

Installation , Operation, & Maintenance UCS Hydronic Heat Fan Coil Units

IOM6505 - REV. A- (09/26)

ATTENTION: Read all instructions thoroughly and retain all manuals for future reference.

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USE THE FOLLOWING QR CODE TO ACCESS UNIT DATA.



Scan for Product Specifications



Safety Considerations

1. Read this entire Installation Manual before starting installation.
2. These instructions are a general guide. ALWAYS follow all national, state, and local codes.
3. Do NOT alter the product or use unauthorized parts. Doing so may:
 - Void the warranty
 - Reduce performance
 - Cause equipment failure
 - Create unsafe conditions
4. ONLY trained, licensed, and authorized personnel may install or service this unit.
5. Use ONLY factory-authorized kits and accessories.



RECOGNIZE THE FOLLOWING SAFETY NOTATIONS:



Refrigerant safety group A2L

⚠ WARNING

Risk of serious injury, death, or property damage.

⚠ CAUTION

Risk of minor or moderate injury or equipment damage.

The manufacturer works to continually improve its products. It reserves the right to change design and specifications without notice. www.firstco.com
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⚠ WARNING

⚡ ELECTRIC SHOCK HAZARD

- Disconnect and lock out all power before servicing. The unit may have more than one power source.
- After turning off and locking out the electrical disconnect, use a properly rated tester to confirm the circuit is NOT energized.
- Verify voltage and grounding before installation.
- Provide a means of disconnection in the fixed wiring as required by codes.
- Follow the National Electrical Code (NEC) NFPA 70 and all state and local codes. When in Canada follow the Canadian Electrical Code (CSA C22.1).
- Make sure wiring matches the unit wiring diagram.
- Disconnect power before installing or removing jumper wires.
- Electronically Commutated Motors (ECM) are energized whenever power is applied.

⚠ WARNING

🔥 FIRE OR EXPLOSION HAZARD

- Minimize ignition risks and make sure all personnel understand the hazards and safety requirements for working with flammable refrigerants.
- Refrigerant may have no odor. Do NOT puncture, crush, or expose the unit to flame or high heat.
- Keep fire extinguisher nearby when brazing.

⚠ WARNING

INSTALLATION AND SERVICE HAZARDS

- Indoor use ONLY.
- Use multiple people when moving or installing the unit.
- Wear appropriate personal protective equipment (PPE). Use eye protection, cut resistant gloves and sleeves to protect against metal edges and screws.
- Use caution to avoid internal damage when drilling screws into the cabinet.
- Do NOT bypass or eliminate safety devices.
- Do NOT use mechanical devices or other means to accelerate the defrosting process or to clean the unit, except as specifically recommended by the manufacturer.

⚠ WARNING

OPERATIONAL HAZARDS

- This appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Keep clear of rotating components.
- Ensure all parts and panels are installed and remove all tools and debris before operation.

⚠ CAUTION

EQUIPMENT DAMAGE

- Do NOT operate without an air filter.
- Do NOT bend or kink hoses.
- Do NOT stack units.

General

These instructions apply only to **UCS* Hydronic Heat Fan Coil** units. For other equipment, follow the manufacturer's instructions. The manufacturer is NOT responsible for damage caused by improper installation, misuse, or construction debris. Metal shavings, dust, drywall compound, paint overspray, and other jobsite debris can damage the unit and void the warranty. Install the unit in accordance with all applicable national and local codes.

All units are inspected at the factory and shipped in good condition. Upon receipt of the shipment:

1. Inspect all cartons immediately.
2. Check for shipping damage.
3. Note visible damage on the delivery receipt.
4. File a claim with the carrier immediately if damage is found.

Packaging

Each unit includes:

1. Shipping brackets and screws
2. Installation Manual

Storage

⚠ WARNING

🔥 FIRE OR EXPLOSION HAZARD

- Units are factory-charged with refrigerant. Store them in a place where they are protected from damage. Do NOT store them in areas with continuous ignition sources. Do NOT pierce or burn the unit.

Store the unit indoors in a clean, dry area between 32.0°F and 120°F [0.0°C and 48.9°C]. Store the unit upright and leave the packaging in place until installation. Store the unit in an area free of continuously operating ignition sources, including open flames, gas appliances, and electric heaters.

Initial Unit Inspection

1. Inspect the unit for shipping damage. Report damage immediately to the carrier.
2. Verify any shortages or damage are noted on the freight bill.
3. Verify the unit nameplate matches the sales order, including model, configuration, size, and voltage.
4. Remove the front panel and verify all electrical connections are tight.
5. Verify the blower rotates freely and is free of obstructions.
6. Verify the evaporator distributor tubes are positioned over the drain pan and are NOT touching each other.
7. Inspect the evaporator coil fins for damage.
8. Remove all shipping brackets and screws from the condensing section.
9. Remove the foam shipping block supporting the blower assembly.

Refrigerant Safety

 WARNING
 FIRE OR EXPLOSION HAZARD
FLAMMABLE REFRIGERANTS - FAILURE TO FOLLOW THESE WARNINGS COULD CAUSE INJURY, EXPLOSION, AND DEATH • NEVER burn refrigerant as highly toxic gas will be produced. • Do NOT purge or allow refrigerant to be released into an interior space. Refrigerant released into an enclosed space will displace oxygen and may cause unconsciousness or death. If an indoor refrigerant leak is suspected, thoroughly ventilate the area before beginning any work. • Avoid contact with refrigerant, as it can cause frostbite or blindness. ALWAYS wear proper eye and hand protection, and seek medical attention if contact occurs. • It is a violation of federal law to release refrigerant into the atmosphere. Always use approved reclaiming methods and certified equipment when installing or servicing this unit. This service must be performed by a qualified agency. A sealed refrigerant system is designed to be closed and self-contained and typically requires no routine maintenance. • Follow all EPA regulations. ONLY EPA certified technicians should handle refrigerants. In Canada technicians must be ODP/ODS certified to handle refrigerants. • Explosion risk, recover refrigerant only in a cylinder designed and intended for this purpose. • Do NOT use an expired or damaged cylinder. • Do NOT apply flame or excessive heat to a refrigerant cylinder. • Do NOT fill a refrigerant cylinder to more than 80% of its capacity. • Do NOT use a refrigerant cylinder for anything other than its designed and intended purpose. • Use recovery equipment designed to handle the refrigerant being recovered. • Ground refrigerant cylinders before using. • Ensure that the correct number of cylinders for holding the total system charge are available. • Do NOT use flames or any potential ignition sources to leak check refrigerant tubing or components. • Ensure that no live electrical components and wiring are exposed while charging, recovering or purging the system • Post "NO SMOKING" signs. • Ensure the work area is either open or adequately ventilated before opening the system or performing any hot work. Maintain sufficient ventilation throughout the duration of the work. • Refrigerant may be odorless and may NOT provide a detectable warning if released.

If a refrigerant leak is suspected indoors:

- Ventilate the area before beginning work.
- Do NOT release refrigerant indoors.
- Eliminate all ignition sources.

- Verify the refrigeration system is properly grounded before charging.
- All metering devices in the refrigerant system MUST match the refrigerant being used.

Follow Outdoor Unit Manufacturer Instructions

When adding refrigerant to a partially charged system, ALWAYS follow the outdoor unit manufacturer's instructions.

Leak Detection

Use only leak detection methods approved for the refrigerant.

Electronic leak detectors:

- Must be approved for flammable refrigerants.
- Recalibrate in a refrigerant-free area as needed.
- Set the sensitivity to no more than 25% of the refrigerant lower flammability limit (LFL).

Leak Detection Fluids

- Use bubble solution or fluorescent leak detection fluid.
- Do NOT use chlorine-based products.

If a leak is found:

1. Eliminate all ignition sources.
2. Recover the refrigerant or isolate the affected section before brazing.
3. Evacuate the system before repair.

Refrigerant Charging

Always follow the outdoor unit manufacturer's charging instructions. When determining the refrigerant charge, consider:

- Indoor temperature and humidity
- Outdoor temperature and humidity
- Outdoor unit factory charge
- Refrigerant line length and diameter
- Metering device

TXV Charging

Charge the system to the following values:

- Air conditioning units: 12.0°F [6.7°C] subcooling
- Heat pump units: 10.0°F [5.6°C] subcooling
- Adjustable TXVs: 10.0°F [5.6°C] superheat

After the initial charge:

- If the system is undercharged, add refrigerant until the recommended pressures, temperatures, subcooling, and superheat are achieved.
- If the system is overcharged, recover refrigerant until the recommended values are achieved.

Fixed Orifice Charging

Charge fixed orifice systems using the superheat values recommended by the outdoor unit manufacturer for the applicable refrigerant. For heat pump systems charged in cooling mode, verify the refrigerant charge in heating mode and adjust as required by the outdoor unit manufacturer. For systems with microchannel outdoor coils, adjust the charge in increments of 1.0 oz [28 g] or less.

Allow the system to operate for at least 15 minutes between charge adjustments.

Hot Water Coil Circulation

Set the water heater thermostat so the water entering the hot water coil reaches approximately 140°F [60.0°C]. If the pump is operating but hot water is NOT circulating:

1. Open the air bleed valve briefly.
2. Vent trapped air until water flows steadily.
3. Close the air bleed valve.

Installation



SERVICE INDICATOR; READ TECHNICAL MANUAL

Location

Select an installation location that:

- Provides adequate support for the unit.
- Allows proper duct connections.
- Provides sufficient service access.

Clearances

Maintain a minimum clearance of 24.0" [610 mm] at the front of the unit for service. Unless otherwise specified, the unit may be installed with zero clearance to combustible construction. Verify all required clearances using the unit rating plate and applicable codes.

If the unit is installed where it could be damaged (such as a garage), provide protection from physical damage.

Install the unit with a condensate drain slope of 1/4" per ft [6.4 mm per 305 mm] to ensure proper drainage.

All refrigerant joints made during installation must remain accessible for inspection before being covered or enclosed.

Approved zero-clearance surfaces include:

- Fan coil cabinet
- Discharge plenum
- Connecting ducts

Install the unit vertically in the upflow position. Provide front clearance sufficient for:

- Access to electrical controls
- Removal of the motor and blower assembly

Installation Requirements

⚠ WARNING

- Do NOT modify this product or install non-authorized components. Doing so will void all warranties, may impair system operation and performance, and can create hazardous conditions for service personnel and occupants. No company employee or contractor is authorized to waive this requirement.
- Improper installation, adjustment, servicing, maintenance, or repair, or attempts to perform these tasks without proper training, can result in equipment damage, property damage, serious personal injury, or death. Service personnel assume full responsibility for any injury or property damage arising from improper procedures.

Install the unit in accordance with the manufacturer's instructions and all applicable national and local codes, including:

- NFPA 90A – Air Conditioning and Ventilating Systems
- NFPA 90B – Residential Warm Air Heating and Air Conditioning Systems

Installation Procedures

Installation MUST be performed by qualified personnel familiar with the equipment and applicable codes.

Before installation:

- Remove shrink-wrap and all packaging materials.
- Ensure louvered areas are free from obstructions.
- Verify the unit nameplate matches the required voltage and control configuration.
- Review the unit wiring diagram.
- Gather the required tools and equipment.
- For installations using flammable refrigerants, the following checks must be applied as applicable:
 - Verify that the actual refrigerant charge is appropriate for the room size where refrigerant-containing components are installed.
 - Confirm that ventilation systems and outlets are functioning properly and are NOT obstructed.
 - For indirect refrigerant circuits, ensure the secondary circuit contains no unintended refrigerant.
- Ensure all equipment markings remain visible and legible. Replace or correct any markings or signs that are illegible.
- Install refrigerant piping and components in locations where they are unlikely to be exposed to corrosive substances, unless the components are made of corrosion-resistant materials or are adequately protected.

During installation:

- Disconnect and lock out power before wiring or servicing.
- Verify a permanent equipment ground before restoring power.
- Keep a fire extinguisher nearby when soldering or brazing.
- Protect valves and other temperature-sensitive components with heat shields or wet rags.
- Install the unit level, or with the required slope toward the condensate drain.
- Install an auxiliary drain pan or overflow drain if required by code.
- Do NOT overtighten fittings.
- Verify the drain pan is clean.
- Verify the air filter is installed correctly.
- Verify the air distribution system does not exceed the unit's rated external static pressure.
- Ensure cabling is protected from wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental conditions.

Mounting

Secure the unit to a structure capable of supporting its weight. All mounting anchors must:

- Be properly installed.
- Be correctly sized.
- Provide long-term structural support.

Closet Wall Installation

The optional mounting kit (90PK3) allows the unit to be mounted to a closet wall or directly to the air handler. Install sound-isolating material between the unit and the structure to reduce noise transmission.

Recessed Wall Installation

The unit may be recessed into a partition wall using the recommended support framing shown in the installation figures. The front of the unit must be flush with the finished drywall surface. The optional louvered wall panel is required and must be ordered separately.

After drywall is installed:

1. Secure the wall panel and frame to the studs using screws or nails.
2. Refer to the installation figures for proper placement.
3. Install the front face of the unit flush with the finished drywall surface.

Closet Platform – Front Return

The fan coil may be installed on a platform.

- Secure the unit to the platform using screws or nails.
- Provide sufficient clearance below the platform for condensate piping.

Provide front clearance sufficient for:

- Access to electrical controls
- Removal of the motor and blower assembly

Recommended front clearance is approximately equal to the depth of the fan coil.

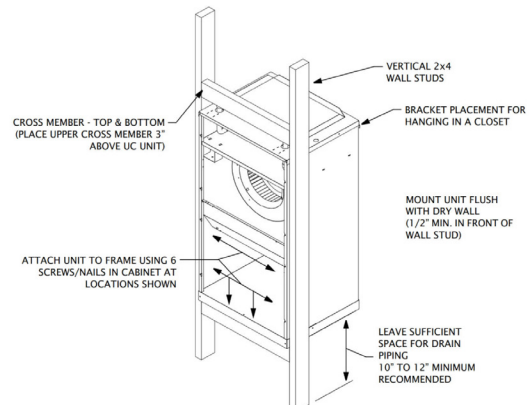


Figure 1: Recessed Wall Mounting (Support Framing)

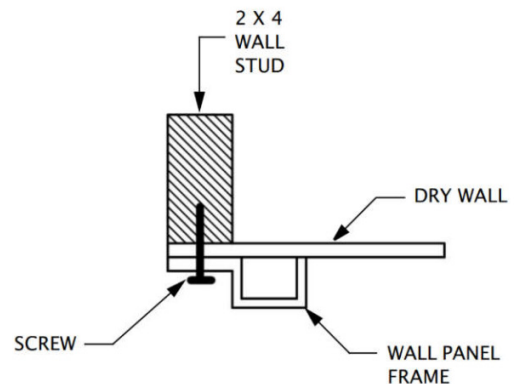


Figure 2: Detail of Wall Panel Frame Installation

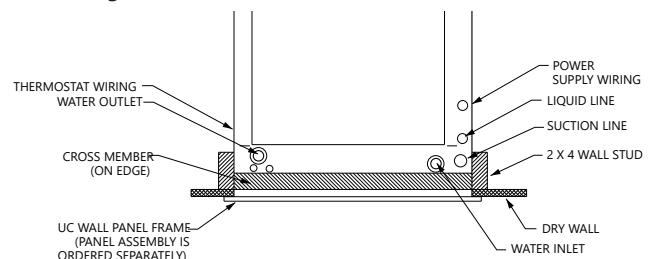


Figure 3: Installed Unit Top View

Piping

⚠ CAUTION

- Hydronic systems are NOT designed for air pressure testing. Using air to pressurize the system may damage the equipment. Pressure-test the system using water ONLY.
- Do NOT bend or reposition coil header tubing to align piping connections. Improper handling may fracture the tubing and cause water leaks.

Protect piping from physical damage during installation, operation, and service. Keep all field-made joints accessible for inspection before they are covered or enclosed. Freeze protection is available for installations in attics, crawl spaces, and other unconditioned areas (Consult the factory for recommendations). Hot water temperatures used for space heating may exceed those permitted for domestic hot water. Install an anti-scald mixing valve where required by applicable codes. Install the valve in accordance with the manufacturer's instructions.

Install all piping in accordance with applicable national and local codes, including:

- ASHRAE 15
- ASHRAE 15.2
- IAPMO Uniform Mechanical Code
- ICC International Mechanical Code
- CSA B52

Hot Water Coil Piping Precautions

Before connecting hot water piping:

- Flush all field-installed piping to remove debris.
- Protect valve bodies with wet cotton rags during soldering.
- Open all valves before soldering.
- Position hand valves halfway open.
- Manually open motorized valves.

When soldering bronze or brass fittings:

- Heat the pipe inside the fitting socket.
- Apply solder only after the flux begins to boil.
- Do NOT apply the flame directly to the solder joint.

Hot Water Coil Piping

When soldering near valves, apply heat for the shortest time possible, even when using wet rags. Excessive heat may damage the valve. Do NOT rapidly cool solder joints with water. Rapid cooling can weaken the joint.

Allow for thermal expansion and contraction when installing:

- Horizontal piping
- Vertical risers
- Branch lines

Support piping to allow for movement caused by temperature changes and to prevent stress on piping, fittings, and valves. Plan piping routing to provide adequate clearance for electrical wiring. Install all piping in accordance with applicable codes and accepted industry practices.

If a flow control module is used, follow the manufacturer's installation instructions.

Hot Water Coil Connections

⚠ WARNING

- An expansion tank may be required if a backflow preventer is installed in the system.

Hot water coil connections:

- 3/4" [19.1 mm] nominal copper
- 7/8" [22.2 mm] outside diameter

With the unit in the upright position and viewed from the front:

- Connect the hot water supply to the right side of the fan coil.

These pipe sizes provide proper flow and minimize pressure loss. If other piping materials are used, size the piping to match the required pressure drop and circulator performance. The maximum coil flow 4.5 GPM. Insulate piping installed in unconditioned spaces to help prevent freezing.

Solder Connections

Use low-temperature and lead-free solder.

"T" Connections At The Water Heater

Connect the fan coil supply and return lines to the horizontal branch of the "T" fittings installed in the vertical hot and cold water lines at the water heater. This arrangement allows air to be purged each time water is added to the system.

Isolation Valves

Install two isolation valves in the circulating loop to allow system servicing and air purging.

After completing all piping connections:

1. Pressure-test the system.
2. Repair any leaking solder joints.
3. Tighten leaking valve packing nuts and piping accessories as required.

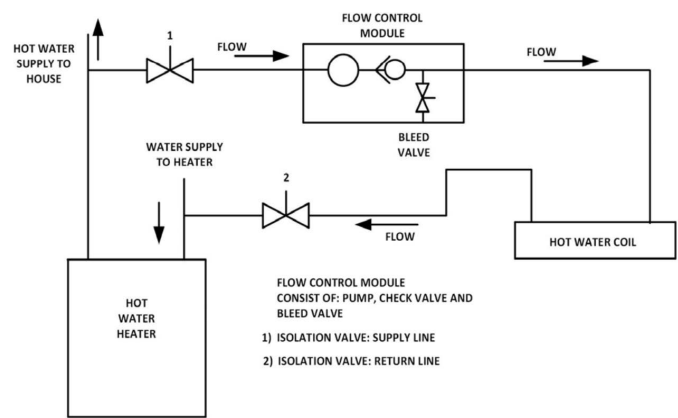


Figure 4: Typical Piping Schematic with Flow Control Module

Cooling Coil Piping

Size the liquid and suction refrigerant lines in accordance with the outdoor unit manufacturer's instructions.

Ducting

⚠ WARNING

⚠ FIRE OR EXPLOSION HAZARD

- Do NOT install auxiliary devices that could serve as ignition sources in the ductwork, except for those specifically listed for use with this appliance. Refer to the installation instructions for details.
- For appliances using A2L refrigerants connected to one or more rooms via ductwork, only auxiliary devices approved by the manufacturer or specifically rated for the refrigerant may be installed in the ducts.
- Auxiliary devices that could serve as ignition sources MUST NOT be installed in the ductwork. Examples of potential ignition sources include electrical switching devices and hot surfaces exceeding 1,292°F [700°C].
- For duct-connected appliances, a false or drop ceiling may serve as a return-air plenum only if the appliance is equipped with a Refrigerant Detection System (RDS). Any external duct connections must also be monitored with a sensor installed immediately below the return-air plenum joint.

For units using A2L refrigerants connected by ductwork to one or more rooms, verify the installation complies with the minimum room size requirements. Ensure duct and damper systems are properly designed.

Air Distribution Ducts

Install ductwork in accordance with:

- NFPA 90A
- NFPA 90B

Insulate ductwork to prevent condensation during cooling and reduce heat loss during heating. All return air must pass through a filter. Non-ducted returns may be prohibited by local codes for some applications. Size supply and return ducts to provide the required airflow while maintaining the unit's rated external static pressure.

Standard duct sizes are suitable for most installations. Consult a qualified professional for unusual layouts or long duct runs. The manufacturer is NOT responsible for performance problems caused by improper duct design or application.

Duct Insulation

Minimum insulation requirements:

- Conditioned spaces: 1.0" [25.4 mm] with vapor barrier
- Unconditioned spaces: 2.0" [50.8 mm]

Damaged insulation can cause condensation, corrosion, component failure, and property damage. Repair or replace insulation that is wet, torn, or otherwise compromised before operating the unit.

UCS* Duct Flanges

Units are shipped with flat top panels. Before installing ductwork, bend the duct flanges upward 90° as shown in **Figure 5: Duct Flange Instructions**.

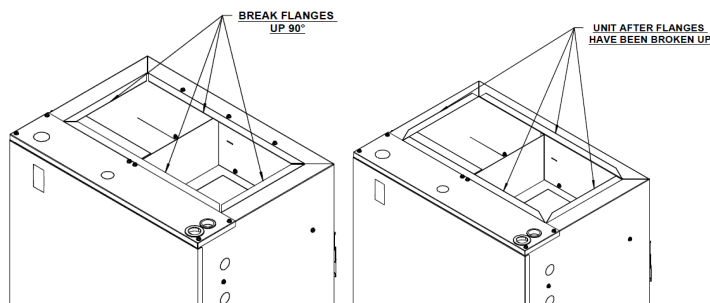


Figure 5: Duct Flange Instructions

If the connected space:

- Is smaller than the minimum room area listed for the unit, or
- Has an effective dispersal volume less than 636 ft³ [18.0 m³], the room shall:
 - Not contain continuously operating open flames, such as gas appliances.
 - Not contain ignition sources, including electric heaters or hot surfaces.

Only install flame-producing devices equipped with an effective flame arrester.

Condensate Drain

⚠ WARNING

- Hand-tighten all drain connections on plastic drain pans. Overtightening may damage the drain pan.

Route the condensate drain with a continuous downward slope away from the unit. Install a P-trap with a minimum depth of 1.5" [38.1 mm] because the drain pan operates under negative pressure. A trapped drain line is recommended for all installations, even when the return-air plenum reduces negative pressure. If an overflow shutoff switch is installed in the secondary drain line, install it in the primary drain line between the fan coil and the P-trap.

Auxiliary Condensate Switch

⚠ WARNING

- If the secondary drain is NOT installed, it must be properly plugged to prevent water leakage, which could cause structural damage or equipment failure.

Where permitted by local codes, an auxiliary condensate overflow switch may be used in place of an auxiliary drain line. For front-drain applications:

1. Remove the metal tab as shown in the installation figure.
2. Route the drain line with a continuous downward slope away from the drain pan.
3. Verify the drain line slopes continuously and drains freely
4. Install auxiliary drain pan where required.

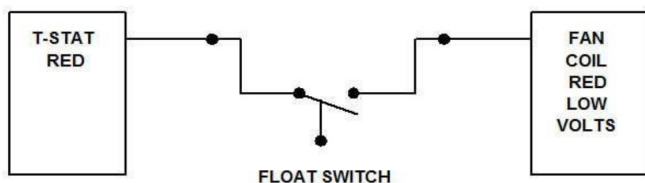


Figure 6: Float Switch

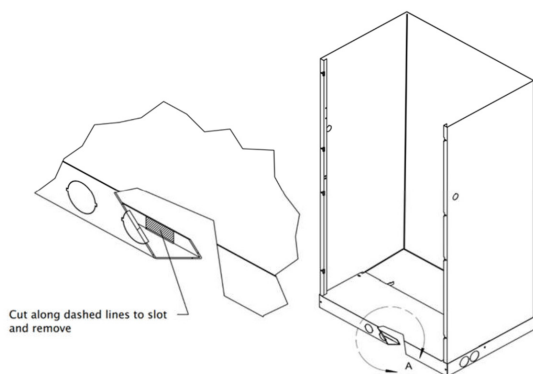


Figure 7: Front Drain Applications

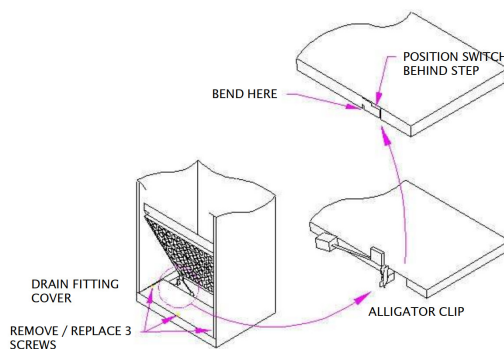


Figure 8: Auxiliary Float Switch Installation

Expansion Valve Installation

⚠ CAUTION

- Do NOT bend or reposition the coil header tubing when connecting piping to the fan coil unit. Doing so may cause tubing fractures and result in refrigerant leaks under system pressure.

Install the thermal expansion valve (TXV) with the directional arrow pointing toward the coil. Attach the sensing bulb to the vertical suction line as shown in the installation figure with the tubing positioned on top. Connect the external equalizer using a 1/4" [6.4 mm] flare connection.

Do NOT install the service valve core before connecting the equalizer line.

After installation:

1. Wrap the sensing bulb with insulation.
2. Seal the bulb completely to prevent exposure to ambient air.

These fan coils include a direct-expansion refrigerant coil. Size the liquid and suction lines in accordance with the outdoor unit manufacturer's recommendations.

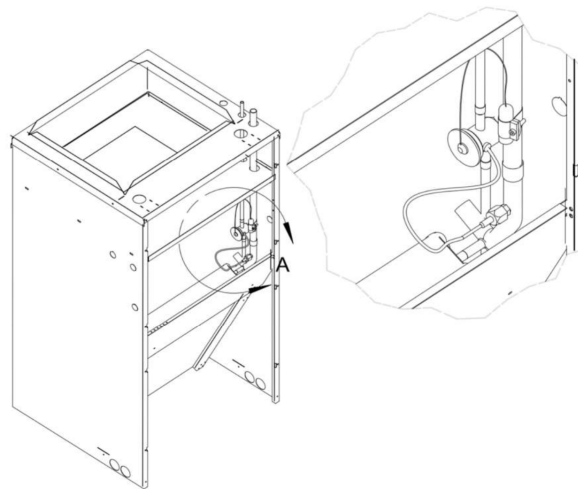


Figure 9: Thermostatic Expansion Valve Installation

Before startup:

- Remove all tools, equipment, and debris from the work area.
- Verify the unit is clean and free of foreign material.
- Verify all electrical and service access panels are installed and secured.

Motor Speed Connections

The motor operates on 24 VAC and includes five programmed speed taps. Refer to the wiring diagrams for motor speed tap connections.

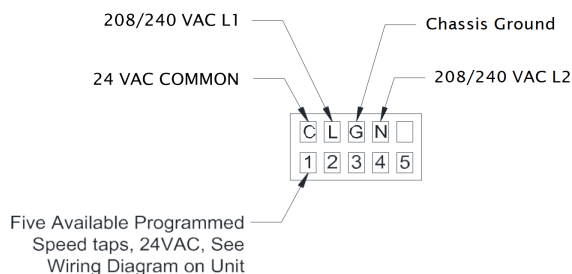


Figure 10: Brushless DC Motor Connections

Final Checks

Before servicing systems containing flammable refrigerant, verify the following:

- **Electrical Components** - Verify all electrical components are suitable for the application and meet the required specifications. Replace components only with manufacturer-approved parts. Contact the manufacturer's technical support department if component suitability is uncertain.
- **Refrigerant Charge and Room Size** - Verify the refrigerant charge is appropriate for the room where refrigerant-containing components are installed.
- **Ventilation Systems** - Verify ventilation systems and air outlets are operating correctly and are NOT blocked or restricted.
- **Secondary Refrigerant Circuits** - Verify secondary refrigerant circuits do NOT unintentionally contain refrigerant.
- **Equipment Markings** - Inspect all labels and markings. Replace any labels that are damaged or unreadable. Labels must remain visible, legible, and properly installed.
- **Refrigerant Piping and Components** - Verify refrigerant piping and components are protected from corrosive substances. Where exposure cannot be avoided, use corrosion-resistant materials or provide suitable corrosion protection.

Electrical

⚠ WARNING

⚡ ELECTRIC SHOCK HAZARD

- A means of disconnection **MUST** be provided in the fixed wiring in accordance with applicable national and local electrical codes.
- The unit cabinet **MUST** have a permanent, uninterrupted equipment ground to reduce the risk of personal injury in the event of an electrical fault. Install the grounding conductor in accordance with all applicable national and local electrical codes.
- Transformers are multi-voltage. **ALWAYS** verify the unit wiring diagram, transformer wiring diagram, and the unit nameplate voltage before making electrical connections. Incorrect wiring may result in equipment damage or improper operation.
- This unit includes a functional ground connection only and is **NOT** intended to serve as the primary safety ground.
- Use copper conductors **ONLY** for all field wiring.

Refer to the wiring diagrams and unit nameplate to determine rating of fuse or rating of circuit breaker for field wiring requirements. These units include a Class 2 transformer for the 24 VAC control circuit. Do NOT interconnect Class 2 transformer outputs. If additional Class 2 transformers are used, install a thermostat with isolating contacts.

Use the backup knockouts if needed, refer to **Figure 11: Electrical Wiring Connections** for locations.

It is important that proper electrical power is available for connection to the unit model being installed. See the unit nameplate wiring diagram and electrical data in the installation instructions. If required, install a branch circuit disconnect of adequate size, located within sight of, and readily accessible to the unit.

Important: After the Electric Heater is installed, units may be equipped with one or three 30-60 amp. circuit breakers. These breaker(s) protect the internal wiring in the event of a short circuit and serve as a disconnect. Circuit breakers installed within the unit do NOT provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

Note: Electric heat may be factory- or field-installed. For field-installed electric heat kit, unit may be installed with 30-60. The indoor unit air switch cannot be used as a circuit breaker and cannot be operated by users. Maintenance personnel need to disconnect the main switch before operation.

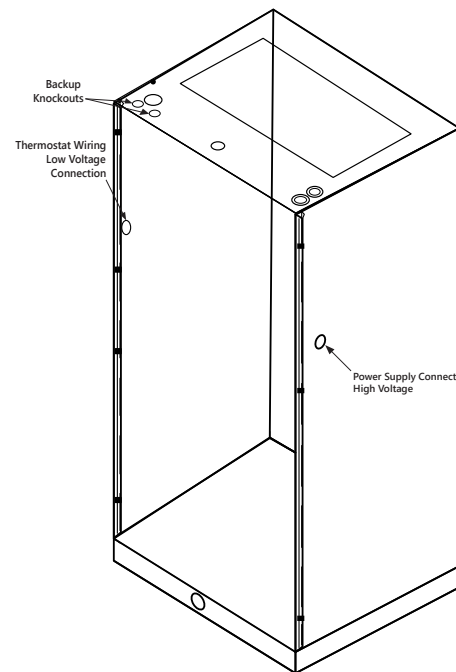


Figure 11: Electrical Wiring Connections

Performance Data

Table 1: Blower Performance: UCS*X 120V with ECM Blower

Unit Size	Speed Tap	Static Pressure (SCFM vs. Static)				
		0.1	0.2	0.3	0.4	0.5
18	T3	840	820	790	760	730
	T2	750	730	710	690	660
	T1	620	590	570	550	530
19	T3	760	730	700	670	640
	T2	680	660	640	610	590
	T1	580	560	530	500	480
20	T3	730	710	680	650	620
	T2	670	650	620	600	580
	T1	570	550	520	490	470
24	T3	870	850	830	810	790
	T2	790	770	750	730	700
	T1	680	660	640	610	590
25	T3	810	800	780	760	740
	T2	730	720	700	680	650
	T1	640	620	590	570	550
26	T3	850	830	810	780	760
	T2	770	750	730	700	680
	T1	660	630	610	580	560
30	T3	1,100	1,080	1,060	1,030	1,010
	T2	1,020	990	970	950	920
	T1	880	850	820	790	760
31	T3	930	910	880	850	820
	T2	790	770	750	720	700
	T1	610	580	550	530	500
32	T3	1,060	1,030	990	960	920
	T2	970	930	890	860	820
	T1	820	770	730	690	660
36	T3	1,140	1,120	1,090	1,060	1,030
	T2	1,040	1,020	1,000	970	950
	T1	810	780	750	720	690
37	T3	1,080	1,050	1,010	980	940
	T2	990	960	920	880	850
	T1	750	700	660	620	580

Notes:

1. Contact factory for correct matches with outdoor units
2. Evaluated and listed for operation with no minimum clearance to combustible materials
3. Add nominal .05 static if wall panel is used

Performance Data

Table 2: Blower Performance: 120V with PSC Blower						
Unit Size	Fan Speed	Static Pressure (SCFM vs. Static)				
		0.1	0.2	0.3	0.4	0.5
18	High	790	740	710	650	610
	Medium	740	700	660	620	580
	Low	580	560	540	520	470
19	High	750	710	670	630	580
	Medium	690	660	620	590	540
	Low	540	530	500	480	450
20	High	720	690	650	610	570
	Medium	680	640	610	570	530
	Low	540	520	500	480	440
24	High	860	820	770	720	680
	Medium	830	800	750	700	660
	Low	740	700	670	620	580
25	High	770	740	700	660	610
	Medium	750	710	670	640	590
	Low	680	650	610	570	530
26	High	850	820	780	720	650
	Medium	830	790	740	690	630
	Low	730	700	660	610	560
30	High	1,090	1,040	990	940	890
	Medium	1,020	970	920	870	820
	Low	990	950	900	860	800
32	High	1,030	970	920	860	820
	Medium	1,010	960	910	850	800
	Low	990	940	890	830	780
36	High	1,090	1,040	990	940	890
	Medium	1,020	970	920	870	820
	Low	990	950	900	860	800
37	High	1,030	970	920	860	820
	Medium	1,010	960	910	850	800
	Low	990	940	890	830	780

Notes:

1. Add nominal 0.05 static if wall panel is used
2. Contact factory for correct matches with outdoor units
3. Evaluated and listed for operation with no minimum clearance to combustible materials

Wiring Diagrams

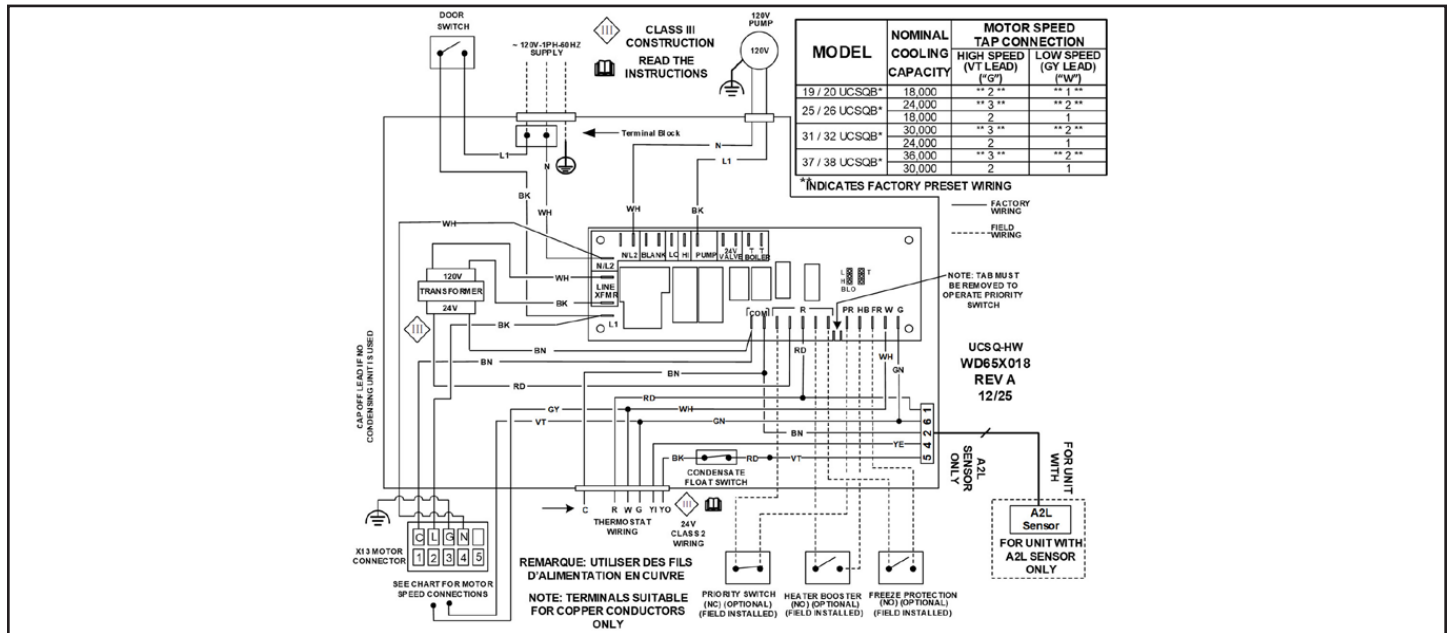


Figure 12: UCS Q-HW

Wiring Diagrams

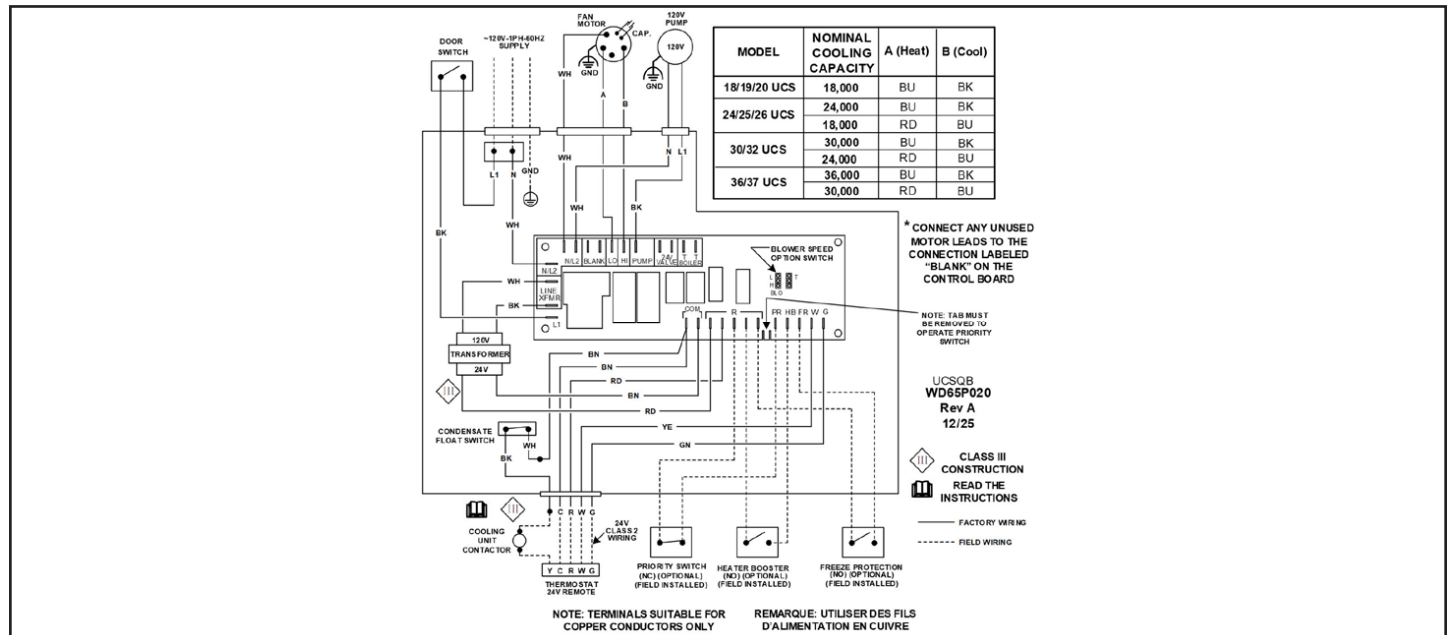


Figure 13: UCSQB-BOARD 120V, COND. SW w/o A2L

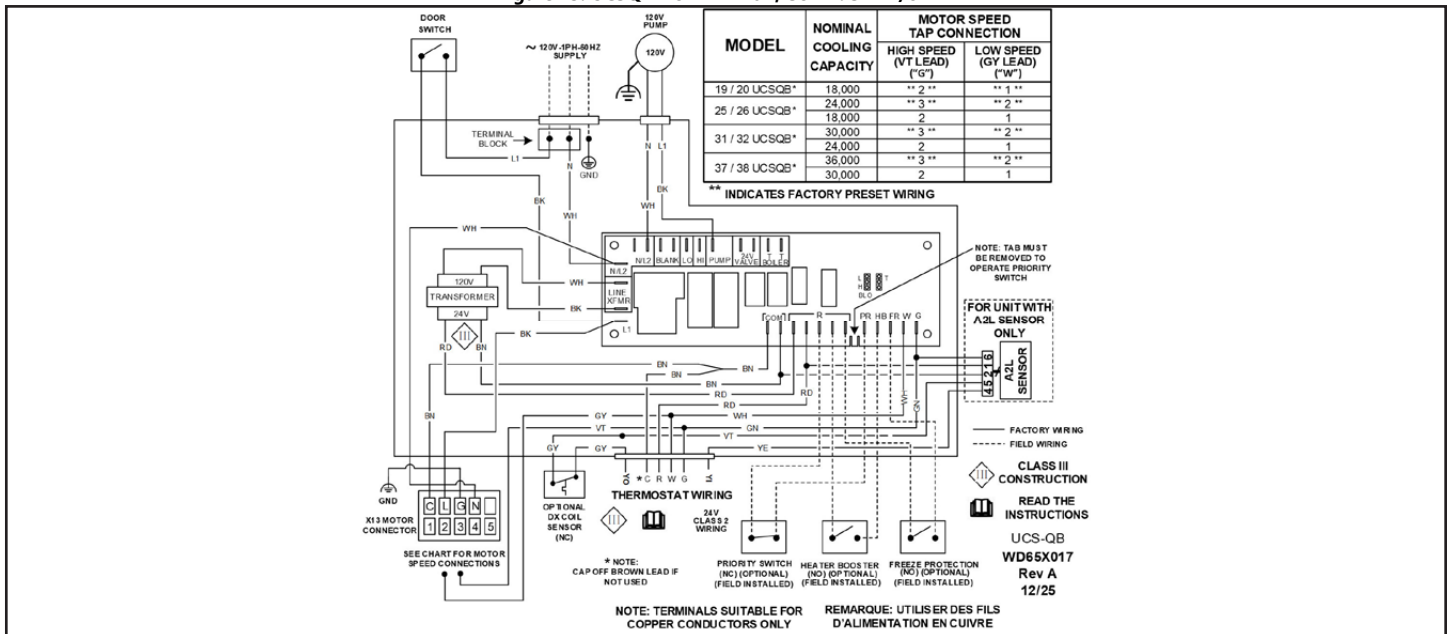


Figure 14: UCS-QB, with ECM Motor 120V

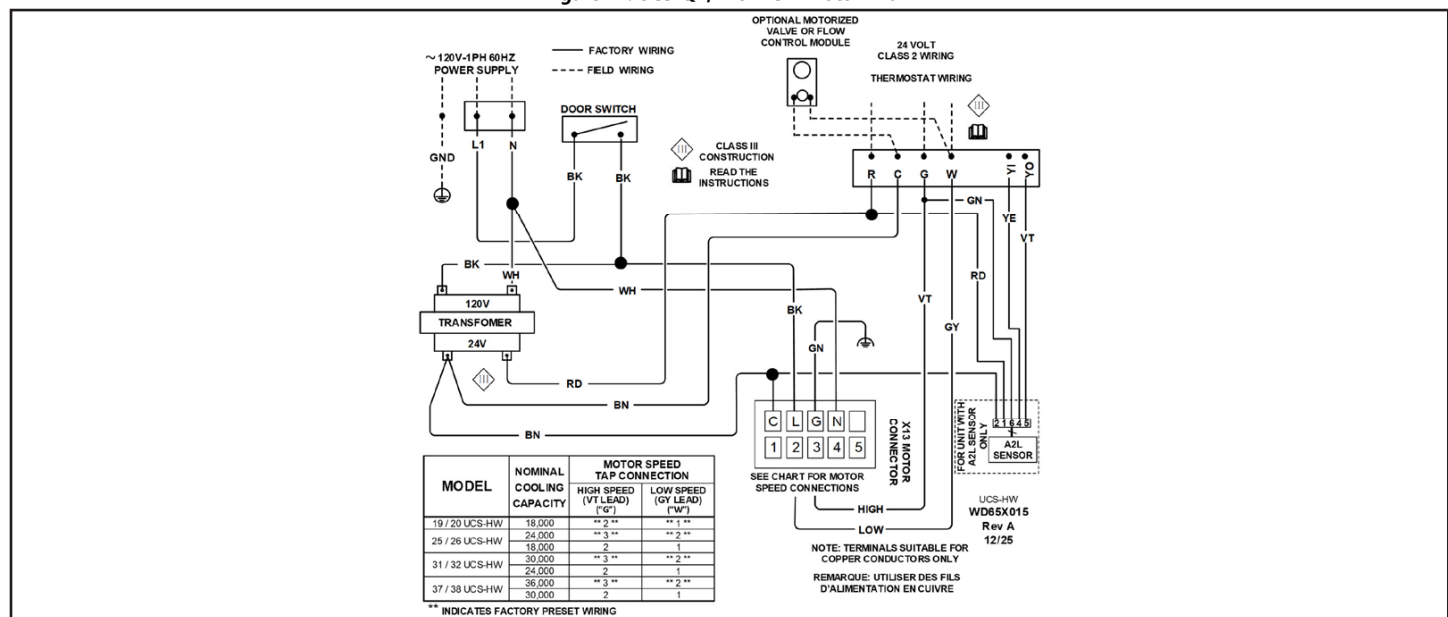


Figure 15: UCS-HW, W/ ECM MOTOR 120V

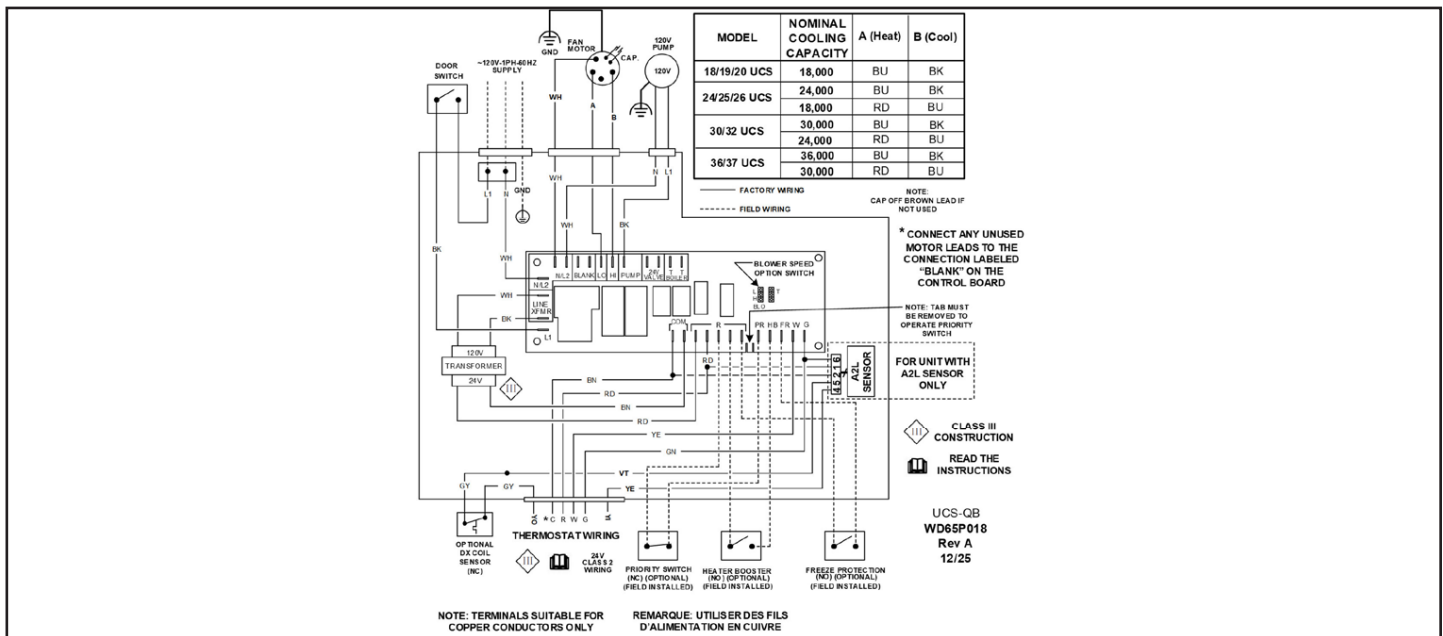


Figure 16: UCS-QB 120V BOARD, W/ EVAP SENSOR

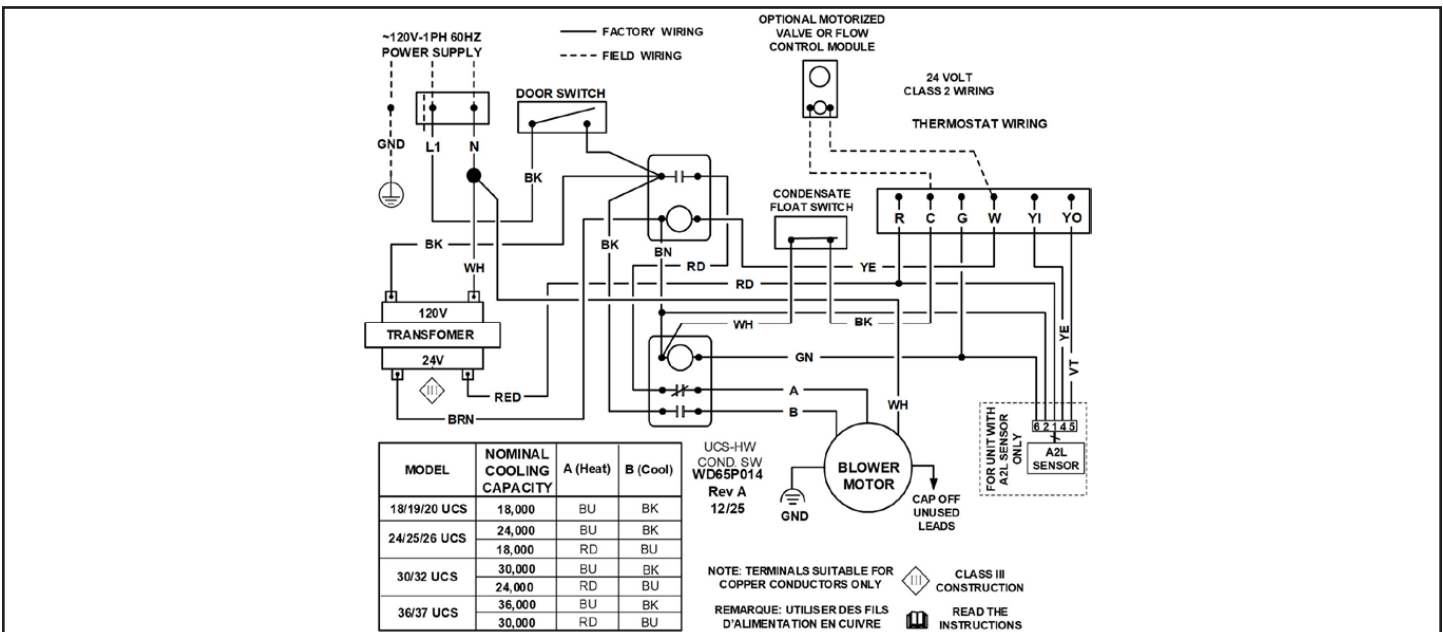


Figure 17: UCS-HW COND. SW

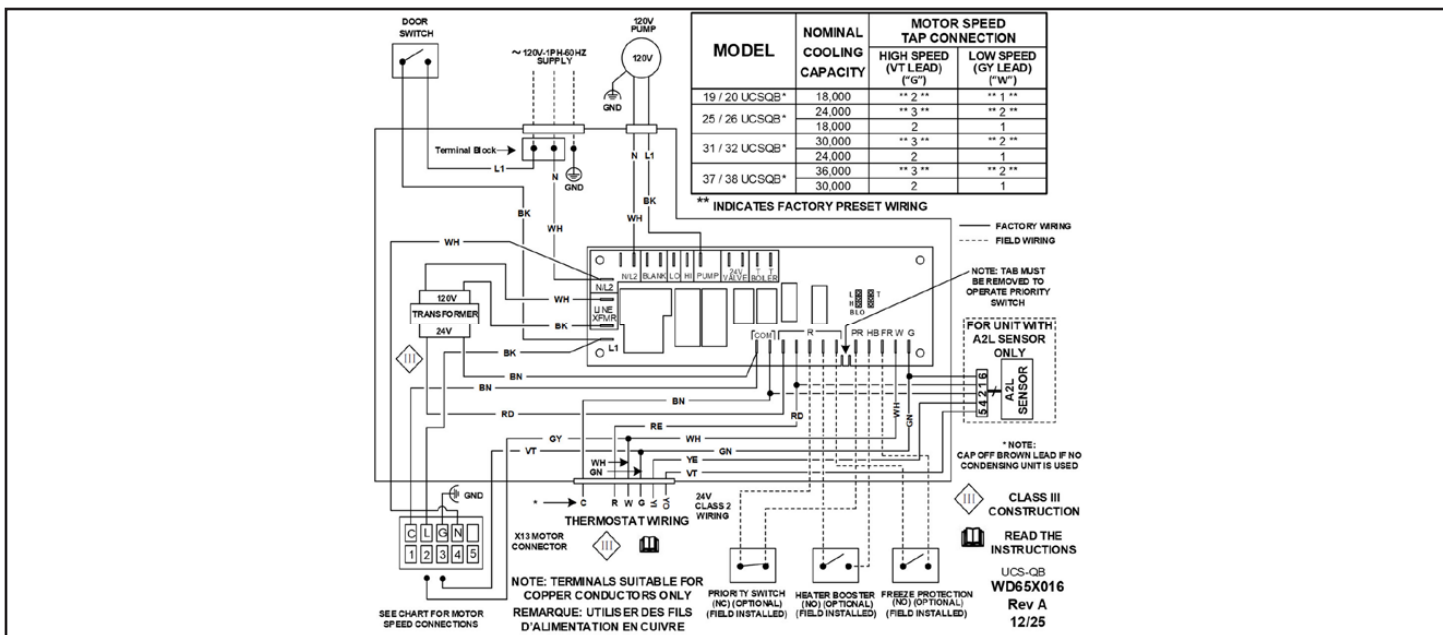


Figure 18: UCS-QB W/ ECM MOTOR 120V

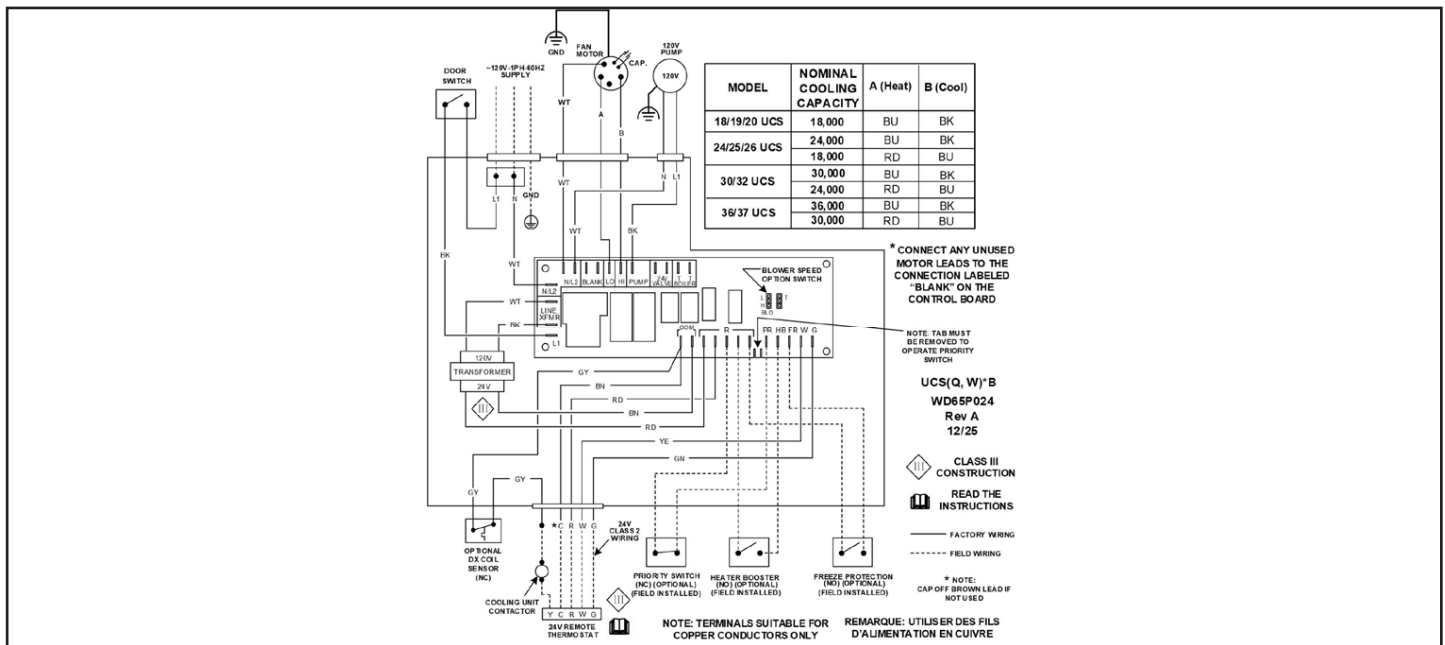


Figure 19: UCS(Q, W)*B

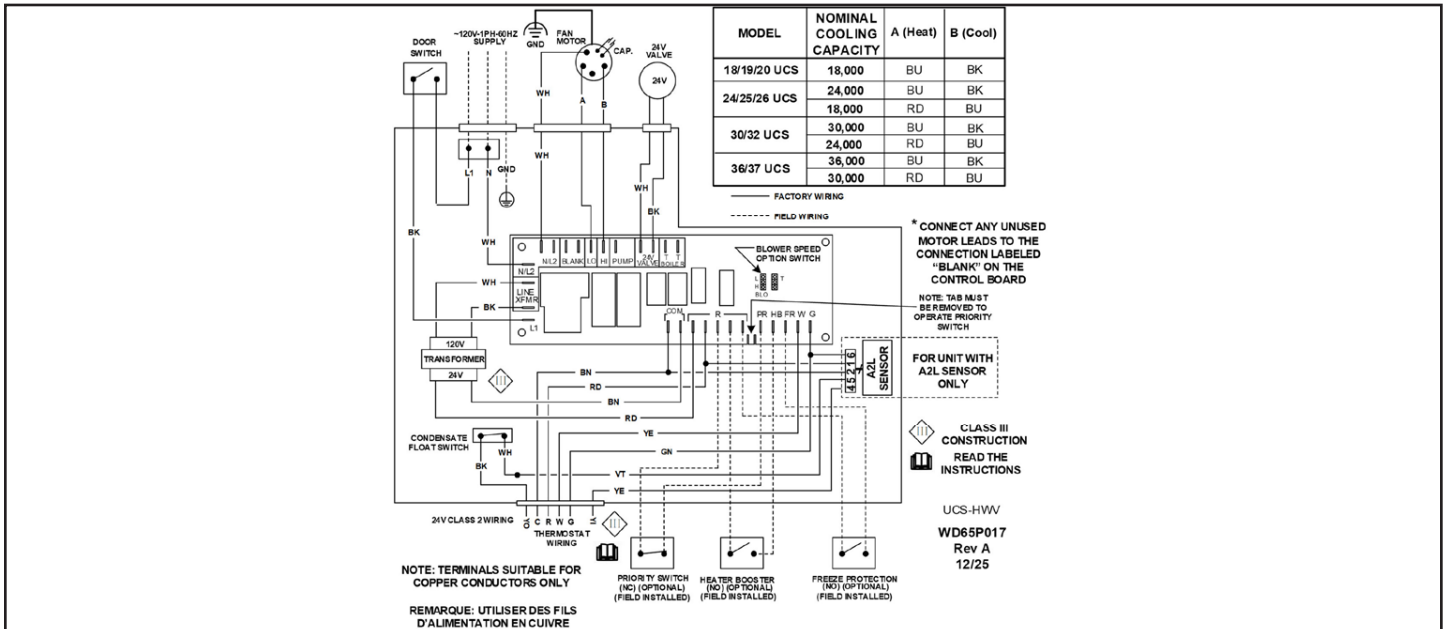


Figure 20: UCS-HW, BOARD 120V 24V VALVE COND. SW

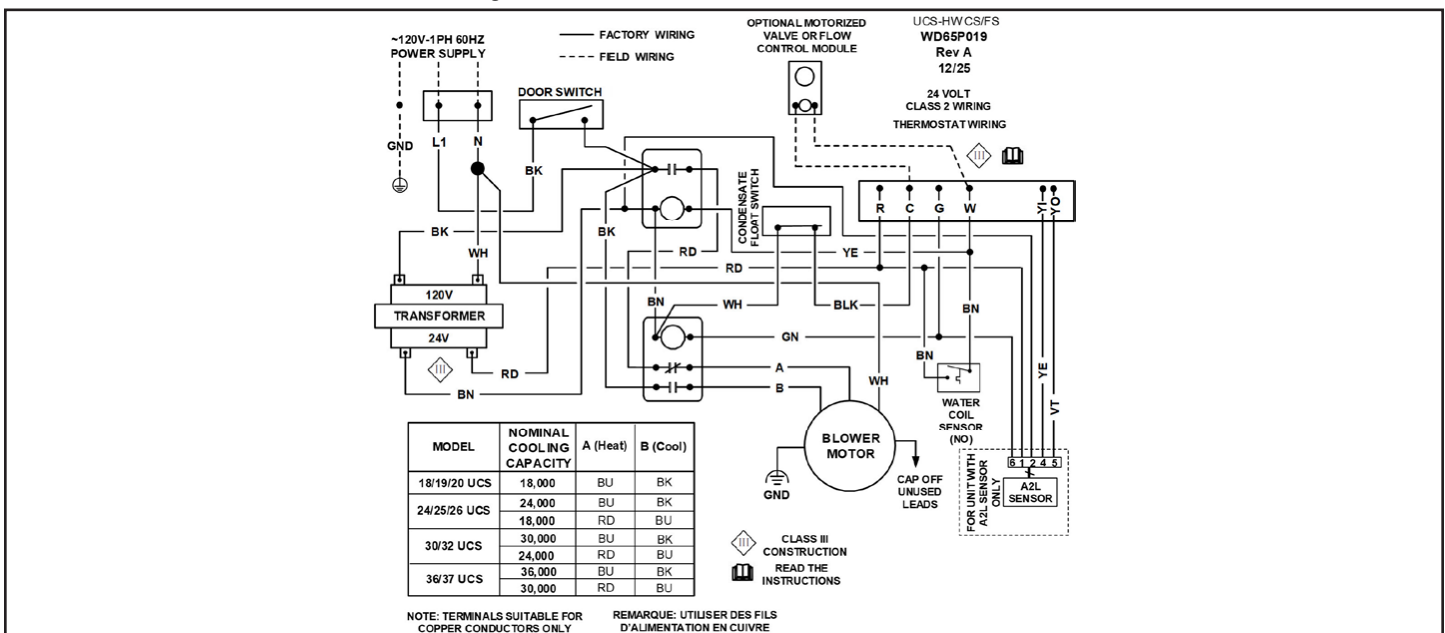


Figure 21: UCS-HW CS/FS

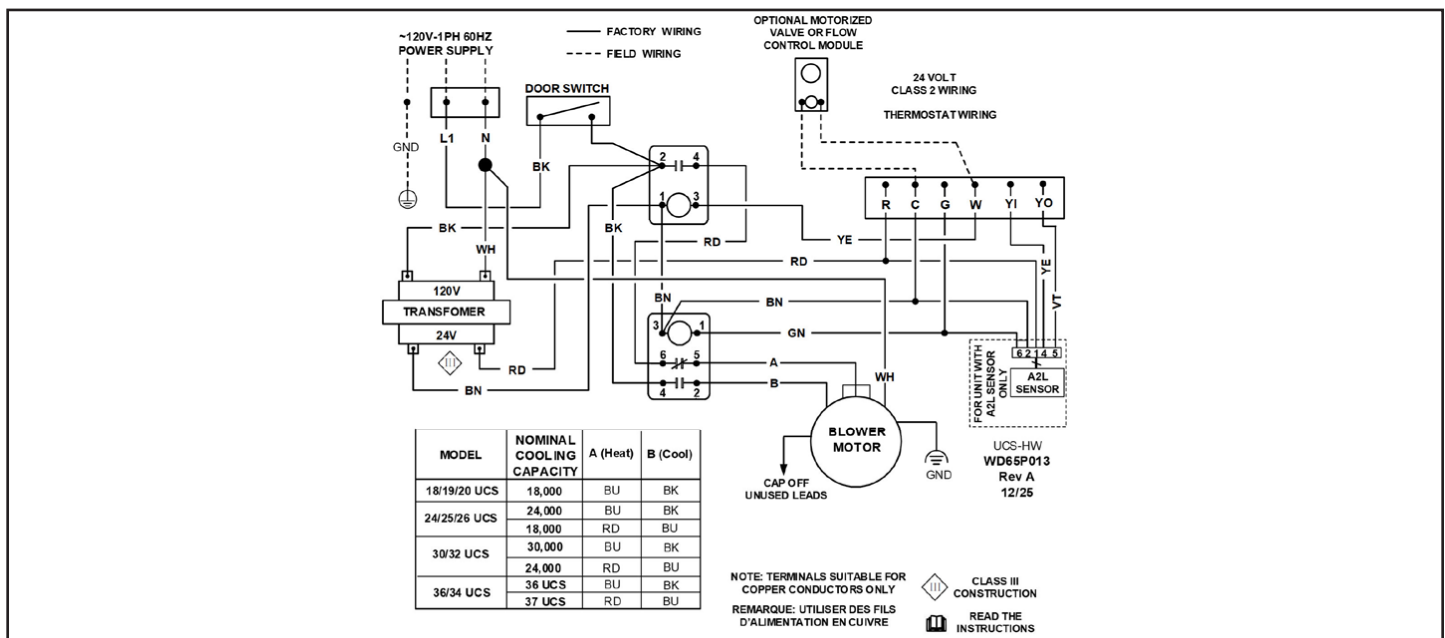


Figure 22: UCS-HW 120V

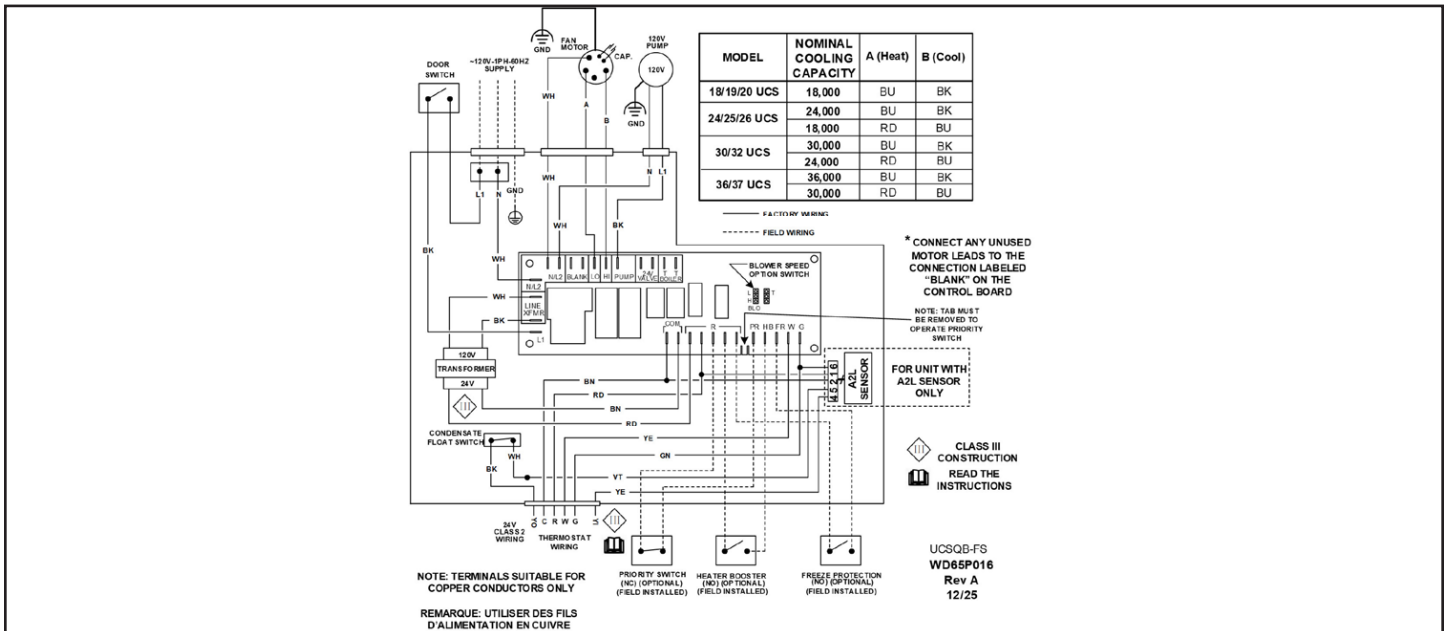


Figure 23: UCSQB, BOARD 120V COND. SW

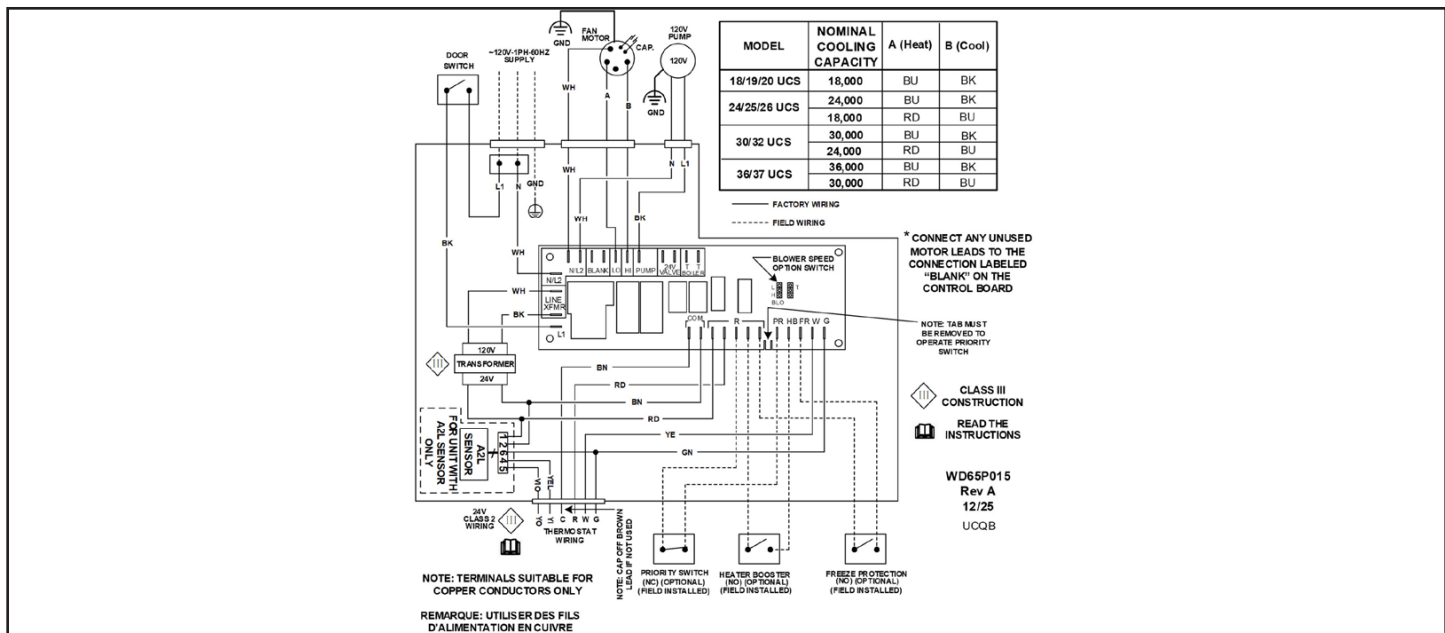


Figure 24: UCQB 120V

Refrigerant System Servicing

WARNING

FIRE OR EXPLOSION HAZARD

FLAMMABLE REFRIGERANT USED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY OR DEATH.

- Repairs MUST be performed only by trained service personnel. Do NOT puncture or damage refrigerant tubing. ONLY personnel properly trained in handling A2L refrigerants may install, decommission, or perform maintenance on this unit.
- Anyone performing work on a refrigerating system that exposes piping must NOT use any sources of ignition that could cause fire or explosion. All potential ignition sources, including smoking, MUST be kept well away from the work area during installation, repair, removal, or disposal, when refrigerant may be released. Before starting work, survey the area to ensure no flammable hazards or ignition risks are present.
- ONLY use service equipment specifically designated for use with A2L refrigerants.
- A2L refrigerants can become combustible if mixed with air at elevated temperature and/or pressure.
- When servicing this equipment, because of high pressures, make sure the reversing valve, expansion device, filter drier and other components are specifically designed for A2L refrigerants.
- When soldering or brazing, always keep a fire extinguisher readily available. When working near valves or other sensitive components, use heat shields or wet rags to protect these parts from heat exposure. Failure to protect components during soldering or brazing can result in damage to valves and other critical parts, leading to equipment malfunction or unsafe operating conditions.
- Exercise extreme caution when installing or servicing systems containing flammable refrigerants. Control the work environment to minimize the risk of ignition and ensure all personnel on site are informed of the hazards and required safety precautions.
- Ensure that all service ports are used and that every refrigerant flow-control device—including expansion valves and solenoid valves—is fully open. Failure to follow these procedures may result in serious injury or death.
- Do NOT open the service valves until the evaporator section and all connecting tubing have been installed, leak-tested, and properly evacuated. Service valves are to be opened ONLY when the system is fully prepared for operation. Premature opening may result in refrigerant loss, contamination, or system damage.
- Dispose of refrigerant properly in accordance with all federal and local regulations.
- Use tools specifically designed for A2L refrigerants. Only non-sparking tools may be used near A2L refrigerants. Open flames and other ignition sources must be avoided, except during brazing, which must be performed only on evacuated and nitrogen-purged refrigerant lines and components exposed to the atmosphere.
- Do NOT exceed the maximum operating pressure listed on the unit rating plate.
- Perform all work under a controlled procedure to minimize the risk of flammable gas or vapor being present during service.

Required Tools

Use tools approved for servicing A2L refrigerant systems.

Manifold gauge set:

- High side: 600 psig [41 bar] minimum
- Low side: 250 psig [17 bar] minimum

Open the service valves only when the system is ready for operation. Opening them too early can cause refrigerant loss, contamination, or system damage. Recover all refrigerant before making repairs on a sealed system or before disposing of the unit.

Qualified Personnel

Service must be performed by qualified personnel trained to work with A2L refrigerants and certified as required by applicable regulations.

Refrigerant Piping

Protect refrigerant piping from physical damage during installation and service. Install piping in accordance with applicable national and local codes and standards, including ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, and CSA B52. Keep all field joints accessible until they have been inspected before being covered or enclosed.

- Keep refrigerant lines between the evaporator coil and condensing unit as short as possible. Maximum line length is 50.0 ft [15.0 m].
- Use only the required line-entry knockouts and seal any unused openings to prevent air leakage.
- Protect service valves from overheating during brazing using a wet cloth.
- Route piping so it does not block access panels or interfere with motor or fan removal.
- Insulate the suction line with a minimum 0.4" [9.5 mm] thick insulation and vapor barrier. Extend the insulation 2.0 – 4.0" [50.8–127 mm] inside the unit cabinet.

Work Area Safety

Before servicing the refrigerant system:

- Eliminate ignition sources from the work area.
- Verify adequate ventilation.
- Verify the area is free of refrigerant using an approved electronic leak detector.
- Keep a dry chemical or CO₂ fire extinguisher available during hot work.
- Post NO SMOKING signs where required

Purging & Leak Testing

- Connect the suction and liquid hoses from the gauge manifold to the service valve ports.
- Use the provided hose access opening so the access panel can remain installed during testing.
- Replace the plastic plug after removing the hoses.
- Connect a cylinder of dry nitrogen to the manifold.
- Open the liquid and suction service valves.
- Allow system pressure to equalize.
- Check all brazed joints for leaks.
- Repair any leaks and repeat the test as necessary.

Do NOT use open flames or flame-based leak detectors. Use only leak detectors approved for the refrigerant or an approved leak detection solution.

Evacuation & System Preparation

Recover refrigerant in accordance with applicable regulations before opening the refrigerant circuit.

- Determine whether evacuation is required.
 - Do NOT evacuate the condensing unit if the refrigerant charge is intact. Keep the service valves closed.
- Recover refrigerant from the evaporator coil and connecting tubing.
- Connect the vacuum pump to the gauge manifold charging port.
- Start the vacuum pump and open the manifold suction valve.
- Evacuate the system to 300 microns.
- Shut off the vacuum pump and monitor system pressure.
 - If pressure rises above 500 microns, continue evacuation until the system holds at 500 microns or less.
- Close the manifold valves and disconnect the vacuum pump.
- Open the condensing unit service valves.
- Verify the system is ready for operation.

The refrigeration system is now ready for normal operation.

Charging

- Verify the system is properly grounded before charging.
- Keep charging hoses as short as practical.
- Do not mix refrigerants.
- Do not overcharge the system.
- After charging, perform a leak test and verify proper operation.
- Label the unit with the refrigerant type and charge, if required.

Refrigerant Detection Sensor (RDS)

Units using A2L refrigerants include a factory-installed RDS. If the RDS detects a refrigerant leak or sensor fault, the controller enters mitigation mode and the unit may not operate normally.

- The RDS is not field serviceable.
- Replace a failed sensor with an approved replacement part.
- Refer to the Minimum Room Size Requirements section (pgs 16-17) for RDS installation requirements and **Tables 6 - 8** for the room requirements.

Ducting

For appliances connected to rooms via ductwork using A2L refrigerants:

- The room must meet the minimum area in the unit's data table or have at least 636 ft³ [18.0 m³] effective dispersal volume.
- If the room is smaller, it must have no open flames or ignition sources (e.g., gas appliances, electric heaters, or hot surfaces).
- Flame-producing devices may be used only if equipped with a flame arrestor.
- No potential ignition sources (hot surfaces >806°F [430°C] or electric switches) are allowed in the ductwork.

All field-made joints must remain accessible for inspection before they are covered or enclosed.

Final Leak Check

After refrigerant piping is installed:

1. Pressurize the system with nitrogen to at least 200 psig.
2. Pressure must remain stable for a minimum of 1 hour. Do NOT use leak detection products that can corrode copper tubing.
3. Evacuate the suction and liquid lines at the outdoor service valves to 500 microns.
4. Isolate the vacuum pump and verify that vacuum does NOT rise above 1,500 microns within 10 minutes.

A2L Sensor Replacement Procedure

1. Remove the front bottom panel to access the coil.
2. Disconnect the A2L harness from the existing sensor.
3. Remove the sensor by loosening the two mounting screws.
4. Keep the screws for reuse.
5. Install the new sensor using the same two screws.
6. Do NOT screw into the coil or tubing.
7. Reconnect the A2L harness to the new sensor.



Figure 25: First A2L Sensor Mounting and Placement

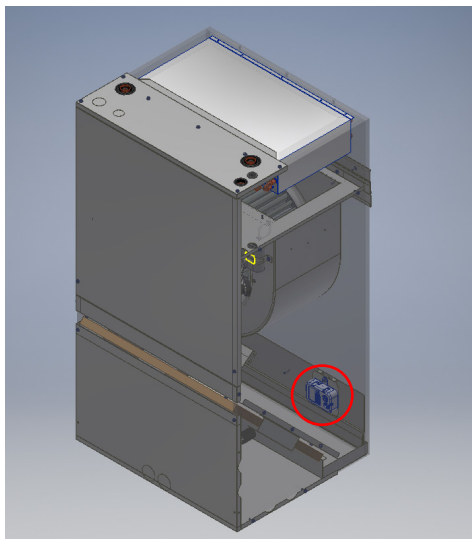


Figure 26: Alternate A2L Sensor Placement

Operation & Maintenance

⚠ WARNING

🔥 FIRE OR EXPLOSION HAZARD

FLAMMABLE REFRIGERANT USED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY OR DEATH.

- Service on this equipment shall be performed ONLY by personnel who are properly trained and qualified in the installation, adjustment, servicing, maintenance, or repair procedures described in this manual. Where licensing is required, service MUST be performed ONLY by licensed personnel. The manufacturer assumes no responsibility for injury or property damage resulting from improper service or procedures.
- Appropriate PPE MUST be worn when servicing or maintaining this unit. Sharp metal edges, moving components, and hot or cold surfaces may cause personal injury.
- Minimize ignition risks and make sure all personnel understand the hazards and safety requirements for working with flammable refrigerants.
- Recover all refrigerant before performing sealed system repairs or before disposing of the unit. Use all service ports and ensure all refrigerant control devices, including expansion and solenoid valves, are fully open.
- Sealed electrical and intrinsically safe components MUST be replaced, NOT repaired.
- Repair and maintenance to electrical components MUST include initial safety checks and component inspection procedures.

Qualified Personnel

Service must be performed only by qualified personnel. Technicians must be certified by recognized training organizations or manufacturers, as required by applicable regulations. Certification must be documented.

Refrigerant Charge

Units are factory charged with refrigerant and use a thermostatic expansion valve (TXV) to control refrigerant flow. For best results, check the refrigerant charge with an outdoor temperature above 70.0°F [21.1°C] and an indoor temperature between 70.0°F and 80.0°F [21.1°C and 26.7°C].

Partial Refrigerant Charge

The total system refrigerant charge is listed on the unit nameplate. For partial charging, verify refrigerant charge using the subcooling and superheat method. Alternatively, recover the refrigerant and recharge the system by weight to the nameplate charge. Operate the unit in cooling mode for at least 15 minutes before taking measurements. Connect refrigerant gauges to the liquid and suction service ports.

Subcooling

1. Attach an insulated temperature sensor to the liquid line near the TXV inlet.
2. Record the liquid line temperature.
3. Record the saturated liquid temperature corresponding to the measured liquid pressure.

Actual Subcooling = Saturated Liquid Temperature – Liquid Line Temperature

Superheat

1. Attach an insulated temperature sensor to the suction line near the compressor.
2. Record the suction line temperature.
3. Record the saturated suction temperature corresponding to the measured suction pressure.

Actual Superheat = Suction Line Temperature – Saturated Suction Temperature

Compare the measured values to the target subcooling and superheat.

Adjustments

- Low subcooling / Low superheat – Turn the TXV adjustment stem clockwise 1/4 turn.
- Low subcooling / High superheat – Add refrigerant.
- High subcooling / High superheat – Turn the TXV adjustment stem counterclockwise 1/4 turn.
- High subcooling / Low superheat – Turn the TXV adjustment stem clockwise 1/4 turn and recover a small amount of refrigerant.

Allow the system to stabilize after each adjustment before rechecking the refrigerant charge.

Preventive Maintenance

To ensure maximum performance, reliability, and service life, a formal preventive maintenance schedule shall be established and followed.

Table 4: Preventive Maintenance Schedule		
Component	Maintenance Task	Interval
Air Filters	Inspect and clean or replace as required	Monthly
Blower Assembly	Inspect blower wheel for dirt accumulation; check set screws and rotation	Quarterly
Electrical Connections	Inspect for tightness, discoloration, or damage	Semiannually
Condensate Drain System	Inspect drain pan, trap, and piping; clean and test for proper drainage	Quarterly
Condensate Overflow Sensor	Verify proper operation and positioning	Semiannually
Refrigerant Circuit	Inspect for signs of leakage or oil residue	Annually
Safety Controls & Sensors	Verify operation of pressure switches, temperature sensors, and protections	Annually
Controls & Setpoints	Verify control settings, DIP switches, and sequence of operation	Annually
General Unit Condition	Inspect cabinet, panels, fasteners, and seals	Annually
Water Coil	Inspect for fouling, corrosion, or leaks	Semiannually
Water Piping	Inspect insulation, fittings, and connections for leaks	Semiannually
Air Venting (Water Coil)	Verify all trapped air has been purged	At Startup and Annually
Compressor	Observe operation for abnormal noise or vibration	Annually

Fan

Inspect and clean the fan assembly annually along with the motor and bearings. Keep the fan and motor clean and free of obstructions to prevent vibration and improper operation.

Motor

Check motor connections to ensure that they are secure and made in accordance with the wiring diagram. The blower motor should be cleaned annually. With DC motors, high voltage power is applied at all times.

Air Filter

Clean or replace the air filter every 30 days, or more often in severe conditions. Use only the same type and size as specified.

Coil

Clean all coil surfaces to remove dirt and debris that may reduce airflow or heat transfer. Use approved cleaning methods and avoid damaging coil fins.

Condensate Drain Pan And Pipe

Inspect and clean the drain pan. Ensure the drain line is clear and free-flowing.

Cabling

Check all wiring for wear, corrosion, vibration damage, or contact with sharp edges. Consider long-term effects such as aging and vibration from components like fans and compressors.

Filter

Inspect the air filter regularly. Replace or clean the filter at least every 30 days, or more often in dusty environments. Always use the same filter type and rating specified for the unit.

Maintenance Updates

Check regularly for the most current copy of the unit's IOM, which can be found at firstco.com.

Unit Performance

Record operating voltage, current, and heating and cooling temperature differences during startup and service. Compare current readings with previous records to monitor system performance.

Unit Lockout

The controller may lock out the unit to protect it from abnormal operating conditions. If a lockout occurs, inspect the following:

- Water system cleanliness
- Water flow
- Water temperature
- Airflow, including filter condition
- Entering and leaving air temperatures

Correct any identified deficiencies before returning the unit to service.

Pump Replacement

1. Disconnect power to the unit.
2. Close the water isolation valves and relieve system pressure.
3. Disconnect the pump 115 VAC power leads.
4. Remove the four hex-head fasteners securing the pump motor to the volute.
5. Remove the pump motor.

To reinstall, reverse the above steps. Ensure the rubber O-ring is properly installed between the pump and volute before assembly.

Check Valve Replacement

1. Close the water isolation valves and relieve system pressure.
2. Remove the four hex-head fasteners securing the pump motor to the volute, then remove the motor.
3. Rotate the check valve to release it from the volute.
4. Remove the check valve.

To install the replacement check valve, reverse these steps. Verify the O-ring is properly seated before assembly.

Cleaning/Flushing

Before connecting the unit to the building water system, clean and flush the piping to remove dirt, debris, and contaminants.

1. Connect the supply and return water lines together to bypass the unit.
2. Start the circulating pump. Open the lowest drains while refilling the system with clean water. Flush for at least 2 hours, or until the discharge water runs clear. Inspect for leaks during flushing.
3. Drain the system completely, then refill with clean water. Test and treat the water as required. Maintain a water pH of 7.5 – 8.5 and add antifreeze if required.
4. Connect the unit supply and return piping. Verify all connections are leak-free, bring the loop to the required operating conditions, and vent all trapped air.

Electrical Safety

Before servicing electrical components:

- Verify capacitors are fully discharged.
- Ensure energized wiring is not exposed.
- Verify equipment grounding.

Do not restore power until all unsafe conditions have been corrected. Replace damaged sealed electrical components. Do not repair them.

Checking For Refrigerant

Check the work area for refrigerant before and during service.

- Use a non-sparking refrigerant detector approved for the refrigerant.
- Keep a dry chemical or CO₂ fire extinguisher available during hot work.
- Do NOT use ignition sources, including smoking, near the work area.
- Eliminate all ignition sources before servicing.

Ventilation Requirements

Provide adequate ventilation before opening the refrigerant circuit or performing hot work. Maintain ventilation throughout the service procedure. Recover refrigerant using approved recovery equipment in accordance with applicable regulations. Do not vent refrigerant to the atmosphere.

Refrigeration System Inspection

Before replacing components:

- Verify replacement parts meet the manufacturer's specifications.
- Confirm the refrigerant charge complies with room size limits for flammable refrigerants.
- Verify ventilation systems are operating and unobstructed.
- Ensure ventilation systems are working and unobstructed.
- Ensure all labels remain visible and legible.
- Protect refrigerant piping from corrosion or use corrosion-resistant materials.

Leak Detection

⚠ WARNING	
⚠ FIRE OR EXPLOSION HAZARD	
• If a refrigerant leak is suspected, immediately remove ignition sources. For repairs involving heat, recover all refrigerant or isolate the affected section using shutoff valves. Perform all recovery and evacuation procedures in accordance with approved practices. • Never use an open flame to test for refrigerant leaks when performing leak checks on refrigerant tubing or components. Always use a commercially available soap solution specifically designed for leak detection to check all connections. • Some soaps used for leak detection can be corrosive to certain metals. Thoroughly rinse all piping after completing the leak test. Do NOT use matches, candles, open flames, or any other ignition sources to check for refrigerant or gas leaks.	

Do not use open flames or flame-type leak detectors.

- Use an electronic leak detector approved for the refrigerant and calibrated in a refrigerant-free area.
- Set the leak detector to no more than 25% of the refrigerant lower flammability limit (LFL).
- Bubble or fluorescent leak detection solutions may be used. Do not use chlorine-based products.

If a leak is suspected, eliminate all ignition sources and recover the refrigerant or isolate the affected section before brazing.

Refrigerant Removal and Evacuation

When opening the refrigerant circuit:

- Recover refrigerant in accordance with applicable regulations.
- Purge the system with oxygen-free nitrogen as required.
- Evacuate the system if required.
- Maintain an oxygen-free nitrogen purge while brazing.
- Open the refrigerant circuit by cutting or brazing as required.

Store recovered refrigerant in approved cylinders. Do not use compressed air or oxygen for purging. After the final purge, return the system to atmospheric pressure before servicing. Keep the vacuum pump discharge away from ignition sources and maintain adequate ventilation.

Charging

Follow standard charging procedures and these additional requirements for flammable refrigerants:

- Prevent refrigerant cross-contamination.
- Keep charging hoses as short as practical.
- Secure refrigerant cylinders.
- Verify the system is properly grounded before charging.
- Label the system with the refrigerant type and charge, if required.
- Do not overcharge the system.

After charging, pressure-test the system with an inert gas, perform a leak test, and verify proper operation before returning the unit to service.

Decommissioning

Decommission the unit only by qualified personnel familiar with the equipment and applicable safety requirements. Recover and handle refrigerant in accordance with all applicable local, national, and international regulations. If refrigerant analysis or reuse certification is required, obtain refrigerant and oil samples before recovery.

Preparation

1. Review the unit operation, wiring diagrams, and service history.
2. Disconnect and lock out electrical power.
3. Verify recovery equipment and lifting devices meet applicable safety requirements.
4. Wear the required personal protective equipment (PPE).

Refrigerant Recovery

5. Pump down the system, if possible.
6. Connect approved recovery equipment and recovery cylinders.
7. Recover the refrigerant using calibrated scales.
8. Do not exceed 80% cylinder capacity or the cylinder maximum working pressure.
9. Do not mix different refrigerants in the same recovery cylinder.

Use only approved recovery cylinders equipped with pressure relief and shutoff valves. Verify recovery equipment is suitable for the refrigerant and all hoses and connections are in good condition.

Completion

1. Close all valves.
2. Cap or seal all system openings.
3. Label each recovery cylinder with the refrigerant type and quantity.
4. Remove all recovery equipment and cylinders from the work area.
5. Do not reuse recovered refrigerant unless it has been reclaimed and certified.

Labeling

After decommissioning, label the unit to indicate that all refrigerant has been removed. Include:

- Confirmation that the unit has been decommissioned and all refrigerant removed.
- Date of decommissioning.
- Name and signature of the authorized technician.

For units with flammable refrigerants, apply additional labels per applicable standards (e.g., ISO 5149, ASHRAE 15, UL/CSA 60335-2-40):

- Identify that the unit contains or previously contained flammable refrigerant.
- Keep labels clearly visible and legible.
- Place labels in a visible location on the unit.

Compressor and Oil Removal

Before removing a compressor or draining oil:

- Evacuate the system to remove refrigerant from the oil.
- Do not use ignition sources to heat components.
- Dispose of oil in accordance with applicable regulations.

Final Maintenance Reminders

To maintain safe and reliable operation:

- Inspect the system regularly.
- Keep the air filter clean.
- Confirm that all access panels are installed and secured.
- Make sure airflow is NOT restricted.
- Repair refrigerant leaks immediately.

Routine maintenance helps maintain system performance and extends equipment life.

A2L Sensing & Mitigation

⚠ WARNING

 FIRE OR EXPLOSION HAZARD

FLAMMABLE REFRIGERANT USED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN INJURY OR DEATH.

- Repairs must be performed **ONLY** by trained service personnel. If any fault indicators appear, troubleshoot and correct the issue immediately to prevent system problems.
- Do **NOT** install any devices in the ductwork that could create an ignition source, unless they are specifically approved for use with this unit. Follow the installation instructions for details.
- Dispose of refrigerant in accordance with all applicable federal, state, and local regulations.
- When the unit contains flammable refrigerant and is installed in a room smaller than the minimum specified in the Minimum Room Size and Mitigation Airflow section, the room **MUST** be free of continuously operating open flames or other potential ignition sources.
- Failure to follow proper A2L refrigerant mitigation system installation procedures may result in property damage, personal injury, or death. If any fault indicators are present, troubleshoot the system immediately to prevent malfunction.
- When a Refrigerant Leak Detection System (RDS) is installed, the unit must remain energized at all times, except during servicing. The installer must verify that the refrigerant sensor is properly installed, correctly wired, and fully operational. Failure to comply with this requirement will void the warranty and may result in fire, property damage, personal injury, or death.
- For duct-connected appliances, a false or drop ceiling may serve as a return-air plenum only if the appliance is equipped with an RDS. Any external duct connections must also be monitored with a sensor installed immediately below the return-air plenum joint.

Units containing more than 4.0 lbs. [1.8 kg] of R-454B (A2L) refrigerant are factory-equipped with a refrigerant leak detection system installed at the evaporator coil, in accordance with UL 60335-2-40 requirements. If the sensor detects refrigerant above the set limit, the system will:

- Turn off the compressor.
- Turn on the evaporator fan to help dilute and disperse refrigerant.

The unit will stay in this safety mode for at least 5 minutes and until refrigerant levels drop below the limit. Once the level is safe and no refrigerant is detected, the unit will automatically return to normal operation based on the thermostat. An LED indicator on the sensor shows system status. Refer to the status table for LED meanings.

Sensor Status Indicator

The refrigerant detection sensor includes an LED status light used for diagnostics. The LED indicates the operating condition of the refrigerant detection system. Refer to the status table for descriptions of the LED signals.

Table 5: Status Light for Refrigerant Detection System (RDS)		
Status Light	State/Condition	System Response
Solid Green	Normal Operation	• Sensor is in startup mode.
Blinking Green	Normal Operation	• The system is actively monitoring refrigerant levels. • No refrigerant detected above the activation threshold. • Outdoor unit compressor and indoor blower operate normally.
Solid Red	Refrigerant Leak Detected	• Refrigerant concentration exceeds the activation threshold. • The outdoor unit compressor (Y) is turned off to prevent further circulation of refrigerant. • The indoor blower is turned on to recirculate air and mitigate the refrigerant concentration.
Blinking Red	Fault Detected	• A fault in the refrigerant detection system (e.g., calibration issue, end-of-life) has been detected. • The outdoor unit compressor (Y) and indoor blower mitigation mode are deactivated for safety. • System requires inspection or replacement.
No Light	System Off or Malfunction	• The system is not operational. • Check the power supply and all system connections.
Blinking Amber	System Initializing	• The system is warming up after power-up. • The outdoor unit compressor (Y) and indoor blower mitigation mode remain inactive during this phase. • Transitions to green blinking when monitoring begins.

Sensor Service

If the refrigerant detection sensor must be replaced, follow the sensor replacement procedure. After installing a new sensor:

1. Restore power to the unit.
2. Confirm the LED indicates normal operation.
3. Verify that the system operates correctly.

Refrigerant Dispersal

The system uses the indoor blower to help disperse refrigerant if a leak is detected. Proper airflow is required for effective mitigation. Make sure the following conditions are met:

- Supply and return duct systems are installed correctly.
- Airflow meets the unit's design requirements.
- Air filters are clean and installed correctly.
- Ductwork is NOT blocked or restricted.

Restricted airflow may reduce the system's ability to disperse refrigerant.

System Restart After Mitigation

If the refrigerant detection system enters mitigation mode:

1. The compressor will stop.
2. The indoor blower will operate to disperse refrigerant.

The system will remain in mitigation mode until the refrigerant level drops below the detection limit. After the sensor no longer detects refrigerant:

1. The blower will continue running for at least 5 minutes.
2. After this delay, the system may restart if the thermostat is calling for operation.

Follow all installation requirements and applicable codes when evaluating room size. Units are compatible with both A1 and A2L refrigerants. When using A2L refrigerants, additional critical components are required. If the unit is NOT factory-configured for A2L refrigerants, a field-installed kit, designed for the specific refrigerant, must be installed to ensure that any refrigerant leak is properly detected and automatically mitigated.

Units charged with A2L refrigerants also require:

- A minimum room size for safe operation.
- A minimum mitigation airflow to ensure proper dispersion of leaked refrigerant.

Both the minimum room size and required mitigation airflow are determined based on the total refrigerant charge, which is the sum of:

- The charge listed on the outdoor unit nameplate.
- Any additional refrigerant added during system installation.

Minimum Room Size Requirements

Systems using A2L refrigerants must be installed in rooms that meet the minimum room size requirements listed in the unit physical data tables. These limits help prevent refrigerant concentration from reaching hazardous levels if a leak occurs.

When determining the room size:

- Include the total volume of the space where the unit is installed.
- Consider any connected spaces if air can freely move between them.

Table 6: Altitude Correction Factor		
Altitude		Adjustment Factor (AF)
m	ft	
0 - 600	0 - 1,968	1.0
800	2,625	1.02
1,000	3,281	1.05
1,200	3,970	1.07
1,400	4,693	1.10
1,600	5,349	1.12
1,800	5,906	1.15
2,000	6,562	1.18
2,200	7,218	1.21
2,400	7,874	1.25
2,600	8,530	1.28
2,800	9,186	1.32
3,000	9,843	1.36
3,200	10,499	1.40

Table 7: R-454B: Minimum Airflow and Room Size by Charge					
System charge of R-454B		Minimum Room Area		Min. Mitigation Airflow	
kg	lbs	m ²	ft ²	m ³ /hr	CFM
1.81	4.0	5.57	60	184	108
2.27	5.0	6.96	75	230	135
2.72	6.0	8.36	90	276	162
3.17	7.0	9.75	105	322	189
3.63	8.0	11.14	120	368	216
4.08	9.0	12.54	135	414	243
4.54	10.0	13.93	150	460	271
4.99	11.0	15.32	165	506	298
5.44	12.0	16.71	180	552	325
5.90	13.0	18.11	195	598	352
6.35	14.0	19.50	210	644	379
6.80	15.0	20.89	225	689	406
7.26	16.0	22.29	240	735	433
7.71	17.0	23.68	255	781	460
8.16	18.0	25.07	270	827	487
8.62	19.0	26.46	285	873	514
9.07	20.0	27.86	300	919	541
9.52	21.0	29.25	315	965	568
9.98	22.0	30.64	330	1,011	595
10.43	23.0	32.04	345	1,057	622
10.88	24.0	33.43	360	1,103	649
11.34	25.0	34.82	375	1,149	676

Table 8: R-32: Minimum Airflow and Room Size by Charge					
System charge of R-32		Minimum Room Area		Min. Mitigation Airflow	
kg	lbs	m ²	ft ²	m ³ /hr	CFM
1.81	4.0	5.39	58	178	105
2.27	5.0	6.74	72	222	131
2.72	6.0	8.08	87	267	157
3.17	7.0	9.43	101	311	183
3.63	8.0	10.78	116	356	209
4.08	9.0	12.13	130	400	236
4.54	10.0	13.47	145	445	262
4.99	11.0	14.82	159	489	288
5.44	12.0	16.17	174	534	314
5.90	13.0	17.52	188	578	340
6.35	14.0	18.86	203	622	366
6.80	15.0	20.21	217	667	393
7.26	16.0	21.56	232	711	419
7.71	17.0	22.90	246	756	445
8.16	18.0	24.25	261	800	471
8.62	19.0	25.60	275	845	497
9.07	20.0	26.95	290	889	523
9.52	21.0	28.29	304	934	550
9.98	22.0	29.64	319	978	576
10.43	23.0	30.99	333	1,023	602
10.88	24.0	32.34	348	1,067	628
11.34	25.0	33.68	362	1,112	654

Startup Instructions

WARNING

ELECTRIC SHOCK HAZARD

- Connect the equipment grounding conductor to the terminal marked with the ground symbol to properly ground the fan coil.
- Failure to properly ground the unit may result in serious injury or death.
- Always disconnect and lock out power before servicing. Verify the unit is de-energized using an approved electrical test device before beginning work.

WARNING

FIRE OR EXPLOSION HAZARD

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

- Do NOT perform any sealed-system repair until the entire refrigerant charge has been fully recovered. Refrigerant-oil mixtures can ignite when exposed to brazing torch flames.
- Recover the complete refrigerant charge from both the high- and low-pressure sides of the system, then purge the sealed system with nitrogen before brazing any component or tubing.
- Do NOT mix refrigerant with air for leak testing or any other purpose. Introducing air into a refrigerant system can create a combustible mixture under pressure, resulting in fire, explosion, or severe equipment damage.
- Use only manufacturer-approved leak-testing methods.

CAUTION

- Field-installed devices, including fan switches and thermostats, MUST be wired in accordance with the supplied wiring diagram.
- Improper wiring may damage system components and will void the warranty.

Pre-Start Checks

Before starting the unit, perform the following checks:

- The fan coil is securely mounted and sloped toward the condensate drain.
- The condensate drain line is properly sized, routed, trapped, and sloped.
- The drain line has been leak-tested and drains properly.
- A clean air filter is installed.
- All access panels are installed and secured.
- All refrigerant piping connections are leak-free.
- Refrigerant lines are fully insulated to prevent condensation.
- All cabinet openings are sealed, including:
 - Knockouts
 - Wiring entries
 - Piping openings

Sealing cabinet openings helps reduce air leakage and prevent condensation.

Warranty Notice

The warranty may be void unless the Startup & Performance Checklist is completed and returned to the warrantor. Improper installation may void the warranty, and the manufacturer is NOT responsible for failures resulting from improper installation.

Startup & Performance Checklist

For extended warranty registration, email form to returns@firstco.com For startup assistance, email form to techsupport@firstco.com

Customer: _____ Date: _____ Startup Date: _____

Address: _____ Phone #: _____

Installing Contractor: _____ Technician: _____

Model #: _____ Serial #: (Ex: A-12-B-345678) _____

Air Handler Information:

Brand: _____ Model Number: _____ Serial Number: _____

Metering Device: Piston ☐ TXV Hard Shut-off TXV ☐ Rapid Bleed ☐

Multi-voltage: _____ Amps: _____

Cooling Speed: _____ Heating Speed: _____

Evaporator Coil Temperatures:

Evaporator Coil EAT Dry Bulb: _____ Evaporator Coil LAT Dry Bulb: _____ Delta: _____

Evaporator Coil EAT Wet Bulb: _____ Evaporator Coil LAT Wet Bulb: _____ Delta: _____

Condensing Unit:

Unit Voltage: _____ Compressor Voltage: _____

Amps: _____ Discharge Line Temp: _____

Min Circuit Amps (MCA): _____ Max Overcurrent Amps (MCO): _____

Breaker/Fuse Size: _____ Wire Size: _____

Start Kit: Yes ☐ No ☐

Recommended: Kickstart or similar kit with a potential relay only—do NOT use solid state kits.

Refrigerant Pressures/Temperatures:

Outdoor Ambient Temp: _____

Low Side PSIG:_____ {Vapor Line Temp:___ minus Saturated Temp: __ = __ degrees of Superheat}

High Side PSIG:_____ {Saturated Temp:___ minus Liquid Line Temp: __ = __ degrees of Subcooling}

Problem Summary

Corrective Actions Taken

[illegible]

In accordance with its policy of continuous product improvement, First Co. reserve the right to modify, change, or discontinue specifications or designs at any time without notice and without incurring obligation. The warranty shall be considered void unless the Startup & Performance Checklist is properly completed and submitted to the warrantor. In addition, any failure to install the unit in accordance with the manufacturer's published instructions and applicable codes shall render the warranty null and void. The manufacturer shall NOT be held liable for any damages, failures, or performance issues arising from improper installation, adjustment, or application of the equipment.