

INSTALLATION INSTRUCTIONS

BCE7S Series Air Handler

This manual must be left with the homeowner for future reference.



This is a safety alert symbol and should never be ignored. When you see this symbol on labels or in manuals, be alert to the potential for personal injury or death.

Table of Contents

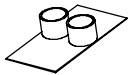
Unit Dimensions	2	Sealing the Unit	13
Model Number Identification	4	Field Control Wiring	13
General Information	5	Air Handler Control Button, Display and Jumpers	20
Shipping and Packing List	5	Unit Operating Sequences	27
Installation Clearances	5	Operation	35
Requirements	5	Repairing or Replacing Cabinet Insulation	36
Installation	6	Homeowner Maintenance	36
Brazing Connections	10	Professional Maintenance	37
Condensate Drain	12	Checkout Procedures	37
Inspecting and Replacing Filters	13		

NOTE: Special procedures are required for cleaning the all-aluminum coil in this unit. See Page 37 in this instruction for information.

IMPORTANT INFORMATION FOR INSTALLER

CHECK FOR AND REMOVE THE FOLLOWING ITEMS BEFORE OPERATING UNIT.

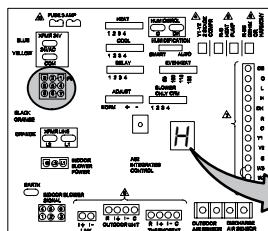
A BLOWER HOUSING SUPPORT PAD



B HORIZONTAL DRAIN PAN (SEE UPFLOW APPLICATIONS ON PAGE 6 AND DOWNFLOW APPLICATIONS ON PAGE 8)

C REFRIGERANT LINE PLUGS (SEE BRAZING CONNECTION ON PAGE 10)

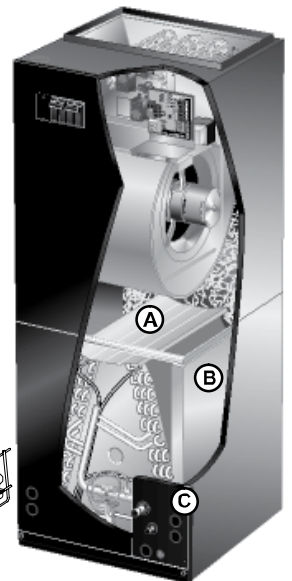
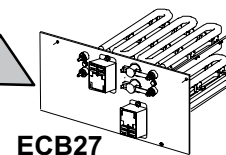
FOR PROPER OPERATION THE ELECTRIC HEAT (IF APPLICABLE) MUST BE CONFIGURED (SET-UP) THROUGH THE AIR HANDLER CONTROL (AHC)



IMPORTANT: WHEN ELECTRIC HEAT IS INSTALLED, THE AIR HANDLER CONTROL MUST BE MANUALLY CONFIGURED. SEE JUMPERS AND LINKS GUIDE ON PAGE 19.

CONFIGURE ELECTRIC HEAT

H ELECTRIC HEAT SECTIONS MUST BE CONFIGURED. IF INSTALLED, SEE PROCEDURE IN FIGURE 22 ON PAGE 31.



Manufactured By
Allied Air Enterprises LLC
A Lennox International, Inc. Company
215 Metropolitan Drive
West Columbia, SC 29170

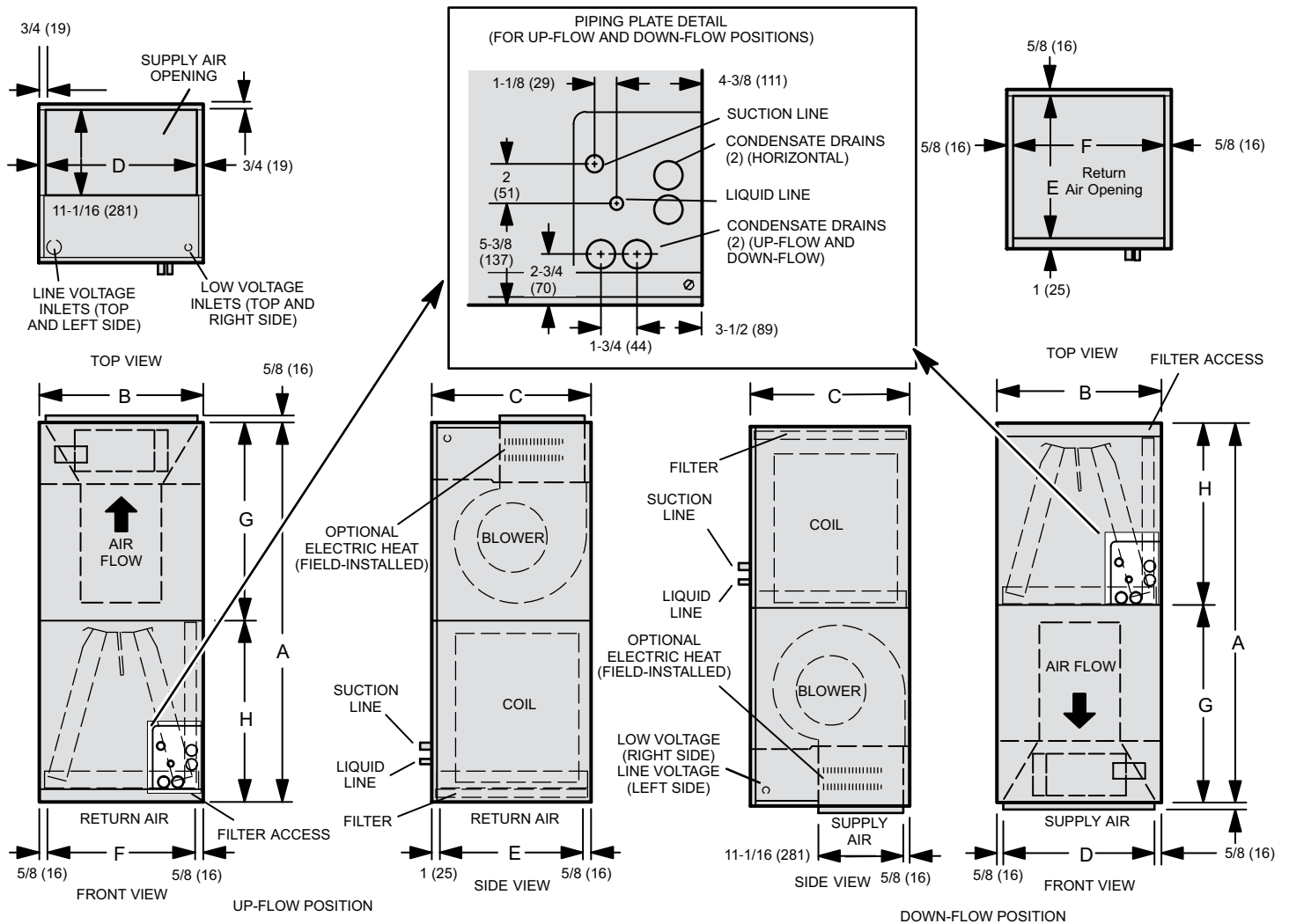


(P) 507746-01

Save these instructions for future reference

Unit Dimensions

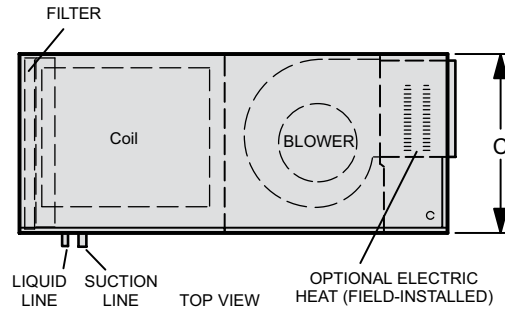
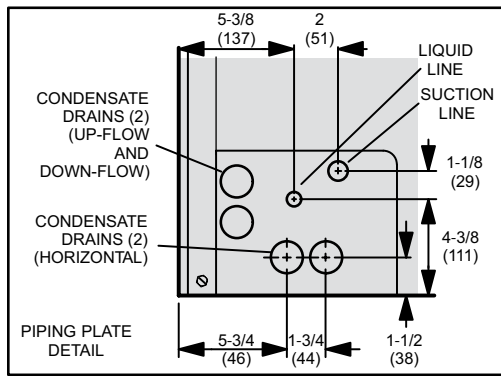
Upflow and Downflow Unit Dimensions - Inches (mm)



Common Dimensions

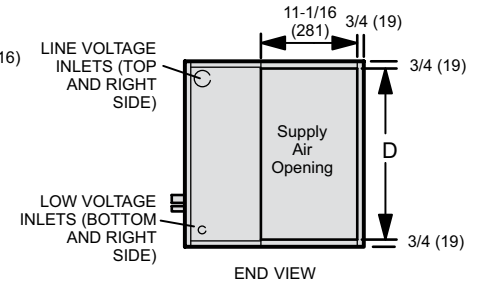
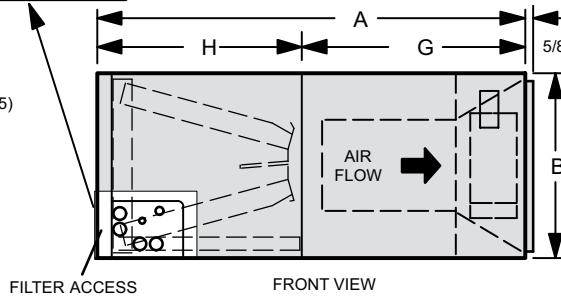
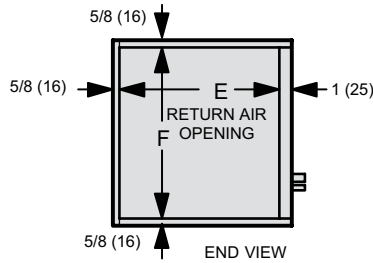
Dimension	24		30/36		42/48		60	
	in.	mm	in.	mm	in.	mm	in.	mm
A	49-1/4	1251	51	1295	58-1/2	1486	62-1/2	1588
B	21-1/4	540	21-1/4	540	21-1/4	540	21-1/4	540
C	20-5/8	524	22-5/8	575	24-5/8	625	24-5/8	625
D	19-3/4	502	19-3/4	502	19-3/4	502	19-3/4	502
E	19	483	21	533	23	584	23	584
F	20	508	20	508	20	508	20	508
G	24-5/8	625	26-3/8	670	27-7/8	708	27-7/8	708
H	24-5/8	625	24-5/8	625	30-5/8	778	34-5/8	879

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

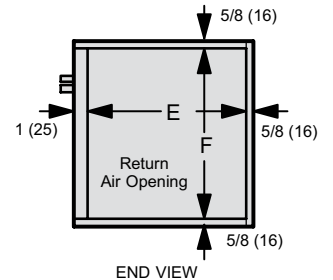
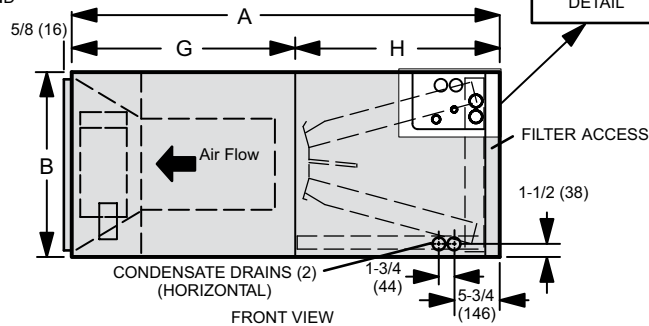
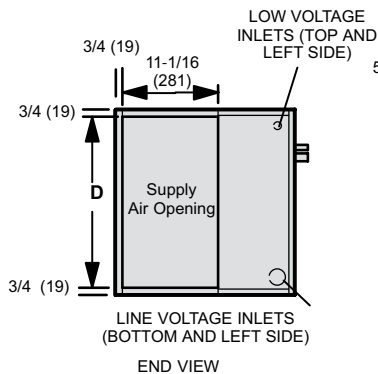
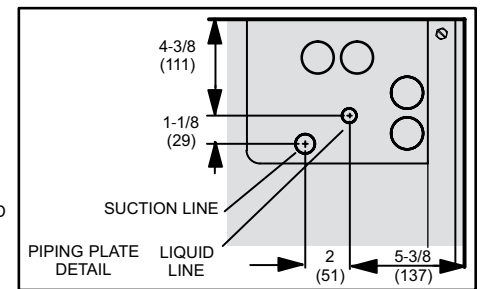
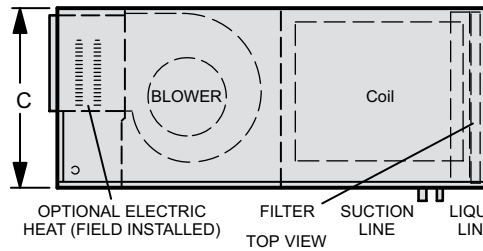


Horizontal Position (Right-Hand Air Discharge)

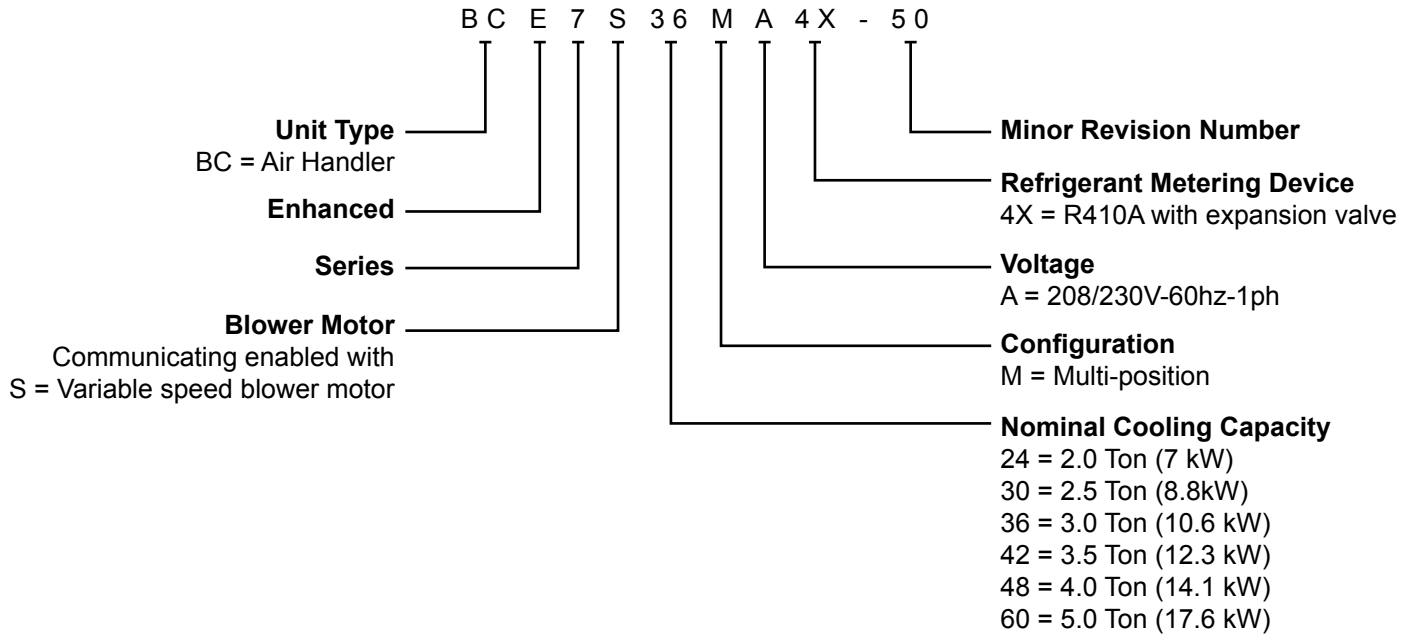
FOR DIMENSIONS "A" THROUGH "H", SEE CHART ON PAGE 2.



Horizontal Position (Left-Hand Air Discharge)



Model Number Identification



WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

IMPORTANT

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

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.

NOTE

A thermostat is not included and must be ordered separately.

- A Comfort Sync® thermostat must be used in communicating applications.
- A non-communicating thermostat may be used in non-communicating applications.

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 14.

General Information

This indoor unit with all-aluminum coil is designed for installation with optional field-installed electric heat and a matched outdoor unit that is charged with HFC-410A refrigerant. These units, designed for indoor installation in multiple positions, are completely assembled for upflow and horizontal right-hand discharge before being shipped from the factory.

All BCE7S air handlers are equipped with a factory-installed, internally mounted check / expansion valve, which is suitable for use in HFC-410A applications.

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

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

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

Shipping and Packing List

Package 1 of 1 contains:

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

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

Installation Clearances

Cabinet	0 inch (0 mm)
To Plenum	0 inch (0 mm)
To Outlet Duct within 3 feet (914 mm)	0 inch (0 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 (610 mm) minimum.	
NOTE - If cabinet depth is more than 24 inches (610 mm), allow a minimum of the cabinet depth plus 2 inches (51 mm).	

Table 1. Installation Clearances

⚠ IMPORTANT

This unit must be matched with an indoor coil as specified in the AHRI Database. Coils previously charged with HCFC-22 must be flushed.

⚠ WARNING

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

⚠ WARNING

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

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

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

Requirements

In addition to conforming to manufacturer's installation instructions and local municipal building codes, installation of air handler units (with or without optional electric heat), shall 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.

Installation

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

Disassemble/Reassemble Air Handler Units

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

To disassemble:

1. Remove access panels.
2. Remove both blower and coil assemblies. This will lighten the cabinet for lifting.
3. Remove one screw from the left and right posts inside the unit. Remove one screw from each side on the back of the unit. Unit sections will now separate.

To reassemble:

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

Upflow Application

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

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

Model	Kit Number
All unit sizes	45K32

Table 2. Optional Side-Return Unit Stand (Upflow Only)

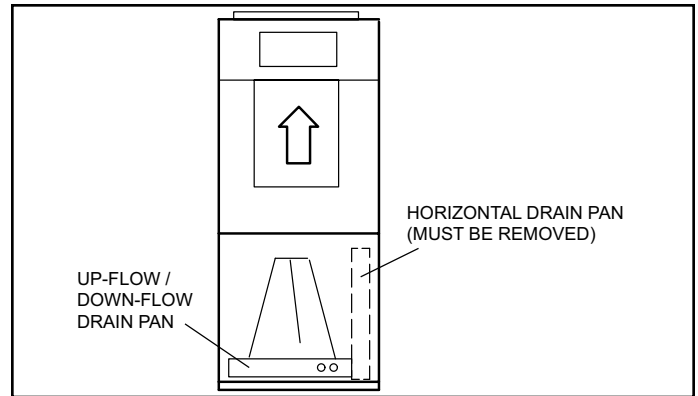


Figure 1. Upflow Configuration

Horizontal Right-Hand Discharge Application

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

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

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

NOTE: (BCE7S60 Model Only) Before operating the unit, remove access panels and the horizontal drip shield and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields.

NOTE: (BCE7S60 Model Only) Install the horizontal shield on the front edge of the horizontal drain pan as illustrated in Figure 2.

1. No further adjustment is necessary. Set unit so that it is sloped 1/4" towards the drain pan end of the unit.
2. If the unit is suspended, the entire length of the cabinet must be supported. If you use a chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) to support the length of the cabinet. Use securing screws no longer than 1/2" to avoid damaging the coil or filter as illustrated in Figure 3. Use sheet metal screws to connect the return and supply air plenums as required.

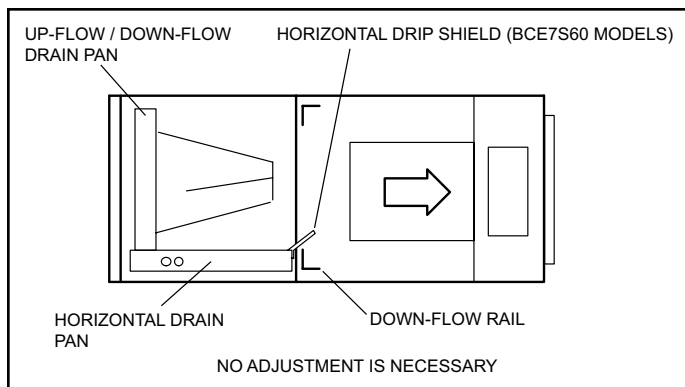


Figure 2. Right-Hand Discharge Configuration

Horizontal Right-Hand Discharge Application in High-Humidity Areas

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

To remove rail:

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

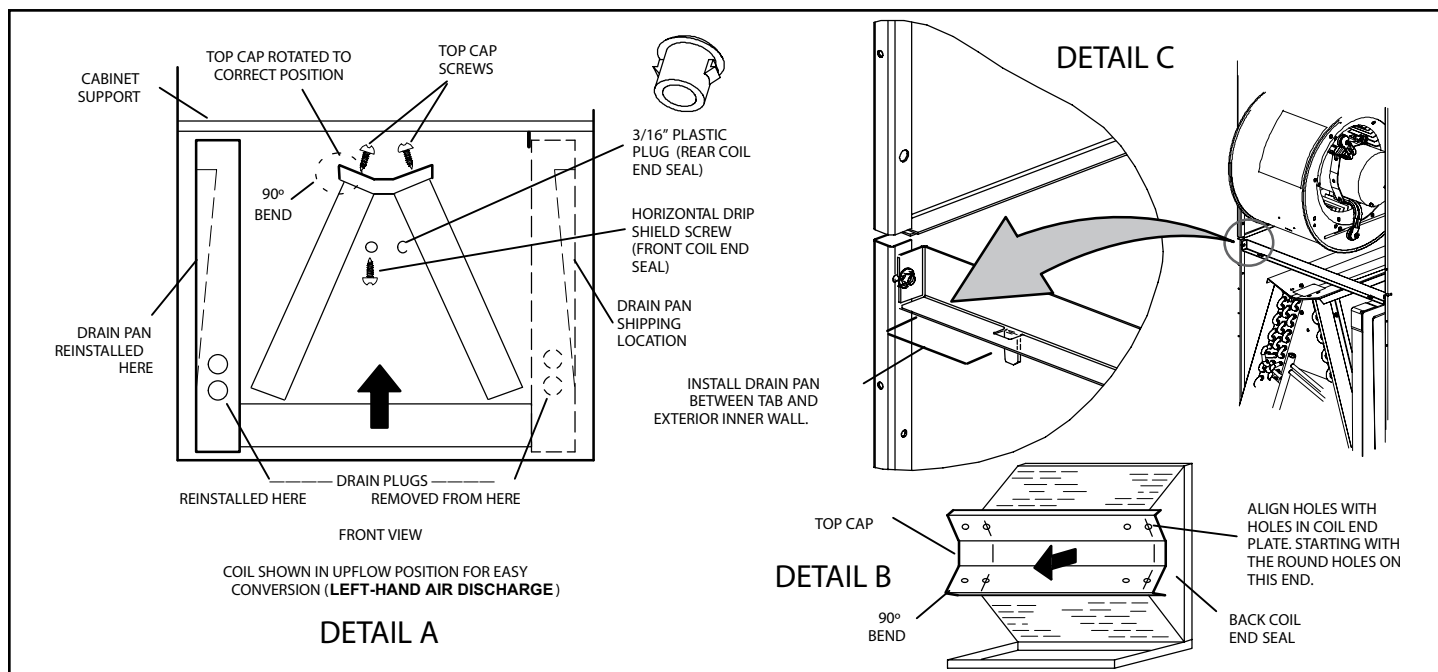


Figure 4. Field Modification for Left-Hand Discharge

⚠ 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.

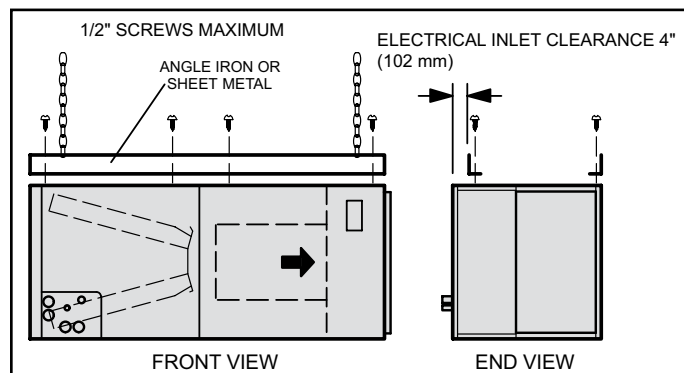


Figure 3. Suspending Horizontal Unit

Horizontal Left-Hand Discharge Application

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

NOTE: (BCE7S60 Model Only) Before operating the unit, remove access panels and the horizontal drip shield and the corrugated padding between the blower and coil assembly. Discard the corrugated padding and the downflow drip shields. (The shields are used for downflow applications only.)

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

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

⚠ IMPORTANT

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

3. Rotate drain pan 180° front-to-back and install it on the opposite side of the coil.
 4. Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal as illustrated in Detail A in Figure 4.
 5. Rotate horizontal drip shield 180° front-to-back.
 6. Remove plastic plug from left hole on coil front end seal and reinstall plug in back hole. Reinstall horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.
- NOTE:** Be very careful when reinstalling the screws into the coil end plate engaging holes. Misaligned screws may damage the coil.
7. From the upflow position, flip cabinet 90° to the left and set into place. Replace blower assembly. Secure coil in place by bending down the tab on the cabinet support rail as illustrated in Figure 4 and Figure 5.

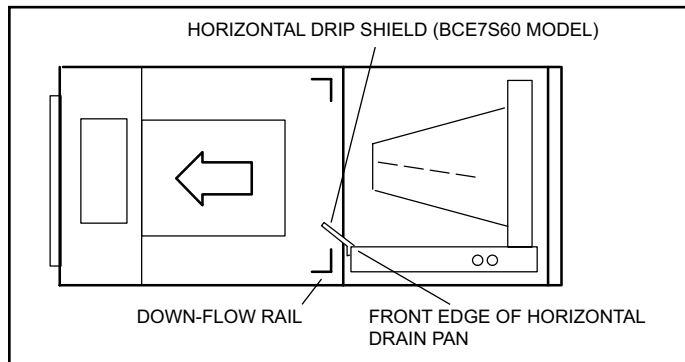


Figure 5. Left-Hand Discharge Configuration

8. Install the horizontal shield (BCE7S60 model) on the front edge of the horizontal drain pan as illustrated in Figure 5.

NOTE: For horizontal applications in high humidity areas, remove the downflow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow

rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.

9. Knock out drain seal plate from access door. Secure plate to cabinet front flange with screw provided.
10. Flip access door and replace it on the unit.
11. Set unit so that it is sloped 1/4" toward the drain pan end of the unit. Connect return and supply air plenums as required using sheet metal screws.
12. If suspending the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" to avoid damage to coil or filter, as illustrated in Figure 3. Connect return and supply air plenums as required using sheet metal screws.

Downflow Application

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

⚠ IMPORTANT

If electric heat sections with circuit breakers is applied to downflow BCE7S unit, the circuit breakers must be rotated 180° to the UP position. See electric heat installation instructions for more details.

Table 3 outlines the sizes of the various drip shields.

NOTE: (BCE7S60 Model Only) Remove access panels and horizontal drip shield from the corrugated padding between the blower and coil assembly.

1. Remove the coil assembly from the unit.
2. For best efficiency and air flow, remove the horizontal drain pan from the units in downflow positions as illustrated in Figure 6.
3. Rotate cabinet 180° from the upright position. See Figure 6. You may need to first remove the blower assembly to lighten the cabinet for lifting.
4. Foam tape that is provided creates a seal between the drip shield and the coil so that water does not leak into the air stream. The foam tape pieces are precut. Apply the tape to the drip shields as illustrated in Figure 7 and specified as follows:
 - Apply two pieces of foam tape provided down both ends of each shield. The tape should measure 4-3/4" X 2" (120 X 25 mm). Ensure that the tape covers both sides of the shield equally.
 - Apply the longer piece of 1 inch wide foam tape between the end pieces of tape.
5. From the underside of the coil, install the downflow drip shield firmly in place as illustrated in Figure 8.

Units	Length	Width
24	Not Required	Not Required
30	15-7/8"	4-11/16"
36, 42	17-7/8"	4-11/16"
48, 60	19-7/8"	4-11/16"

Table 3. Downflow Drip Shields (Tape Required)

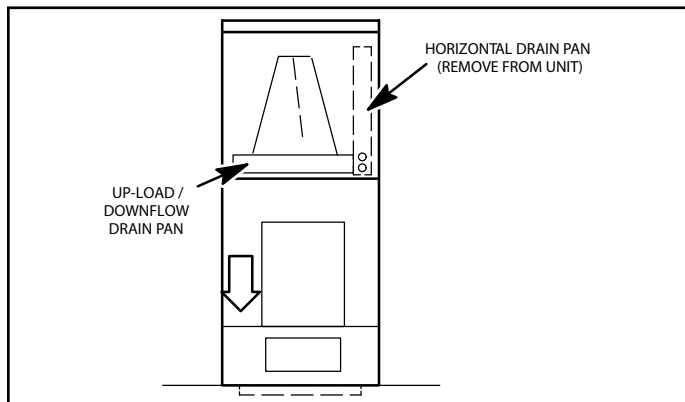


Figure 6. Downflow Discharge Position

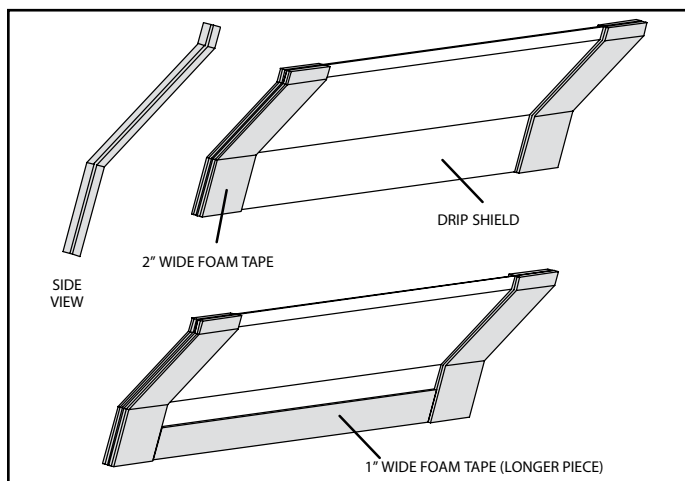


Figure 7. Applying Foam Tape to Drip Shield

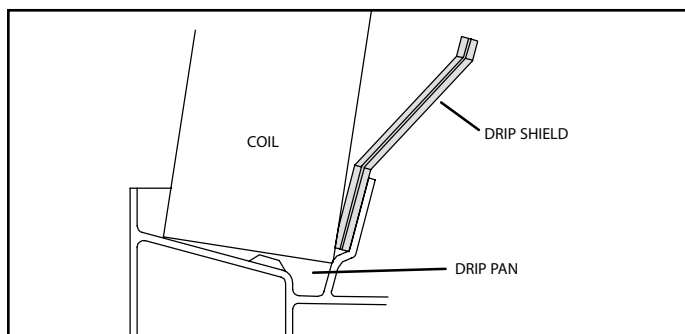


Figure 8. Downflow Drip Shields

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

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

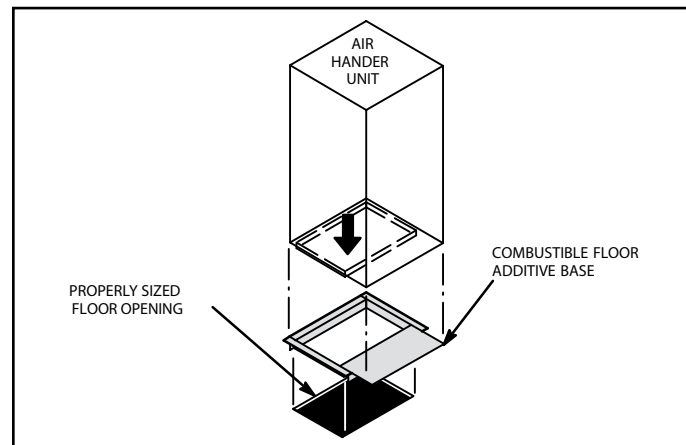


Figure 9. Downflow Combustible Flooring Base

- For downflow installation on combustible flooring, an additive base must be used as illustrated in Figure 9. Downflow combustible flooring base kit 44K15 is available for all units.
- Cut an opening appropriately sized for combustible base. Base dimensions are illustrated in Figure 10. After opening has been cut, set the additive base into opening. Connect outlet air plenum to the additive base. Set the unit on the additive base so flanges of the unit drop into the base opening and seal against the insulation strips. The unit is now locked in place. Install return air plenum and secure with sheet metal screws.

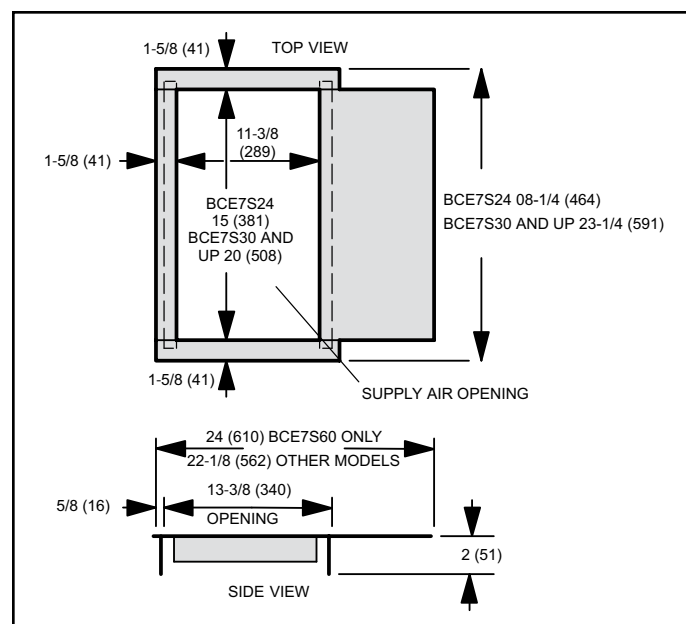


Figure 10. Downflow Combustible Base Dimensions - in. (mm)

Brazing Connections

WARNING

Polyolester (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 pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture. Check the high and low pressures before applying heat.

WARNING

Danger of explosion!



Can cause equipment damage, injury, or death.

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

CAUTION

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

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

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

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

IMPORTANT

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

Model	Liquid Line	Vapor Line	L15 Line Sets
24	3/8" (10mm)	5/8" (16mm)	L15 line set sizes are dependent on unit match-up. See Product Specifications for outdoor unit to determine correct line set sizes
30, 36	3/8" (10mm)	3/4" (19mm)	
42, 48	3/8" (10mm)	7/8" (22mm)	
60	3/8" (10mm)	7/8" (22mm)	Field fabricated

NOTE - Some applications may require a field-provided 7/8" to 1-1/8" adapter.

Table 4. Refrigerant Connections and Line Set Requirements

IMPORTANT

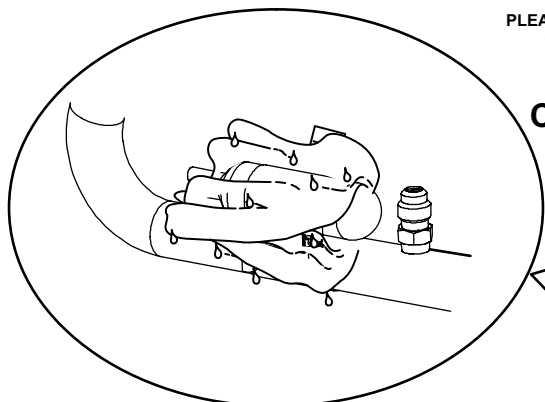
Refrigerant lines must be connected by a qualified technician in accordance with established procedures.

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

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

Do not remove sealing caps from the refrigerant piping or unit connection points until connections are ready to be completed.

PLEASE READ IMPORTANT ISSUES CONCERNING BRAZING OPERATIONS ON PAGE 10 BEFORE PROCEEDING.

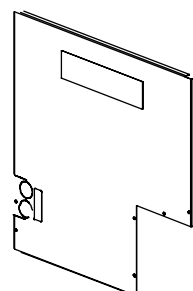


C USE A WET RAG TO PROTECT CTXV SENSING BULB WHEN BRAZING SUCTION LINE CONNECTIONS.

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

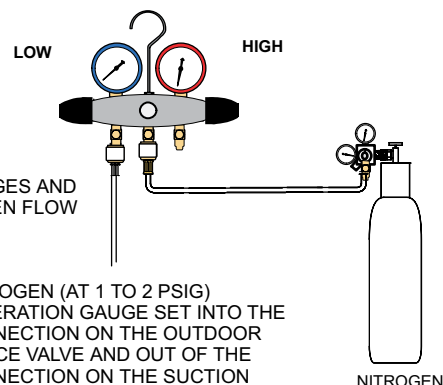


B REMOVE RUBBER PLUG FROM BOTH LIQUID AND SUCTION LINES

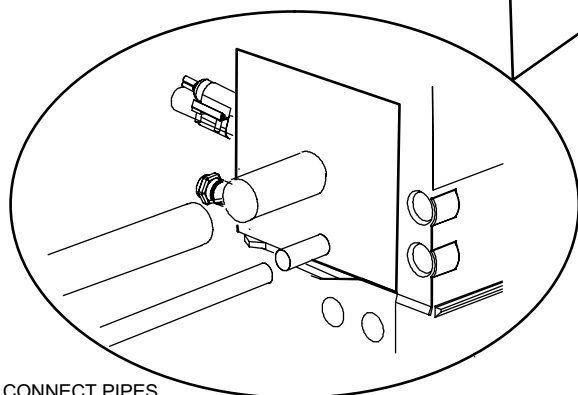
NOTE — BCE7S SERIES UNITS USE NITROGEN OR DRY AIR AS A HOLDING CHARGE. IF THERE IS NO PRESSURE WHEN THE RUBBER PLUGS ARE REMOVED, CHECK THE COIL FOR LEAKS BEFORE INSTALLING.

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.

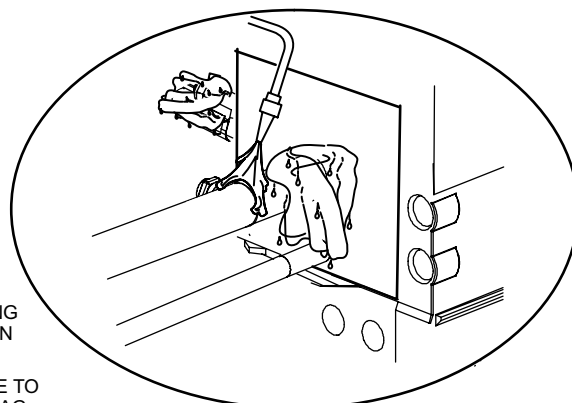


E CONNECT PIPES

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 11. Brazing Connections

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 13 for typical drain trap configuration.

Overflow Drain

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

For downflow orientation, the overflow drain **MUST** be connected and routed to a overflow drain line. See Figure

12 for main and overflow drain locations based on coil orientation.

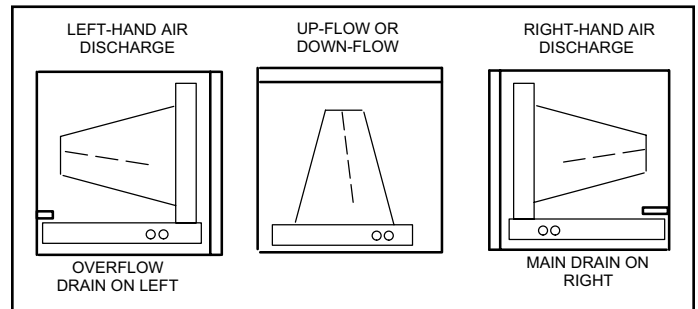


Figure 12. Main and Overflow Drain Locations Based on Coil Orientation

Best Practices

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

- Main and overflow drain lines should **NOT** be smaller than both drain connections at drain pan.
- Overflow drain line should run to an area where homeowner will notice drainage.

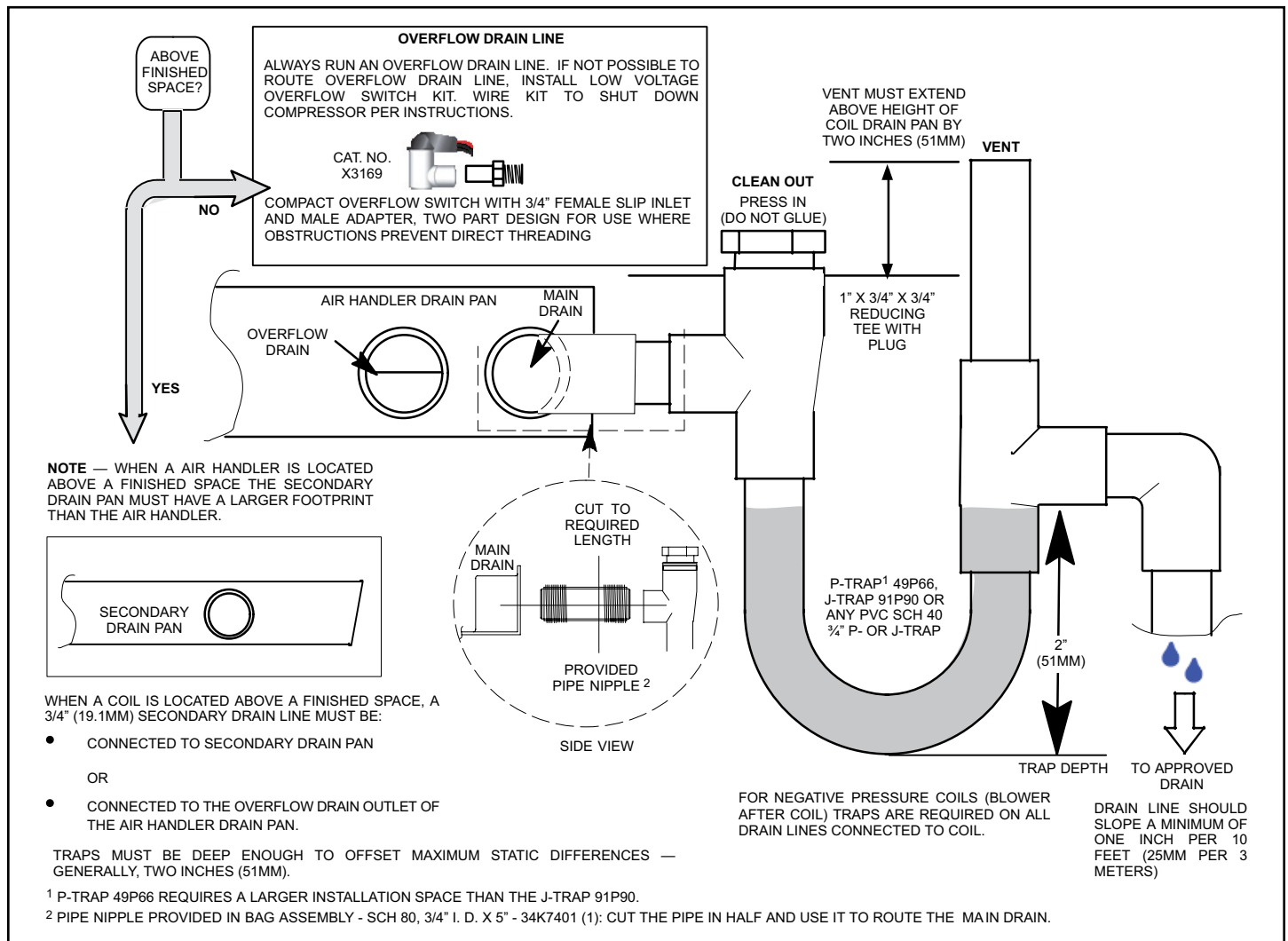


Figure 13. Typical Main and Overflow Drain Installations

- It is recommended that the overflow drain line be vented and a trap installed. Refer to local codes.
- Condensate drain lines must be configured or provided with a cleanout to permit the clearing of blockages and for maintenance without requiring the drain line to be cut.

Inspecting and Replacing Filters

IMPORTANT

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

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

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

To replace filter:

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

See Table 5 for replacement filter sizes.

BCE7S	Filter Size – in. (mm)
24, 30, 36	20 x 20 x 1 (508 x 508 x 25)
42, 48, 60	20 x 24 x 1 (508 x 610 x 25)

Table 5. Filter Dimensions

Sealing the Unit

WARNING

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

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

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

Field Control Wiring

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

WARNING

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.

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.

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.

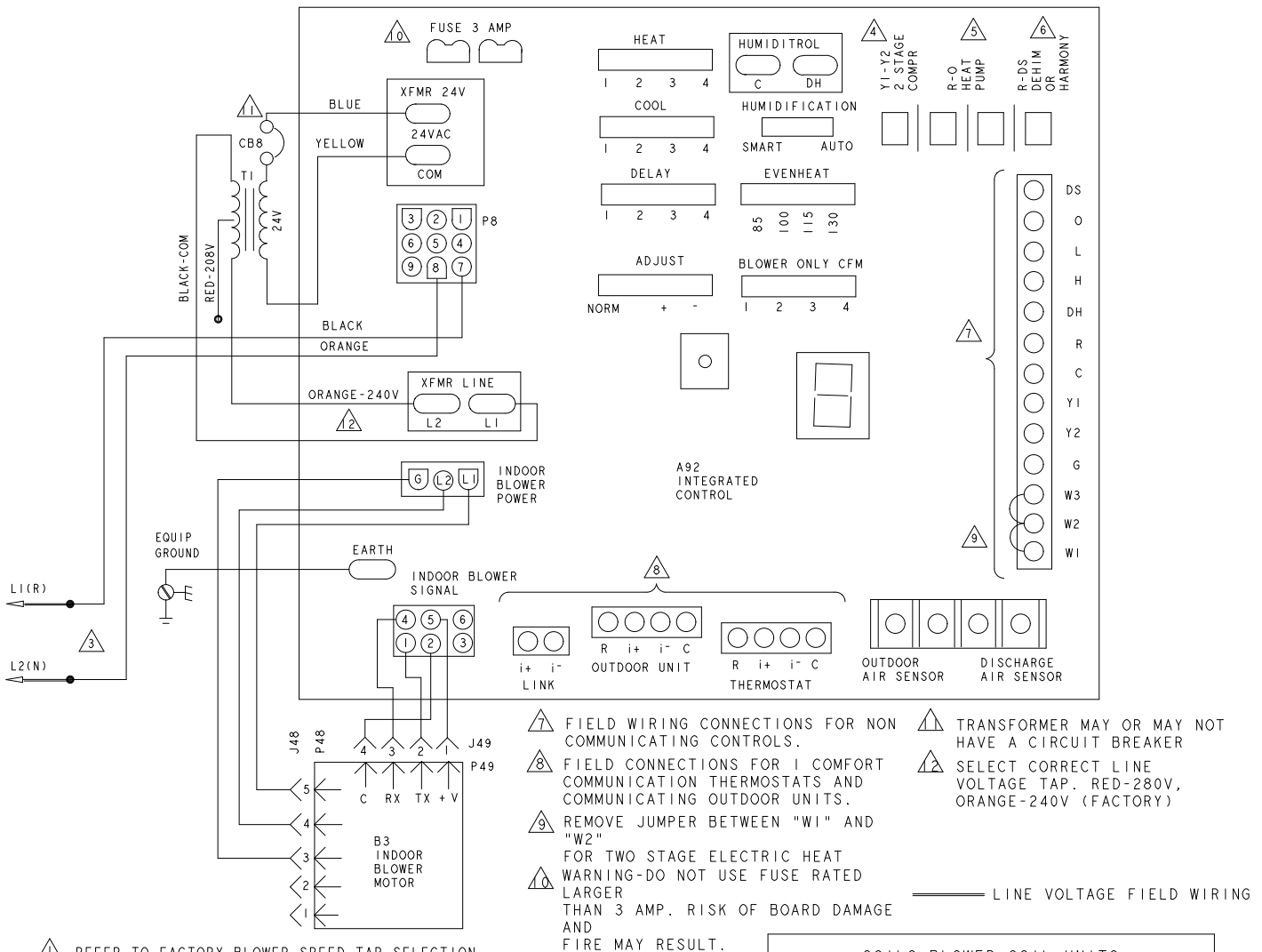
Separate openings have been provided for 24V low voltage and line voltage. Refer to the dimension illustration of specific location.

CAUTION

Use copper conductors only.

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

MODEL	BLOWER COIL	RECOMMENDED SPEED TAP SELECTION			
		COOL		HEAT	
BCE4	24,30,36	PIN #3	PIN #3	PIN #4	PIN #4
	48	PIN #2	PIN #2	PIN #1	PIN #1
	60	PIN #3	PIN #3	PIN #1	PIN #1
BCE7	24,30,36,42	PIN #3	PIN #3	PIN #3	PIN #3
	48	PIN #2	PIN #2	PIN #2	PIN #2
	60	PIN #3	PIN #3	PIN #3	PIN #3



- 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 CLIP LINK "Y1" TO "Y2" FOR TWO STAGE UNIT
- 5 CLIP LINK "R" TO "O" WHEN HEAT PUMP IS USED
- 6 CLIP LINK BETWEEN "R" AND "DS" WHEN DEHUMIDIFICATION CONTROL IS USED

COILS-BLOWER COIL UNITS	
BCE4MS AND BCE7SM	
11/14	Supersedes
Form No. 537793-02	

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Figure 14. BCE7S Air Handler Unit Typical Wiring Diagram

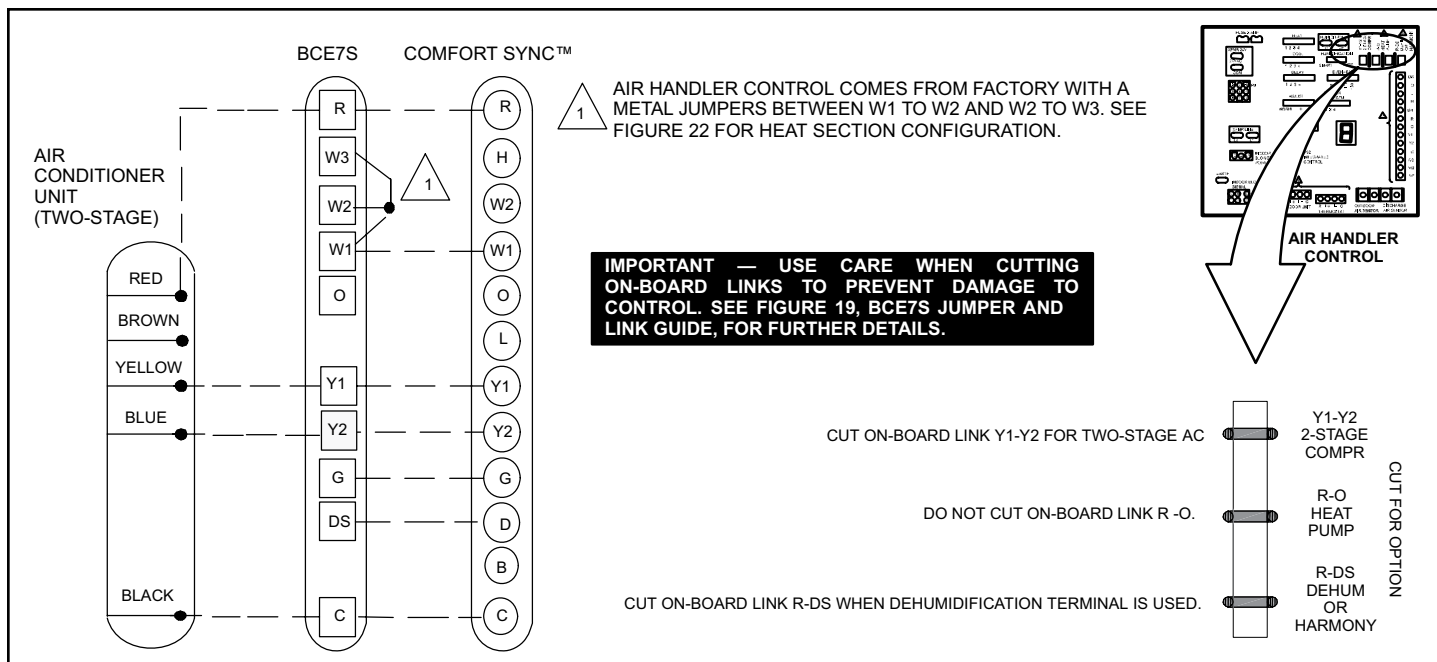


Figure 15. Control (Field Wiring) – Cooling Application (Non-Communicating)

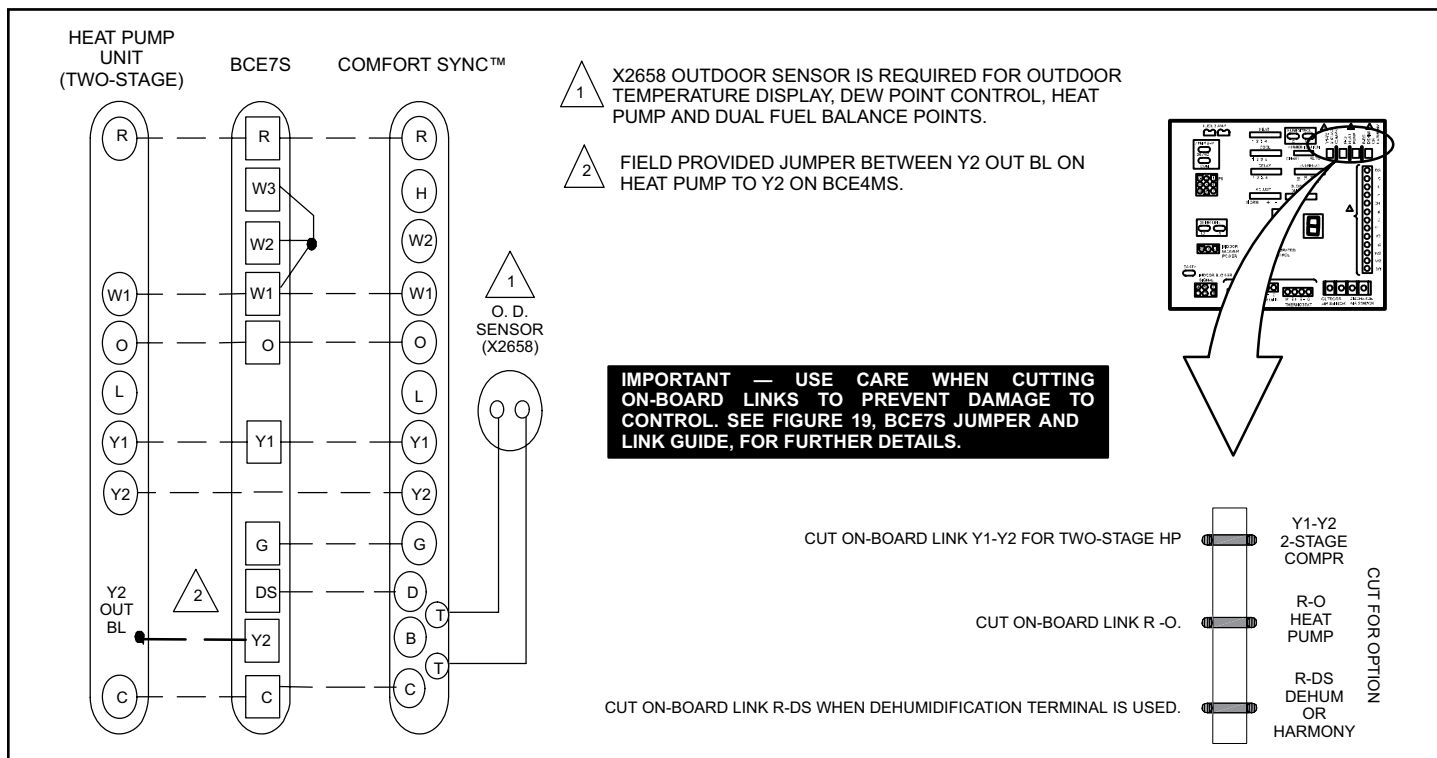


Figure 16. Control (Field Wiring) – Heat Pump (Non-Communicating)

⚠ WARNING

ELECTROSTATIC DISCHARGE (ESD)

Precautions and Procedures

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

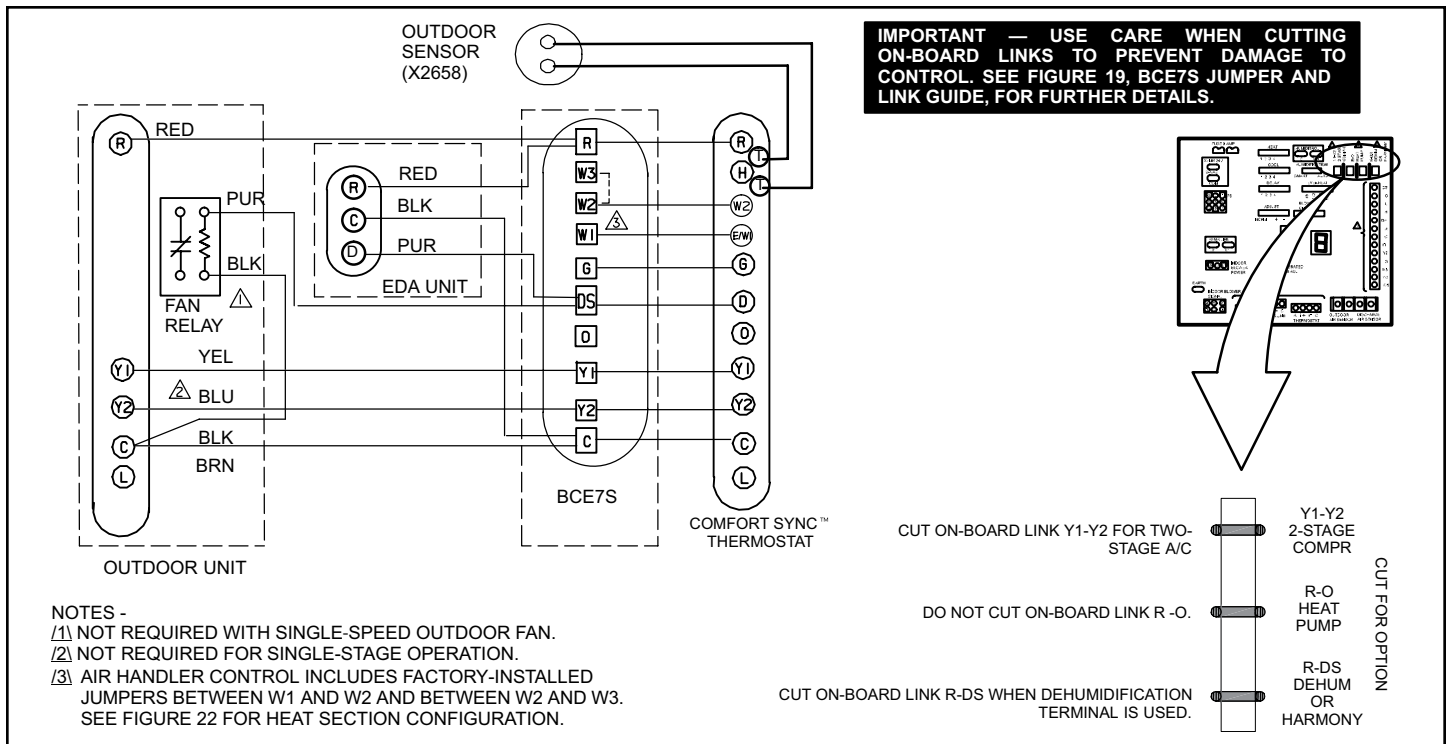


Figure 17. Control (Field Wiring) — Cooling Application (Humidification Control and Second-Stage Outdoor Fan Relay Wiring) Non-Communicating

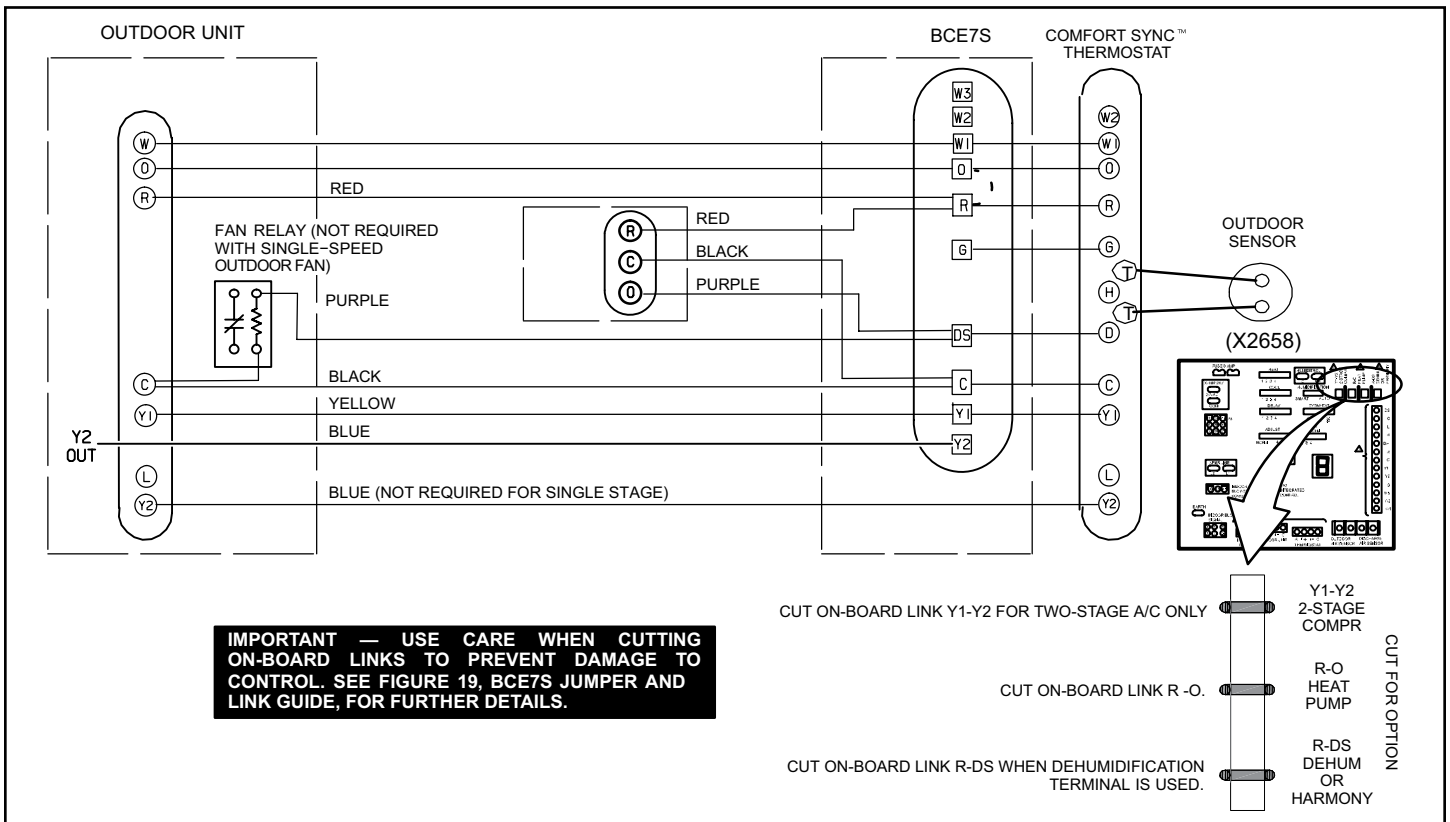


Figure 18. Control (Field Wiring) — Heat Pump Application (Humidification Control and Second-Stage Outdoor Fan Relay Wiring) Non-Communicating

Wiring Connections

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

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

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

Sensor Connections and Wiring Requirements

Outdoor Air Sensor

This is a two screw terminal for connection to an 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 6).

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

Table 6. Electric Heat Connection (P8)

Control Connections and Wiring Requirements

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

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 7. Air Handler Control Connections – Communicating

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

Table 8. Run Length – 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 9. Run Length – Non-Communicating

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.	
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.		

Table 10. Air Handler Control Connections

COOLING MODE
BLOWER SPEED

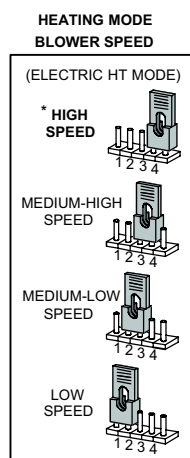
(COOLING & HP MODE)

HIGH SPEED

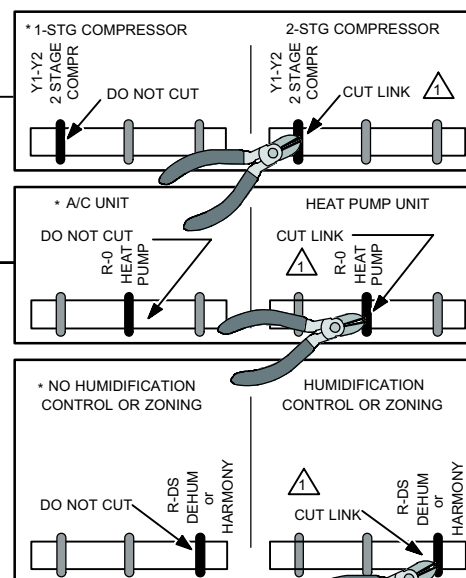
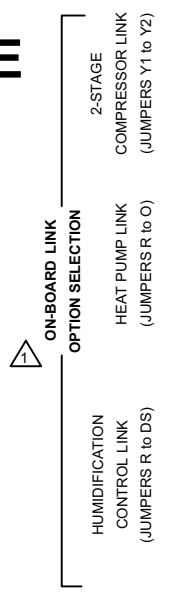
* MEDIUM-HIGH SPEED

MEDIUM-LOW SPEED

LOW SPEED

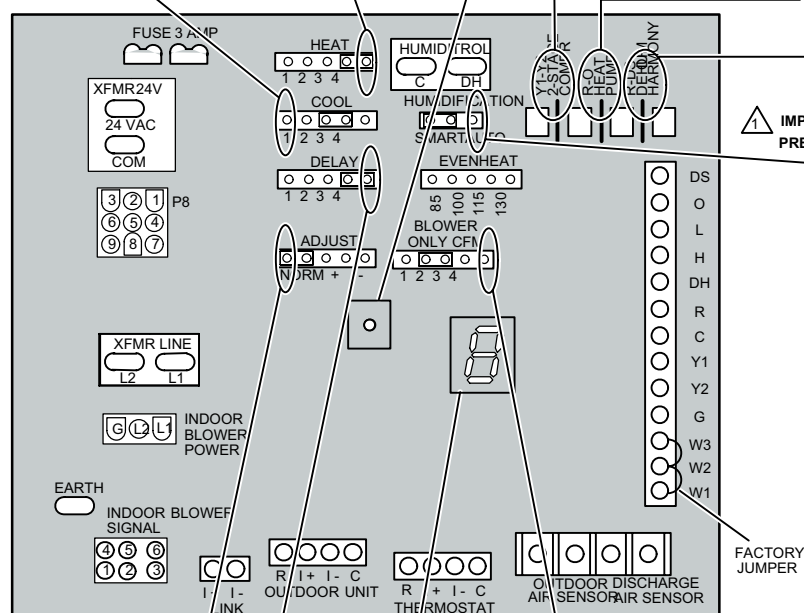


**PUSH
BUTTON**



CUT ON-BOARD LINK (SOLDER TRACE) COMPLETELY THROUGH BOTH LAYERS ON THE CONTROL BOARD

1 IMPORTANT: USE CARE WHEN CUTTING LINKS TO PREVENT DAMAGE TO CONTROL.



HUMIDIFICATION MODE

HUMIDIFICATION MODE
24VAC OUTPUT ON "H"
FOR HUMIDIFIER OR
ACCESSORY INTERLOCK

*** SMART MODE**
- "H" ENABLED WHEN
HEAT ACTIVE
(HP or ELECT. HT)

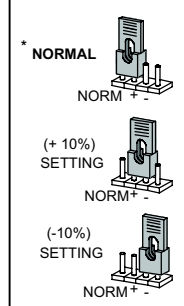
AUTO MODE
- "H" ENABLED WHEN
BLOWER ACTIVE
& NO CLG
OR DEHUM

SMART AUTO

SMART AUTO

FACTORY
JUMPER

BLOWER ADJUST SELECTION



COOLING BLOWER RAMPING

(COOLING MODE UNLESS NOTED)

DELAY PROFILE #4

OFF-50%-82%-
100%-50%-OFF

DELAYPROFILE #3
OFF-82%-100%-OFF

DELAY PROFILE #2

CLG
OFF 100% DEM

SATISFIED - 100% FOR 45
SECONDS - OFF

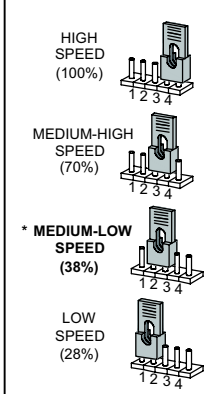
HP

OFF - 30 SECOND DELAY -
100% - DEMAND
SATISFIED - 100% FOR 45
SECOND - OFF

DELAYPROFILE #1

OFF-100%-OFF

CONTINUOUS FAN
BLOWER SPEED



* INDICATES FACTORY DEFAULT SETTING

Page 19 of 39

Air Handler Control Button, Display and Jumpers

Use Figure 19 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 13, and the Air Handler Control will automatically use the factory default setting shown in Figure 19.

⚠ IMPORTANT

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

Push Button

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

1. Press the diagnostic push button and hold it to cycle through a menu of options. Every three seconds a new menu item will be displayed. Release the button when the desired mode is displayed.
2. When the solid "E" is displayed, the control enters the Error Code Recall mode. Error Code Recall mode menu options: No change (displaying error history) remains in Error Code Recall mode; solid "≡" exits Error Code Recall mode; and solid "c" clears the error history. Must press button while flashing "c" is displayed to clear error codes.
3. When the solid "-" is displayed, the control enters the applicable mode. Field configuration mode menu options: Solid "C" starts pressure switch calibration; blinking "-" exits current active mode.

Jumpers

Jumpers are used for non-communicating mode only.

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

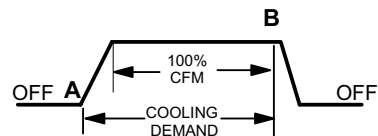
- If jumper is installed in AUTO Humidification position, H terminal is energized whenever indoor blower is running.
2. **Blower Only CFM** — Used to select Indoor blower CFM for continuous operation.
 3. **Heat** — Used to select Indoor blower CFM for electrical heat by placing the jumper in proper position. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on Page 25.
 4. **Cool** — Used to select cooling indoor blower CFM by placing the jumper in proper position. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on Page 25.
 5. **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 and will automatically use the default factory setting in Table 11. See Figure 19 for jumper configurations. Actual CFM values for different air handler sizes are shown in Targeted CFM tables starting on Page 25.

6. **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 11. See Figure 19 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.

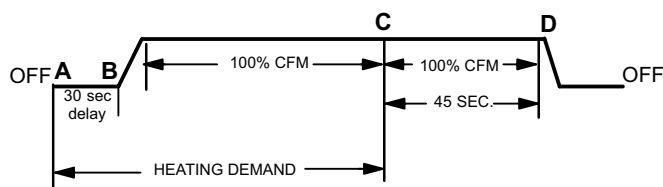
Delay Profile 2

Cooling – Air Conditioner and Heat Pump



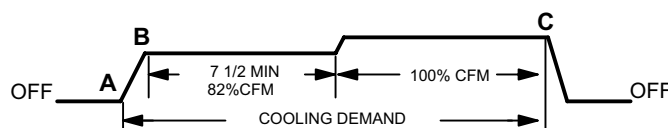
- When cool demand is initiated, motor ramps up to 100% and runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds.
- Motor ramps down to stop.

Heating – Heat Pump Only



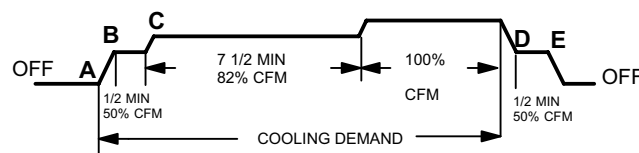
- When heat demand is initiated, 30 seconds motor on delay starts.
- After the motor on delays expires, motor ramps up to 100% and runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45 seconds.
- Motor ramps down to stop.

Delay Profile 3



- When cool demand is initiated, motor ramps up to 82%.
- 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.
- Once demand is met, motor ramps down to stop.

Delay Profile 4



- When cool demand is initiated, motor ramps up to 50%.
- Motor runs at 50% for 30 seconds and ramps up to 82%.
- 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.
- Once demand is met, motor runs at 50% for 30 seconds.
- Motor ramps down to stop.

Display

An on-board single character LED display (see Figure 19 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.

Single Character Display	Action
Letter or Number	Unit Size Code displayed represents air handler model size and capacity. See Configuring Unit Size Codes in Figure 21.
≡	If three horizontal bars are displayed, control does not recognize air handler model size and capacity. See Configuring Unit Size Codes in Figure 21.
.	Idle mode (decimal point / no unit operation).
ft ³	Cubic feet per minute (cfm) setting for indoor blower (1 second ON, 0.5 second OFF) / cfm setting for current mode displayed. Example: A1200.
ℓ	Cooling stage (1 second ON, 0.5 second OFF) / 1 or 2 displayed / Pause / cfm setting displayed / Pause / Repeat codes. Example: C1 or C2
d	Dehumidification mode (1 second ON / 1 second OFF) / cfm setting displayed / Pause / Repeat codes.
dF	Defrost mode. (Y, W and O call).
H	Heat stage (1 second ON, 0.5 second OFF) / Active electric heat stage displayed / Pause / cfm setting displayed / Pause / Repeat codes. Example: H1 or H2
h	Heat pump stage (1 second ON, 0.5 second OFF) / Active heat pump stage displayed / Pause/ cfm setting / Pause/ Repeat codes. Example: h1 or h2

Table 11. AHC System Status Codes

NOTE — AHC MUST BE IN IDLE MODE)		
Single Character LED Display		Action
Solid	-	Push and hold button until solid appears, release button. Display will blink.
Blinking	-	Push and hold button until required symbol displays. <i>H</i> <i>R</i> or <i>P</i>
CONFIGURING ELECTRIC HEAT SECTIONS		
Solid	<i>H</i>	Release push button - control will cycle the indoor blower motor on to the selected heat speed and stage the electric heat relays on and o to automatically detect number of electric heat sections. Control will store the number of electric heat sections. Control will automatically exit current active mode .
INDOOR BLOWER TEST		
Solid	<i>R</i>	Release push button - control cycles indoor blower on for ten seconds at 70% of maximum air for selected capacity size unit. Control will automatically exit current active mode .
CONFIGURING UNIT SIZE CODES		
Single Character LED Display		Action
Solid	<i>P</i>	RELEASE push button - This mode allows the field to select a unit size code (number or letter) that matches the air handler model size and capacity. IMPORTANT — All field replacement controls may be manually configured to confirm air handler model size and capacity.
Blinking	<i>P</i>	1. When the correct Unit Sized Code is displayed, RELEASE push button. Selected code will ash 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	<i>E</i>	To enter Error Code Recall Mode — PUSH and HOLD button until solid E appears, then RELEASE button. Control will display up to ten error codes stored in memory. If E000 is displayed, there are no stored error codes.
Solid	≡	To exit Error Code Recall Mode — PUSH and HOLD button until solid three horizontal bars appear, then RELEASE button. NOTE - Error codes are not cleared
Solid	<i>c</i>	To clear error codes stored in memory, continue to HOLD push button while the three horizontal bars are displayed. Release push button when solid <i>c</i> is displayed.
Blinking	<i>c</i>	Push and hold for one (1) second, release button. Seven-segment will display 0000 and exit error recall mode.

Table 12. AHC Configuration, Test and Error Recall (Fault and Lockout) Function

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

Table 13. AHC Single Character Display Alert Codes (Communicating and Non-Communicating)

Alert Code	Priority	Alert	How to Clear
E345	Critical	The O relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	O relay failed. Pilot relay contacts did not close or the relay coil did not energize. Replace control. The alarm clears after a reset.
E346	Critical	The R to O jumper was not removed on the air-handler control.	Configuration link(s) not removed on control. Cut / remove R to O jumper. Applicable with non communicating outdoor unit with communicating indoor unit. The fault clears after the R to O jumper is cut/removed.
E347	Critical	The Y1 relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y1 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y1 input sensed.
E348	Critical	The Y2 relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y2 relay failed. Pilot relay contacts did not close or the relay coil did not energize. The indoor unit cannot verify that the relay is closed. The alarm clears after a reset and Y2 input sensed.
E350	Critical	The air-handler's electric heat is not configured.	Heat call with no configured or mis-configured electric heat. Configure electric heat in the air-handler. The fault clears electrical heat is successfully detected.
E351	Critical	There is a problem with the air-handler's first stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize.	Heat section / stage 1 failed. Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The alarm clears after stage 1 relay is detected.
E352	Moderate ¹	There is a problem with the air-handler's second stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 2 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E353	Moderate ¹	There is a problem with the air-handler's third stage electric heat. Either the pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on first stage electric heat until the issue is resolved.	Heat section / stage 3 failed (same as code 351). Pilot relay contacts did not close, or the relay coil in the electric heat section did not energize. The air-handler will operate on stage 1 heat only. The alarm clears after stage 2 relay is detected.
E409	Moderate	The secondary voltage for the air-handler has fallen below 18VAC. If this continues for 10 minutes, the Comfort Sync™ thermostat will turn off the air-handler.	Secondary voltage is below 18V AC. After 10 minutes, operation is discontinued. Check the indoor line voltage, transformer output voltage. The alarm clears after the voltage is higher than 20VAC for 2 seconds or after a power reset.

Table 13. AHC Single Character Display Alert Codes (Communicating and Non-Communicating)

Target CFM Tables

BCE7S24M Blower Performance

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

"Adjust" 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
+	465	690	900	1050	465	690	900	1050
NORM	425	620	825	950	425	620	825	950
-	385	560	735	850	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.
- Zone Control applications - minimum blower speed of 250 cfm.

BCE7S30M Blower Performance

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

"Adjust" 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
+	660	880	1100	1320	660	880	1100	1320
NORM	600	800	1000	1200	600	800	1000	1200
-	540	720	900	1080	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.
- Zone Control applications - minimum blower speed of 250 cfm.

BCE7S36M Blower Performance

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

"Adjust" 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
+	900	1225	1380	1545	900	1225	1380	1545
NORM	810	1125	1275	1400	810	1125	1275	1400
-	730	1000	1135	1265	730	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 250 cfm.
- Zone Control applications - minimum blower speed of 250 cfm.

BCE7S42M Blower Performance**0 through 0.80 in. w.g. External Static Pressure Range**

"Adjust" 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 250 cfm.
- Zone Control applications - minimum blower speed of 250 cfm.

BCE7S48M Blower Performance**0 through 0.80 in. w.g. External Static Pressure Range**

"Adjust" 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
+	1625	1820	2055	2145	1625	1820	2055	2145
NORM	1425	1625	1805	2005	1425	1625	1805	2005
-	1205	1375	1555	1725	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 250 cfm.
- Zone Control applications - minimum blower speed of 250 cfm.

BCE7S60M Blower Performance**0 through 0.80 in. w.g. External Static Pressure Range**

"Adjust" 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
+	1640	1840	2075	2150	1640	1840	2075	2150
NORM	1465	1625	1800	2000	1465	1625	1800	2000
-	1250	1390	1560	1720	1250	1390	1560	1720

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.
- Zone Control applications - minimum blower speed of 250 cfm.

Unit Operating Sequences

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

NOTE: For communicating systems, see the Comfort Sync thermostat installation instruction.

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%	Thermostat energizes Y1 and de-energizes D on a dehumidification demand. NOTE - No over cooling.
Dehumidification demand	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 setpoint.
Dehumidification demand	2	On		On	On			Demand	0 VAC	High	70%	
Dehumidification demand ONLY	1	On		On	On			Demand	0 VAC	High	70%	Thermostat will keep outdoor unit energized after cooling temperature has been reached in order to maintain room humidity setpoint. NOTE - Allow to cool 2°F beyond cooling setpoint.

Table 14. BCE7S with Non-Communicating 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 - 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%	Thermostat energizes Y2 and de-energizes D on a dehumidification demand. NOTE - No over cooling.	
Dehumidification demand	2	On	On	On	On			Demand	0 VAC	High	100%		
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 setpoint.	
Dehumidification demand	2	On	On	On	On			Demand	0 VAC	High	70%		
Dehumidification demand ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	Thermostat will keep outdoor unit energized after cooling temperature has been reached in order to maintain room humidity setpoint. NOTE - Allow to cool 2°F beyond cooling setpoint.	
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%	Thermostat energizes Y2 and de-energizes D on a dehumidification demand. NOTE - No over cooling.	
Dehumidification demand	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 setpoint.	
Dehumidification demand	2	On	On	On	On			Demand	0 VAC	High	70%		
Dehumidification demand ONLY	1	On	On	On	On			Demand	0 VAC	High	70%	Thermostat will keep outdoor unit energized after cooling temperature has been reached in order to maintain room humidity setpoint. NOTE - Allow to cool 2°F beyond cooling setpoint.	

Table 15. BCE7S with Non-Communicating Thermostat and Two-Stage Outdoor Unit Operating Sequence

Configuring Unit

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

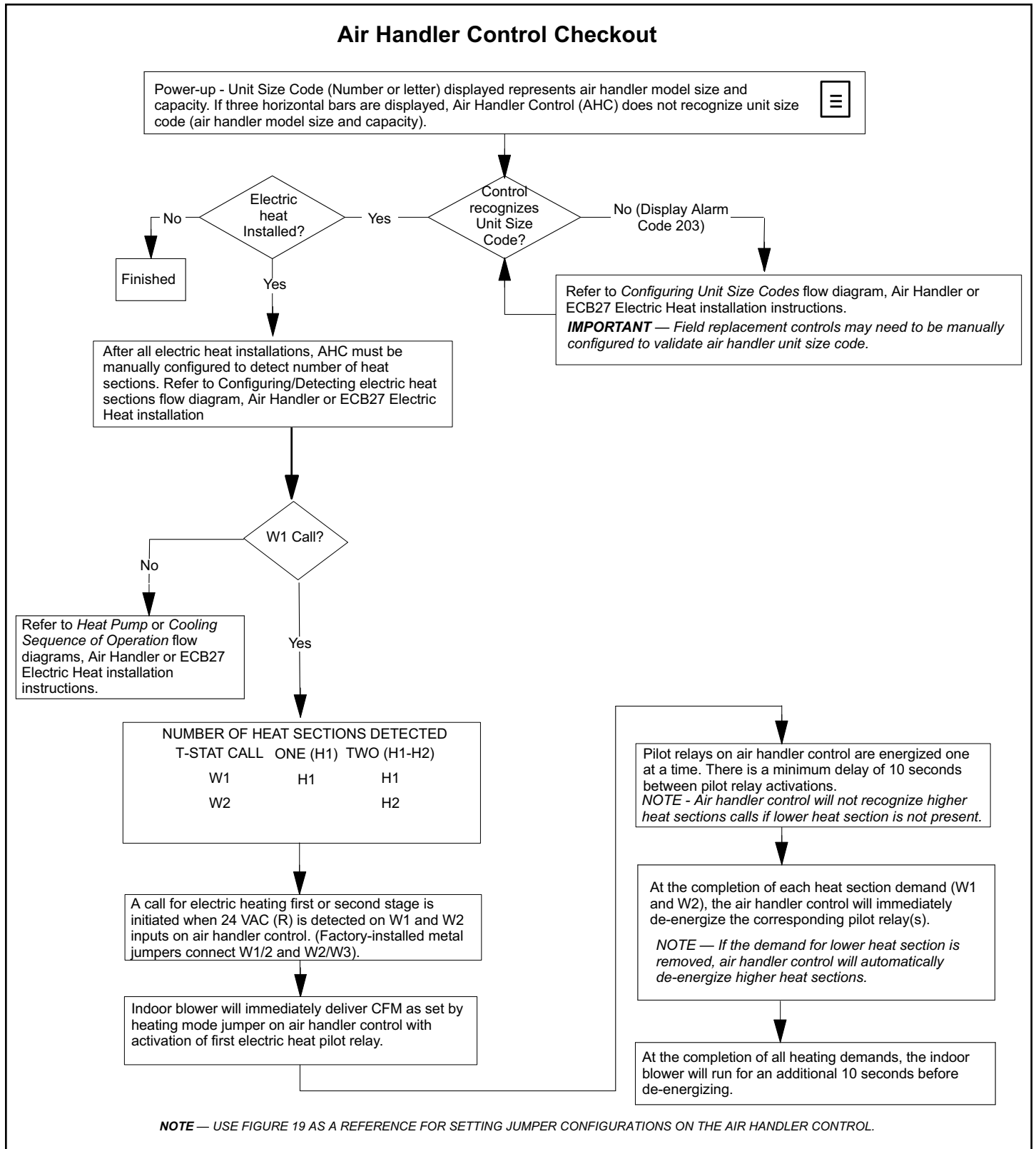


Figure 20. Air Handler Control Checkout

Configuring Unit Size Codes (Model Number)

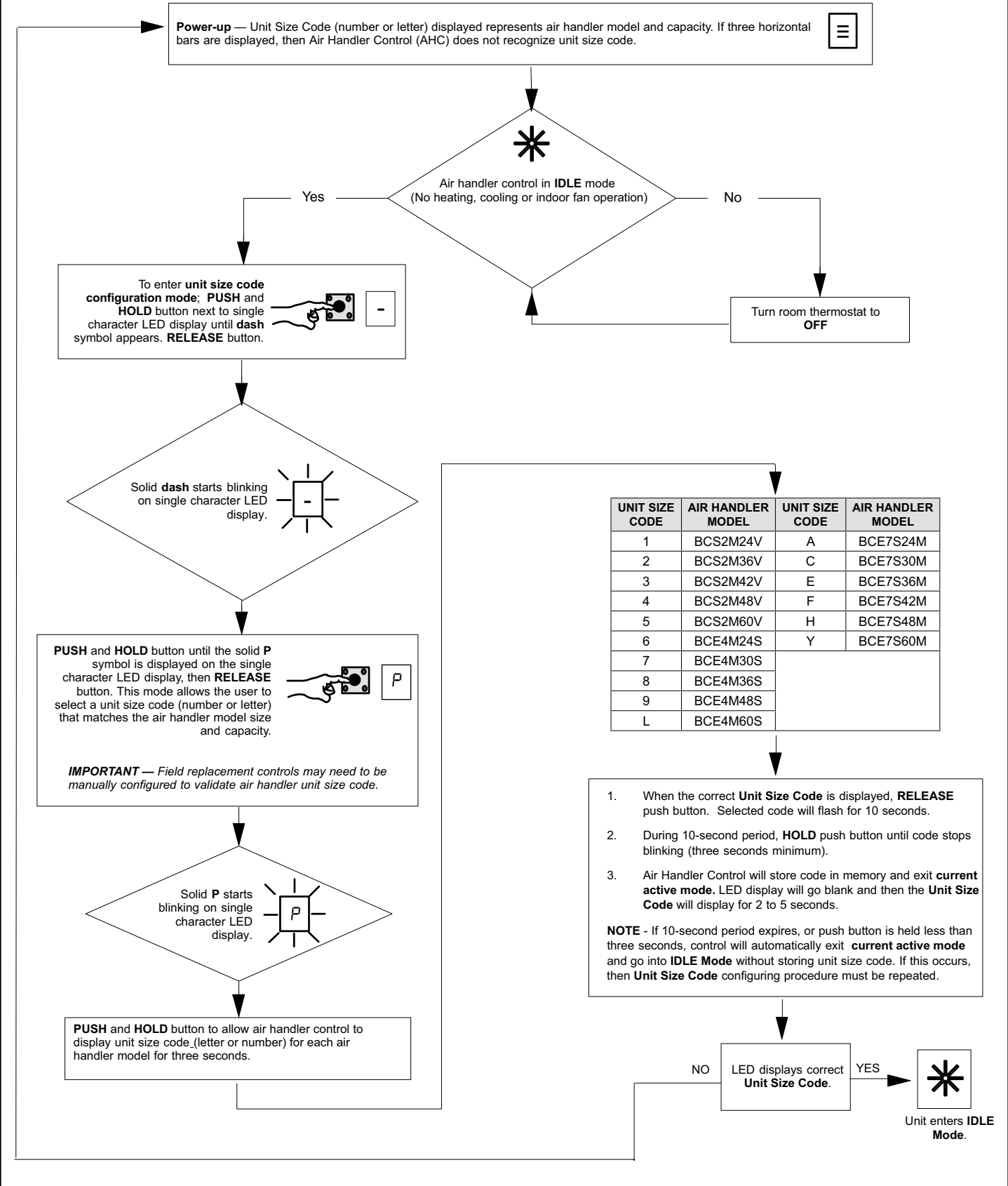


Figure 21. Configure Unit Size Codes

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 air handler controls must be configured to detect electric heat sections.

NOTE - USE FIGURE 19 AS A REFERENCE FOR SETTING JUMPER CONFIGURATIONS ON THE AIR HANDLER CONTROL.

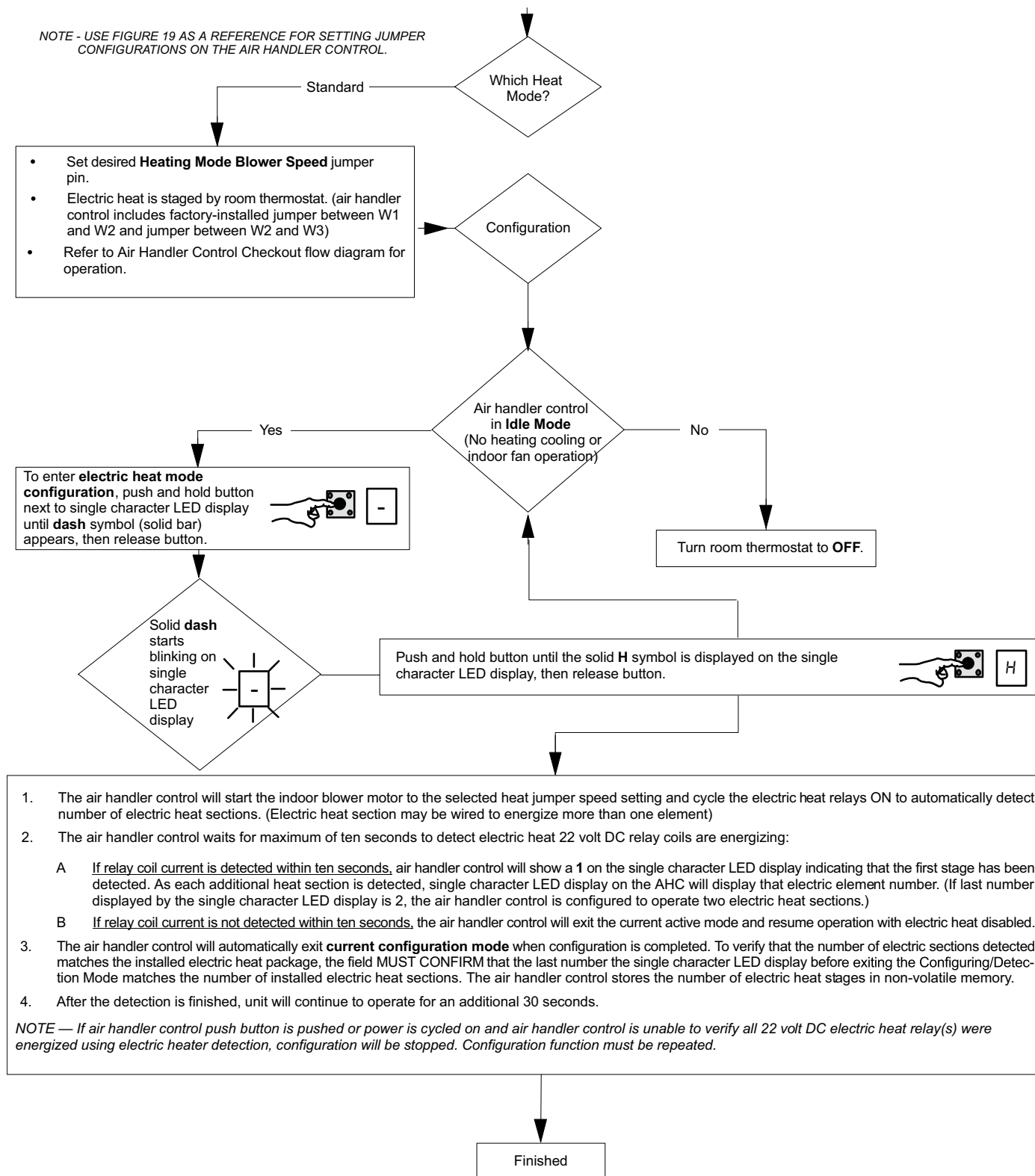


Figure 22. Heat Mode Selection

Heat Pump Operation (Heating and Cooling)

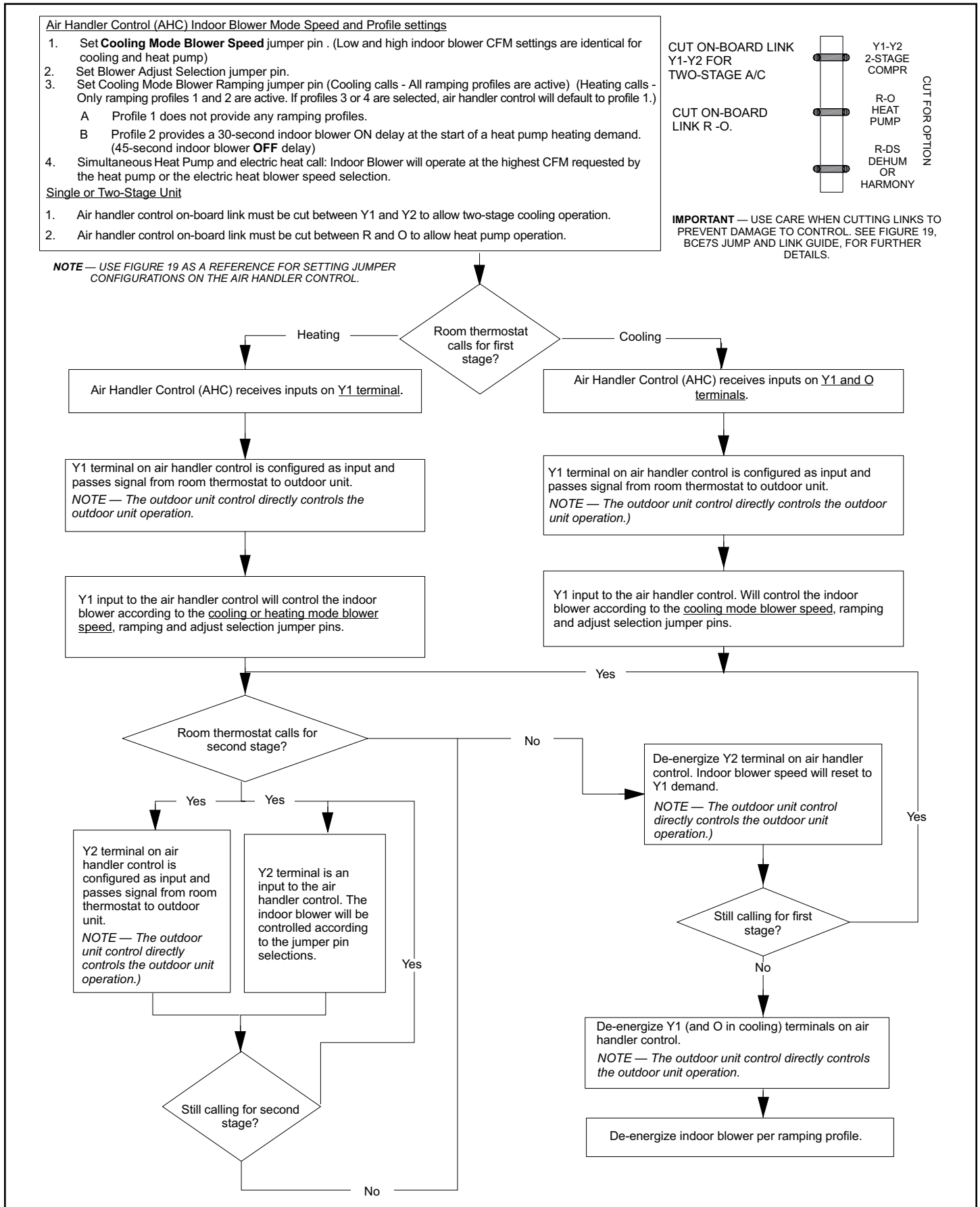


Figure 23.

Cooling Operation

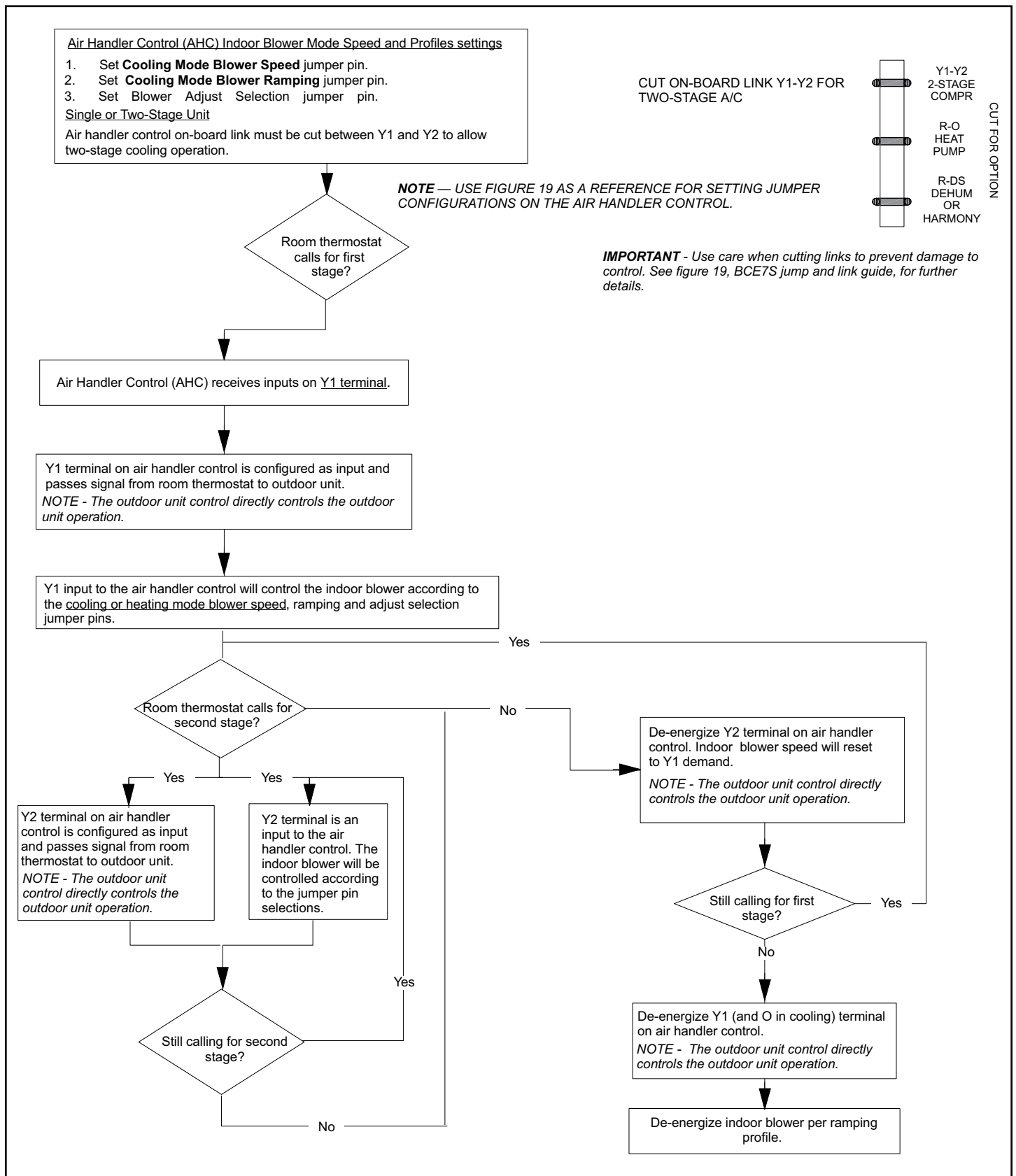


Figure 24.

Error Code / Recall Mode

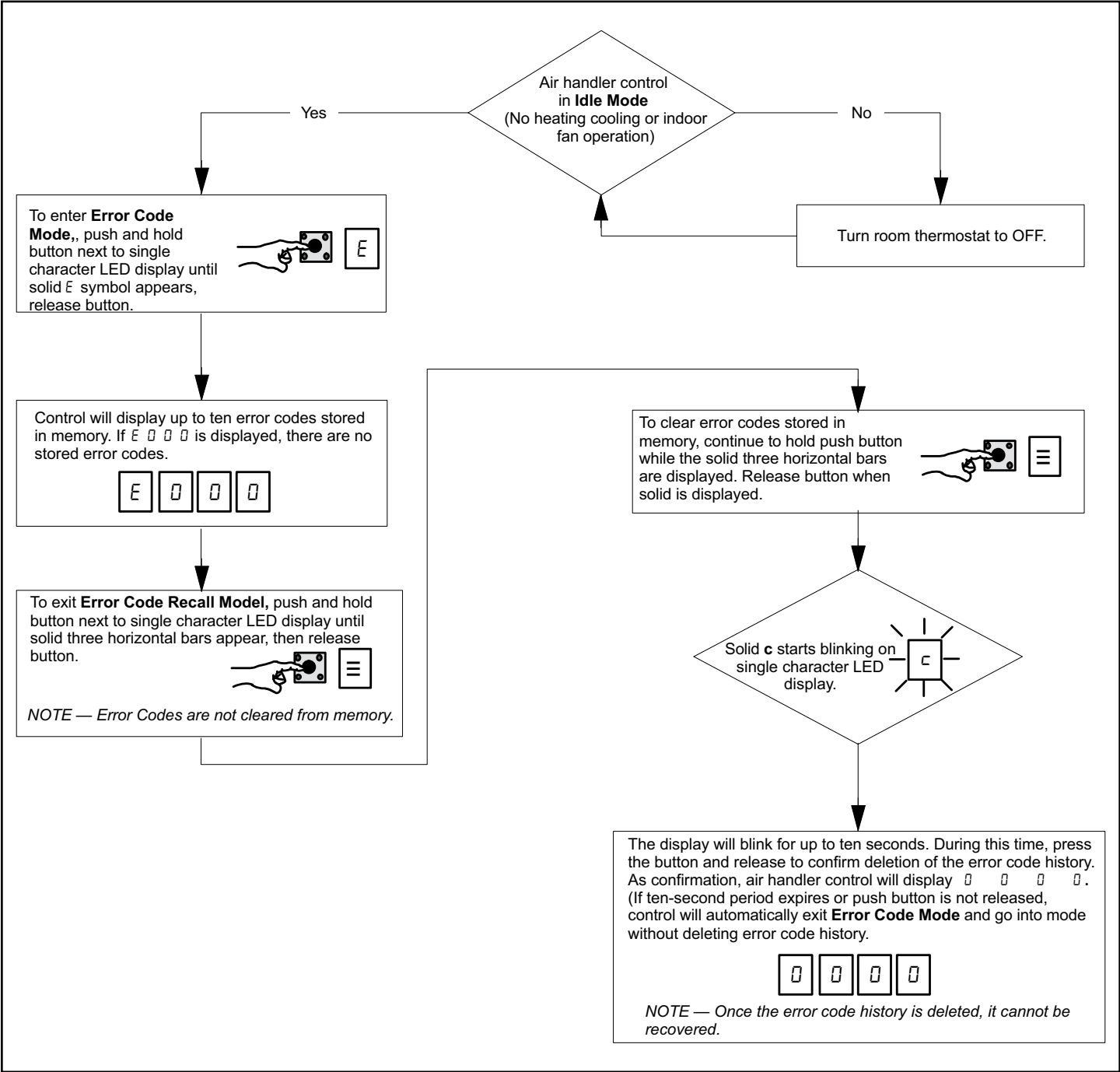


Figure 25.

Indoor Blower Test

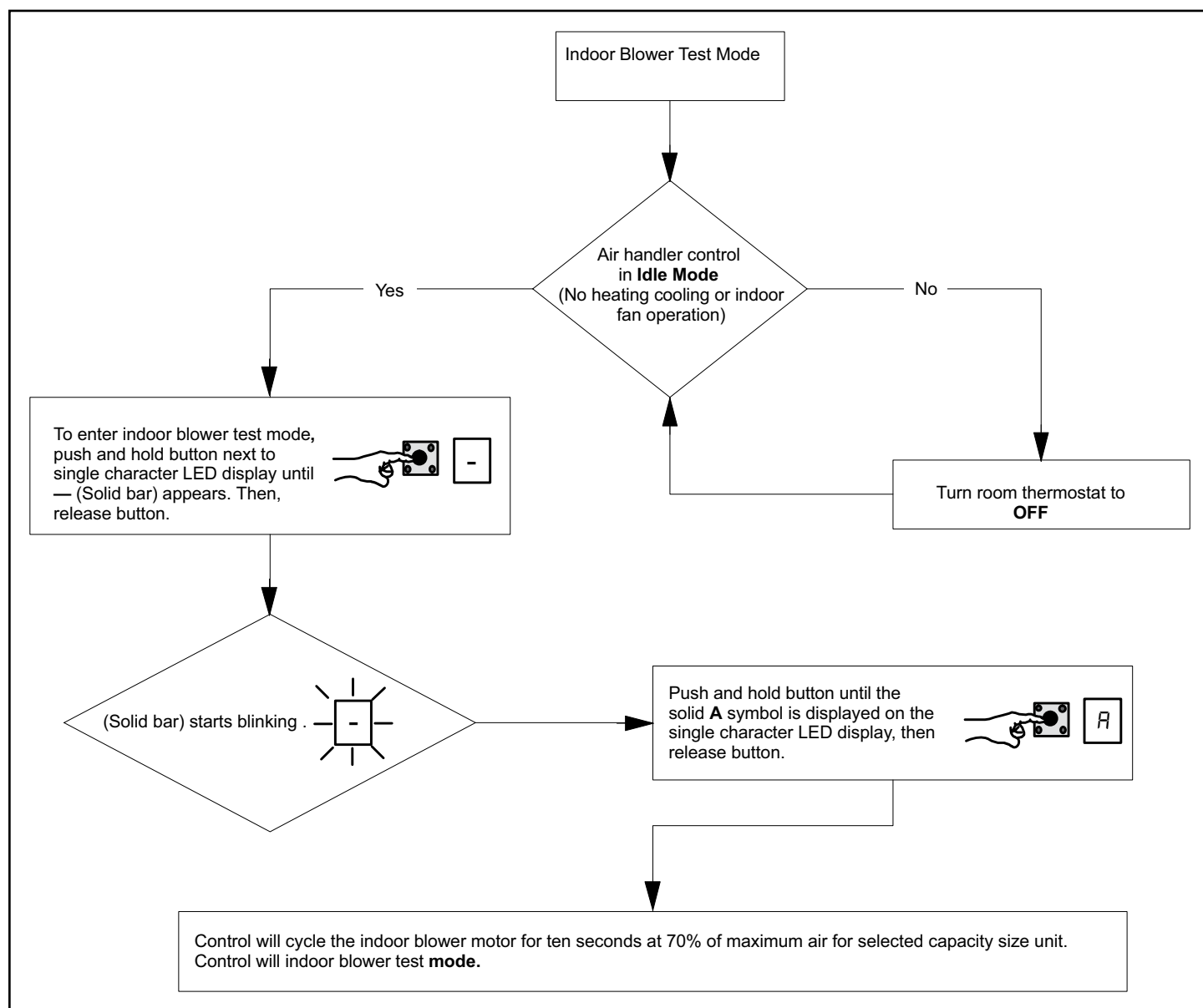


Figure 26.

Operation

Cooling (Cooling Only or Heat Pump)

When the thermostat calls for cooling, 24 volts 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 timed 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 fall, the circuit between R and W1 is completed by the second-stage heat room thermostat. Circuit R-W1 energizes a heat sequencer. The completed circuit energizes supplemental electric heat (if applicable). If the unit includes a second heat sequencer, it can be connected with the first sequencer to W1 on the thermostat. The second heat sequencer may also be connected to second-stage heating (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 demand will be satisfied by the electric heat (if applicable). A jumper should be placed between W2 and E on the thermostat subbase so that the electric heat control will transfer to the first-stage heat on the thermostat. This will allow the indoor blower to cycle on and off with the electric heat when the fan switch is in the AUTO position.

Repairing or Replacing Cabinet Insulation

IMPORTANT

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

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

Repairing Damaged Insulation

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

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

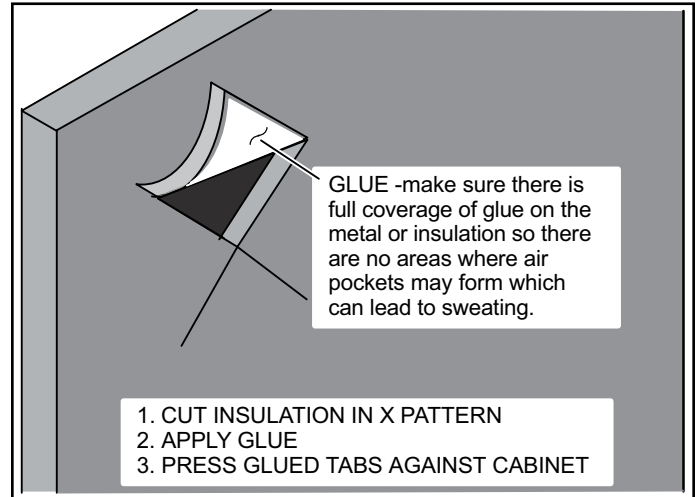


Figure 27. Repairing Insulation

WARNING

Electric Shock Hazard.

Can cause injury or death.

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

Homeowner Maintenance

IMPORTANT

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

- Inspect air filters at least once a month and replace or clean as required. Dirty filters are the most common cause of inadequate heating or cooling performance.

- Replace disposable filters. Cleanable filters can be cleaned by soaking in mild detergent and rinsing with cold water.
- Install new/clean filters with the arrows on the side pointing in the direction of airflow. Do not replace a cleanable (high velocity) filter with a disposable (low velocity) filter unless return air system is properly sized for it.
- If water is dripping from the secondary drain line, a problem exists which should be investigated and corrected. Contact a licensed professional service technician.

Professional Maintenance

NOTE

Failure to follow instructions will cause damage to the unit.

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

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

Checkout Procedures

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

Pre-Startup 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 expansion valve properly sized for the outdoor unit being used?
- Have all unused parts and packaging been disposed of?
- Is the filter clean, in place, and of adequate size?
- Is the wiring neat, correctly connected, 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

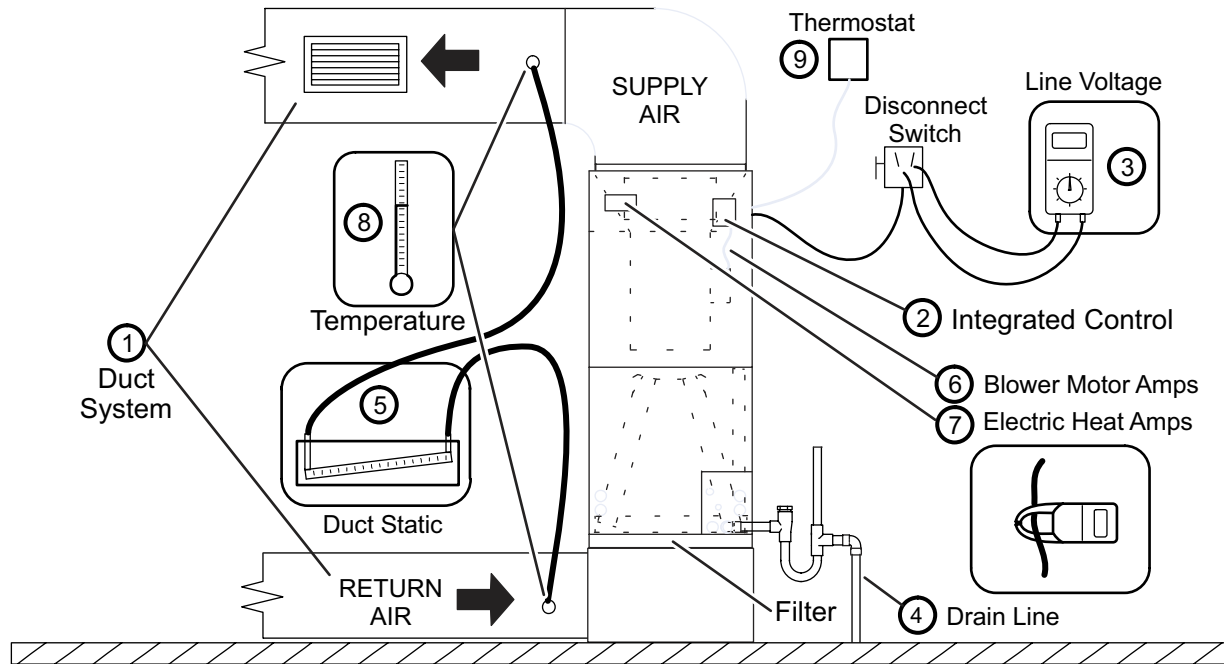
- Set thermostat to force a demand for cooling (approximately 5°F lower than the indoor ambient temperature).
- The outdoor unit should come on immediately and the indoor blower should start between 30 - 60 seconds later.
- Check the airflow from a register to confirm that the system is moving cooled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

Check Electric Heater (If Used)

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

Installing Contractor's Name _____
 Installing Contractor's Phone _____
 Job Address _____

Installing Date _____
 Air Handler Model # _____



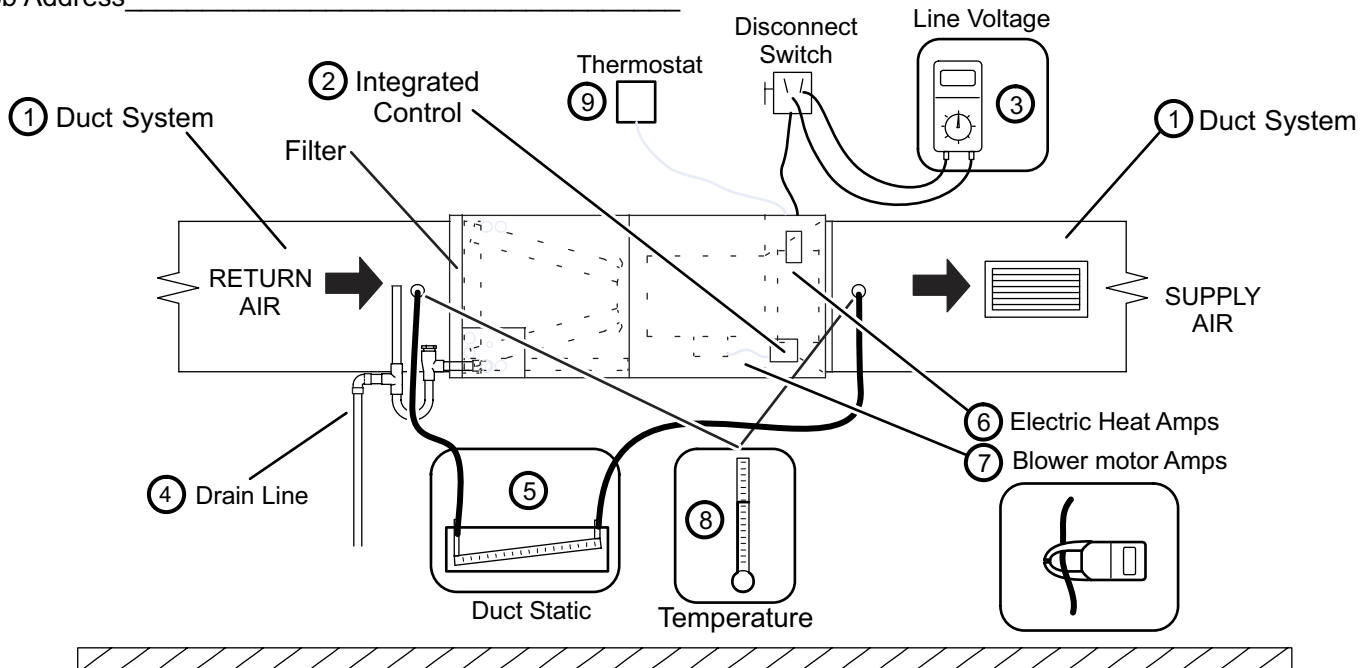
- ① DUCT SYSTEM
- SUPPLY AIR DUCT
- ☐ Sealed
 - ☐ Insulated (if necessary)
 - ☐ Registers Open and Unobstructed
- RETURN AIR DUCT
- ☐ Sealed
 - ☐ Filter Installed and Clean
 - ☐ Registers Open and Unobstructed
- ② INTEGRATED CONTROL
- ☐ Jumpers Configured Correctly (if applicable)
 - ☐ Appropriate Links in Place (if applicable)
- ③ VOLTAGE CHECK
- ☐ Supply Voltage _____
 - ☐ Low Voltage _____
 - ☐ Electrical Connections Tight
- ④ DRAIN LINE
- ☐ Leak Free
- ☐ Explained Operation of System to Homeowner

- 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

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

Figure 28. Start-Up and Performance Checklist (Upflow Configuration)

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



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

☐ Explained Operation of System to Homeowner

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

Figure 29. Start-Up and Performance Checklist (Horizontal Configuration)