



## Task Title: Air Conditioner Installation

### OALCF Cover Sheet – Learner Copy

**Learner Name:** \_\_\_\_\_

**Date Started:** \_\_\_\_\_

**Date Completed:** \_\_\_\_\_

**Successful Completion:** Yes ☐ No ☐

**Goal Path:** Employment ☒ Apprenticeship ☒

Secondary School ☐ Post Secondary ☐ Independence ☐

**Task Description:** The learner will read an excerpt from an air conditioning installation manual and answer questions.

#### Main Competency/Task Group/Level Indicator:

- Find and Use Information/Interpret documents/A2.2

#### Materials Required:

- Pen/pencil and paper and/or digital device

## Learner Information

Heating, Ventilation, and Air Conditioning (HVAC) technicians use manuals to install, repair and troubleshoot problems with air conditioning units.

Scan the excerpts from the air conditioner installation manual “Lennox Installation Instructions Signature Collection CBX40UHV Units”.

## Lennox Installation Instructions Signature Collection

### CBX40UHV Units

#### SENSOR CONNECTIONS AND WIRING REQUIREMENTS

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

##### Discharge Sensor (DAT)

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

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

The discharge air sensor should be mounted downstream of the electric heat elements as illustrated in figure 11, detail A. It must be placed in a location with unobstructed airflow, where other accessories (such as humidifiers, UV lights, etc.) will not interfere with its accuracy.

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

##### Outdoor Air Sensor

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

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

#### AIR HANDLER CONTROL 9-PIN CONNECTOR (P8)

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

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

**Table 7. Electric Heat Connection (P8)**

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

#### CONTROL CONNECTIONS AND WIRING REQUIREMENTS

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

**Table 8. Air Handler Control Connections — Communicating**

Label	Label	Function
Thermostat	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Outdoor Unit	R	24VAC
	i+	RSbus data high connection
	i-	RSbus data low connection
	C	24VAC command (ground)
Link	i+	Not used.
	i-	

**Table 9. Run Length — Communicating**

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

**Table 10. Air Handler Control Connections — Non-Communicating**

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

**Table 11. Run Length — Non-Communicating**

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

## Task Title: AirConditionerInstallation\_EA\_A2.2

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

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



## Work Sheet

**Task 1: List two requirements when mounting the discharge air sensor.**

Answer:

---

**Task 2: Which position is the electric heat connection in when it is a "heat stage 5 relay coil"?**

Answer:

---

**Task 3: List three error codes that occur because of the indoor blower.**

Answer:

---

**Task 4: Under which circumstances would error codes 401 to 409 be displayed?**

Answer:

---