LENNOX Service Literature®

INSTALLATION AND SERVICE PROCEDURE

Corp. 1241-L9
December 2012
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CBX25UH

CBX25UH Series

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⚠WARNING

The State of California has determined that this product may contain or produce a chemical or chemicals, in very low doses, which may cause serious illness or death. It may also cause cancer, birth defects, or reproductive harm.

⚠ WARNING

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

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

⚠ CAUTION

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

⚠ IMPORTANT

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.

The CBX25UH are high-efficiency air handler. Several models are available in sizes ranging from 1-1/2 through 5-tons. The CBX25UH is designed for HFC-410A refrigerant.

CBX25UH series units are designed to be matched with either a13 SEER air conditioner or heat pump, but can be matched with other air conditioners or heat pumps as noted in the rating information. See Product Specification bulletin.

This air handler is designed for indoor installation only. As shipped, the unit is ready for installation in either upflow or horizontal left-hand. Field modifications are required for right-hand air discharge applications. Electric heat, down flow air discharge application kits, air filters and other various accessories are available and listed in the *CBX25UH Product Specification bulletin* for ordering.

All units come with a factory installed check/expansion valve.

Information contained in this manual is intended for use by experienced licensed HVAC service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes.

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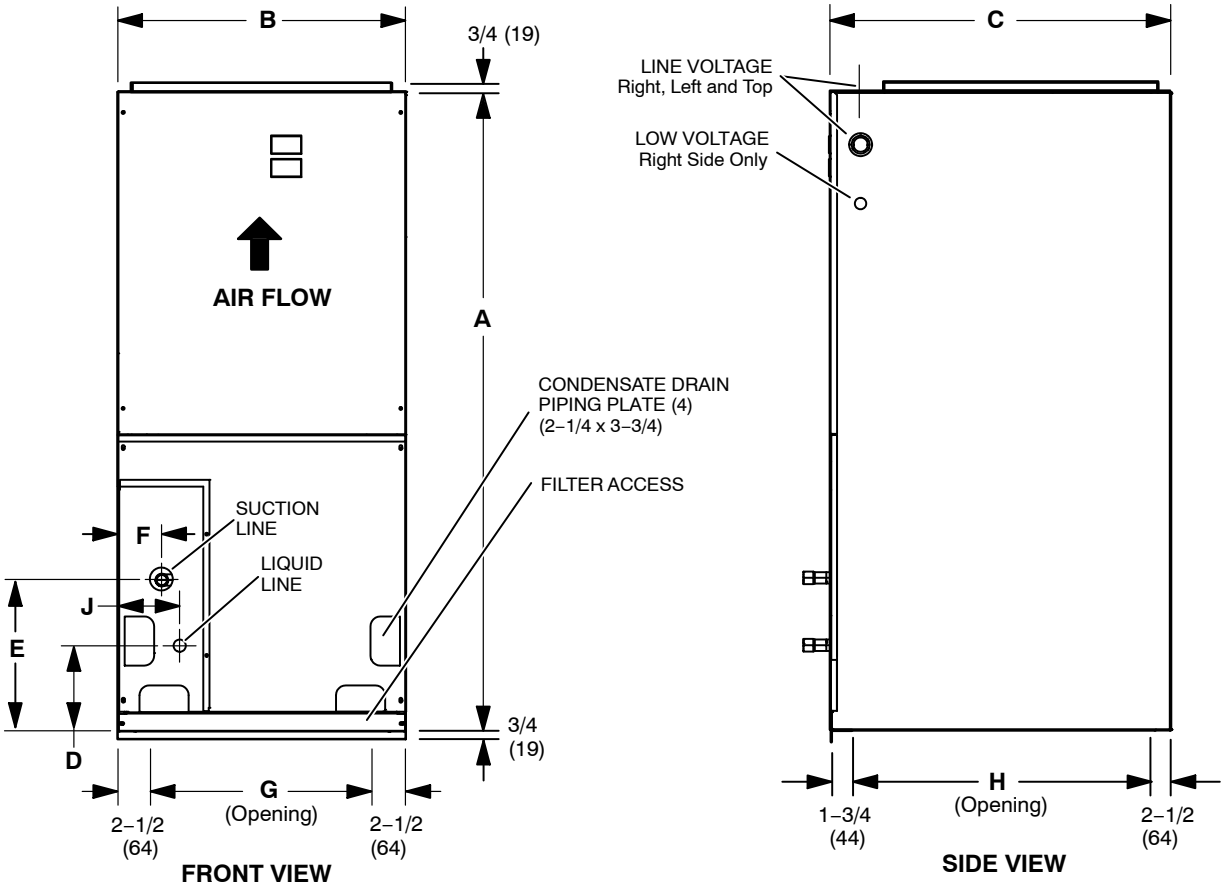
Specification and Electrical Data Unit Dimensions - inches (mm)



Dimension		–018		–024		–030		–036		–042		–048 / –060	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A		38	965	40–1/2	1029	43	1092	48	1219	48	1219	52–1/2	1334
B		15	381	18–1/2	470	18–1/2	470	21–7/8	556	21–7/8	556	21–7/8	556
C		22	559	22	559	22	559	22	559	26	660	26	660
D		6	152	6	152	6	152	12–1/4	311	6–1/4	159	6–3/8	162
E		11	279	14	357	16	406	18–7/8	479	17–7/8	454	15–1/4	387
F		3–5/8	92	5–1/2	140	5–1/2	140	5–3/4	146	3–1/4	83	3–1/4	83
G		10	254	13–1/2	343	13–1/2	343	16–7/8	429	16–7/8	429	16–7/8	429
H		17–3/4	451	17–3/4	451	17–3/4	451	17–3/4	451	21–3/4	552	21–3/4	552
J		3–5/8	92	5–1/2	140	5–1/2	140	5–3/4	146	4–5/8	117	6–3/8	162
Supply Air Opening	Depth	17	432	17	432	17	432	17	432	21	533	21	533
	Width	13	330	16–1/2	419	16–1/2	419	19–7/8	505	19–7/8	505	19–7/8	505
Return Air Opening	Depth	20–3/4	527	20–3/4	527	20–3/4	527	20–3/4	527	24–3/4	629	24–3/4	629
	Width	12–1/2	318	16	406	16	406	19–3/8	492	19–3/8	492	19–3/8	492

Specification and Electrical Data

SPECIFICATION					
General Data	**Model Number**	**CBX25UH-018**	**CBX25UH-024**	**CBX25UH-030**	**CBX25UH-036**
	Nominal tonnage	1.5	2	2.5	3
Connections	**Suction/Vapor line (o.d.) - in. sweat**	3/4	3/4	3/4	7/8
	Liquid line (o.d.) - in. sweat	3/8	3/8	3/8	3/8
	Condensate - in. fpt	(2) 3/4	(2) 3/4	(2) 3/4	(2) 3/4
Indoor Coil	**Net face area - ft.^{2}**	3.11	3.56	4.00	4.89
	Tube outside diameter - in.	3/8	3/8	3/8	3/8
	Number of rows	3	3	3	3
	Fins per inch	14	14	14	14
Blower	**Wheel nominal diameter x width - in.**	9 x 6	9 x 6	10 x 8	9 x 10
	Blower motor output - hp	1/5	1/3	1/3	1/2
[1] Filters	**Size of filter - in.**	12 x 20 x 1	15 x 20 x 1	15 x 20 x 1	18 x 20 x 1
Shipping Data -1 package - lbs.		105	123	126	161
ELECTRICAL DATA					
	Voltage - 1 phase (60 hz)	208/240V	208/240V	208/240V	208/240V
	[2] Maximum over-current protection (unit only)	15	15	15	15
	[3] Minimum circuit ampacity (unit only)	1.4	2.0	2.4	2.9
	Blower Motor Full Load Amps	1.1	1.6	1.9	2.3

SPECIFICATIONS				
General Data	**Model Number**	**CBX25UH-042**	**CBX25UH-048**	**CBX25UH-060**
	Nominal tonnage	3.5	4	5
Connections	**Suction/Vapor line (o.d.) - in. sweat**	7/8	7/8	7/8
	Liquid line (o.d.) - in. sweat	3/8	3/8	3/8
	Condensate - in. fpt	(2) 3/4	(2) 3/4	(2) 3/4
Indoor Coil	**Net face area - ft.^{2}**	5.83	7.00	7.00
	Tube outside diameter - in.	3/8	3/8	3/8
	Number of rows	3	3	3
	Fins per inch	14	14	14
Blower	**Wheel nominal diameter x width - in.**	12 x 8	11 x 9	12 x 9
	Blower motor output - hp	1/3	1/2	1/2
[1] Filters	**Size of filter - in.**	18 x 24 x 1	18 x 24 x 1	18 x 24 x 1
Shipping Data -1 package - lbs.		163	186	186
	Voltage - 1 phase (60 hz)	208/240V	208/240V	208/240V
	[2] Maximum overcurrent protection (unit only)	15	15	15
	[3] Minimum circuit ampacity (unit only)	2.4	4.9	4.9
	Blower Motor Full Load Amps	1.9	3.9	3.9

[1] Disposable filter.
[2] HACR type circuit breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F.

Model Number Identification

CB X 25 UH – 030 – 230 – 1

- **Unit Type**: CB - Air Handler
- **Refrigerant Type**: X = HFC-410A
- **Series**: 25
- **Configuration**: UH = Up-Flow / Horizontal
- **Nominal Cooling Capacity**: 030
  - 018 = 1.5 tons
  - 024 = 2 tons
  - 030 = 2.5 tons
  - 036 = 3 tons
  - 042 = 3.5 tons
  - 048 = 4 tons
  - 060 = 5 tons
- **Voltage**: 230 = 208/230V-1 phase-60hz
- **Minor Revision Number**: 1

Blower Data

The cooling blower speed is factory configured to provide correct airflow for an outdoor unit that matches the cooling capacity rating of the air handler.

CHANGE BLOWER SPEED

If the outdoor unit is smaller than the maximum cooling capacity rating for the air handler, the cooling blower speed may need to be changed. Refer to blower performance chart, table 1 on page 5. Use figure 1 on page 4 as a illustrated guide to the following procedure:

1. Disconnect all power supplies.
2. Remove the air handler access panel.
3. A blower relay harness is used to connect blower relay terminals **2** and **5**. The third connector is mated to the **BLUE (MED)** wire.
4. Disconnect the **BLUE (MED)** wire connection.
5. Determine the required blower speed and connect either the blower lead **RED (LO)** or **BLACK (HI)** to the blower relay harness.

NOTE — Reuse the factory-installed plastic cap on the connector that is not used.

6. Replace all panels.
7. Reconnect power.

⚠ CAUTION

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

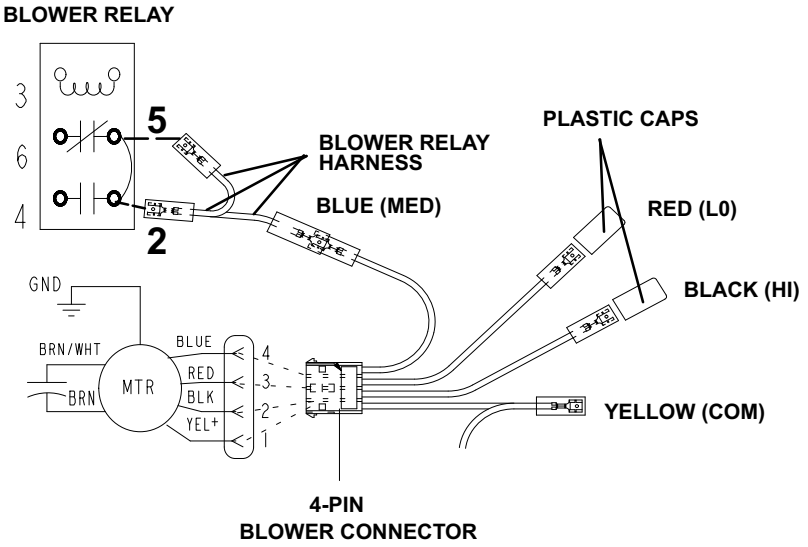


Figure 1. Changing Blower Speed

NOTE — Refer to wiring diagram located on the unit access panel (or figure 1 above) and blower performance (table 1).

- All air data measured external to unit with 1 inch non-pleated air filter in place.
- All factory settings are medium speed except the -48 which is set to low speed from the factory.
- All data given while air handler is operating with a dry DX coil.

Table 1. Specification and Electrical Data Blower Performance (3-Speed PSC) - 240V (CFM @ ESP. - in. W. C.)

Air Handler Model	Blower Speed	.10" WC	.20" WC	.30" WC	.40" WC	.50" WC
18	Low (Red) Med (Blue) High (Black)	510 670 905	495 650 865	475 630 820	420 595 770	325 505 705
24	Low (Red) Med (Blue) High (Black)	630 885 1130	625 875 1100	615 850 1070	610 820 1010	580 780 950
30	Low (Red) Med (Blue) High (Black)	900 1075 1240	865 1060 1210	830 1030 1170	780 985 1135	740 940 1085
36	Low (Red) Med (Blue) High (Black)	1160 1500 1660	1140 1445 1575	1115 1385 1495	1085 1300 1405	990 1200 1390
42	Low (Red) Med (Blue) High (Black)	1325 1490 1820	1315 1465 1770	1300 1440 1690	1275 1395 1600	1225 1315 1500
48	Low (Red) Med (Blue) High (Black)	1775 1995 2070	1710 1895 1970	1645 1800 1850	1565 1685 1719	1470 1560 1595
60	Low (Red) Med (Blue) High (Black)	1675 1965 2140	1630 1925 2085	1580 1875 2000	1520 1800 1895	1450 1695 1795

NOTE — Refer to wiring diagram located on the unit access panel and blower performance (table 1).

- All air data measured external to unit with 1 inch non-pleated air filter in place.
- All factory settings are medium speed except the -48 which is set to low speed from the factory.
- All data given while air handler is operating with a dry DX coil.
- Blower Performance (CFM vs. ESP inches H2O)
- Cooling speeds should not be reduced below factory setting.
- Units with electric heat approved at 0.5" maximum and medium blower speed minimum.

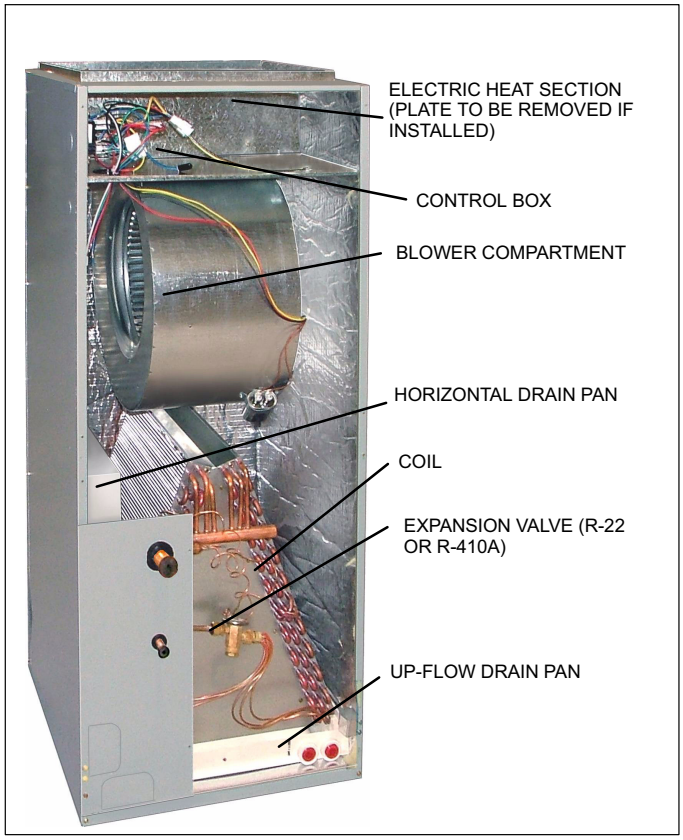


Figure 2. Unit Parts Arrangement

Application

All major blower coil components must be matched according to Lennox recommendations for the unit to be covered under warranty. Refer to the Product Specification bulletin for approved system matchups. A misapplied system will cause erratic operation and can result in early unit failure. The units come with factory installed check and expansion valve for all applications. The TXV valve has been installed internally for a cleaner installation and is accessible if required.

Unit Components

CONTROL BOX

The CBX25UH control box is located above the blower section shown in figure 2. Line voltage and electric heat connections are made in the control box. Optional electric heat fits through an opening located in the center of the control box. When electric heat is not used, cover plates cover the opening. The electric heat control arrangement is detailed in the electric heat section of this manual.

TRANSFORMER

All CBX25UH series units use a single line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to the control circuits in the indoor and outdoor unit. Transformers are rated at 40VA. 208/240VAC single phase transformers use two primary voltage taps as shown in figure 3.

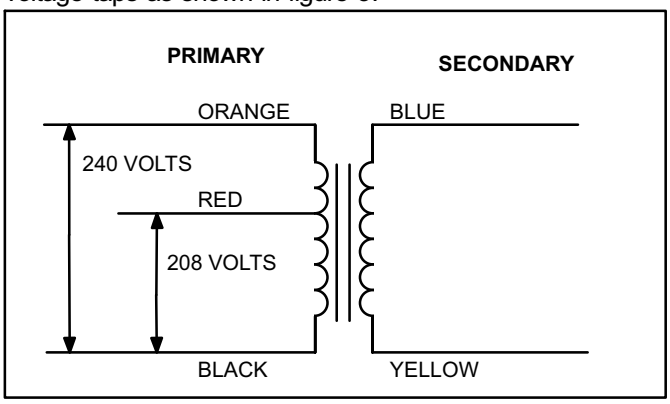


Figure 3. 208/240 Volt Transformer

BLOWER RELAY

All CBX25UH units use a double-pole single-throw (DPST) switch relay to energize the blower motor. The relay coil is energized by blower demand from indoor thermostat. When the coil is energized, a set of normally open (N.O.) contacts closes to energize the blower motor on cooling speed. When de-energized, a set of normally closed (N.C.) contacts allows the electric heat relay to energize the blower on heating speed (refer to unit wiring diagram).

TIME DELAY RELAY

Blower time delay operation:

1. When cooling demand is initiated, there is a 1 second motor-on delay.
2. After the motor-on delay expires, motor ramps up to 100% and runs at 100% until cooling demand is satisfied.
3. Once demand is met, motor runs at 100% for 45 seconds.
4. Motor ramps down to stop.

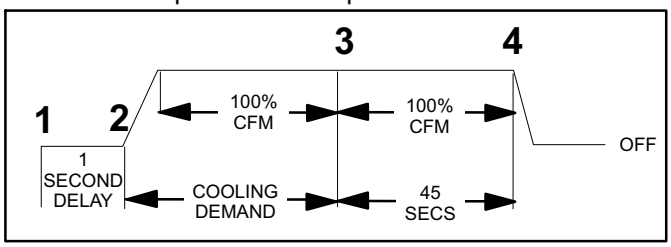


Figure 4. Blower Time Delay

BLOWER MOTOR (B3)

CBX25UH units use single-phase direct drive blower motors with a run capacitor. Figure 5 shows the parts arrangement. All motors have three speed taps. Typically, the high speed tap is energized during normal operation.

All units are factory wired for heat pump and cooling applications with or without electric heat. The unit wiring diagrams will provide factory set blower speeds.

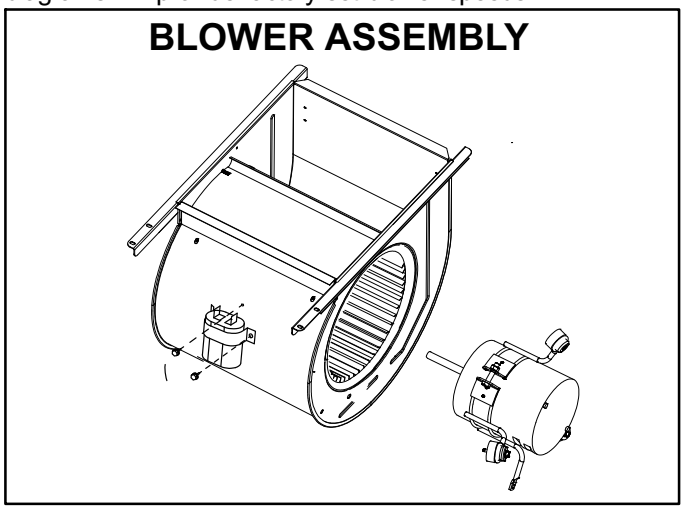


Figure 5. Blower Assembly

BLOWER MOTOR CAPACITOR

All CBX25UH series units use single-phase direct drive motors with a run capacitor. The run capacitor is mounted on the blower housing. See figure 5. Capacitor ratings are shown on side of capacitor and indoor blower motor nameplate.

COIL

CBX25UH units have dual slab coils arranged in an **A** configuration. Each coil has two or three rows of copper tubes fitted with ripple-edged aluminum fins. An expansion valve, feeds multiple parallel circuits through the coils. The coil is designed to easily slide out of the unit cabinet.

PLASTIC DRAIN PANS

Drain pans are provided and installed on the CBX25UH, The drain pans are made from fiberglass filled plastic.

Optional ECB25 Electric Heat

The electric heat sections provide field installed electric heat for air handler units.

Table 2 shows the available heat sections. Refer to the Product Specifications for heat section applications.

Table 2. Electric Heat Sections

Termination Type	Part Number	Catalog Number
2.5kW with stripped wires	0668142-10	89W42
5 kW with terminal block	0668142-02	89W43
5 kW with breaker	0668142-03	89W44
7.5 kW with breaker	0668142-04	89W45
7.5 kW with terminal block	0668142-05	89W46
10 kW with terminal block	0668142-06	89W47
10 kW with breaker	0668142-07	89W48
12.5 kW with breaker	0668142-11	89W49
15 kW with breaker	0668142-08	89W50
20 kW with breaker	0668142-09	89W51

HEAT SECTION INSTALLATION

Be sure to disconnect all power to the unit while you install and service this equipment. Use proper tools and protective equipment during installation and service.

Before installing the unit, check information on the unit rating plate to ensure that the unit meets the job specification, proper electrical power is available, and that proper duct clearances are maintained.

⚠ CAUTION

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

⚠ WARNING

Before installing or servicing unit, be sure ALL power to the unit is OFF. More than one disconnect switch may be present. *Electrical shock can cause personal injury or death!*

NOTE - If installing heat sections at the same time as the air handler unit, install the electric heat section in the air handler unit before setting the air handler unit and attaching the plenum.

1. Shut off all power to the air handler unit. More than one disconnect may be required.
2. Remove air handler access panel and keep the 6 screws to reattach access panel after installing heat elements.
3. Disconnect any existing field supply wires and pull them out of the air handler. Disconnect and remove wiring harness and fastener (see figure 6). If not removed, these items will prevent the heat section's base from resting properly in the compartment.
4. Remove the no-heat seal plate in the air handler frame. See figure 6.

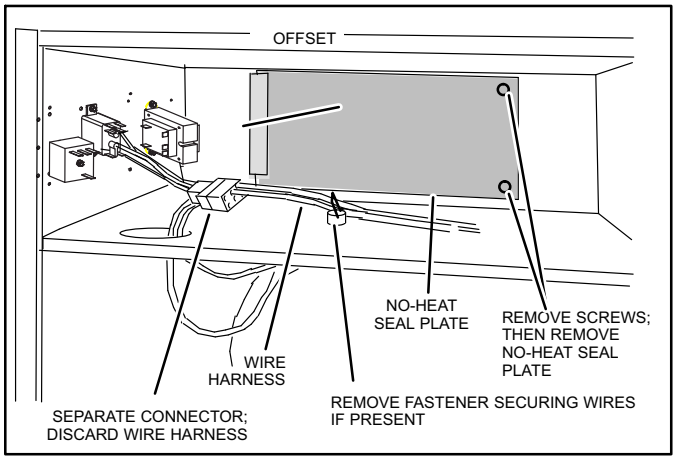


Figure 6. Prepare to Install Heat Element

5. Slide the electric heat section into the air handler. Be careful that the heating elements do not rub against the sheet metal opening when they slide into the air handler. The side opposite the side with the mounting holes should slip behind the offset. The mounting holes should then line up with holes in the air handler control box.
6. Secure the electric heater assembly into place with the screws that were removed from the heat element panel. Install two field-provided #8 SDST screws in the front of the electric heater assembly (see figure 7).

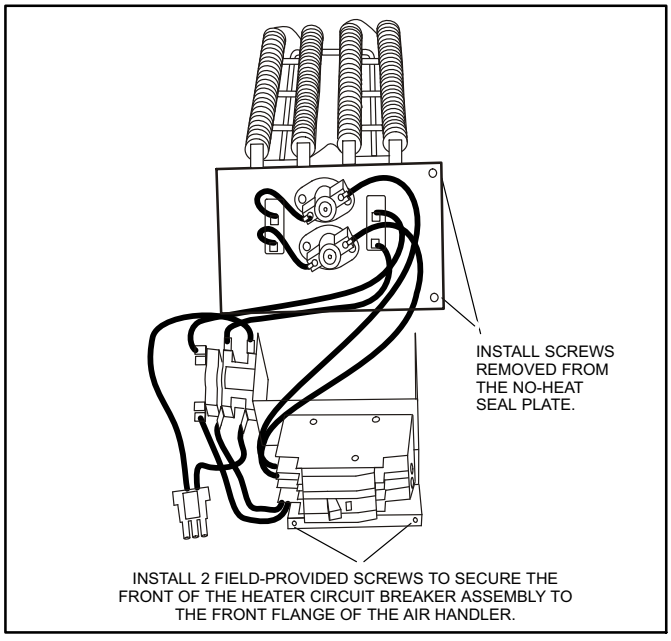


Figure 7. Installing the Heat Element Assembly

7. The air handler access panels have knockouts over the circuit breaker opening. Knock out both plates to accommodate the circuit breaker levers. If installing a heat element assembly with circuit breakers, remove the knockouts but do not install the access panel until all electrical connections have been completed.

⚠ WARNING

Foil face insulation must be cut to eliminate the possibility for any frayed foil to coming in contact with any main or low voltage connections. Insulation must be kept a minimum of 1/2" away from any electrical connection.

CHANGING CIRCUIT BREAKER ORIENTATION

The air handler comes from the factory setup for horizontal left-hand discharge which will require no change in the circuit breaker orientation. However, if the air handler is installed in a horizontal right-hand discharge position, the breaker will need to be rotated 180º so that the **UP** position of the breaker is the **ON** position. The circuit breaker orientation change is required by UL 1995, Article 26.18 (25 September 2005).

1. The factory default configuration for the two circuit breakers is horizontal left-hand discharge which will require no change (see figure 9). To change the applicable circuit breakers orientation for right-hand discharge, proceed to step 2.
2. Locate the one clip which is located on the right side (see arrow) of each breaker (see figure 8). The clip secures the circuit breaker to the mounting bracket. Pull the clip to release the breaker from the mounting bracket.

NOTE - There may be only one clip securing each circuit breaker.

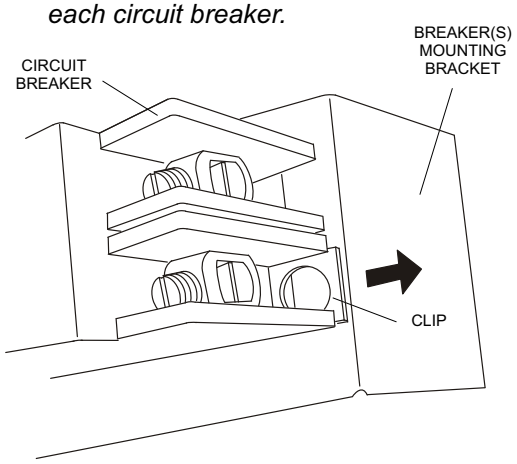


Figure 8. Circuit Breaker Clip

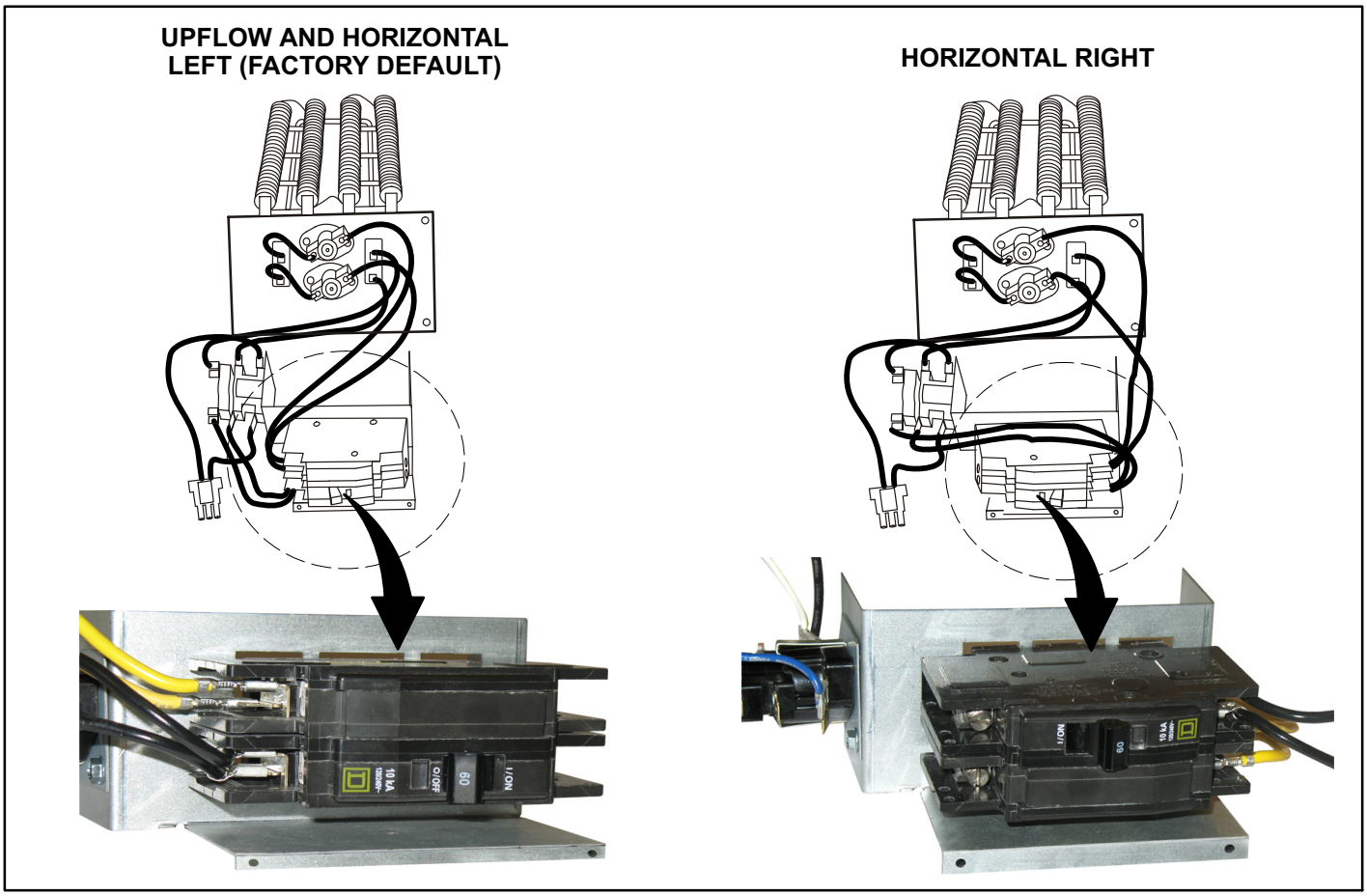


Figure 9. Circuit Breaker Orientation

3. Flip the breaker so that the wires attached to the circuit breakers terminals are on the left side (see figure 9).
4. Use the black clip to reattach the circuit breaker to the mounting bracket.

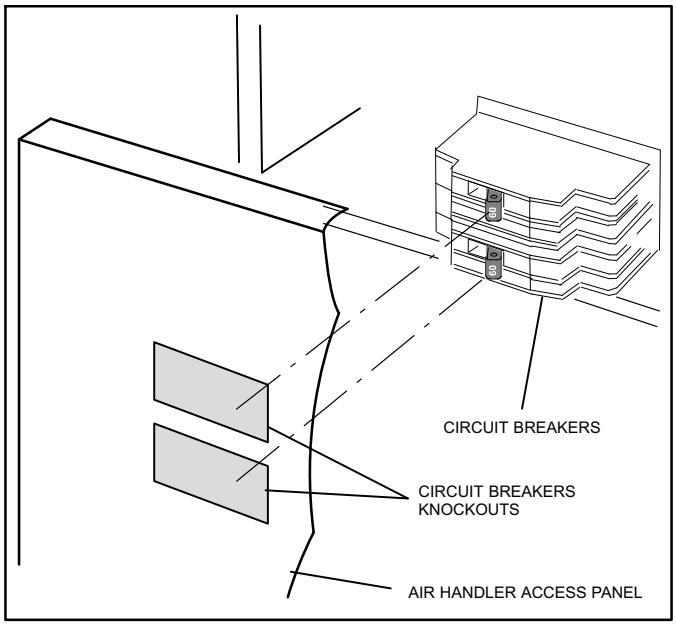


Figure 10. Circuit Breaker Knockouts

BREAKER ELECTRICAL CONNECTIONS

⚠WARNING

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

Replace all parts and panels before operating.

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

⚠ WARNING

USE COPPER CONDUCTORS ONLY.

NOTE - Refer to the nameplate on the air handler unit for minimum circuit ampacity and maximum overcurrent protection size.

The air handler units are provided with openings to be used with 1-1/2 inch trade size (1-31/32 inch diameter) conduit.

If you want a single point power supply, refer to the nameplate on the single point power supply accessory for minimum circuit ampacity and maximum overcurrent protection size. Select the proper supply circuit conductors in accordance with tables 310-16 and 310-17 in the National Electric Code, ANSI/NFPA No. 70 or tables 1 through 4 in the Canadian Electric Code, Part I, CSA Standard C22.1.

Refer to figure 31 for typical low voltage field wiring for air handler/condensing unit and heat pump applications. Figure 32 is a diagram of the air handler connections and the heater elements high-voltage wiring.

1. Make wiring connections as follows -

   Heaters equipped with circuit breakers—Connect field power supply wiring to circuit breaker(s). Figure 11 shows **L1**, **L2** and ground **GND** connections for a 2-breaker configuration.

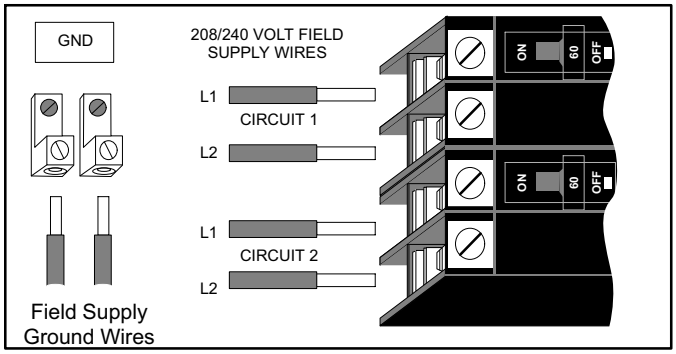


Figure 11. Field Power Supply Wiring

   Heaters equipped with terminal blocks—Connect field power supply wiring to terminal block(s).Figure 12 shows L1, L2 and ground (GND) connection for a terminal block configuration.

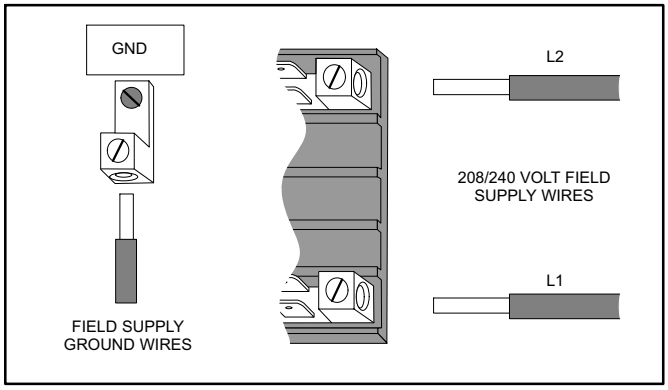


Figure 12. Terminal Block Connections

2. Remove the interface harness from the air handler unit and connect the 6-pin connector on the heater assembly to the mating connector on the air handler unit.
3. For applications using a two-stage room thermostat and/or an outdoor thermostat, connect wiring as shown in figure 31.

CIRCUIT BREAKER COVER INSTALLATION

1. Remove any installed patch plates still present .
2. Remove paper covering adhesive back around backside perimeter of circuit breaker cover (figure 13).
3. Position the breaker cover over the air handler circuit breaker opening (figure 14).

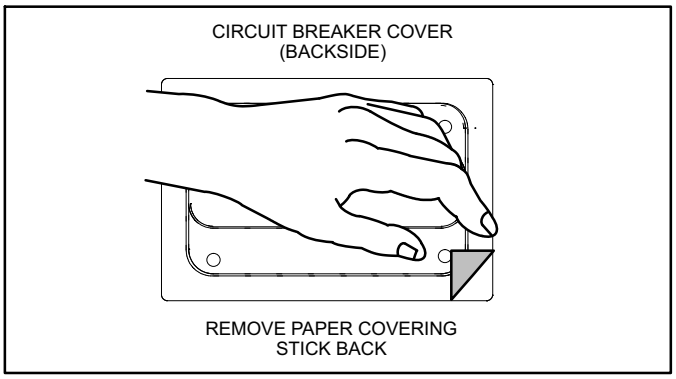


Figure 13. Remove Paper Cover

⚠ IMPORTANT

Confirm air tight seal between breaker cover and air handler access panel. Apply a thin silicone bead to the adhesive back seat to ensure air tight seal.

Failure to seal circuit breaker cover will allow warm moist air to be pulled into control panel which can create condensation to form on the circuit breaker and other electrical components within the control panel.

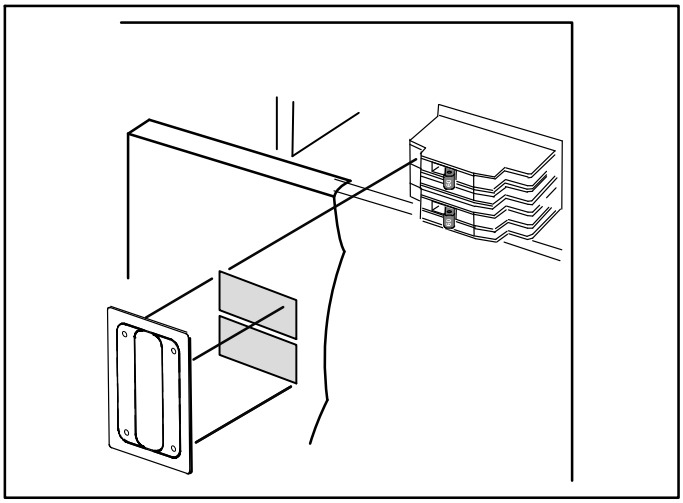


Figure 14. Typical Circuit Breaker Cover Installation

AIR HANDLER SPEED CONNECTIONS

When using the electric heat sections with air handler units, you must adjust the air handler speed according to the size of electric heat and air handler unit. **Air handler speed tap for electric heat in upflow and horizontal position is medium**. **For downflow it is high speed.** See specific air handler installation instructions for air handler speed adjustment procedure and location.

1. Set the thermostat above room temperature.
2. Check the heat pump and the heat section for normal operation.
3. Set the thermostat to desired setting.
4. Affix the wiring diagram sticker to air handler scroll, aligned with circuit breaker unit wiring diagram sticker.

Configuration Modification

UPFLOW APPLICATION

1. The air handler must be supported on the bottom only and set on solid floor or field-supplied support frame. Securely attach the air handler to the floor or support frame.
2. If installing a unit in an upflow application, remove the horizontal drain pan. **IMPORTANT - The horizontal drain pan is not required in upflow air discharge installations; its removal provides the best efficiency and air flow.**
3. Place the unit in the desired location and slope unit as previously mentioned. Connect return and supply air plenums as required using sheet metal screws.
4. Install units that have no return air plenum on a stand that is at least 14” from the floor. This will allow proper air return.

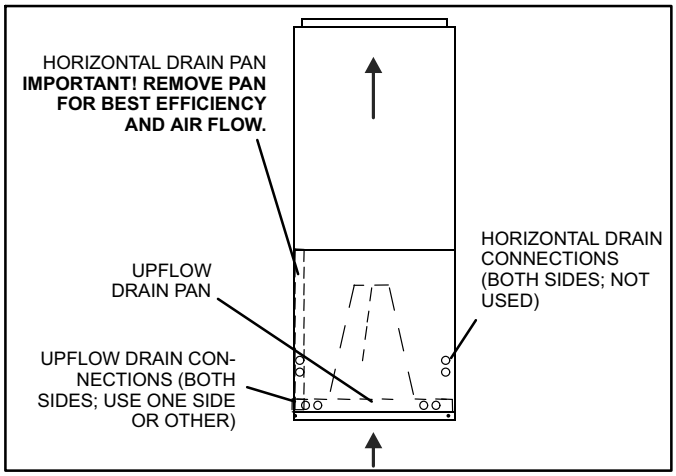


Figure 15. Upflow Configuration

HORIZONTAL APPLICATION

⚠ 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.

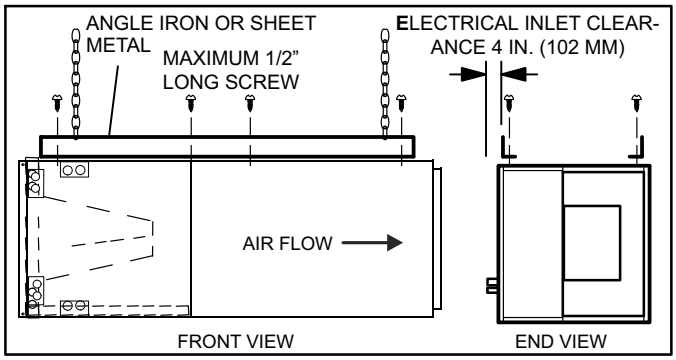


Figure 16. Suspending Horizontal Unit

NOTE — When the unit is installed in horizontal applications, a secondary drain pan is recommended. Refer to local codes.

NOTE — This unit may be installed in left-hand or right-hand air discharge horizontal applications. Adequate support must be provided to ensure cabinet integrity. Ensure that there is adequate room to remove service and access panels if installing in the horizontal position.

LEFT-HAND DISCHARGE

1. Determine knockouts required for drain line connections.
2. With access door removed, knock out drain line opening for installing drain lines.
3. Set unit so that it is sloped toward the drain pan end of the unit (see figure 24).
4. The horizontal configuration is shown in figure 17.

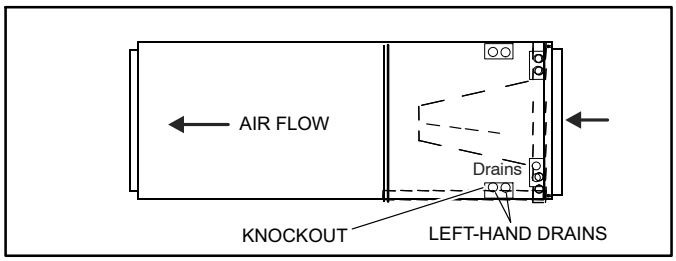


Figure 17. Left-Hand Discharge Configuration

5. 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 inch to avoid damaging the coil or filter. See figure 16. Use sheet metal screws to connect the return and supply air plenums as required.

RIGHT-HAND AIR DISCHARGE

For horizontal right-hand air discharge, the following field modifications are required.

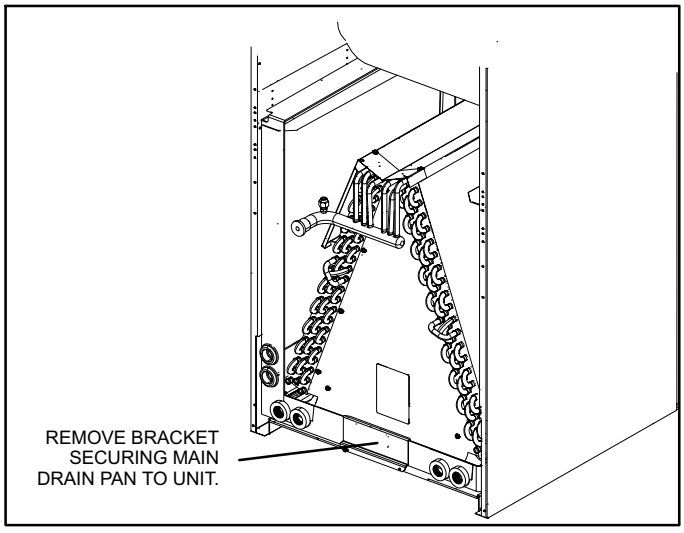


Figure 18. Remove Main Drain Pan Mounting Bracket (-018 through -036)

1. Remove and set aside blower and coil access covers.
2. Remove bracket(s) securing pan(s) to unit as illustrated in figures 18 and 19.

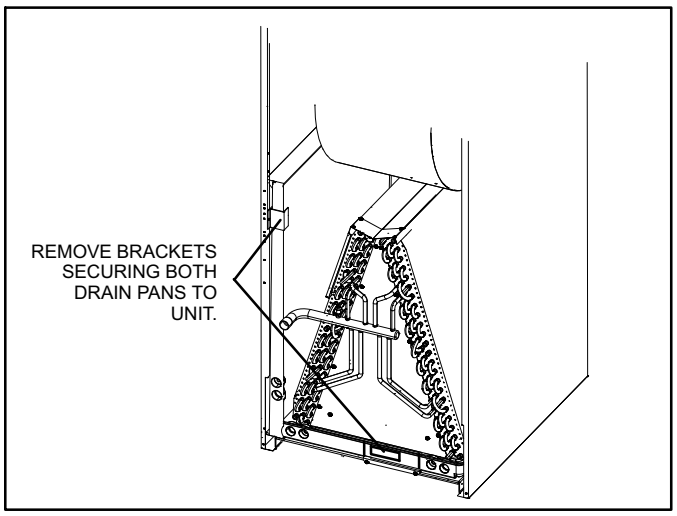


Figure 19. Remove Horizontal and Main Drain Pan Mounting Brackets (-042 through -060)

3. Remove coil assembly, bottom drain pan and horizontal drain pan as one assembly from the air handler.
4. Move the horizontal drain pan to the opposite side of the coil. Be sure drain holes toward the back of the unit are plugged. Remove the plugs from the front drain pan ports.
5. Re-install modified coil/drain pan assembly in air handler in the same orientation as before (figures 20 and 21).

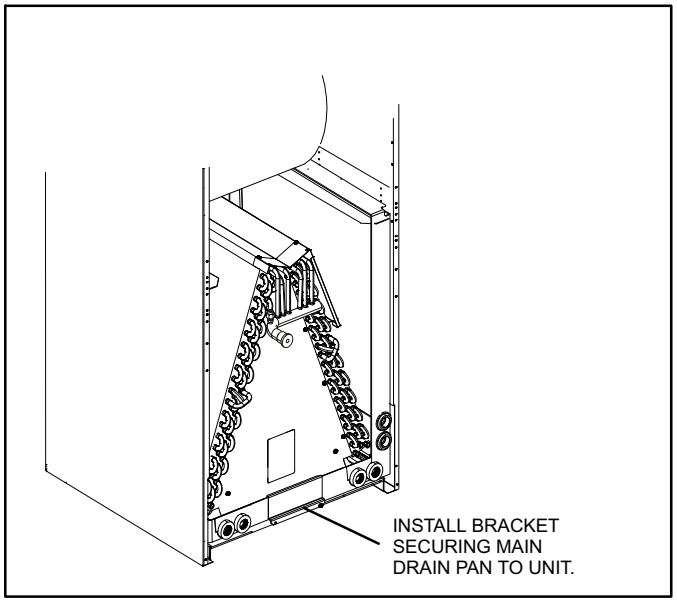


Figure 20. Install Main Drain Pan Mounting Bracket (-018 through -036)

⚠IMPORTANT

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

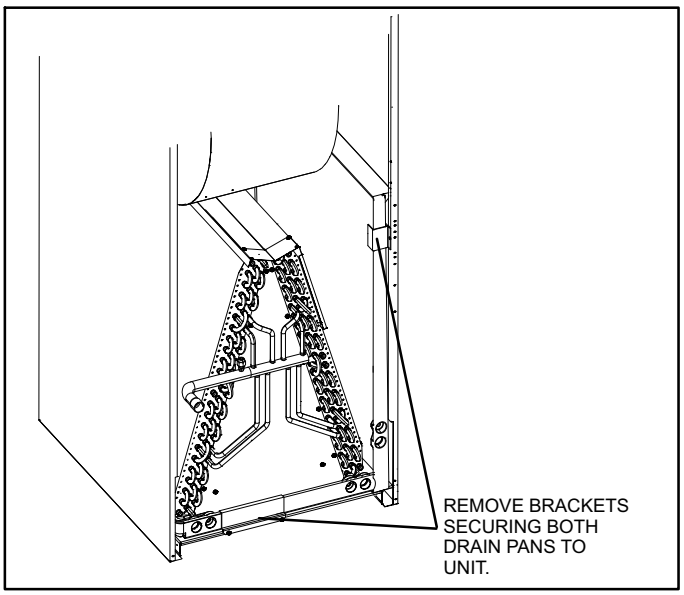


Figure 21. Install both Horizontal and Main Drain Pan Brackets (-042 through -060)

6. Remove two screws securing the blow-off prevention bracket. Rotate the brackets 180º and reinstall using the same screws. See figure 22.

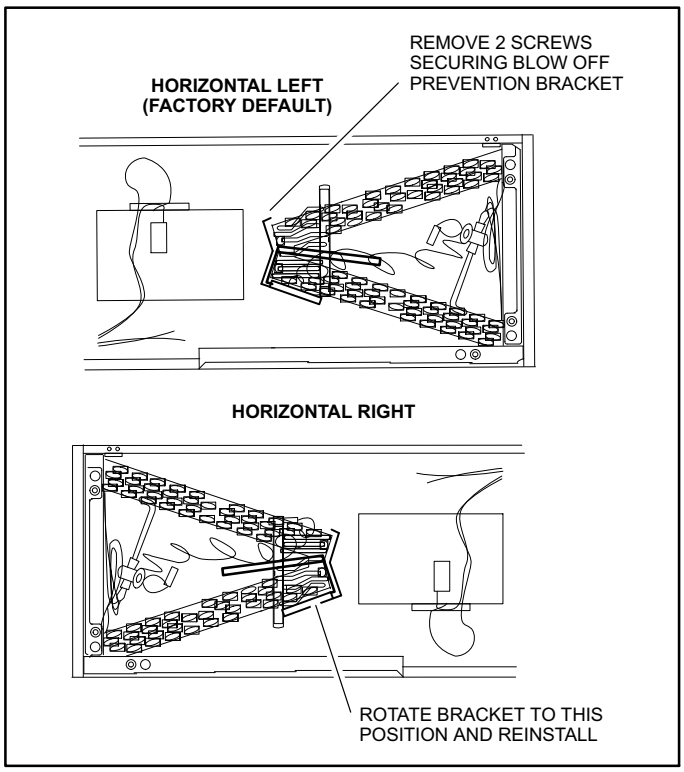


Figure 22. Blow-Off Prevention Plate

CONDENSATE DRAIN

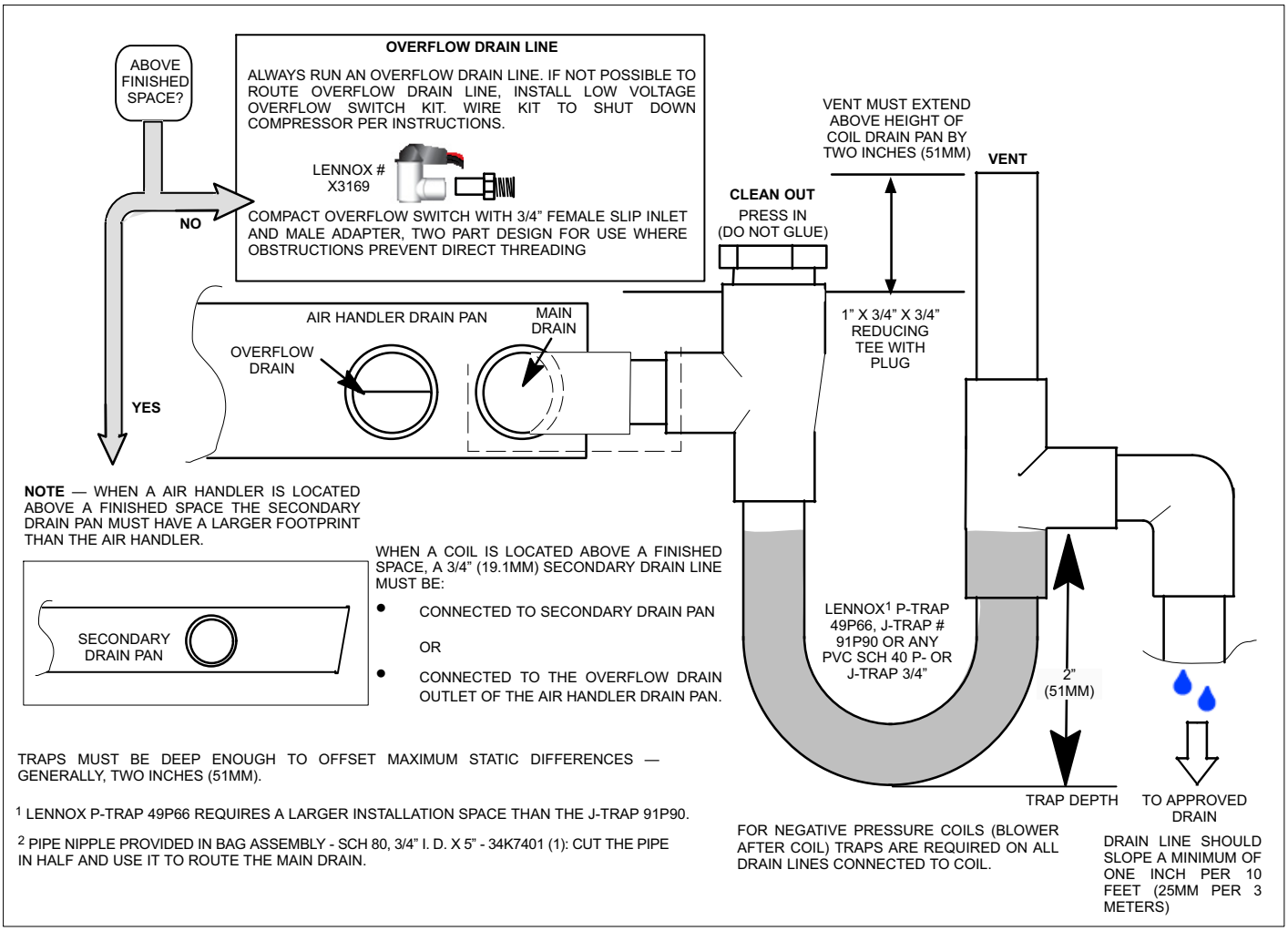


Figure 23. Typical Main and Overflow Drain

IMPORTANT

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

The air handler is provided with ¾" NPT condensate drain connections.

SLOPING THE DRAIN

Make sure the unit is sloped (similar to the slope shown in figure 24) (horizontal or upflow) so that the drain pan will empty completely without water standing in the pan.

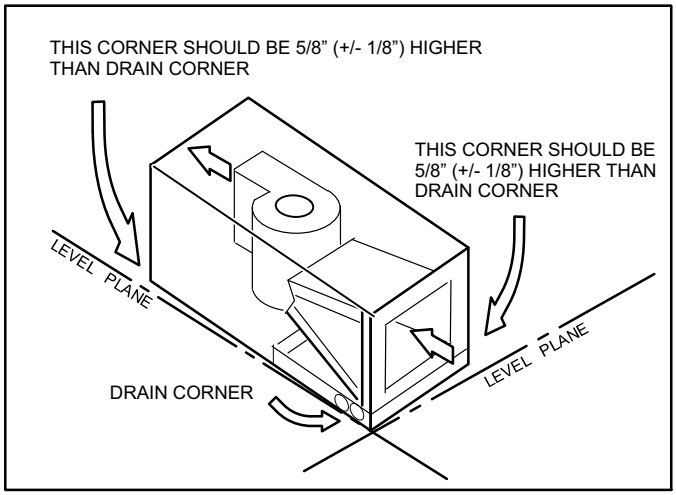


Figure 24. Sloping the Drain

INSTALL CONDENSATE DRAIN

1. Remove the appropriate drain knockouts. If necessary, remove the indoor coil assembly from the cabinet.
2. Connect primary drain line connection to the primary drain pan connection. The primary drain connection is flush with the bottom of the inside of the pan. Secondary connection is raised above the bottom of the inside of the pan.

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

3. If the auxiliary drain line is to be used, remove the plug and route the drain line so that water draining from the outlet will be easily noticed by the homeowner. The auxiliary drain line does not require venting or a trap. Refer to local codes.
4. After removal of drain pan plugs, check the drain port to see if holes have been drilled. If not drilled, use a 19/32" bit to drill out the primary drain hole; use a 3/8" drill bit for the secondary drain hole. Remove all drill shavings.
5. Make sure drain ports and drain pan are free of all debris.
6. Plug and check any unused drain pan openings for tightness. Torque plugs to 30 in. lb. to prevent water leaks or seepage from the drain pan.
7. Install a 2" trap in the primary drain lines as close to the unit as practical (see figure 23). Make sure the top of the trap is below the connection to the drain pan to allow complete drainage of the pan.

NOTE — Horizontal runs must have an anti-siphon air vent (standpipe) installed ahead of the horizontal run (See figure 23). An extremely long horizontal run may require an oversized drain line to eliminate air trapping.

NOTE — Do not operate air handler without a drain trap. The condensate drain is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will prevent positive drainage without a proper trap.

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

NOTE — Check local codes before connecting the drain line to an existing drainage system.

Insulate the drain lines where sweating could cause water damage.

TEST CONDENSATE DRAIN

Test the drain pan and drain line after installation:

1. Pour several quarts of water into drain pan, enough to fill drain trap and line.
2. Check to make sure the drain pan is draining completely, no leaks are found in drain line fittings, and water is draining from the end of the primary drain line.
3. Correct any leaks found.

DUCT SYSTEM

The air handler is provided with flanges for the connection of the plenum and ducts. The air handler is equipped with flanges that can form a filter rack for the installation of the air filter, or the filter may be installed as part of the return air duct system.

Supply and return duct system must be adequately sized to meet the system's air requirements and static pressure capabilities. The duct system should be insulated with a minimum of 1" thick insulation with a vapor barrier in conditioned areas or 2" minimum in unconditioned areas.

Supply plenum should be the same size as the flanged opening provided around the blower outlet and should extend at least 3 ft. from the air handler before turning or branching off plenum into duct runs. The plenum forms an extension of the blower housing and minimizes air expansion losses from the blower.

INSTALLING DUCT SYSTEM

Connect supply air duct to the flange on top of the air handler. If an isolation connector is used, it must be nonflammable.

A return air duct system is recommended. If the unit is installed in a confined space or closet, a return connection must be run, full size, to a location outside the closet.

CONNECTING REFRIGERANT LINES

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

⚠ IMPORTANT

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

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

1. Route the suction and liquid lines from the fittings on the indoor coil to the fittings on the outdoor unit. Run the lines in as direct a path as possible avoiding unnecessary turns and bends.
2. Make sure that the suction line is insulated over the entire exposed length and that neither suction nor liquid lines are in direct contact with floors, walls, duct system, floor joists, or other piping.
3. Connect the suction and liquid lines to the evaporator coil.
4. To avoid damaging the rubber grommets in the cabinet while brazing, slide the rubber grommets over the refrigerant lines until they are away from the heat source.
5. Braze using an alloy of silver or copper and phosphorus with a melting point above 1,100°F (593°C).

NOTE — Do not use soft solder.

6. Reinstall the rubber grommets after brazing is finished.

7. Make sure outdoor unit has been put in place according to the Installation Instructions and is connected to the refrigerant lines.

RELOCATING TXV BULB

Relocation of the TXV bulb to the exterior of the unit cabinet is highly recommended. Use the following procedure to perform this task.

1. Remove unit access panel.
2. Locate factory installed TXV bulb.

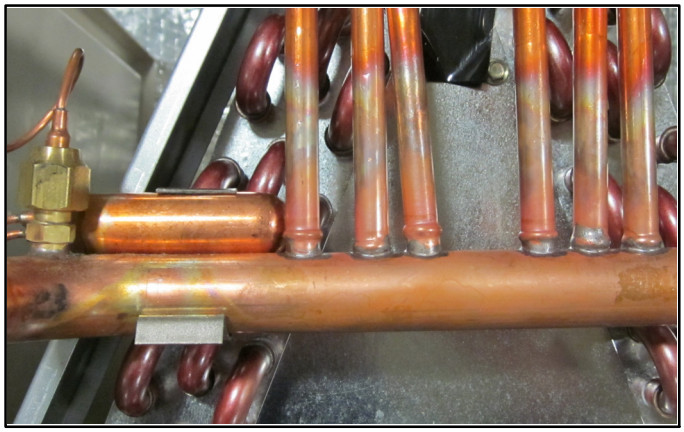


Figure 25. Factory Installed Location

3. Relocate TXV bulb to external suction line.

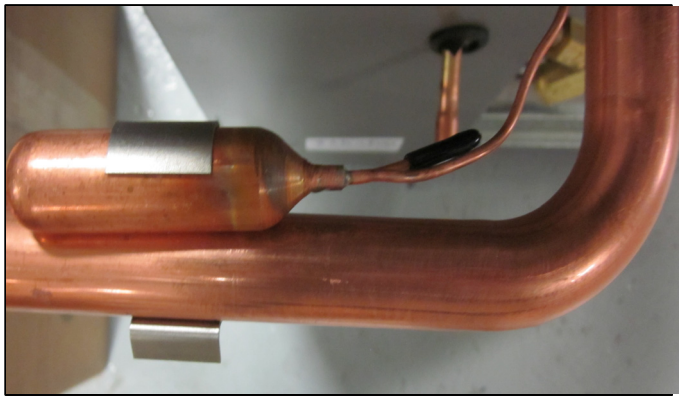


Figure 26. External Suction Line

4. Mount and fasten TXV bulb on suction line as indicated below.

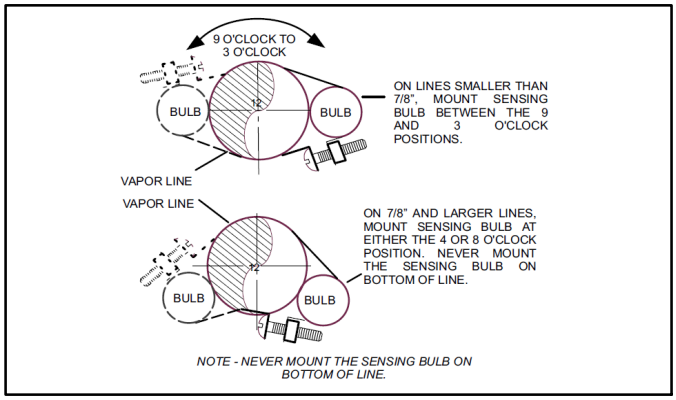


Figure 27. Sloping the Drain

5. Apply insulation over the suction line and TXV bulb and secure with tape or cable ties..

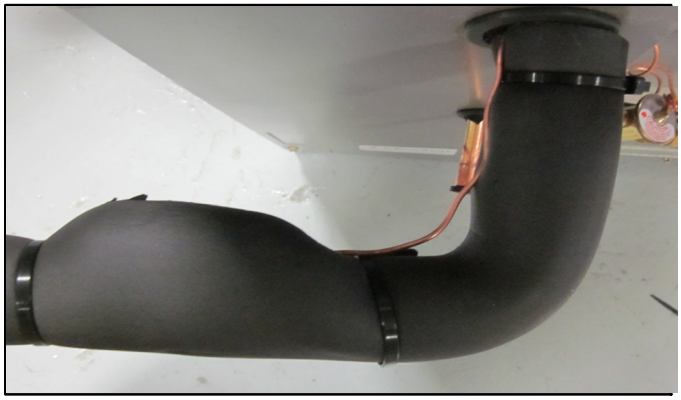


Figure 28. Insulation

***Note**: Route copper away from sharp edges and make sure that copper refrigerant tubing does not touch other metal surfaces (end plates, brazed connections, etc.) where damage may be caused by vibration, or by movement of metal against metal.*

SEALING THE UNIT

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.

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

⚠ WARNING

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.

⚠ IMPORTANT

When sealing the cabinet, be sure to seal closed any space around the holes where the drain lines exit the cabinet using duct tape and/or Permagum. Warm air must not be allowed to enter through any gaps or holes in the cabinet.

Make sure the liquid line and suction line entry points are sealed with either ARMAFLEX material or with Permagum. Permagum may also be used to seal around the main and auxiliary drains and around open areas of electrical inlets.

Electrical Connections

⚠WARNING

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

Replace all parts and panels before operating.

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

⚠WARNING

Electric Shock Hazard.

Can cause injury or death.

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.

- All field wiring must be done in accordance with National Electrical Code, applicable requirements of UL and local codes, where applicable.
- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the air handler rating plate for maximum over-current protection, minimum circuit ampacity, as well as operating voltage.
- The power supply must be sized and protected according to the specifications supplied on the product.
- This air handler is factory-configured for 240 volt, single phase, 60 cycles. For 208-volt applications, see "208 Volt Conversion" later in this section.
- For optional field-installed electric heat applications, refer to the instructions provided with the accessory for proper installation.

⚠ WARNING

USE COPPER CONDUCTORS ONLY

1. Disconnect all power supplies.
2. Remove the air handler access panel.
3. Route the field supply wires to the air handler electrical connection box.
4. Use UL-listed wire nuts to connect the field supply conductors to the unit black and yellow leads, and the ground wire to ground terminal marked **GND**.
5. Replace the air handler access panel.

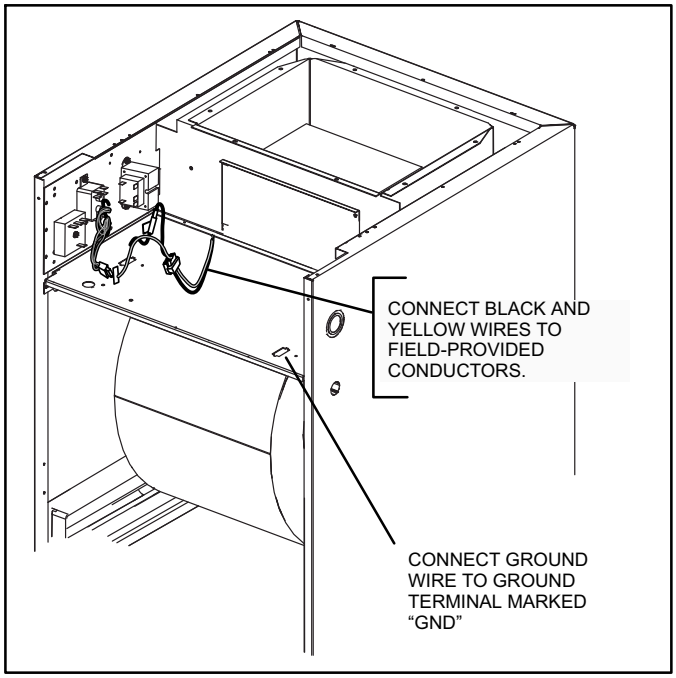


Figure 29. Making Electrical Connections

208 VOLT CONVERSION

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

⚠WARNING

Electrically ground air handler. Connect ground wire to ground terminal marked "GND".

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

Wiring Diagrams

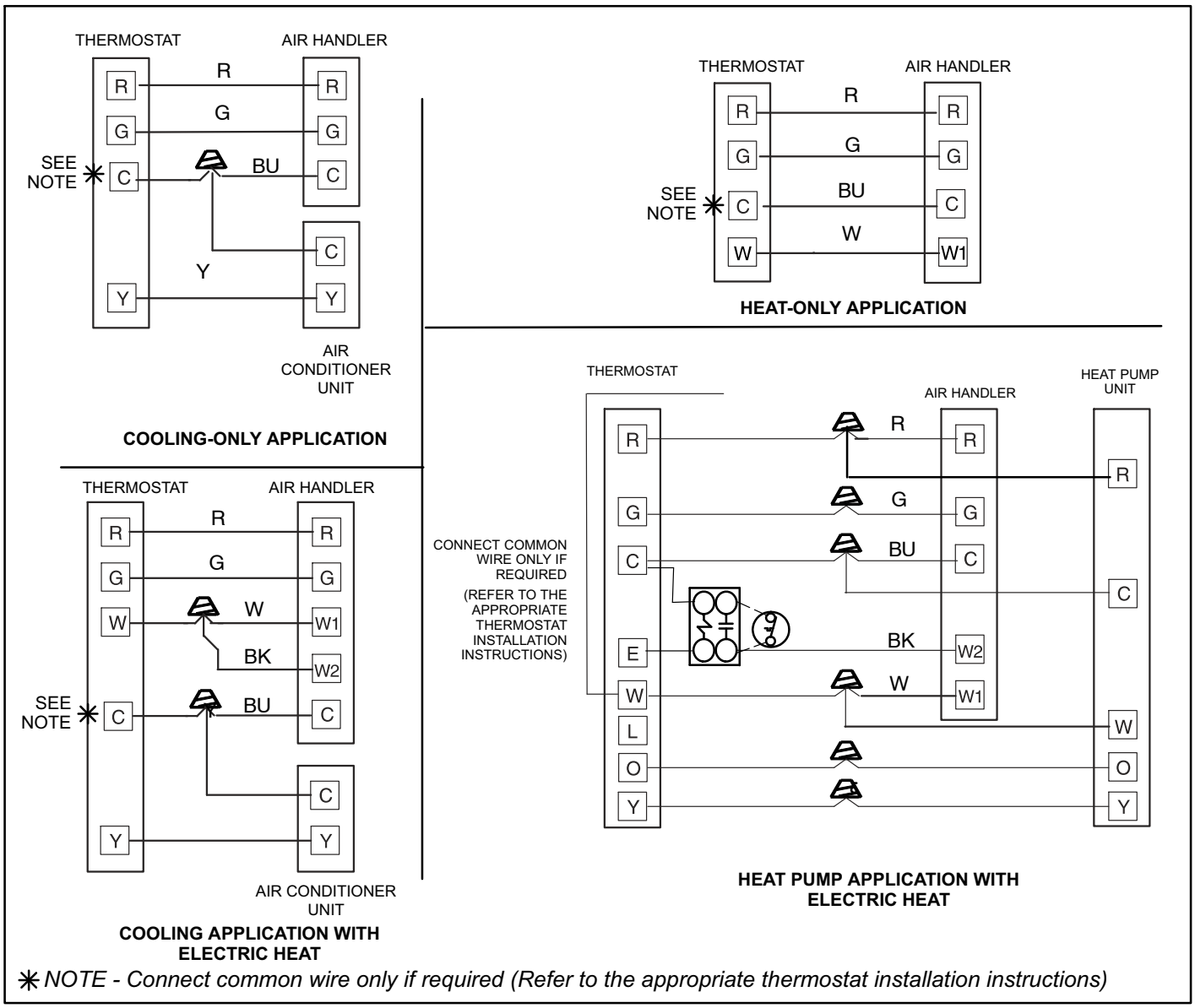


Figure 30. Low Voltage Connections (3-Speed PSC Motor) - Field Wiring

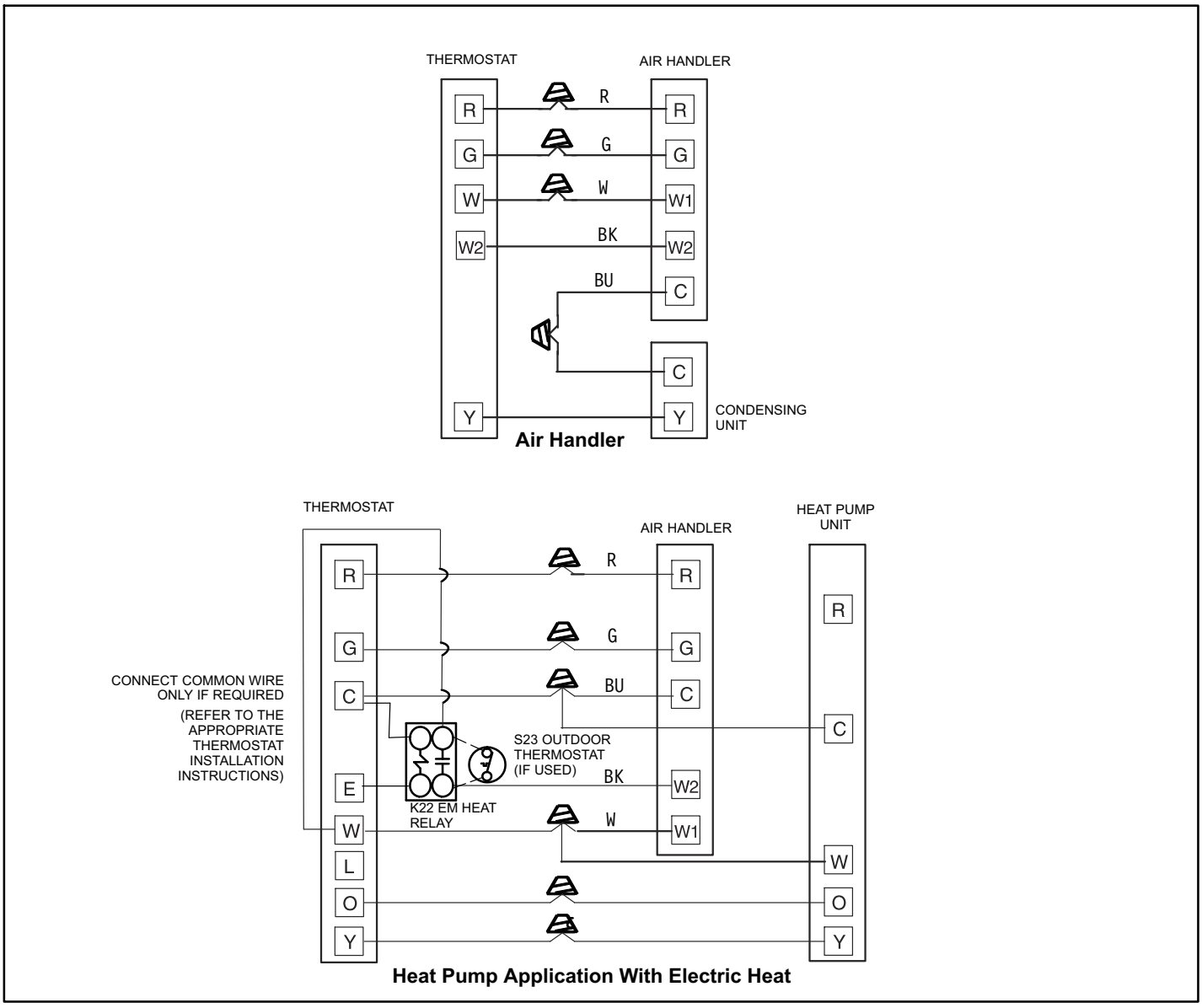


Figure 31. Low Voltage Field Wiring Electric Heat

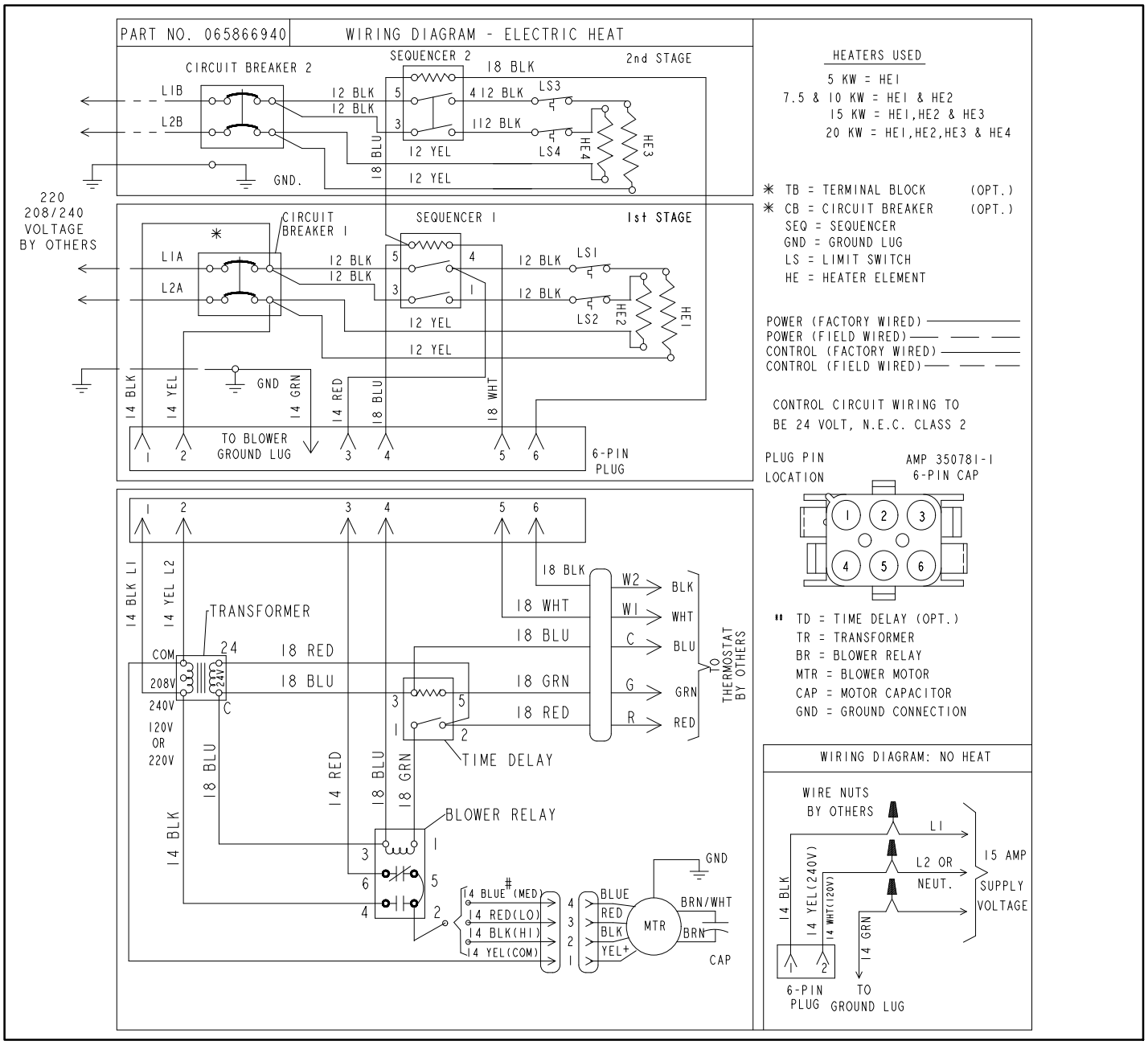


Figure 32. Unit Wiring Diagram - Electric Heat and Air Handler

Start-Up Operation

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

PRE-START-UP CHECKS

- Is the air handler properly and securely installed?
- If horizontally configured, is the unit sloped up to 5/8 inch toward drain lines?
- Will the unit be accessible for servicing?
- Has an auxiliary pan been provided under the unit with separate drain for units installed above a finished ceiling or in any installation where condensate overflow could cause damage?
- Have ALL unused drain pan ports been properly plugged?
- Has the condensate line been properly sized, run, trapped, pitched, and tested?
- Is the duct system correctly sized, run, sealed, and insulated?
- Have all cabinet openings and wiring been sealed?
- Is the indoor coil factory-installed TXV properly sized for the outdoor unit being used?
- Have all unused parts and packaging been disposed of?
- Is the filter clean, in place, and of adequate size?
- Is the wiring neat, correct, and in accordance with the wiring diagram?
- Is the unit properly grounded and protected (fused)?
- Is the thermostat correctly wired and in a good location?

- Are all access panels in place and secure?

CHECK BLOWER OPERATION

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

CHECK COOLING OPERATION

- Set thermostat to force a call for cooling (approximately 5ºF lower than the indoor ambient temperature).
- The outdoor and indoor units should come on immediately.
- Check the airflow from a register to confirm that the system is moving cooled air.
- Set the thermostat 5ºF higher than the indoor temperature. The indoor blower and outdoor unit should cycle off. Air handler should cycle off 45 seconds after the outdoor unit shuts 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.

Sequence of Operation

COOLING (COOLING ONLY OR HEAT PUMP)

When the thermostat calls for cooling, 24 volts is put on the blower time-delay relay coil and then 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 the indoor blower and outdoor unit should cycle off. Air handler should cycle off 45 seconds after the outdoor unit shuts 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 put on the blower time-delay relay coil. Then 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.

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

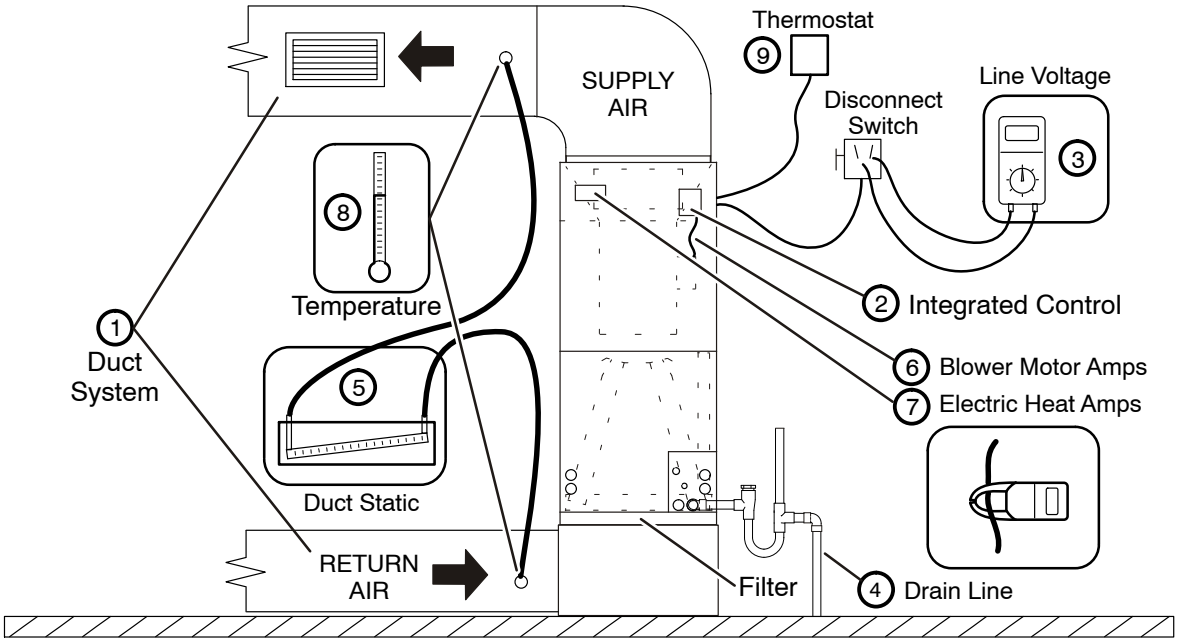
EMERGENCY HEAT (HEATING HEAT PUMP)

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

Installing Contractor's Name_____ Installing Date_____

Installing Contractor's Phone_____ Air Handler Model #_____

Job Address_____



1 DUCT SYSTEM

SUPPLY AIR DUCT

☐ Sealed

☐ Insulated (if necessary)

☐ Registers Open and Unobstructed

RETURN AIR DUCT

☐ Sealed

☐ Filter Installed and Clean

☐ Registers Open and Unobstructed

2 INTEGRATED CONTROL

☐ Jumpers Configured Correctly (if applicable)

☐ Appropriate Links in Place (if applicable)

3 VOLTAGE CHECK

☐ Supply Voltage _____

☐ Low Voltage _____

☐ Electrial Connections Tight

4 DRAIN LINE

☐ Leak Free

5 TOTAL EXTERNAL STATIC (dry coil)

	dry coil	wet coil
Supply External Static	_____	_____
Return External Static	_____	_____
Total External Static =	_____	_____

6 ELECTRIC HEAT AMPS_____

7 INDOOR BLOWER AMPS_____

INDOOR BLOWER CFM_____

8 TEMPERATURE DROP (Cooling Mode)

Return Duct Temperature _____

Supply Duct Temperature – _____

Temperature Drop = _____

8 TEMPERATURE RISE (Heating Mode)

Return Duct Temperature _____

Supply Duct Temperature – _____

Temperature Rise = _____

9 THERMOSTAT

☐ Adjusted and Programmed

☐ Operation Explained to Owner

☐ Explained Operation of System to Homeowner

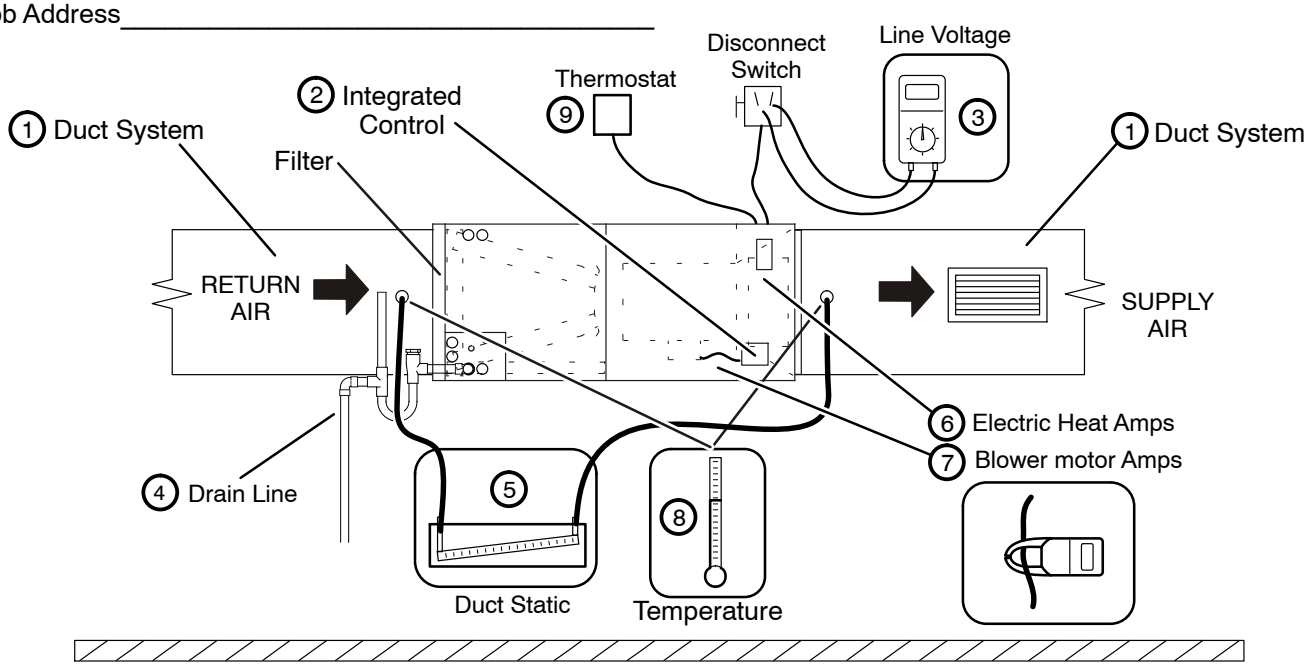
Technician's Name:_____Date Start–Up & Performance Check Completed_____

Figure 33. Start-Up and Performance Checklist (Upflow Configuration)

Installing Contractor's Name_____ Installing Date_____

Installing Contractor's Phone_____ Air Handler Model #_____

Job Address_____



1 DUCT SYSTEM

SUPPLY AIR DUCT

☐ Sealed

☐ Insulated (if necessary)

☐ Registers Open and Unobstructed

RETURN AIR DUCT

☐ Sealed

☐ Filter Installed and Clean

☐ Registers Open and Unobstructed

2 INTEGRATED CONTROL

☐ Jumpers Configured Correctly (if applicable)

☐ Appropriate Links in Place (if applicable)

3 VOLTAGE CHECK

☐ Supply Voltage _____

☐ Low Voltage _____

☐ Electrial Connections Tight

4 DRAIN LINE

☐ Leak Free

5 TOTAL EXTERNAL STATIC (dry coil)

	dry coil	wet coil
Supply External Static	_____	_____
Return External Static	_____	_____
Total External Static =	_____	_____

6 ELECTRIC HEAT AMPS_____

7 INDOOR BLOWER AMPS_____

INDOOR BLOWER CFM_____

8 TEMPERATURE DROP (Cooling Mode)

Return Duct Temperature _____

Supply Duct Temperature – _____

Temperature Drop = _____

8 TEMPERATURE RISE (Heating Mode)

Return Duct Temperature _____

Supply Duct Temperature – _____

Temperature Rise = _____

9 THERMOSTAT

☐ Adjusted and Programmed

☐ Operation Explained to Owner

☐ Explained Operation of System to Homeowner

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

Figure 34. Start-Up and Performance Checklist (Horizontal Configuration)