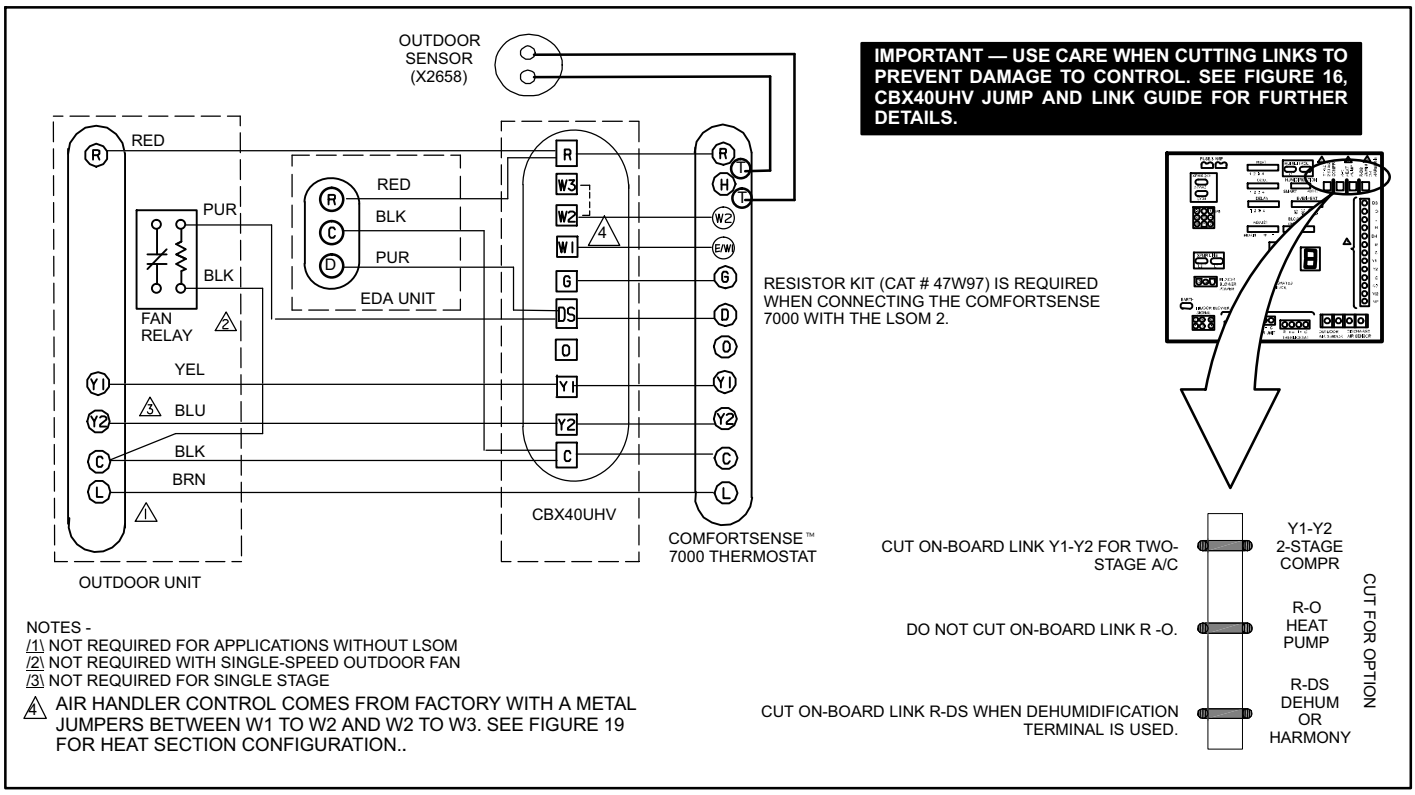


Figure 14. Cooling Application — Humiditrol ® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

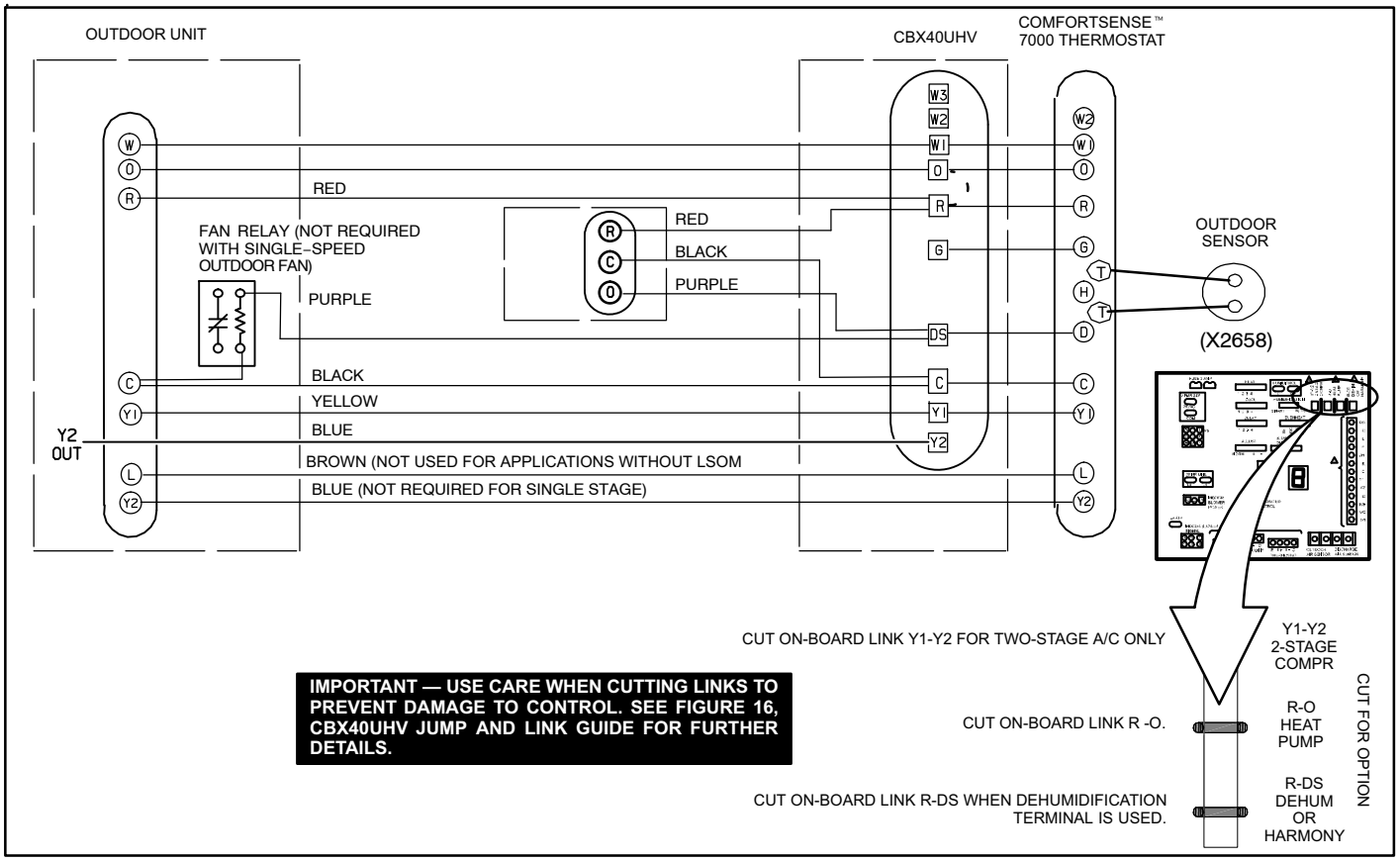


Figure 15. Heat Pump Application — Humiditrol ® and Second-Stage Outdoor Fan Relay Wiring (Non-Communicating)

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 air flow, 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: -40ºF (-40ºC)
- Maximum temperature: 70ºF (158ºC)

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 6).

NOTE — See figure 11, detail B for wire colors.

Table 6. 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 7. 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 8. 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 9. 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 10. 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.		

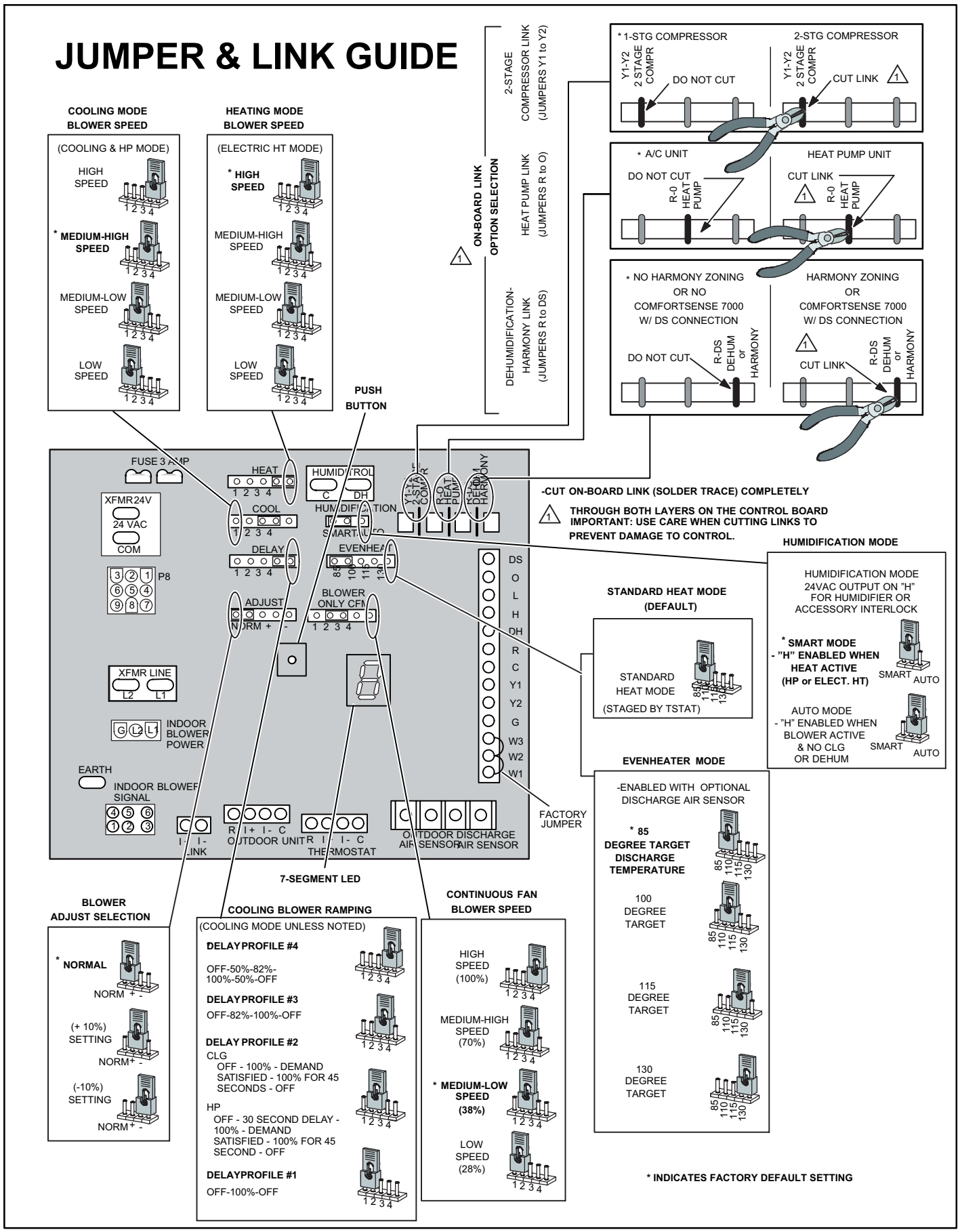


Figure 16. Air Handler Configuration

Air Handler Control Button, Display and Jumpers

Use figure 16 as reference for jumper settings. If any of the referenced 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 shown 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.

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 the ***Targeted CFM Tables***.
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 n the ***Targeted CFM Tables***.
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.

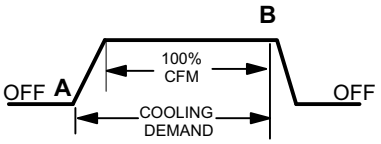
   If the jumper is missing, the Air Handler Control will activate the *Configuration Jumper is Missing* alarm in and will automatically use the default factory setting in table 10. See figure 16 for jumper configurations. Actual CFM values for different air handler sizes are shown in the ***Targeted CFM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

Delay Profile 1

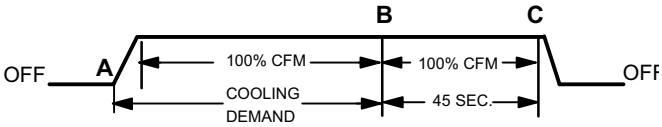
A. When cool or heat demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.

B. Once demand is met, motor ramps down to stop.



Delay Profile 2

Cooling — Air Conditioner and Heat Pump:

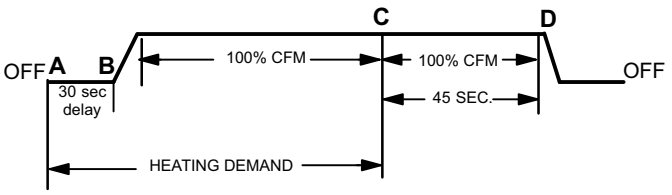


A. When cool demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.

B. Once demand is met, motor runs at 100% for 45 seconds.

C. Motor ramps down to stop.

Heating — Heat Pump only:



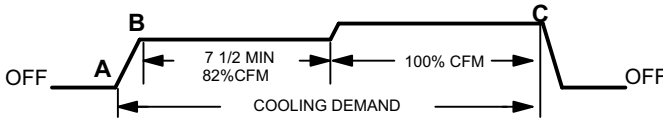
A. When heat demand is initiated, 30 seconds motor on delay starts

B. After the motor on 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

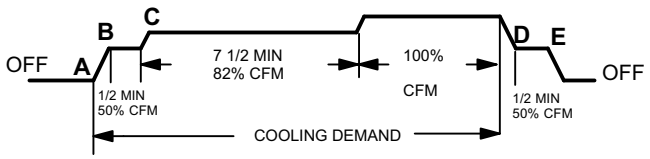


A. When cool demand is initiated, motor ramps up to 82%

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 11. 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 *Configuring Unit Size Codes* in figure 18.
=	If three horizontal bars are displayed, AHC does not recognize air handler model size and capacity. See Configuring Unit Size Codes in figure 18.
.	Idle mode (decimal point / no unit operation)
A	Delivered CFM. Example: A 1200
C	Stage Cooling (Shows active cooling stages) C 1 or C2
d	Dehumidification mode (Unit in dehumidification mode only)
d F	Shown only while in active defrost (Y, W and O call)
H	Stage heating (Shows number of active electric heat pilot relays) H 1 or H2 or H3
h	Stage heat pump (shows active heat pump stages) h 1 or h2
U	Discharge air sensor temperature (indoor blower must be operating) U 105

Table 12. 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. H A or P
CONFIGURING ELECTRIC HEAT SECTIONS		
Solid	H	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	A	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	P	**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	P	1. When the correct **Unit Sized 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. **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.
ERROR CODE RECALL MODE (NOTE — CONTROL MUST BE IN IDLE MODE)		
Solid	E	To enter ***Error Code Recall*** option— **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*** *option* — **PUSH** and **HOLD** button until **solid three horizontal bars** appear, then **RELEASE** button. *NOTE - Error codes are not cleared*
Solid	c	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	c	Push and hold for one (1) second, release button. Seven-segment will display 0000 and exit error recall mode.

Table 13. AHC Single Character Display — Error 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 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 or 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 watch-guard 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.
E3 10	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.
E3 12	Minor	The blower cannot provide the requested CFM due to high static.	Warning Only. Restricted air flow - 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.
E3 13	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 14. AHC Single Character Display Alert Codes (Communicating and Non-Communicating) *(continued)*

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 sage 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.
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 18VAC. 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

CBX40UHV-024 BLOWER PERFORMANCE

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

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	715	855	1000	1130	465	690	900	1050
NORM	670	770	900	1035	425	620	825	950
-	580	700	800	930	385	560	735	850

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 settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 250 cfm.

CBX40UHV-030 BLOWER PERFORMANCE

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

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	800	935	1070	1210	660	880	1100	1320
NORM	725	850	975	1100	600	800	1000	1200
-	655	765	880	990	540	720	900	1080

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 settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 250 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 250 cfm.

CBX40UHV-036 BLOWER PERFORMANCE

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

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	1230	1335	1445	1545	900	1225	1380	1545
NORM	1120	1215	1315	1400	81	1125	1275	1400
-	1010	1185	1200	1265	73	1000	1135	1265

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 settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 380 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 380 cfm.

CBX40UHV-042 BLOWER PERFORMANCE

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

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	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 settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 450 cfm.

CBX40UHV-048 AND CBX40UHV-060 BLOWER PERFORMANCE

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

"AJUST" Jumper Setting	Jumper Speed Positions							
	"HEAT" Speed				"COOL" Speed			
	1	2	3	4	1	2	3	4
	cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm
+	1850	1960	2090	2150	1625	1820	2055	2145
NORM	1705	1800	1900	2005	1425	1625	1805	2005
-	1560	1625	1720	1770	1205	1375	1555	1725

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 settings. Continuous fan speed is approximately 28%, 38%, 70% and 100% (Jumper selectable) of the same second-stage COOL speed selected, minimum 450 cfm.
- Lennox Harmony III™ Zone Control applications - minimum blower speed if 450 cfm.

Additional Reference Information

BLOWER MOTOR WATTS DATA

Refer to either the CBX40UHV Production Specification bulletin (EHB) or CBX40UHV Installation and Service Procedure for complete data on this topic.

OPTIONAL ACCESSORIES.

Refer to the CBX40UHV Production Specification bulletin (EHB) or Product Price Book for a complete list of optional accessories and ordering information.

REPLACEMENT CIRCUIT BREAKERS

Refer to the CBX40UHV Production Specification bulletin (EHB) or Product Price Book for complete reference and ordering information.

ELECTRIC HEAT INFORMATION

Refer to either the CBX40UHV Production Specification bulletin (EHB) or CBX40UHV Installation and Service Procedure for complete electric heat information .

PRODUCT FEATURES

Refer to the CBX40UHV Production Specification bulletin (EHB) for complete feature information.

Unit Operating Sequences

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

Table 14. 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. *NOTE — No over cooling.*
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. *NOTE — Allow to over cool 2^0F from cooling set point.*

Table 15. CBX40UHV, with ComfortSense™ 7000 Thermostat and Two-Stage Outdoor Unit Operating Sequence

Operating Sequence		System Demand								System Response		
		Thermostat Demand						Relative Humidity			Air Handler CFM (COOL)	
System Condition	Step	Y1	Y2	O	G	W1	W2	Status	D	Compr		Comments
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 *NOTE — No over cooling.*
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. *NOTE — Allow to over cool 2^0F from cooling set point.*
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 *NOTE — No over cooling.*
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. *NOTE —: Allow to over cool 2^0F from cooling set point.*

Configuring Unit

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

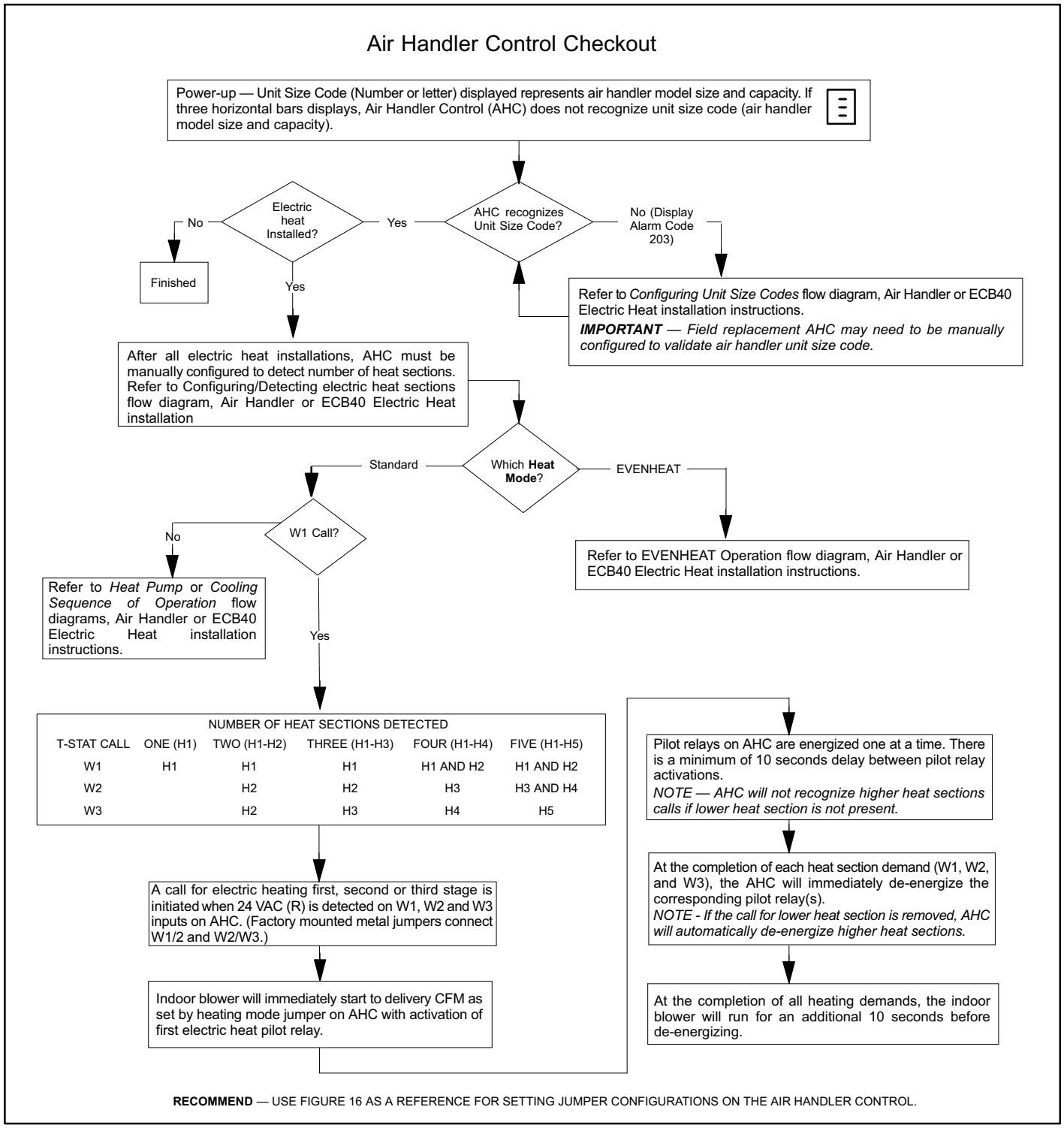


Figure 17. Air Handler Control Checkout

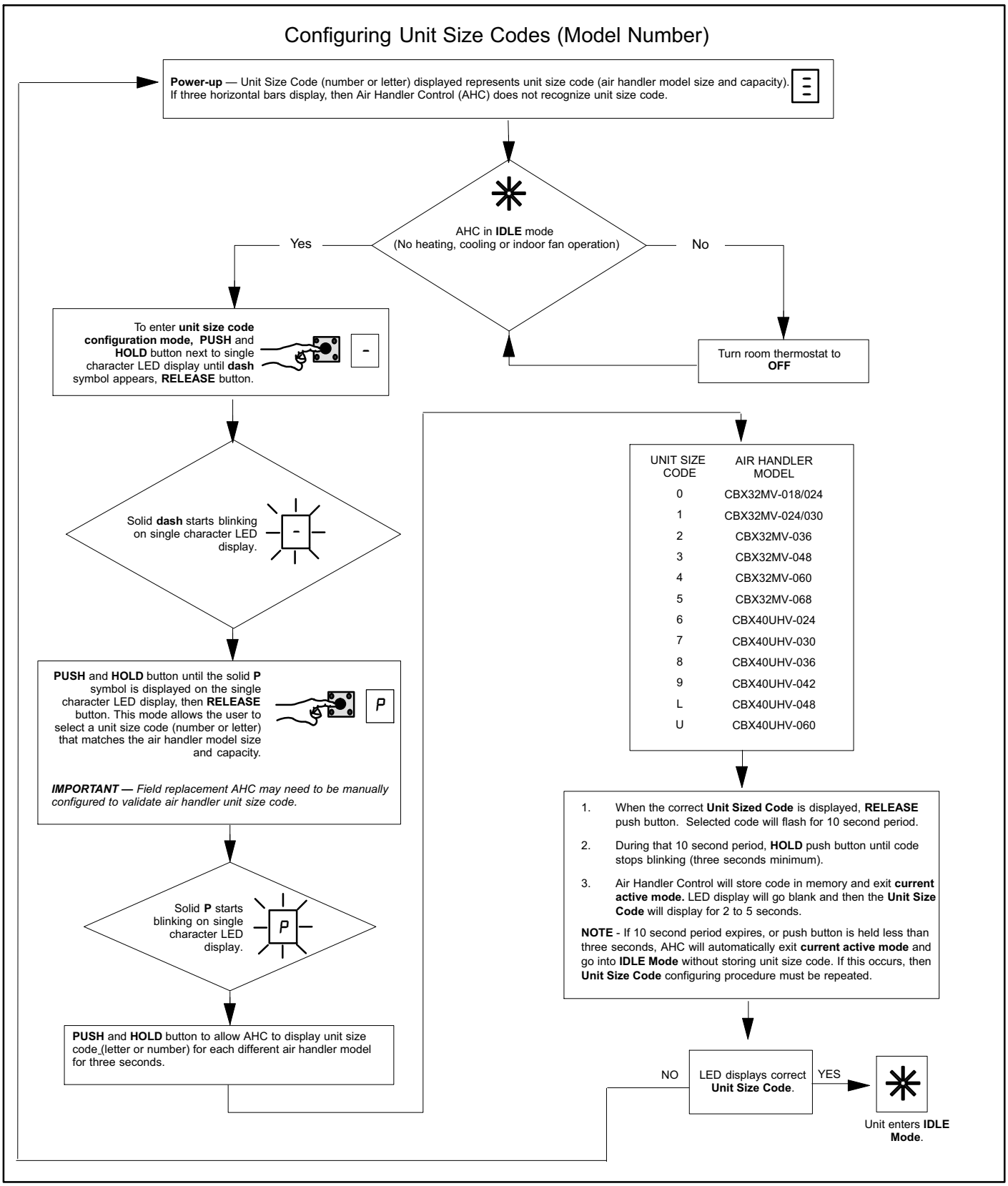


Figure 18. Configure Unit Size Codes

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.

Which Heat Mode?

Standard

- Set desired **Heating Mode Blower Speed** jumper pin.
- Electric heat is stages by room thermostat. (AHC comes with factory jumper between W1 to W2 and W2 to W3)
- Refer to Air Handler Control Checkout flow diagram for operation.

EVENHEAT

- Set desired **Heating Mode Blower Speed** jumper pin.
- Install and wire discharge air temperature sensor.
- Set desired **Target Discharge Temperature** jumper pin. If jumper pin is missing or discharge air temperature sensor is not detected, AHC defaults to **Standard Heat Mode**. Target settings are 85, 100, 115 and 130ºF) .
- Refer to **EVENHEAT Operation** flow diagram for operation.

Configuration

AHC in **Idle Mode** (No heating cooling or indoor fan operation)

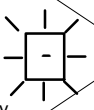
Yes

To enter **electric heat configuration mode**, push and hold button next to single character LED display until **dash** symbol (solid bar) appears, then release button.

No

Turn room thermostat to **OFF**.

Solid **dash** starts blinking on single character LED display



Push and hold button until the solid **H** symbol is displayed on the single character LED display, then release button.

1. AHC will start the indoor blower motor to the selected heat jumper speed setting and cycle the electric heat relays ON to automatically detect number of electric heat sections. (Electric heat section may be wired to energize more than one element)
2. AHC waits for maximum of ten seconds to detect electric heat 22 volt DC relay coils are energizing:
   - A. If relay coil current is detected within ten seconds, AHC will show a **1** on the single character LED display indicating that the first stage has been detected. As each additional heat section is detected, single character LED display on the AHC will display that electric element number. (Example: Last number displayed by the single character LED display is 3, the AHC is configured to operate three electric heat sections.)
   - B. If relay coil current is not detected within ten seconds, the AHC will exit the current active mode and resume operation with electric heat disabled.
3. AHC will automatically exit current active mode when configuration is completed. To verify that the number of electric sections detected matches the installed electric heat package, the field MUST CONFIRM that the last number the single character LED display before exiting the Configuring/Detection Mode matches the number of installed electric heat sections. AHC stores the number of electric heat stages in non-volatile memory.
4. After the detection is finished, unit will continue to operate for an additional 30 seconds.

NOTE — If AHC push button is pushed or power is cycled on AHC is unable to verify all 22 volt DC electric heat relay(s) were energized using electric heater detection, configuration will be stopped. Configuration function must be repeated.

Finished

Figure 19. Heat Mode Selection

EvenHeat Operation

INPUTS	OUTPUTS		
Room Thermostat Demand	**Target Discharge Air Temperature Set at 85ºF**	**Target Discharge Air Temperature Set at 100ºF**	**Target Discharge Air Temperature Set at 115ºF/130ºF**
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.

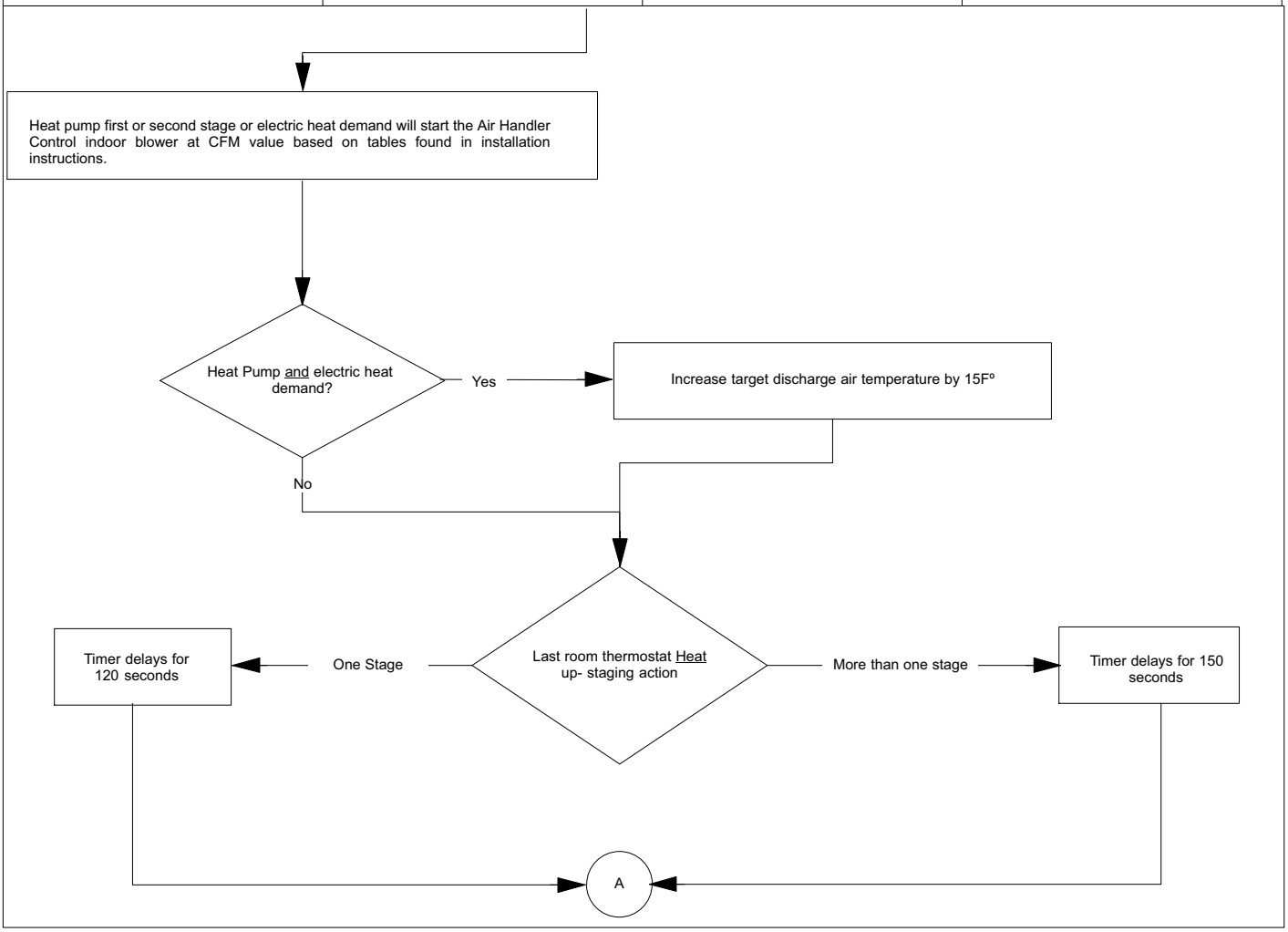


Figure 20. EVENHEAT Operation (1 of 2)

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.

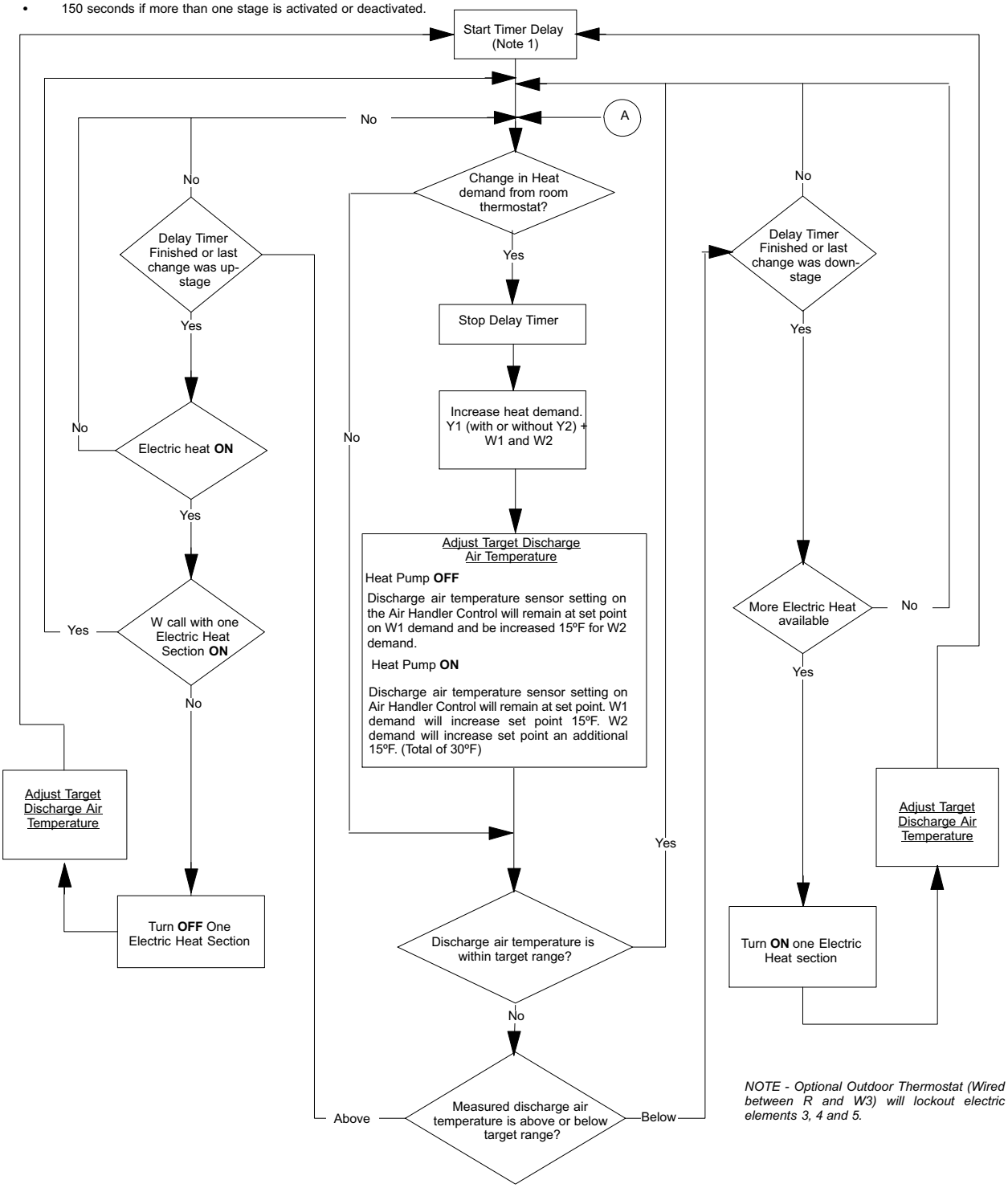


Figure 21. EVENHEAT Operation (2 of 2)

Heat Pump Operation (Heating and Cooling)

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

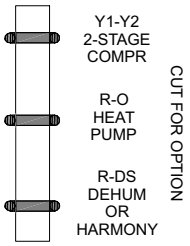
1. Set **Cooling Mode Blower Speed** jumper pin . (Low and high indoor blower CFM settings are identical for cooling and heat pump)
2. Set Blower Adjust Selection jumper pin.
3. Set Cooling Mode Blower Ramping jumper pin (Cooling calls — All ramping profiles are active). (Heating calls — Only ramping profiles 1 and 2 are active. If profiles 3 or 4 are selected, AHC will default to profile 1)
   A. Profile 1 does not provide any ramping profiles.
   B. 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)
4. 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

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

Room thermostat calls for first stage?

Heating

Cooling

Air Handler Control (AHC) receives inputs on Y1 terminal.

Y1 terminal on AHC is configured as input and passes signal from room thermostat to outdoor unit.

NOTE — The outdoor unit control directly controls the outdoor unit operation.

Y1 input to the AHC will control the indoor blower according to the cooling or heating mode blower speed, ramping and adjust selection jumper pins.

Air Handler Control (AHC) receives inputs on Y1 and O terminals.

Y1 terminal on AHC is configured as input and passes signal from room thermostat to outdoor unit.

NOTE — The outdoor unit control directly controls the outdoor unit operation.)

Y1 input to the AHC. Will control the indoor blower according to the cooling mode blower speed, ramping and adjust selection jumper pins.

Yes

Room thermostat calls for second stage?

No

Yes

Yes

Y2 terminal on AHC is configured as input and passes signal from room thermostat to outdoor unit.

NOTE — The outdoor unit control directly controls the outdoor unit operation.)

Y2 terminal is an input to the AHC. The indoor blower will be controlled according to the jumper pin selections.

Yes

Still calling for second stage?

No

De-energize Y2 terminal on AHC. Indoor blower speed will reset to Y1 demand.

NOTE — The outdoor unit control directly controls the outdoor unit operation.)

Yes

Still calling for first stage?

No

De-energize Y1 (and O in cooling) terminals on AHC

NOTE — The outdoor unit control directly controls the outdoor unit operation.

De-energize indoor blower per ramping profile.

Cooling Operation

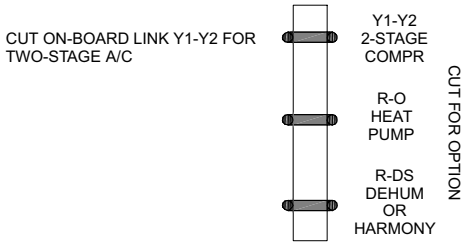
Air Handler Control AHC) Indoor Blower Mode Speed and Profiles settings

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.



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

Room thermostat calls for first stage?

Air Handler Control (AHC) receives inputs on Y1 terminal.

Y1 terminal on AHC is configured as input and passes signal from room thermostat to outdoor unit.

NOTE — The outdoor unit control directly controls the outdoor unit operation.

Y1 input to the AHC will control the indoor blower according to the cooling or heating mode blower speed, ramping and adjust selection jumper pins.

Yes

Room thermostat calls for second stage?

No

De-energize Y2 terminal on AHC. Indoor blower speed will reset to Y1 demand.

NOTE — The outdoor unit control directly controls the outdoor unit operation.

Yes

Yes

Y2 terminal on AHC is configured as input and passes signal from room thermostat to outdoor unit.

NOTE — The outdoor unit control directly controls the outdoor unit operation.

Y2 terminal is an input to the AHC. The indoor blower will be controlled according to the jumper pin selections.

Still calling for first stage?

Yes

No

Yes

Still calling for second stage?

De-energize Y1 (and O in cooling) terminals on AHC.

NOTE — The outdoor unit control directly controls the outdoor unit operation.

No

De-energize indoor blower per ramping profile.

Error Code / Recall Mode

AHC in **Idle Mode** (No heating cooling or indoor fan operation)

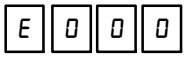
Yes

No

Turn room thermostat to OFF

To enter **Error Code Mode**, push and hold button next to single character LED display until solid **E** symbol appears, release button.

Control will display up to ten error codes stored in memory. If **E 0 0 0** is displayed, there are no stored error codes.

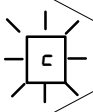


To exit **Error Code Recall Model,** push and hold button next to single character LED display until solid three horizontal bars appears, then release button.

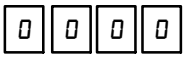
NOTE — Error Codes are not cleared from memory.

To clear error codes stored in memory, continue to hold push button while the solid three horizontal bars are displayed. Release button when solid is displayed.

Solid **c** starts blinking on single character LED display.

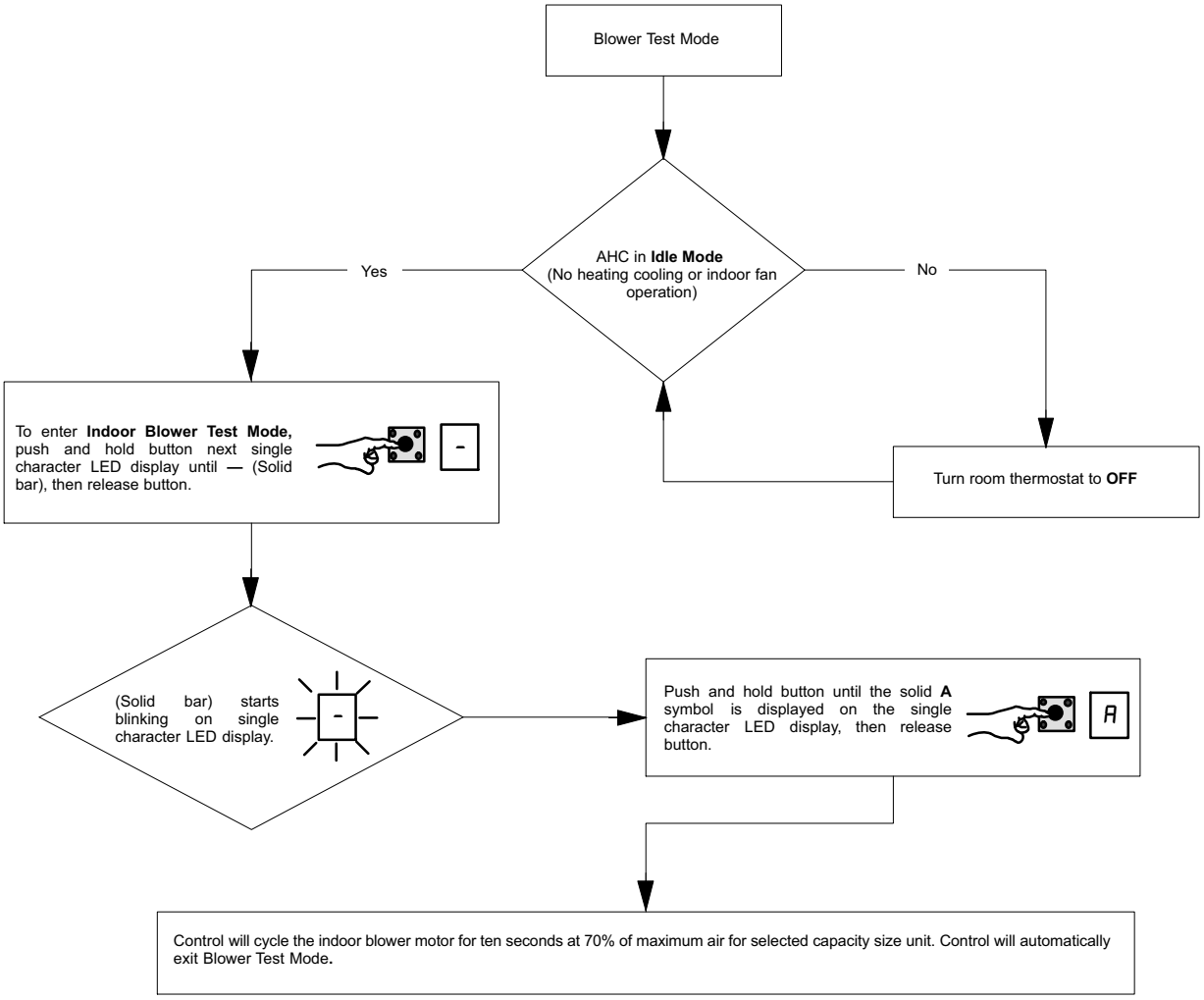


The display will blink for up to ten seconds. During this time, press the button and release to confirm deletion of the error code history. As confirmation, AHC will display **0 0 0 0.** (If ten second period expires or push button is not released, control will automatically exit **Error Code Mode** and go into mode without deleting error code history.



NOTE — Once the error code history is deleted, it cannot be recovered.

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.

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.

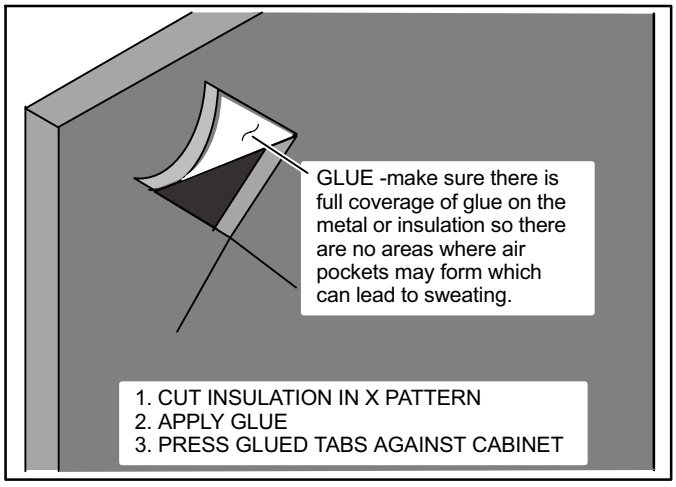


Figure 22. Repairing Insulation

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 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.

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 air flow. 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.

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 properly?
- 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 5ºF 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 5ºF 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.
- 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.

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.

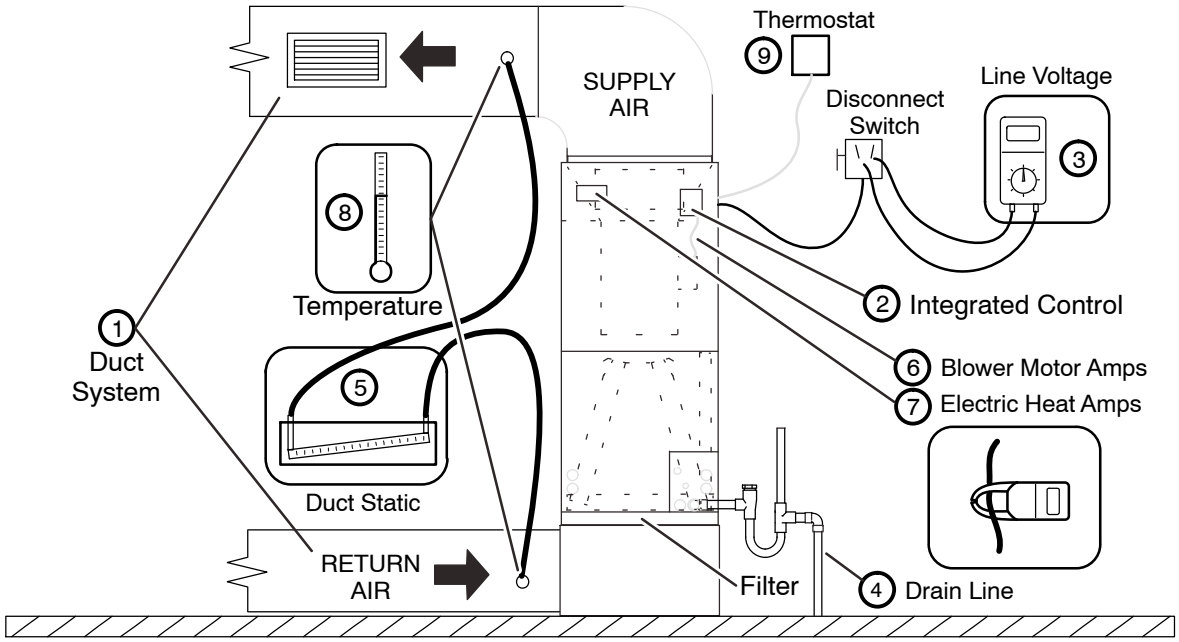
Air handler units may be used for heating (heat pumps) or cooling of buildings under construction, if the following conditions are met:

- 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.

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 _____

☐ Electrial 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

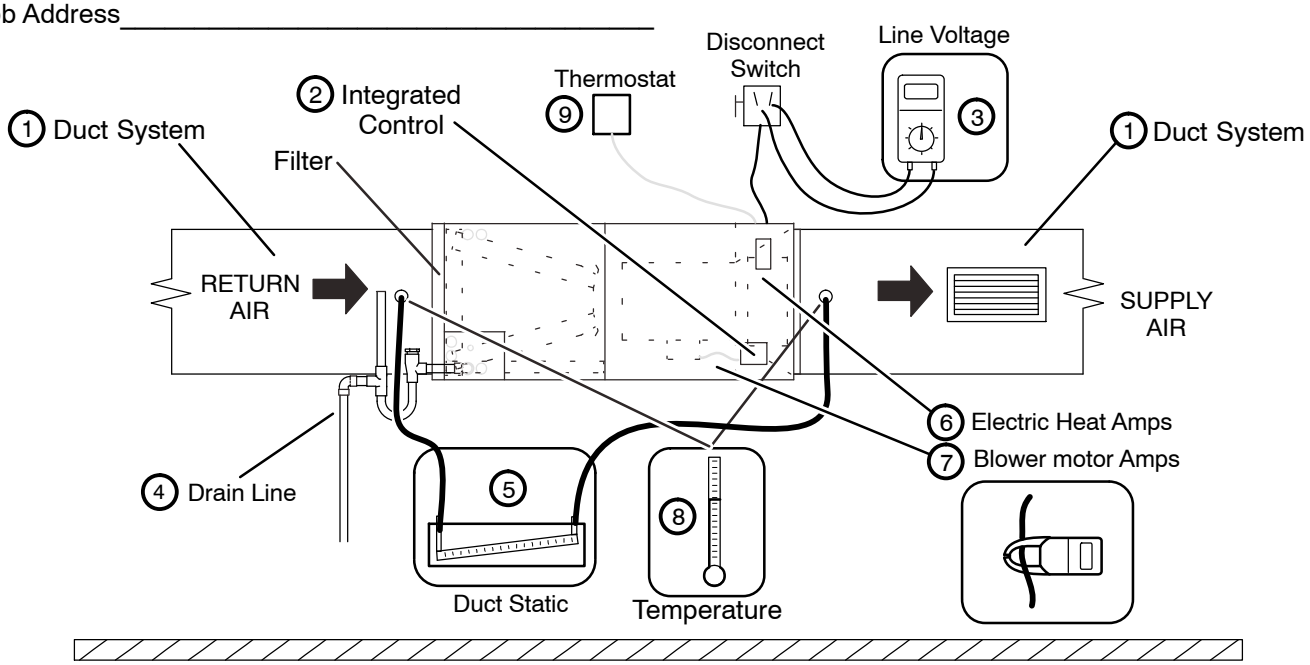
Technician's Name:_____Date Start–Up & Performance Check Completed_____

Figure 23. 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 _____

☐ Electrial 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 24. Start-Up and Performance Checklist (Horizontal Configuration)