YORK®
Heating and Air Conditioning

# *INSTALLATION MANUAL*

**AFFINITY CONSOLE**
**COMMERCIAL GEOTHERMAL/**
**WATER SOURCE HEAT PUMPS**
**SINGLE CAPACITY**

**MODELS:**
**YC09 - 18**
**(.75 THRU 1.5 NOMINAL TONS)**

AHRI CERTIFIED™ www.ahridirectory.org
Water Source HP
ANSI/AHRI/ASHRAE/ISO13256-1

C ETL LISTED®

Due to continuous product improvement, specifications are subject to change without notice.

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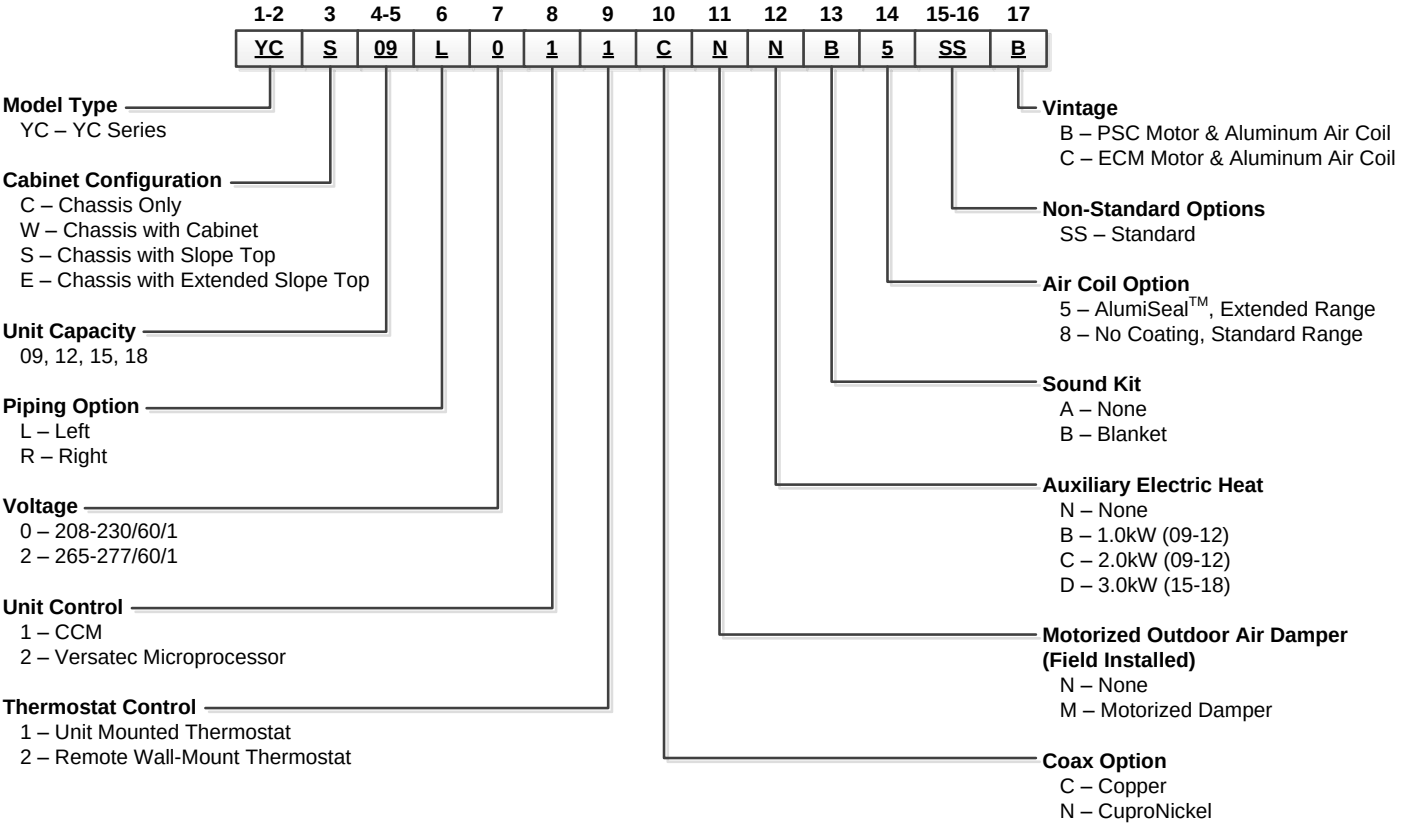
# Model Nomenclature




**Note:** Chassis only available with left piping option

**Rev.:** 02 March 2014D

# General Installation Information

## Safety Considerations

**WARNING: Before performing service or maintenance operations on a system, turn off main power switches to the indoor unit. If applicable, turn off the accessory heater power switch. Electrical shock could cause personal injury.**

Installing and servicing heating and air conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair or service heating and air conditioning equipment. Untrained personnel can perform the basic maintenance functions of cleaning coils and cleaning and replacing filters. All other operations should be performed by trained service personnel. When working on heating and air conditioning equipment, observe precautions in the literature, tags and labels attached to the unit and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing operations and have a fire extinguisher available.

### Moving and Storage

Move units in the normal “up” orientation. Do not stack units. When the equipment is received, all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Examine units for shipping damage, removing the units from the packaging if necessary. Units in question should also be internally inspected. If any damage is noted, the carrier should make the proper notation on the delivery receipt, acknowledging the damage.

### Water Piping

The proper water flow must be provided to each unit whenever the unit operates. To assure proper flow, use pressure/temperature ports to determine the flow rate. These ports should be located at the supply and return water connections on the unit. The proper flow rate cannot be accurately set without measuring the water pressure drop through the refrigerant-to-water heat exchanger.

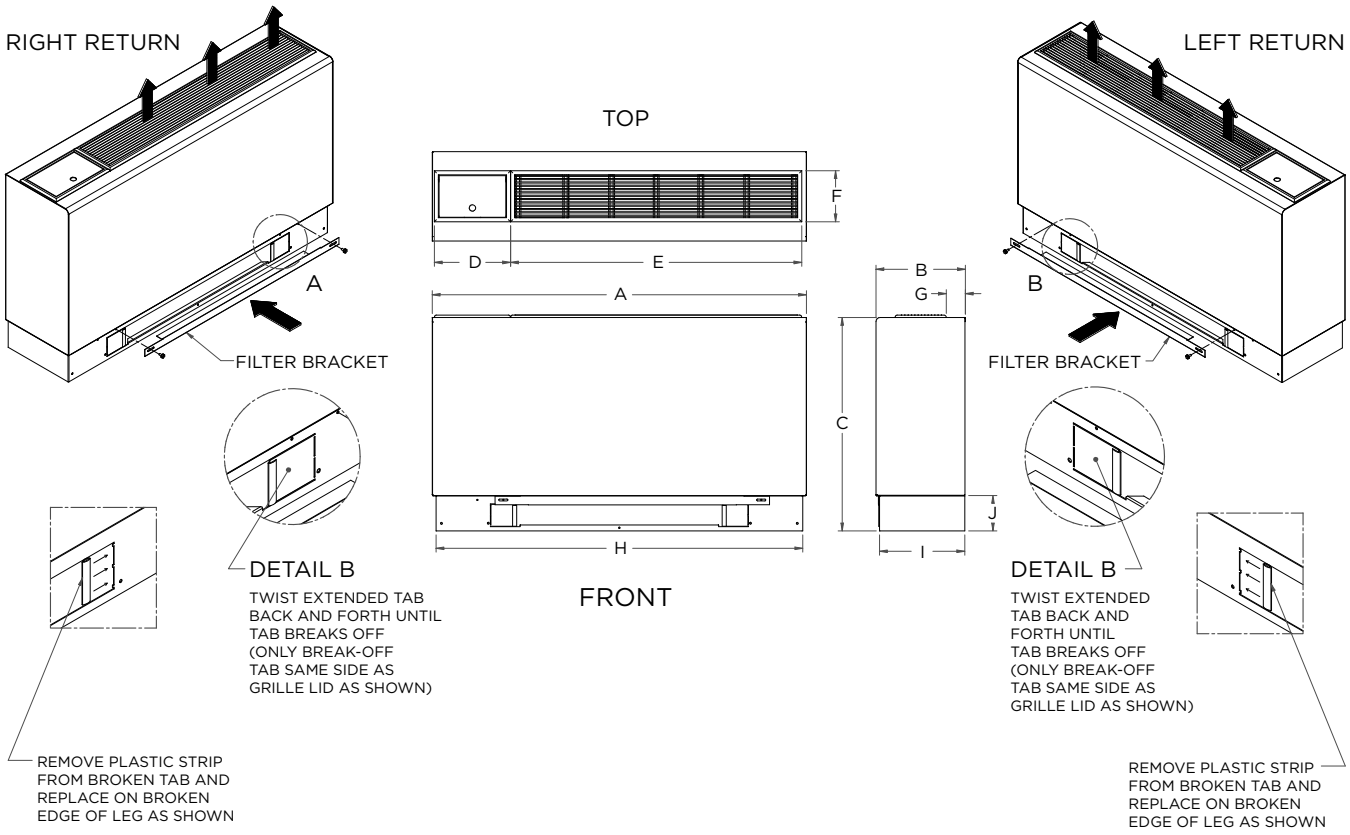
All source water connections on commercial units are fittings that accept a male pipe thread (MPT). Insert the connectors by hand, then tighten the fitting with a wrench to provide a leakproof joint. When connecting to an open loop (groundwater) system, thread any copper MPT fitting into the connector and tighten in the same manner as described above.

### Refrigerant Systems

To maintain sealed circuit integrity, do not install service gauges unless unit opertion appears abnormal. Compare the change in temperature on the air side as well as the water side to the Unit Operating Parameters tables. If the unit’s performance is not within the ranges listed, and the airflow and water flow are known to be correct, gauges should then be installed and superheat and subcooling numbers calculated. If superheat and subcooling are outside recommended ranges, an adjustment to therefrigerant charge may be necessary.

# Dimensional Data - Flat Top Cabinet

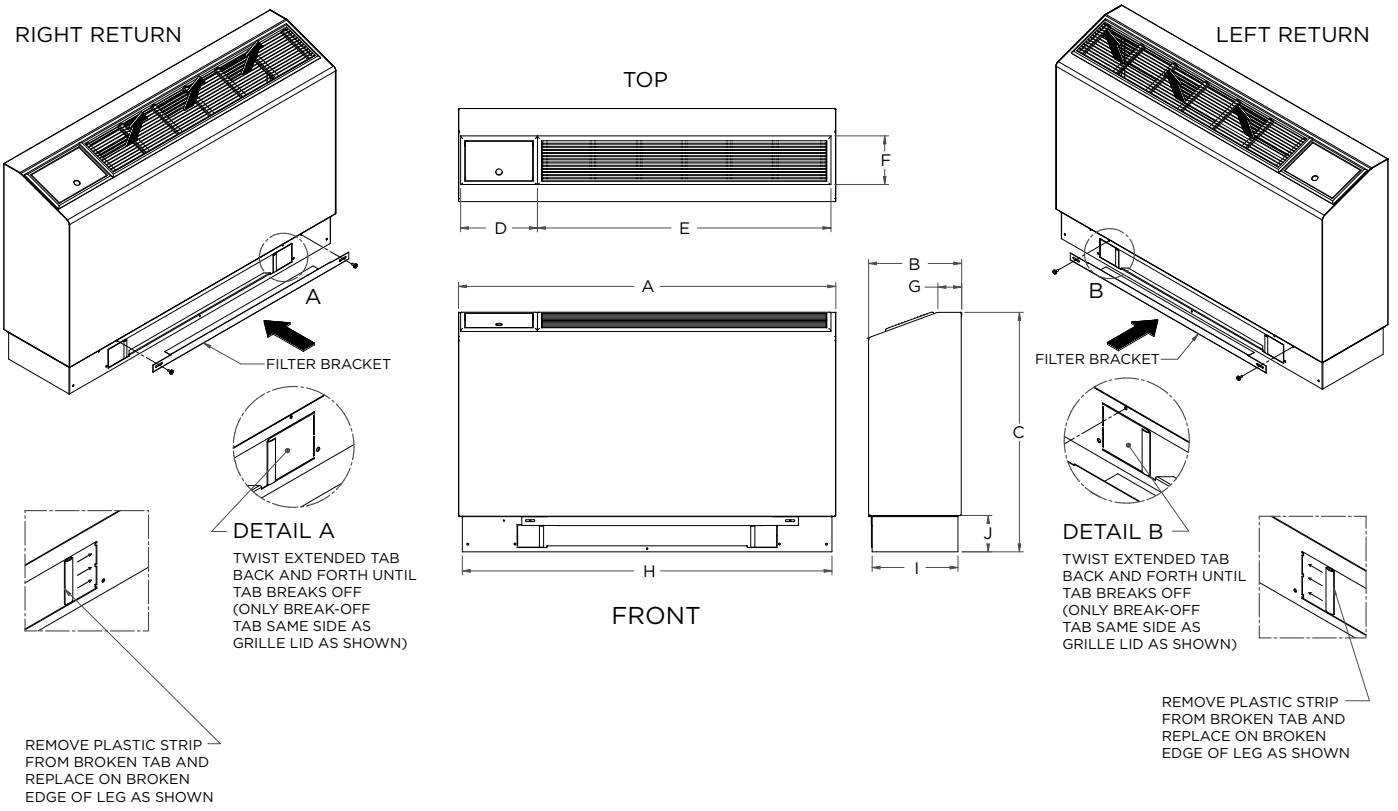
**YCW09-18**




| Flat Top Configuration | | Overall Cabinet | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H | I | J |
| | | Width | Depth | Height | Grille Lid | Grille Length | Grille Width | | | | |
| 09-12 | in. | 45.0 | 10.8 | 25.7 | 9.2 | 35.0 | 6.1 | 2.3 | 44.1 | 10.3 | 4.3 |
| | cm. | 114.3 | 27.3 | 65.2 | 23.4 | 88.9 | 15.6 | 5.8 | 112.0 | 26.0 | 10.9 |
| 15-18 | in. | 50.0 | 12.3 | 25.7 | 9.2 | 35.0 | 6.1 | 3.3 | 49.1 | 11.8 | 4.3 |
| | cm. | 127.0 | 31.1 | 65.2 | 23.4 | 88.9 | 15.6 | 8.3 | 124.7 | 29.8 | 10.9 |

# Dimensional Data - Slope Top Cabinet

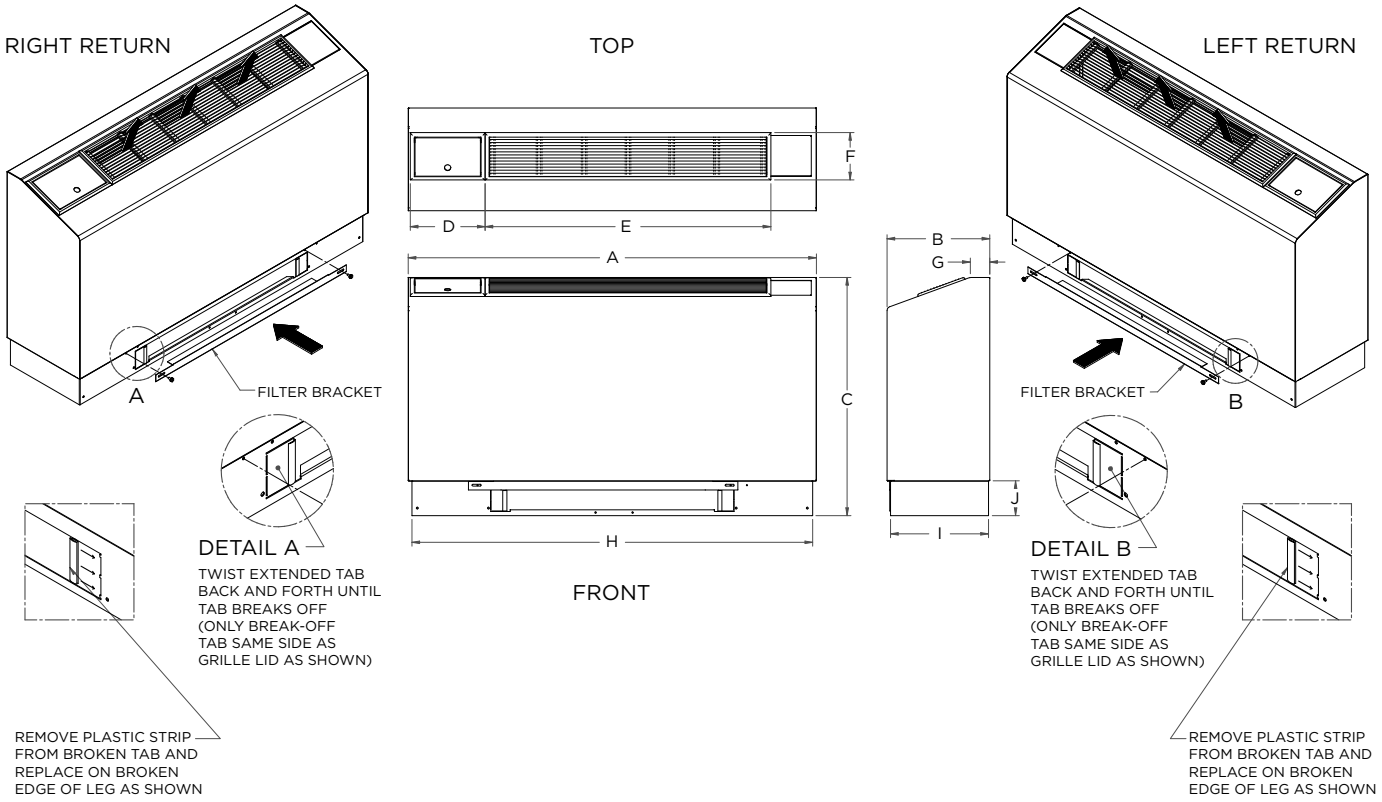
**YCS09-18**




| Slope Top Configuration | | Overall Cabinet | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H | I | J |
| | | Width | Depth | Height | Grille Lid | Grille Length | Grille Width | | | | |
| 09-12 | in. | 45.0 | 11.1 | 28.6 | 9.2 | 35.0 | 6.1 | 2.8 | 44.1 | 10.3 | 4.3 |
| | cm. | 114.3 | 28.2 | 72.6 | 23.4 | 88.9 | 15.6 | 7.2 | 112.0 | 26.0 | 10.9 |
| 15-18 | in. | 50.0 | 12.6 | 29.1 | 9.2 | 35.0 | 6.1 | 2.5 | 49.1 | 11.8 | 4.3 |
| | cm. | 127.0 | 32.0 | 73.9 | 23.4 | 88.9 | 15.6 | 6.4 | 124.7 | 29.8 | 10.9 |

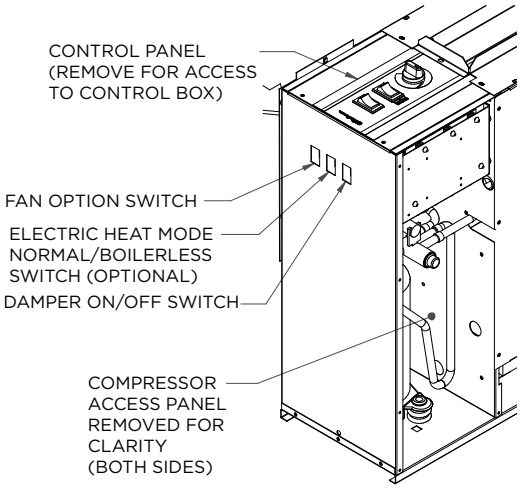
# Dimensional Data - Extended Slope Top Cabinet

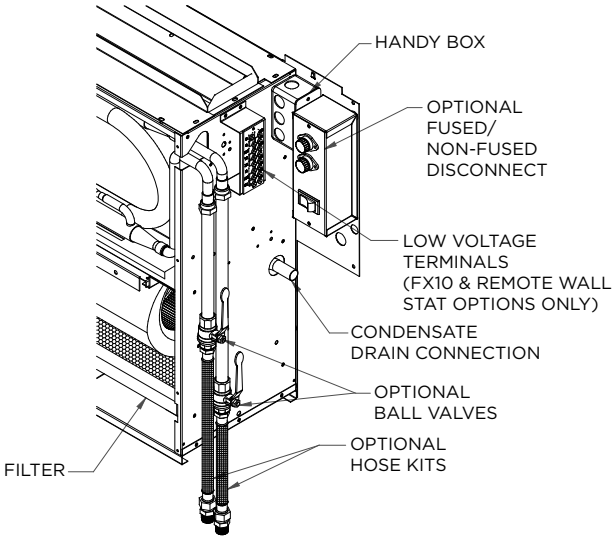
**YCE09-18**

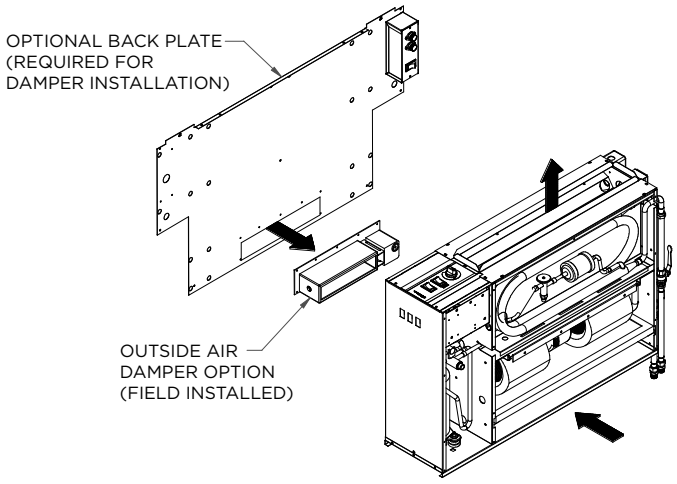



| Ext. Slope Top Configuration | | Overall Cabinet | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A Width | B Depth | C Height | D Grille Lid | E Grille Length | F Grille Width | G | H | I | J |
| 09-12 | in. | 50.0 | 12.6 | 29.1 | 9.2 | 35.0 | 6.1 | 2.4 | 49.1 | 12.0 | 4.3 |
| | cm. | 127.0 | 32.0 | 73.9 | 23.4 | 88.9 | 15.6 | 6.1 | 124.7 | 30.5 | 10.9 |
| 15-18 | in. | 55.0 | 12.6 | 29.1 | 9.2 | 35.0 | 6.1 | 2.5 | 54.1 | 11.8 | 4.3 |
| | cm. | 139.7 | 32.0 | 73.9 | 23.4 | 88.9 | 15.6 | 6.4 | 137.4 | 29.8 | 10.9 |

# Dimensional Data - Right Return Controls Detail



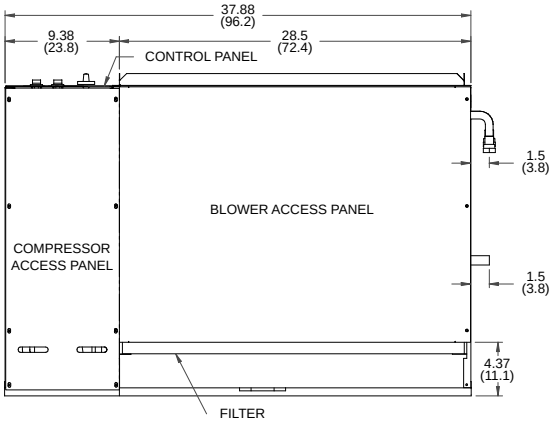



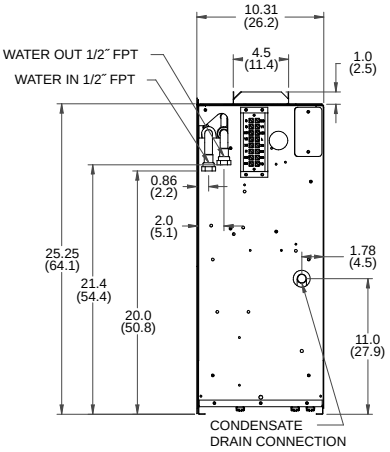



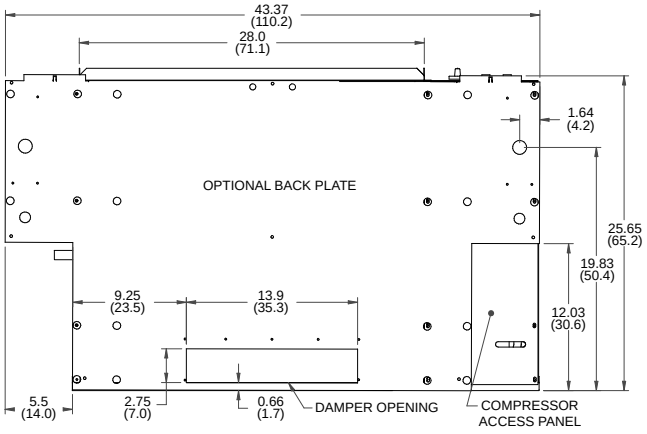
# Dimensional Data - Right Return Chassis

Data = inches (cm)

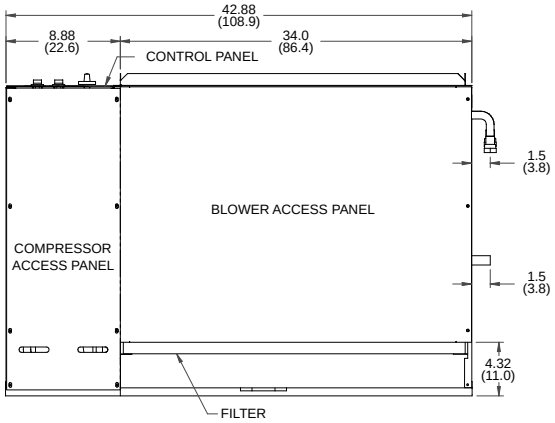
## Models 09-12

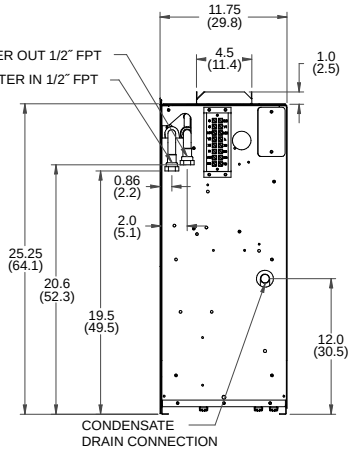


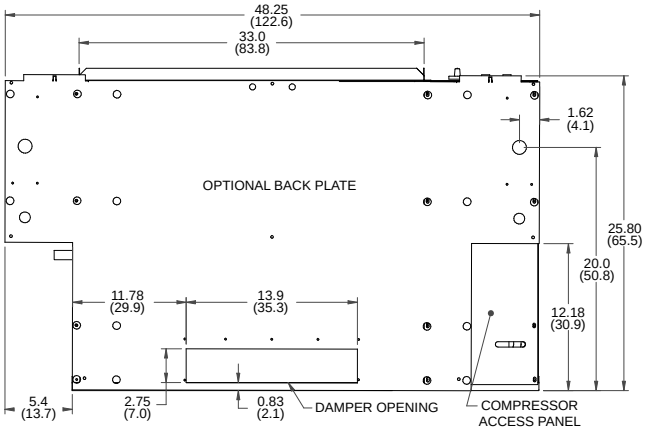



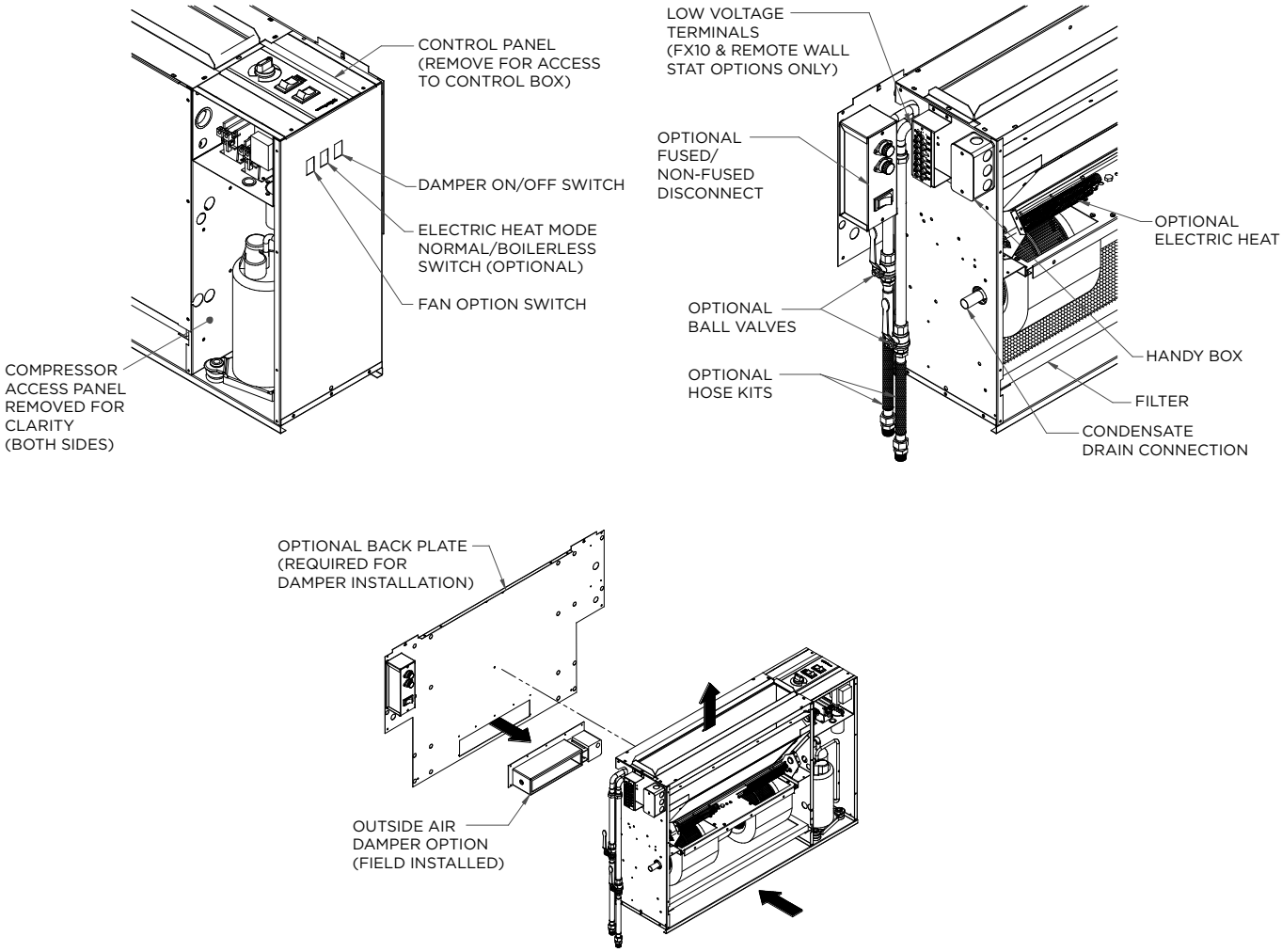

## Models 15-18



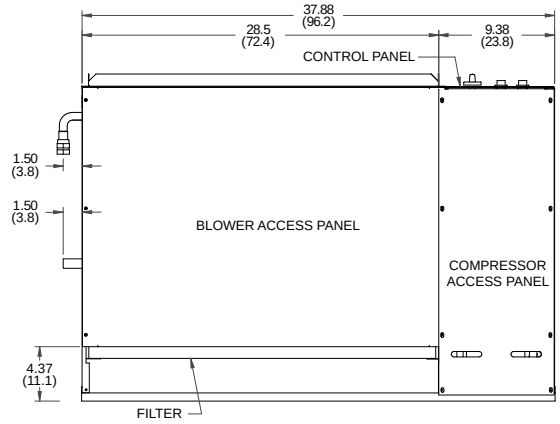
# Dimensional Data - Left Return Controls Detail

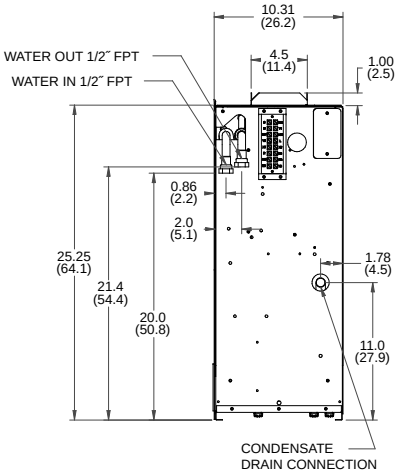


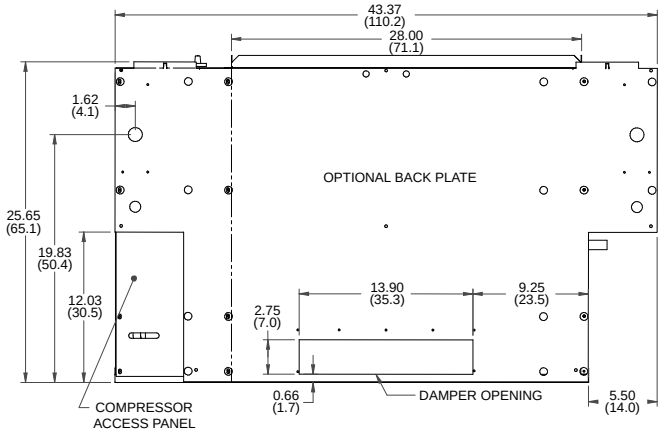
# Dimensional Data - Left Return Chassis

Data = inches (cm)

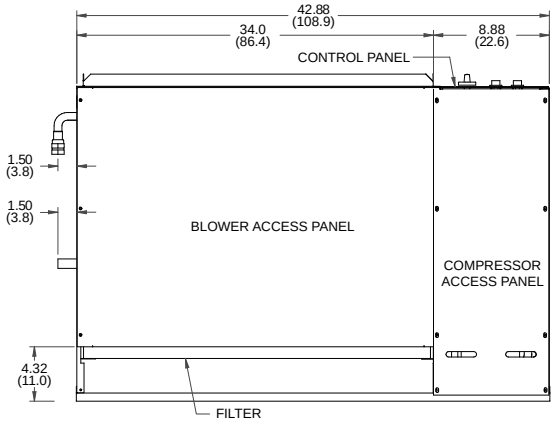
## Models 09-12

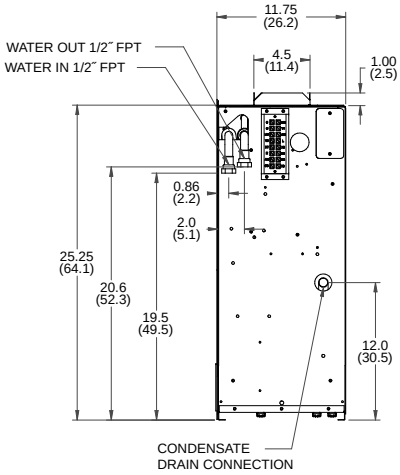


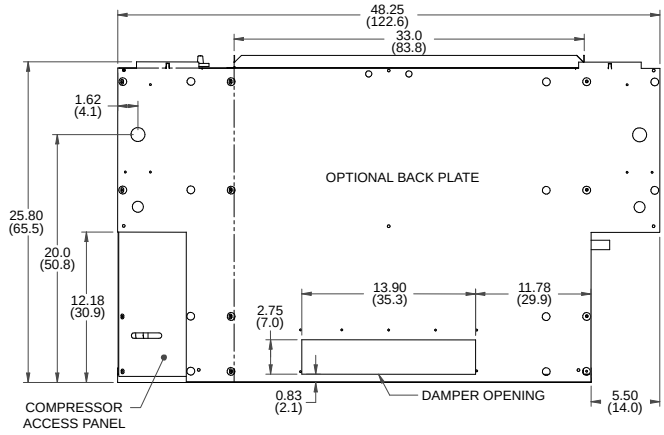




## Models 15-18



# Installation Steps

### Step 1: Unpack Equipment and Inspect for Damage

### Step 2: Determine Equipment Location

- Choose level flooring surface (Correctable with shims. Do not pitch towards drain.)
- Location of wall support and fasteners required to secure chassis backplate.
- Easy access for both installation and service.
- Consider availability and ease of wiring, water piping and condensate drain.
- No obstructions to block airflow in front of the unit.

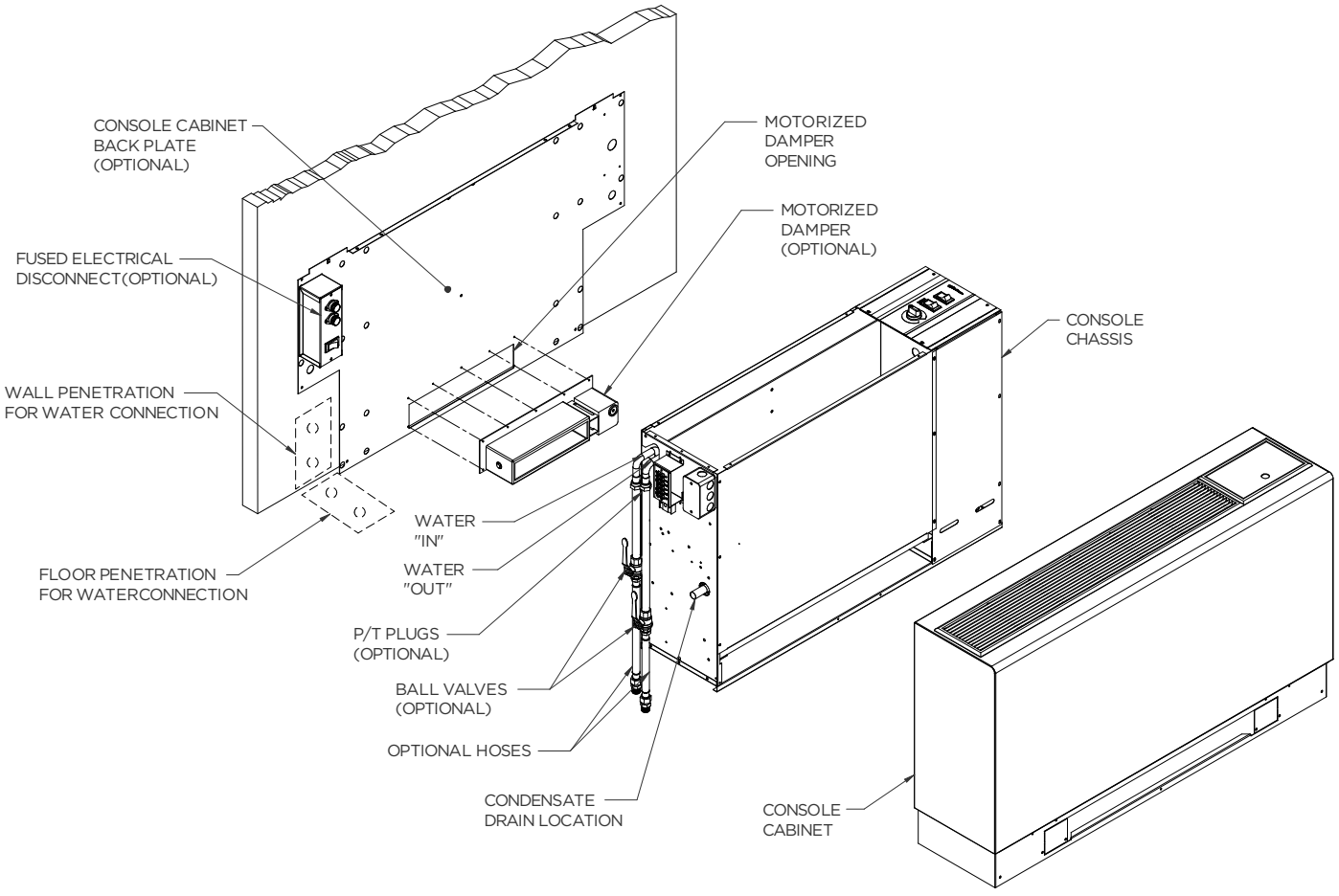
### Step 3: Mark Unit Position

- Ensure that floor is level. If shims are required, make sure that the entire compressor compartment area is uniformly shimmed and that the backplate mounting height is increased by the thickness of the shims used.
- Position backplate in desired equipment location. To further reduce the operating sound level of the unit, 1/8-inch thick rubber matting may be placed under the chassis to eliminate vibration on hard flooring surfaces. (Make sure back plate is level).
- Mark and cut floor or wall penetrations for electrical wiring, water and condensate piping.

### Optional Electrical Disconnect and Motorized Outside Air Damper

- Mark and cut wall penetrations for field fabricated outside air duct sleeve.
- Align mounting holes with backplate and attach with screws supplied.

***Figure 1***



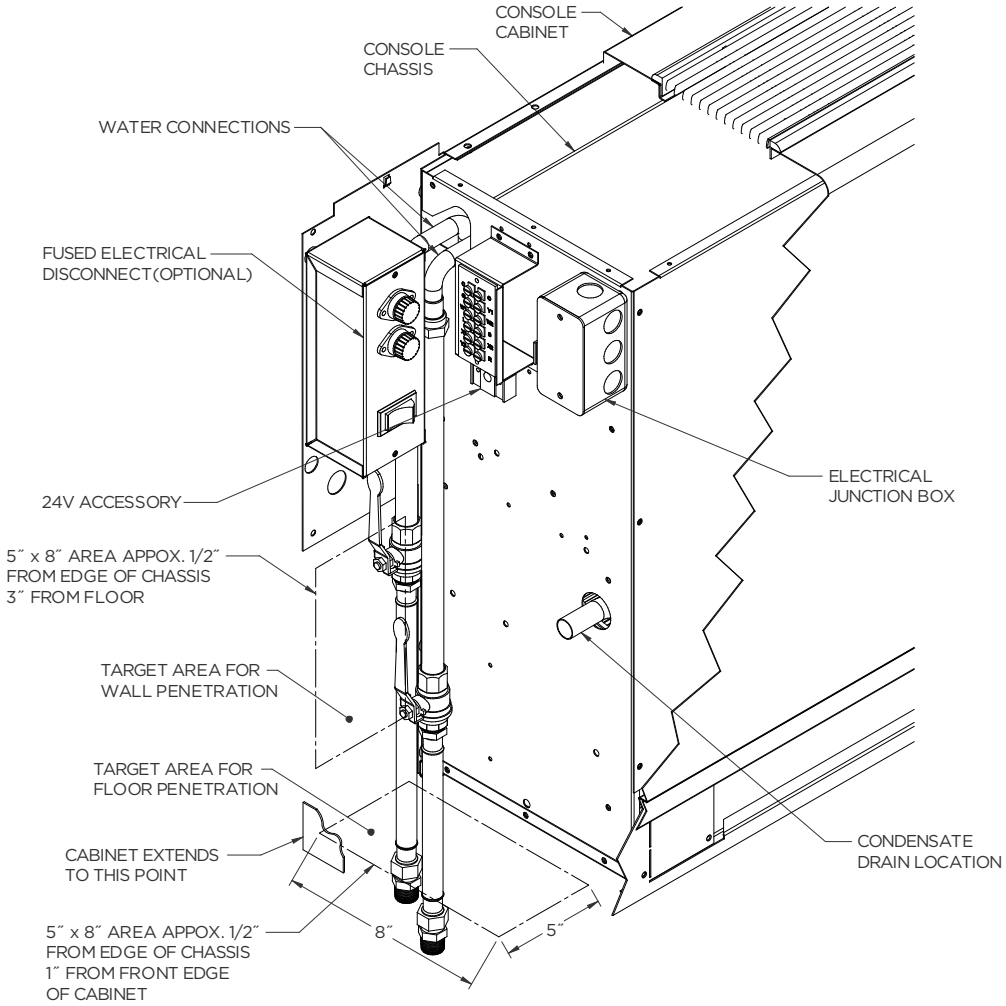
# Installation Steps cont.

### Step 4: Provide Water and Condensate Drain Connections

- A two-pipe reverse return piping configuration is recommended as it equalizes the piping circuit lengths and delivers even water flow to each unit. A direct return piping configuration may be used, but it may be difficult to achieve and maintain proper water flow to the units.
- An air vent must be installed in the water distribution system.
- The supply and return water piping should be run through the wall or floor penetration and terminate with a ball valve. The piping material used must comply with all local codes.
- Refer to: ***System Cleaning and Flushing procedures***.

### Pipe Locations

***Figure 2***



# Installation Steps cont.

### Step 5: Provide Line Voltage Wiring

- Check unit data plate located on control side of chassis for ampacity and fuse size.
- Remove electrical knockouts from chassis backplate.
- Run line voltage wiring through knockout and secure wiring to backplate or disconnect.

### Step 6: Chassis Installation

- Level and secure backplate to wall.
- Position the chassis against back plate. Drive (2) screws through holes in lip of backplate into top flange of chassis.

### Step 7: Final Electrical Connection

- Install flexible electrical conduit between the backplate or electrical disconnect and the unit mounted junction box.
- Make final wiring connections in disconnect and junction box, taking care to replace all covers when done. Wiring must conform to NEC and/or all local codes. ***Refer to Electrical Data.***

***NOTE: It is necessary to make final wiring connections prior to securing unit chassis to back plate on right-hand piping models with electrical disconnect.***

### Step 8: Final Water Connection

- For ease of installation and sound attenuation, high pressure (recommended) flexible hoses with a swivel fitting should be provided. Apply Teflon® tape or sealant compound to threaded hose fittings.
- Combination shut-off/balancing valves should be installed on both the supply and return water lines of the unit.
- Flow control valves should be installed on the water discharge line.
- It is recommended that P/T ports be installed on the supply and return water lines.

### Step 9: Set Unit Controls

- Locate the “continuous fan/cycle fan” switch within the electrical compartment of the chassis and set to desired position. (Remote wall thermostat units do not use this optional switch.)
- Optional Control Settings-
  Remote Thermostat - Run low voltage wiring from unit to the desired thermostat location.
  Mount and wire thermostat according to manufacturer’s recommendations.
  Motorized Outside Air Damper - Locate the “damper on/damper off” damper switch within the electrical compartment of the chassis and set to desired position.
  Emergency Electrical Heat - Locate the “electric heat/normal/boilerless” control switch within the electrical compartment of the chassis and set to desired position.

### Step 10: Secure the Cabinet Cover

- Position and lower cabinet over unit chassis. Apply pressure to the front of the cabinet to ensure that the back lip of the cabinet hooks over the tabs provided on the backplate.
- Secure cabinet to chassis with mounting screws provided.

### Step 11: Perform Final Unit Check

- Measure the pressure drop across the water coil and monitor water or air temperatures in both heating and cooling modes. The measured values should fall within the acceptable ranges shown in the ***Startup Performance table***.

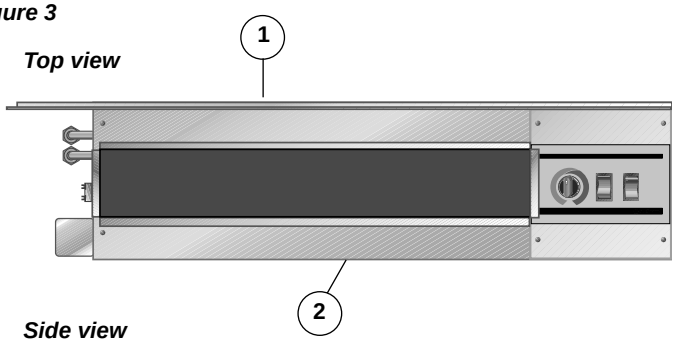
# Installation Steps cont.

## Field Converting Console

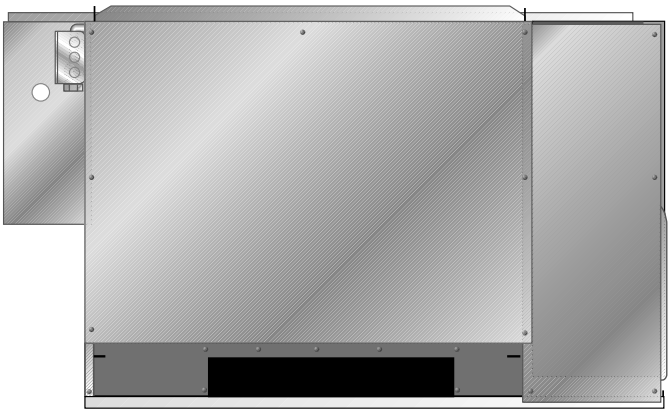
Chassis is normally configured with controls on right end and piping on left end (see Figure 3 top view). In this position panel number 1 would be positioned against wall or back plate. Unit may also be turned 180° against wall or back plate. In this position controls will be on left end and piping on right end panel number 2 would be positioned against wall or back plate. Chassis must be enclosed with an approved cabinet enclosure.

***Figure 3***

***Top view***

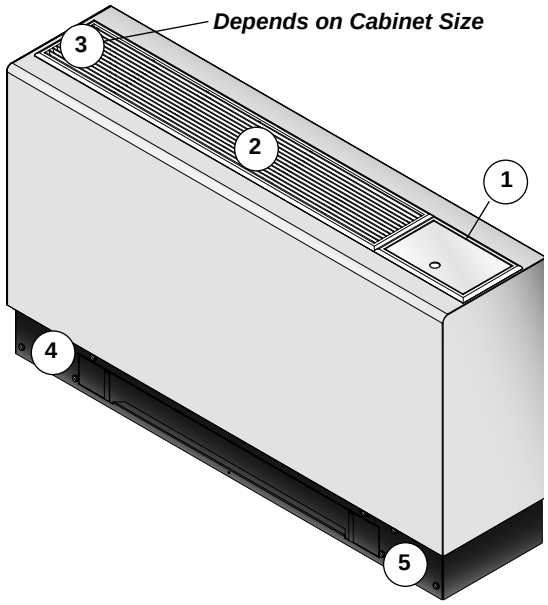



***Side view***



1. Remove 4 screws from front kick panel on cabinet.
2. Remove cabinet from chassis by lifting and sliding cabinet straight up.
3. Remove grille assembly from cabinet by removing 4 screws from brackets located on the bottom of the grille and door assemblies.
4. Replace grille/door assemblies into cabinet repositioning pieces 1, 2, and 3 into the locations directly opposite the original positions. Secure by replacing mounting brackets. (Note: Be sure that louvers on the grille assembly are facing the proper direction when replacing the grille section.)
5. Replace grille/frame assembly into cabinet, and secure by replacing mounting brackets.
6. Replace cabinet by sliding it down over the top of the chassis.
7. Remove tab on leg that extends into return air opening. When the grille side of the cabinet is flat against chassis there will be 4 holes that line up in the leg section. Only use 1 hole for alignment for opposite side of grille. (Note: The tab can be removed by twisting back and forth until it breaks off.)
8. Remove plastic strip from tab and replace on rough edge that the tab was removed from.
9. Replace screws in font kick panel to secure cabinet to chassis.
10. Mount filter bracket in designated opening area. (Note: The filter bracket will only fit in one direction if cabinet is installed properly.)

***Figure 4***



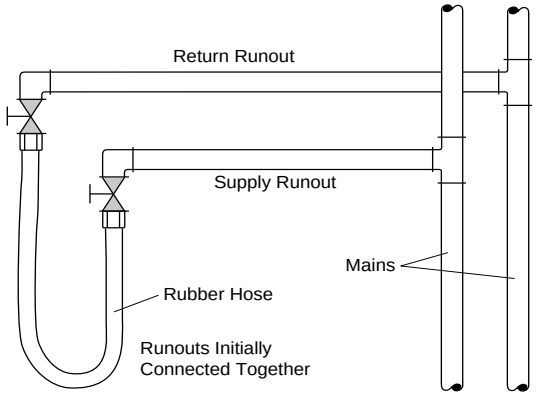
# System Cleaning and Flushing

## Cleaning and Flushing

Prior to start up of any heat pump, the water circulating system must be cleaned and flushed of all dirt and debris.

If the system is equipped with water shutoff valves, the supply and return runouts must be connected together at each unit location (This will prevent the introduction of dirt into the unit, see Figure 7). The system should be filled at the water make-up connection with all air vents open. After filling, vents should be closed.

**Figure 7: Flushing with Water Shutoff Valve Equipped Systems**




The contractor should start the main circulator with the pressure reducing valve makeup open. Vents should be checked in sequence to bleed off any trapped air and to verify circulation through all components of the system.

As water circulates through the system, the contractor should check and repair any leaks found in the piping system. Drain(s) at the lowest point(s) in the system should be opened for initial flush and blowdown, making sure water fill valves are set at the same rate. Check the pressure gauge at the pump suction and manually adjust the make-up water valve to hold the same positive pressure both before and after opening the drain valves. Flushing should continue for at least two hours, or longer if required, until drain water is clean and clear.

The supplemental heater and/or circulator pump, if used, should be shut off. All drains and vents should be opened to completely drain the system. Short-circuited supply and return runouts should now be connected to the unit supply and return connections.

Refill the system with clean water. Test the system water for acidity and treat as required to leave the water slightly alkaline (pH 7.5 to 8.5). The specified percentage of antifreeze may also be added at this time. Use commercial grade antifreeze designed for HVAC systems only. Environol™ brand antifreeze is recommended..

Once the system has been filled with clean water and antifreeze (if used), precautions should be taken to protect the system from dirty water conditions. Dirty water will result in system-wide degradation of performance, and solids may clog valves, strainers, flow regulators, etc. Additionally, the heat exchanger may become clogged which reduces compressor service life and can cause premature unit failure.

In boiler/tower application, set the loop control panel set points to desired temperatures. Supply power to all motors and start the circulating pumps. After full flow has been established through all components including the heat rejector (regardless of season), air vented and loop temperatures stabilized, each of the units will be ready for check, test and start up and for air and water balancing.

## Ground Source Loop System Checkout

Once piping is completed between the unit pumping system and ground loop, final purging and charging of the loop is needed. A high pressure pump is needed to achieve adequate flow velocity in the loop to purge air and dirt particles from the loop itself. Antifreeze solution is used in most areas to prevent freezing. Flush the system adequately to remove as much air as possible; then pressurize the loop to a static pressure of 40-50 PSI (summer) or 50-75 PSI (winter). This is normally adequate for good system operation. Loop static pressure may decrease soon after initial installation, due to pipe expansion and loop temperature change. Running the unit for at least 30 minutes after the system has been completely purged of air will allow for the “break-in” period. It may be necessary to adjust static loop pressure (by adding water) after the unit has run for the first time. Loop static pressure will also fluctuate with the seasons. Pressures will be higher in the winter months than during the cooling season. This fluctuation is normal and should be considered when charging the system initially.

Insure the pump provides adequate flow through the unit by checking pressure drop across the heat exchanger.
Usually 2.25-3.0 GPM of flow per ton of cooling capacity is recommended in earth loop applications.

# Open Loop Ground Water Systems

Always maintain water pressure in the heat exchanger by placing water control valves at the outlet of the unit to prevent mineral precipitation. Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. Insure proper water flow through the unit by checking pressure drop across the heat exchanger and comparing it to the figures in unit capacity data tables in the specification catalog. 1.5-2 GPM of flow per ton of cooling capacity is recommended in open loop applications.

Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local codes, i.e. recharge well, storm sewer, drain field, adjacent stream or pond, etc. Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning departments to assure compliance in your area.

**Note:** For open loop/groundwater systems or systems that do not contain an antifreeze solution, set SW1-Switch #2 to the "WELL" position (Refer to the Dip Switch Field Selection table). Slow opening/closing solenoid valves (type VM) are recommended to eliminate water hammer.

### Water Quality

In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, a closed loop system is recommended. The heat exchanger coils in ground water systems may, over a period of time, lose heat exchange capabilities due to a buildup of mineral deposits inside. These can be cleaned, but only by a qualified service mechanic, as special solutions and pumping equipment are required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional flushing.

Units with cupronickel heat exchangers are recommended for open loop applications due to the increased resistance to build-up and corrosion, along with reduced wear caused by acid cleaning.

| Material | | Copper | 90/10 Cupronickel | 316 Stainless Steel |
|---|---|---|---|---|
| **pH** | **Acidity/Alkalinity** | 7 - 9 | 7 - 9 | 7 - 9 |
| **Scaling** | Calcium and Magnesium Carbonate | (Total Hardness) less than 350 ppm | (Total Hardness) less than 350 ppm | (Total Hardness) less than 350 ppm |
| **Corrosion** | Hydrogen Sulfide | Less than 0.5 ppm (rotten egg smell appears at 0.5 ppm) | 10 - 50 ppm | Less than 1 ppm |
| | Sulfates | Less than 125 ppm | Less than 125 ppm | Less than 200 ppm |
| | Chlorine | Less than 0.5 ppm | Less than 0.5 ppm | Less than 0.5 ppm |
| | Chlorides | Less than 20 ppm | Less than 125 ppm | Less than 300 ppm |
| | Carbon Dioxide | Less than 50 ppm | 10 - 50 ppm | 10 - 50 ppm |
| | Ammonia | Less than 2 ppm | Less than 2 ppm | Less than 20 ppm |
| | Ammonia Chloride | Less than 0.5 ppm | Less than 0.5 ppm | Less than 0.5 ppm |
| | Ammonia Nitrate | Less than 0.5 ppm | Less than 0.5 ppm | Less than 0.5 ppm |
| | Ammonia Hydroxide | Less than 0.5 ppm | Less than 0.5 ppm | Less than 0.5 ppm |
| | Ammonia Sulfate | Less than 0.5 ppm | Less than 0.5 ppm | Less than 0.5 ppm |
| | Total Dissolved Solids (TDS) | Less than 1000 ppm | 1000 - 1500 ppm | 1000 - 1500 ppm |
| | LSI Index | +0.5 to -0.5 | +0.5 to -0.5 | +0.5 to -0.5 |
| **Iron Fouling (Biological Growth)** | Iron, $FE^{2}$+ (Ferrous) Bacterial Iron Potential | < 0.2 ppm | < 0.2 ppm | < 0.2 ppm |
| | Iron Oxide | Less than 1 ppm, above this level deposition will occur | Less than 1 ppm, above this level deposition will occur | Less than 1 ppm, above this level deposition will occur |
| **Erosion** | Suspended Solids | Less than 10 ppm and filtered for max. of 600 micron size | Less than 10 ppm and filtered for max. of 600 micron size | Less than 10 ppm and filtered for max. of 600 micron size |
| | Threshold Velocity (Fresh Water) | < 6 ft/sec | < 6 ft/sec | < 6 ft/sec |

**NOTES:** Grains = ppm divided by 17 2/22/12
mg/L is equivalent to ppm

# Electrical Connections

## General

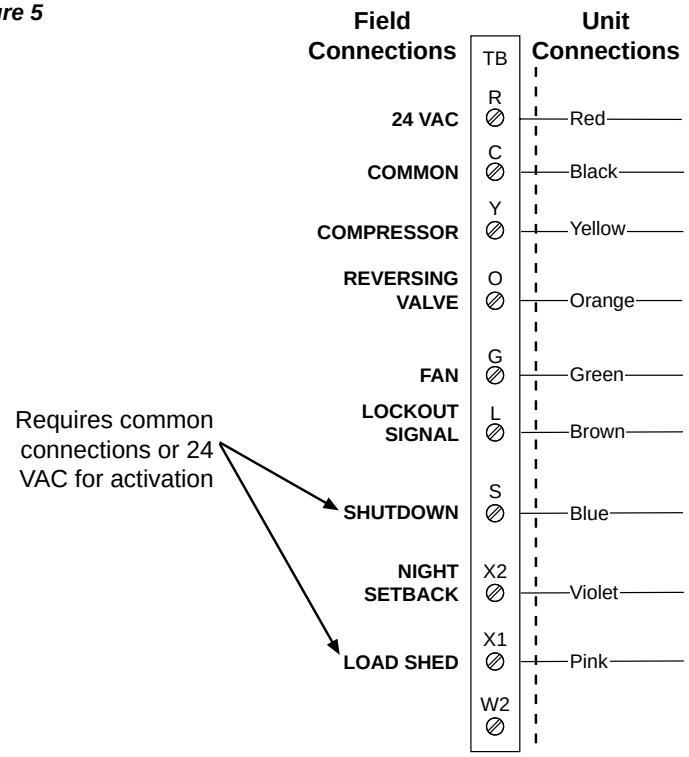
Be sure the available power is the same voltage and phase as that shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

## 208 Volt Operation

All Envision Series 208/230 units are factory wired for 230 volt operation. For 208 volt operation, the red and blue transformer wires must be switched.

## Microprocessor Remote Thermostat Wiring

***Figure 5***



# Electrical Data

### ECM Motor

| Model | Rated Voltage | Voltage Min/Max | Compressor | | | Fan Motor FLA | Total Unit FLA | Min Circ Amp | Max Fuse/ HACR |
|---|---|---|---|---|---|---|---|---|---|
| | | | MCC | RLA | LRA | | | | |
| 09 | 115/60/1 | 104/127 | 12.5 | 8.0 | 50.0 | 4.25 | 12.3 | 14.3 | 20 |
| | 208-230/60/1 | 187/253 | 6.4 | 4.1 | 21.0 | 2.6 | 6.7 | 7.7 | 10/15 |
| | 265/60/1 | 238/292 | 6.7 | 4.3 | 22.0 | 2.5 | 6.8 | 7.9 | 10/15 |
| 12 | 115/60/1 | 104/127 | 14.8 | 9.5 | 50.0 | 4.25 | 13.8 | 16.1 | 25 |
| | 208-230/60/1 | 187/253 | 7.7 | 4.9 | 25.0 | 2.6 | 7.5 | 8.8 | 10/15 |
| | 265/60/1 | 238/292 | 7.0 | 4.5 | 22.0 | 2.5 | 7.0 | 8.1 | 10/15 |
| 15 | 208-230/60/1 | 187/253 | 9.2 | 5.9 | 29.0 | 2.6 | 8.5 | 10.0 | 15 |
| | 265/60/1 | 238/292 | 7.8 | 5.0 | 28.0 | 2.5 | 7.5 | 8.8 | 10/15 |
| 18 | 208-230/60/1 | 187/253 | 10.4 | 6.7 | 33.5 | 2.6 | 9.3 | 10.9 | 15 |
| | 265/60/1 | 238/292 | 8.7 | 5.6 | 28.0 | 2.5 | 8.1 | 9.5 | 15 |

HACR circuit breaker in USA only

1/20/14

### PSC Motors

| Model | Rated Voltage | Voltage Min/Max | Compressor | | | Fan Motor FLA | Total Unit FLA | Min Circ Amp | Max Fuse/ HACR |
|---|---|---|---|---|---|---|---|---|---|
| | | | MCC | RLA | LRA | | | | |
| 09 | 115/60/1 | 104/127 | 12.5 | 8.0 | 50.0 | 0.92 | 8.9 | 10.9 | 25 |
| | 208-230/60/1 | 187/253 | 6.4 | 4.1 | 21.0 | 0.50 | 4.6 | 5.6 | 10/15 |
| | 265/60/1 | 238/292 | 6.7 | 4.3 | 22.0 | 0.50 | 4.8 | 5.9 | 10/15 |
| 12 | 115/60/1 | 104/127 | 14.8 | 9.5 | 50.0 | 0.92 | 10.4 | 12.8 | 30 |
| | 208-230/60/1 | 187/253 | 7.7 | 4.9 | 25.0 | 0.50 | 5.4 | 6.6 | 10/15 |
| | 265/60/1 | 238/292 | 7.0 | 4.5 | 22.0 | 0.50 | 5.0 | 6.1 | 10/15 |
| 15 | 208-230/60/1 | 187/253 | 9.2 | 5.9 | 29.0 | 0.69 | 6.6 | 8.1 | 10/15 |
| | 265/60/1 | 238/292 | 7.8 | 5.0 | 28.0 | 0.65 | 5.7 | 6.9 | 10/15 |
| 18 | 208-230/60/1 | 187/253 | 10.4 | 6.7 | 33.5 | 0.69 | 7.4 | 9.1 | 15 |
| | 265/60/1 | 238/292 | 8.7 | 5.6 | 28.0 | 0.65 | 6.3 | 7.7 | 10/15 |

HACR circuit breaker in USA only

1/20/14

# Auxiliary Heat Ratings

### ECM Motors

| Model | Rated Voltage | Voltage Min./Max. | Heater Element Watts | Fan Motor FLA | Heater Element FLA | Total Unit FLA | Min. Circuit Amp. | Max. Fuse/ Brkr. |
|---|---|---|---|---|---|---|---|---|
| 09-12 (1 kW) | 208/60/1 | 197/254 | 818 | 2.45 | 3.93 | 6.4 | 8.0 | 10 |
| | 230/60/1 | 197/254 | 1000 | 2.60 | 4.35 | 7.0 | 8.7 | 15 |
| | 265/60/1 | 239/291 | 1000 | 2.50 | 3.77 | 6.3 | 7.8 | 10 |
| 09-12 (2 kW) | 208/60/1 | 197/254 | 1636 | 2.45 | 7.86 | 10.3 | 12.9 | 20 |
| | 230/60/1 | 197/254 | 2000 | 2.60 | 8.70 | 11.3 | 14.1 | 25 |
| | 265/60/1 | 239/292 | 2000 | 2.50 | 7.55 | 10.1 | 12.6 | 20 |
| 15-18 (3 kW) | 208/60/1 | 197/254 | 2454 | 2.45 | 11.80 | 14.3 | 17.8 | 30 |
| | 230/60/1 | 197/254 | 3000 | 2.60 | 13.04 | 15.6 | 19.6 | 35 |
| | 265/60/1 | 239/292 | 3000 | 2.50 | 11.32 | 13.8 | 17.3 | 30 |

Always refer to unit nameplate data prior to installation. 10/5/10

### PSC Motors

| Model | Rated Voltage | Voltage Min./Max. | Heater Element Watts | Fan Motor FLA | Heater Element FLA | Total Unit FLA | Min. Circuit Amp. | Max. Fuse/ Brkr. |
|---|---|---|---|---|---|---|---|---|
| 09-12 (1 kW) | 208/60/1 | 197/254 | 818 | 0.50 | 3.93 | 4.4 | 5.5 | 10 |
| | 230/60/1 | 197/254 | 1000 | 0.50 | 4.35 | 4.9 | 6.1 | 10 |
| | 265/60/1 | 239/291 | 1000 | 0.50 | 3.77 | 4.3 | 5.3 | 10 |
| 09-12 (2 kW) | 208/60/1 | 197/254 | 1636 | 0.50 | 7.86 | 8.4 | 10.5 | 15 |
| | 230/60/1 | 197/254 | 2000 | 0.50 | 8.70 | 9.2 | 11.5 | 20 |
| | 265/60/1 | 239/292 | 2000 | 0.50 | 7.55 | 8.1 | 10.1 | 15 |
| 15-18 (3 kW) | 208/60/1 | 197/254 | 2454 | 0.69 | 11.80 | 12.5 | 15.6 | 25 |
| | 230/60/1 | 197/254 | 3000 | 0.69 | 13.04 | 13.7 | 17.2 | 30 |
| | 265/60/1 | 239/292 | 3000 | 0.65 | 11.32 | 12.0 | 15.0 | 25 |

10/5/10

# Fan Performance Data

### PSC Motors

| Model | CFM | |
|---|---|---|
| | Low Speed | High Speed |
| 09 | 300 | 350 |
| 12 | 300 | 350 |
| 15 | 450 | 500 |
| 18 | 450 | 500 |

Factory settings are in Bold
Air flow values are with dry coil and standard filter.

### ECM Motors

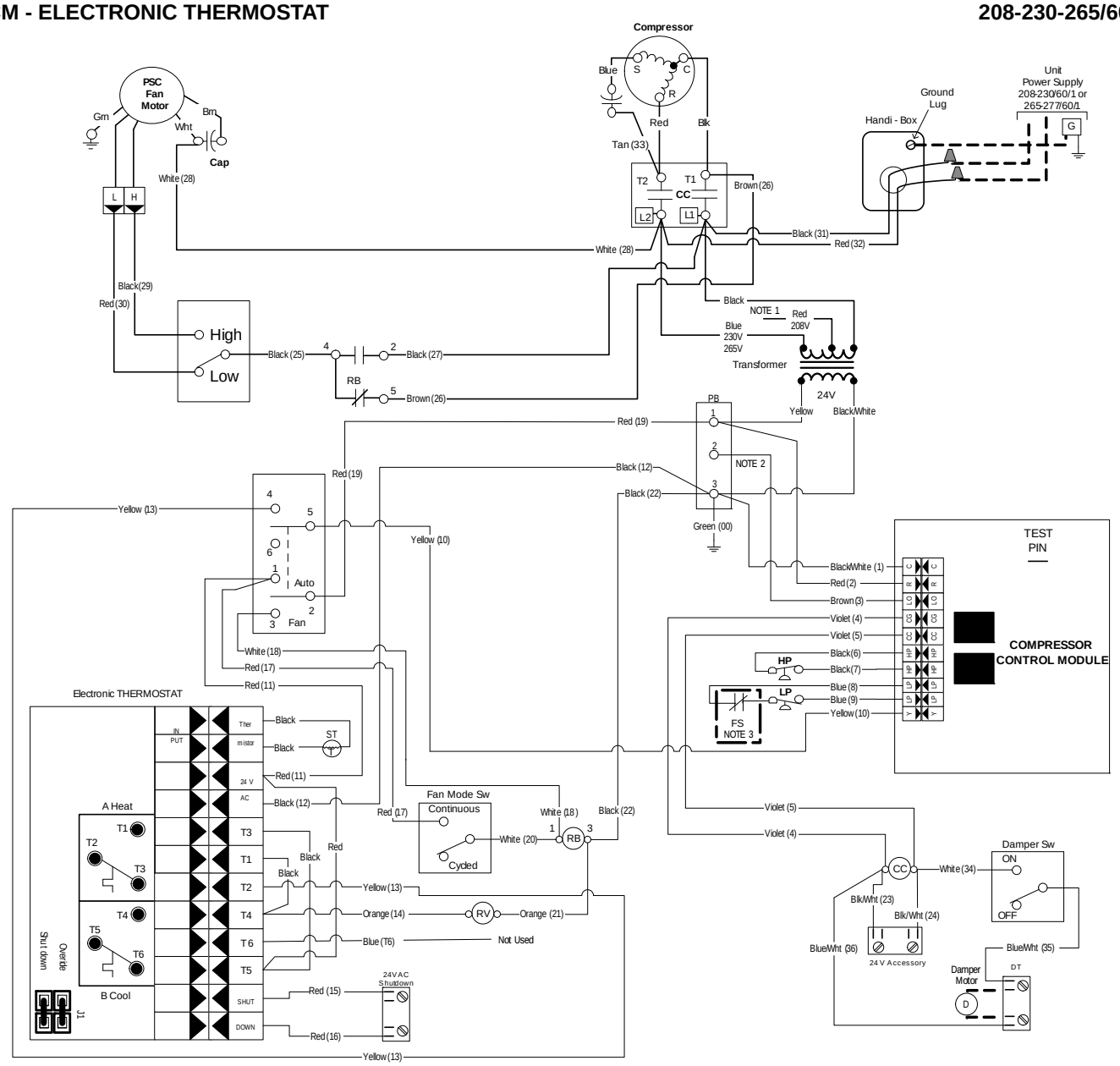
| Model | CFM | | |
|---|---|---|---|
| | Low Speed | Medium Speed | High Speed |
| 09 | 300 | 325 | 400 |
| 12 | 300 | 325 | 400 |
| 15 | 350 | 450 | 600 |
| 18 | 350 | 450 | 600 |

**For wet coil performance first calculate the face velocity of the air coil (Face Velocity [fpm] = Airflow [cfm] / Face Area [sq ft]). Then for velocities of 200 fpm reduce the static capability by 0.03 in. wg, 300 fpm by 0.08 in. wg, 400 fpm by 0.12in. wg. and 500 fpm by 0.16 in. wg.**

# Wiring Schematics

## CCM - ELECTRONIC THERMOSTAT

**208-230-265/60/1**




### Legend

- Factory low voltage wiring
- Factory line voltage wiring
- Field low voltage wiring
- Field line voltage wiring
- Quick connect terminal
- Wire nut

CC - Compressor Contactor
DT - Damper Terminal Block
FS - Freeze Sensing Device
HP - High Pressure Switch
LP - Low Pressure Switch
PB - Power Block
RB - Blower Relay
RV - Reversing Valve Coil
ST - Entering Air Temperature Sensor

- Field wire lug
- Earth Ground
- Relay Contacts- N.O., N.C.
- Polarized connector

- Switch - High Pressure
- Switch - Low Pressure
- Relay coil
- Capacitor
- Thermistor
- Temperature Switch

Notes:

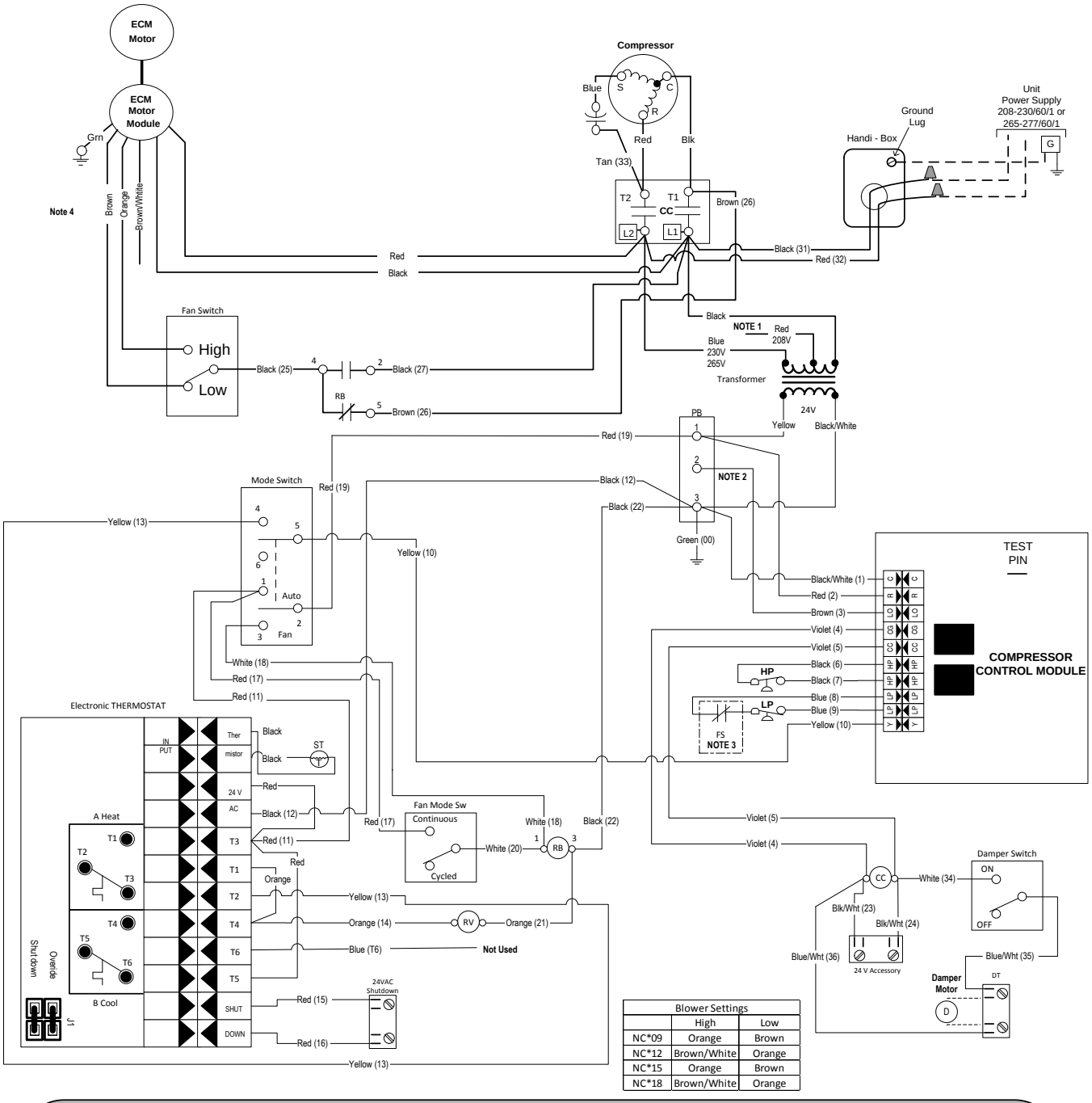
1. Switch Red and Blue wires for 208 volt operation
2. Terminal C of 24 V PB is used as "L" output for Brown wire3 for Lockout
3. Optional field installed freeze sensing device.

6/10/08

# Wiring Schematics cont.

## CCM w/ECM - ELECTRONIC THERMOSTAT

**208-230-265/60/1**




| Blower Settings | | |
|---|---|---|
| | High | Low |
| NC*09 | Orange | Brown |
| NC*12 | Brown/White | Orange |
| NC*15 | Orange | Brown |
| NC*18 | Brown/White | Orange |

## Legend

- Factory low voltage wiring
- Factory line voltage wiring
- Field low voltage wiring
- Field line voltage wiring
- Quick connect terminal
- Wire nut

CC - Compressor Contactor
DT - Damper Terminal Block
FS - Freeze Sensing Device
HP - High Pressure Switch
LP - Low Pressure Switch
PB - Power Block
RB - Blower Relay
RV - Reversing Valve Coil
ST - Entering Air Temperature Sensor

- L1 — Field wire lug
- Earth Ground
- Relay Contacts - N.O., N.C.
- P — Polarized connector

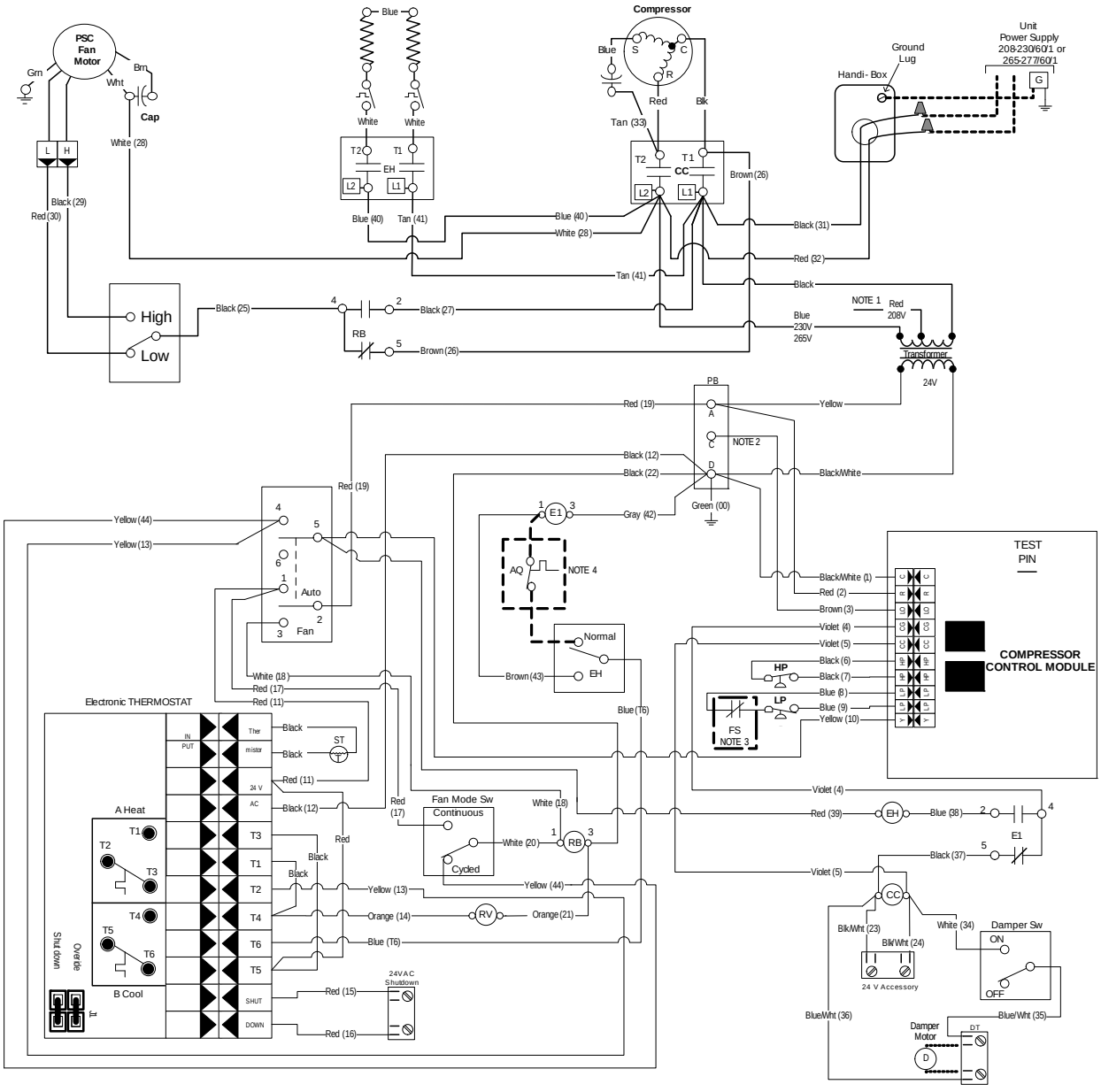
- HP — Switch - High Pressure
- LP — Switch - Low Pressure
- Relay coil
- Capacitor
- T — Thermistor
- Temperature Switch

Notes:

1. Switch Red and Blue wires for 208 volt operation
2. Terminal C of 24 V PB is used as "L" output for Brown wire 3 for Lockout.
3. Optional field installed freeze sensing device.
4. Factory wired. Refer to blower table settings.

# Wiring Schematics cont.

## CCM w/EH - ELECTRONIC THERMOSTAT 208-230-265/60/1




### Legend

| | | | | |
|---|---|---|---|---|
| Factory low voltage wiring<br>Factory line voltage wiring<br>Field low voltage wiring<br>Field line voltage wiring<br>Quick connect terminal<br>Wire nut | AQ - Aquastat<br>CC - Compressor Contactor<br>DT - Damper Terminal Block<br>E1 - Electric Heat Relay<br>EH - Electric Heat Contactor<br>FS - Freeze Sensing Device<br>HP - High Pressure Switch<br>LP - Low Pressure Switch<br>PB - Power Block<br>RB - Blower Relay<br>RV - Reversing Valve Coil<br>ST - Entering Air Temperature Sensor | L1 Field wire lug<br>Earth Ground<br>Relay Contacts N.O., N.C.<br>P 2 3 1 Polarized connector | HP Switch - High Pressure<br>LP Switch - Low Pressure<br>Relay coil<br>Capacitor<br>Thermistor<br>Temperature Switch | Notes:<br>1. Switch Red and Blue wires for 208 volt operation<br>2. Terminal C of 24 V PB is used as "L" output for Brown wire 3 for Lockout<br>3. Optional field installed freeze sensing device.<br>4. Optional field installed aquastat |

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# Wiring Schematics cont.

## VERSATEC CONTROL - EH & REMOTE WALL THERMOSTAT 208-230-265/60/1

### Legend for Schematic [A]

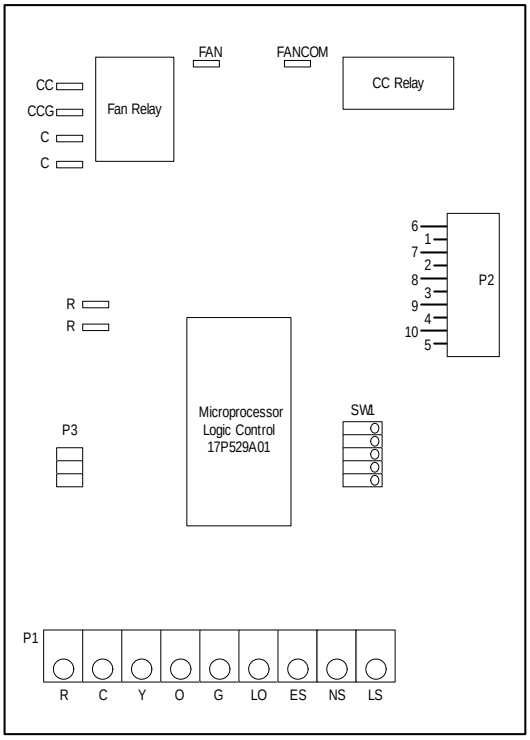
Normal Control Timing Table

| | |
|---|---|
| Blower off delay | 30 seconds |
| Compressor on delay | 10 seconds |
| Short cycle delay | 5 minutes |
| Minimum compressor on time | 60 seconds (except for fault condition ) |
| High pressure fault recognition delay | Less than 1 second |
| Low pressure fault recognition delay | 30 seconds |
| Freeze sensing fault recognition delay | 30 seconds |
| Condensate overflow fault recognition delay | 30 seconds |
| Low pressure fault bypass delay | 2 minutes |
| Freeze sensing fault bypass delay | 2 minutes |
| Motorized valve delay | 90 seconds |
| Random start delay | 0 - 25 seconds |

Test Control Timing Table

| | |
|---|---|
| Blower off delay | 5 seconds |
| Compressor on delay | 2 seconds |
| Short cycle delay | 15 seconds |
| Minimum compressor on time | 5 seconds (except for fault condition ) |
| High pressure fault recognition delay | Less than 1 second |
| Low pressure fault recognition delay | 30 seconds |
| Freeze sensing fault recognition delay | 30 seconds |
| Condensate overflow fault recognition delay | 30 seconds |
| Low pressure fault bypass delay | 0 seconds |
| Freeze sensing fault bypass delay | 0 seconds |
| Motorized valve delay | 90 seconds |
| Random start delay | 0 seconds |

Versatec Logic Board Physical Layout




LED Display Mode Table

| LED | Normal Display Mode |
|---|---|
| | SW1 - #4 On, SW2 Off |
| Drain | Drain pan overflow lockout |
| Water Flow | FS thermistor (loop <15°F, well <30°F) lockout |
| High Press | High pressure >600 PSI lockout |
| Low Press | Low pressure < 40 PSI lockout |
| Air Flow | Not used |
| Status | Microprocessor malfunction* |
| DHW Limit | Not Used |
| HWD | SW2 status (Off = down position, On = up position) |

| Diagnostic Modes | | | |
|---|---|---|---|
| LED | Current Fault Status | Inputs | Outputs |
| | SW1- #4 On, SW2 On | SW1- #4 Off, SW2 Off | SW1- #4 Off, SW2 On |
| Drain | Drain pan overflow | Y | Compressor |
| Water Flow | FS thermistor (loop <15°F, well <30°F) | G | FAN |
| High Press | High pressure >600 PSI | O | O |
| Low Press | Low pressure < 40 PSI | ES | ES |
| Air Flow | Not used | NS | NS |
| Status | Not used | LS | LS |
| DHW Limit | Not used | Not Used | Not Used |
| HWD | SW2 in the On position | Off position | On position |

*Flashing Status light indicates microprocessor is functioning properly Solid "on" indicates a microprocessor malfunction.

Logic Board DIP Switch Settings

| Switch | OFF | ON |
|---|---|---|
| SW1 - 1 | Test - Selected timings sped up to facilitate troubleshooting | Normal - Standard timings |
| SW1 - 2 | Loop - Closed loop freeze sensing setting (15°F) | Well - Open loop freeze sensing setting (30°F) |
| SW1 - 3 | Enables NS features | Normal - Standard thermostat operation |
| SW1 - 4 | IO Display * - Enables Input/Output display on external LED board* | Normal * - Unit status display |
| SW1 - 5 | Motorized Valve - 1.5 minute compressor on delay | Normal - Standard delay on call from compressor used |
| SW2 | OFF * - Normal or Input display mode activated | ON * - Current fault or Output display mode activated |

*Refer to LED Display Mode table for position of SW1-4 and SW2

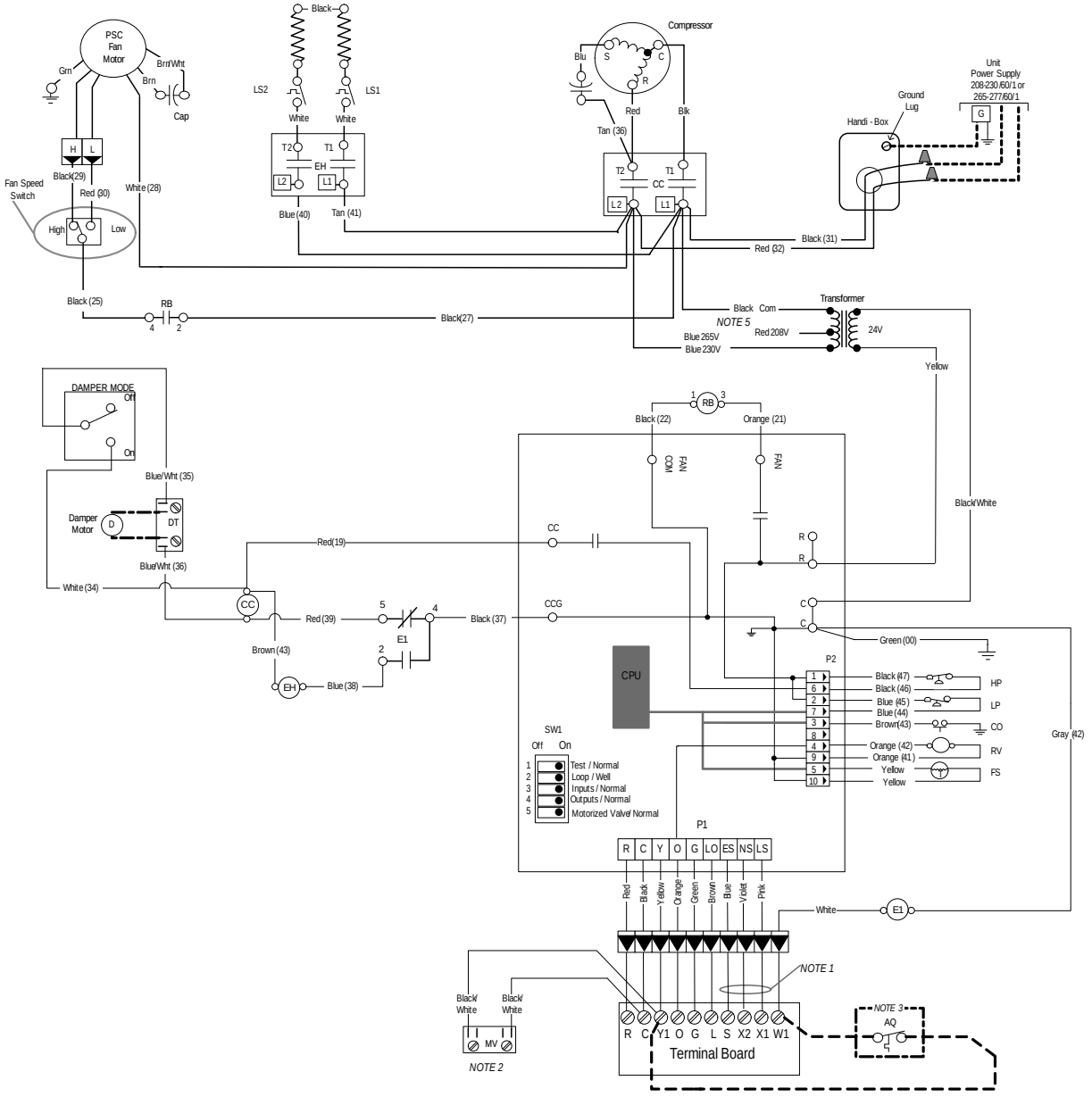
Operational Logic Table

| Mode | Inputs | Fan | Comp | RV |
|---|---|---|---|---|
| Htg | Y | ON | ON | OFF |
| Clg | Y,O | ON | ON | ON |
| Fan | G | ON | OFF | OFF |

# Wiring Schematics cont.

## VERSATEC CONTROL - EH & REMOTE WALL THERMOSTAT 208-230-265/60/1

### Schematic [A]




## Legend

| | | | | |
|---|---|---|---|---|
| Factory low voltage wiring<br>Factory line voltage wiring<br>Field low voltage wiring<br>Field line voltage wiring<br>DC voltage PCB traces<br>Internal junction<br>Quick connect terminal<br>Wire nut<br>L1 Field wire lug<br>Ground | Relay Contacts N.O., N.C.<br>T Thermistor<br>Relay coil | Switch - High pressure<br>Switch - Low pressure<br>P 2 3 1 Polarized connector<br>Condensate Overflow | AQ – Aquastat<br>CC – Compressor Contactor<br>CO – Condensate Overflow<br>DT – Damper Terminal Block<br>E1 – Electric Heat Relay<br>EH – Electric Heat Contactor<br>ES – Emergency Shutdown<br>FS – Freeze Sensing Device<br>HP – High Pressure Switch<br>LP – Low Pressure Switch<br>LS – Loadshed<br>MV – Motorized Valve<br>NS – Night Setback<br>RB – Blower Power Relay<br>RV – Reversing Valve Coil<br>SW1 – DIP Switch #1 | Notes:<br>1 - Requires common connection or 24 VAC for activation.<br>2 - When field installed 24VAC motorized valve is used connect to C and Y or SV terminals<br>3 - Optional field installed aquastat for use with single heat<br>4 - Check installation wiring information for specific thermostat hookup instructions<br>5 - Switch blue and red wires for 208V operation. |

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# Controls

| Control | General Description | Application | Display/Interface | Protocol | Thermostat Options |
|---|---|---|---|---|---|
| **CCM Control**  | The CCM (Compressor control module) is a more reliable replacement for electro-mechanical control applications. It features a small microprocessor board that handles the lockout function of the unit. A second microporcessor handles the unit mounted thermostat for maintaining accurate room temperature. | Residential and commercial applications requiring minimal but reliable controls. Includes Random Start, High and low pressure switches and auto changeover capability. | Dial thermostat with Hi and Low fan speeds, and auto changeover or cont fan selection switches. | None | **Unit Mounted Digital Dial Thermostat**<br>**Remote Mounted Standard Thermostat** |
| **Versatec Control**  | The Versatec Control is a microprocessor based board that adds the features of emergency shutdown (ES), night setback (NS), water freeze sensing (FS), Load Shed (LS) and condensate overflow (CO). The Versatec Control also features Optional Field servicing LED's for mode, Fault and diagnostic indication. | Residential and commercial applications requiring more controls features than CCM and Includes Random Start, High and low pressure switches, auto changeover capability, emergency shutdown (ES), night setback (NS), load shed (LS), water freeze sensing (FS), and condensate overflow (CO). | Optional field servicing LED board for mode, fault and diagnostic indication | None | **Unit Mounted Digital Dial Thermostat**<br>**Remote Mounted Standard Thermostat** |

## Standard CCM Control Features

Compressor control module (CCM) controls are standard on the Affinity Console Series console heat pump. This control features unit mounted thermostat and switches,

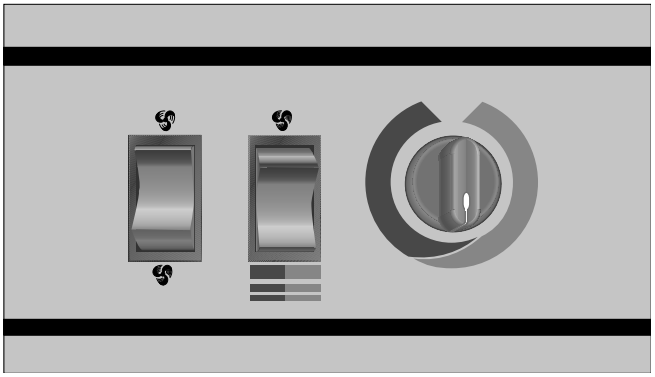
Features of the standard control are:

- Easy to understand color coded thermostat adjustment markings.
- Large, rocker type mode and fan switches.
- Internally mounted fan switch to choose cycled or constant fan operation.
- High pressure and low pressure safety controls to protect the unit components.
- Lockout circuit to shut down unit operation upon receipt of a fault indicator from the safety controls.
- A 24 volt control circuit allows for safe and easy diagnosis.

# Controls cont.

The user selects either “Heat/Cool” or “Fan Only” on the mode switch, then either “High” or “Low” at the fan speed switch. The temperature can be controlled by rotating the thermostat control knob.

***Figure 6: Unit Mounted Control***



The “Fan Only” setting provides constant fan operation.

In the “Heat” mode, a call for heat by the thermostat closes the compressor contactor contacts, energizing the compressor, which will run until the thermostat is satisfied.

In the “Cool” mode, a call for cooling by the thermostat energizes the reversing valve and closes the compressor contactor contacts, energizing the compressor, which will run until the thermostat is satisfied.

The emergency electric heat operation in the “Heat/Cool” mode is subject to the setting of the internally mounted mode switch. The optional, factory installed electric heat will operate when the internally mounted mode switch is in the “Emergency Heat” mode. In the “Heat” mode, a call for heating energizes the fan and electric heater contactor, energizing the electric heat elements and fan, which will run until the thermostat is satisfied. When the internally mounted mode switch is in the “Normal/Boilerless” mode the unit operates in its normal “Heat/Cool” operation, unless there is an aquastat controller. When the normally open circuit of the aquastat closes and the unit is in the heating mode, it will switch to the “Emergency Heat” condition until the thermostat is satisfied or the aquastat opens restarting the compressor.

If either the low or high pressure safety switches are opened, the compressor and reversing valve are disabled by the lockout relay. Unit operation will resume only after the voltage to the unit is interrupted or the mode switch is placed in the “Off” position.

If the electric heat limit switches are opened, the electric heat is disabled.

**Optional Versatec Microprocessor Control Features**

The Versatec microprocessor board provides control of the entire unit as well as outputs for status modes, faults and diagnostics. The control system is a microprocessor-based control board that is located in the unit control box. This feature is available for either unit mounted controls or optional remote wall mounted thermostat.

A 9-pin low voltage terminal strip provides all necessary terminals for the wall mounted thermostat.

**Startup**

The unit will not operate until all the inputs and safety controls are checked for normal operating conditions.

**Fault Retry**

All faults are retried twice before finally locking the unit out to prevent nuisance service calls.

**Component Sequencing Delays**

Components are sequenced and delayed for optimum unit performance.

**Short Cycle Protection and Random Start**

The control allows a minimum on or off time of 5 minutes for short cycle protection. A random time delay of 0 to 30 seconds is generated after each power-up to prevent simultaneous start up of all units within a building after the release from an unoccupied cycle or power loss.

**Night Setback**

A grounded signal to common or connecting 24 VAC to the NS terminal will initiate the night setback mode.

**Load Shed**

A grounded signal to common or connecting 24 VAC to the LS terminal places the controller into the load shed mode. The compressor will become disabled and the fan will start upon a thermostat call for heating or cooling.

**Emergency Shutdown**

A grounded signal to common or connecting 24 VAC to the ES terminal places the controller into the emergency shutdown mode. The compressor and fan operation are suspended while in the emergency shutdown mode.

**Condensate Overflow Protection**

The board incorporates an impedance liquid sensor at the top of the condensate drain pan. Upon a continuous 30-second sensing of the condensate, the cooling operation of the unit is suspended.

**Safety Controls**

The microprocessor board receives separate signals from a high pressure switch for safety, a low pressure switch to prevent loss of refrigerant charge and a low suction temperature thermistor for freeze sensing. Upon a continuous 30-second measurement of the fault (immediate for high pressure), compressor operation is stopped.

# Controls cont.

## Control Tables for Optional Versatec Microprocessor

### Logic Board DIP Switch Settings

| Switch | OFF | ON |
|---|---|---|
| **SW1 - 1** | Test - Selected timings sped up to facilitate troubleshooting | Normal - Standard timings |
| **SW1 - 2** | Loop - Closed loop freeze sensing setting (15°F) | Well - Open loop freeze sensing setting (30°F) |
| **SW1 - 3** | Commercial - Enables NS features when TA32U02 thermostat is used | Normal - Standard thermostat operation |
| **SW1 - 4** | IO Display* - Enables Input/Output display on external LED board | Normal* - Unit status display |
| **SW1 - 5** | Configures board for 2-speed compressor without fan | Configures board for 2-speed compressor with fan |

### Normal Control Timing

| | |
|---|---|
| **Blower off delay** | 30 seconds |
| **Compressor on delay** | 10 seconds |
| **Short cycle delay** | 5 minutes |
| **Miniumum compressor on time** | 2 minutes (except for fault condition) |
| **High pressure fault recognition delay** | Less than 1 second |
| **low pressure fault recognition delay** | 30 seconds |
| **Freeze sensing fault recognition delay** | 30 seconds |
| **Condensate overflow fault recognition delay** | 30 seconds |
| **Low pressure fault bypass delay** | 2 minutes |
| **Freeze sensing fault bypass delay** | 2 minutes |
| **Power on delay** | 5 minutes |

### Operational Logic

| Mode | Inputs | Fan | Comp | RV |
|---|---|---|---|---|
| **Htg** | Y | ON | ON | OFF |
| **Clg** | Y,O | ON | ON | ON |
| **Fan** | G | ON | OFF | OFF |

### Test Control Timing

| | |
|---|---|
| **Blower off delay** | 5 seconds |
| **Compressor on delay** | 2 seconds |
| **Short cycle delay** | 15 seconds |
| **Miniumum compressor on time** | 5 seconds (except for fault condition) |
| **High pressure fault recognition delay** | Less than 1 second |
| **low pressure fault recognition delay** | 30 seconds |
| **Freeze sensing fault recognition delay** | 30 seconds |
| **Condensate overflow fault recognition delay** | 30 seconds |
| **Low pressure fault bypass delay** | 0 seconds |
| **Freeze sensing fault bypass delay** | 0 seconds |
| **Power on delay** | 15 seconds |
| **Fault off time** | 5 minutes |

### Diagnostic Modes

| LED | Current Fault Status<br>SW1 - #4 On, SW2 On | Inputs<br>SW1 - #4 Off, SW2 Off | Outputs<br>SW1 - #4 Off, SW2 On |
|---|---|---|---|
| Drain | Drain pan overflow | Y | Compressor |
| Water Flow | FS thermistor (loop <15°F, well <30°F) | G | FAN |
| High Press | High pressure >600 PSI | O | O |
| Low Press | Low pressure <40 PSI | ES | ES |
| Air Flow | Not used | NS | NS |
| Status | Not used | LS | LS |
| DHW Limit | Not used | Not used | Not used |
| HWD | SW2 in the On position | Off position | On position |

# Startup Notes

### Emergency Electric Resistance Heat

A factory-installed emergency electric heater package is available. Rated for 2,000 watts on models GC09 through GC12 and 3,000 watts on models GC15 through GC18. The heater package consists of ni-cad elements, ceramic insulators, and thermal limit switches. A concealed, chassis mounted rocker switch controls the heater mode operation and allows the field installation of an aquastat for boilerless unit operation.

### Electrical Disconnect

Field installed on the optional chassis back plate, the console disconnect provides a permanent electrical connection to the main electrical supply branch. Wiring between the disconnect and the unit chassis is field supplied and allows the electrical power source to the chassis to be interrupted for unit servicing.

**Non-Fused**

Constructed of heavy gauge galvanized steel, the rocker style disconnect switch provides reliable electrical control. Wiring pigtails, using 12-gauge wires, are factory installed to simplify field wiring.

**Fused**

Similar in construction to the non-fused electrical disconnect. The fused disconnect is available in five models with equipment rated fuses to provide additional circuit protection. The fuses are panel mounted to allow easy inspection and removal without removing the cover on the disconnect.

CFD-10 - 10 amp rated fuse
CFD-12 - 12 amp rated fuse
CFD-15 - 15 amp rated fuse
CFD-20 - 20 amp rated fuse
CFD-25 - 25 amp rated fuse

### Motorized Outside Air Damper

A field installed motorized outside air damper is available to allow the introduction of fresh air into the conditioned space through an outside vent. The damper motor is powered by 24 volts with a spring-close design in the event of a power failure. The damper blade and housing are constructed of aluminum for corrosion resistance and the blade includes a neoprene gasket to prevent air infiltration during off cycles. The damper assembly is installed on the optional chassis back plate and a two-wire low voltage connection simplifies wiring. A concealed, chassis mounted rocker switch allows the damper to be disabled

### Hydronic Loop Controller for Boiler/Tower Installations

The hydronic loop controller is a microprocessor based control panel for control of water loop heat rejector (tower), heat supplier (boiler), and/or water well pumps and circulation pumps. Includes audible and visual alarms, temperature indication, and add-on options of low switches, remote alarm sensor wells and pump alternator.

# Startup Checklist / Unit Startup Steps

**Before Powering Unit, Check The Following:**

- High voltage is correct and matches nameplate.
- Fuses, breakers and wire size correct.
- Low voltage wiring complete.
- Piping completed and water system cleaned and flushed.
- Air is purged from closed loop system.
- Isolation valves are open, water control valves or loop pumps wired.
- Condensate line open and correctly pitched.
- Transformer switched to 208V if applicable.
- Dip switches are set correctly, if applicable.
- Blower rotates freely
- Air filter is clean and in position.
- Service/access panels are in place.
- Return air temperature is between 50-80ºF heating and 60-95ºF cooling.
- Check air coil cleanliness to insure optimum performance. Clean as needed according to maintenance guidelines. To obtain maximum performance the air coil should be cleaned before startup. A 10-percent solution of dishwasher detergent and water is recommended for both sides of coil, a thorough water rinse should follow.

## Startup Steps

**Note:** Complete the Equipment Start-Up/Commissioning Check Sheet during this procedure. Refer to thermostat operating instructions and complete the startup procedure.

1. Initiate a control signal to energize the blower motor. Check blower operation.
2. Initiate a control signal to place the unit in the cooling mode. Cooling setpoint must be set below room temperature.
3. Be sure that the compressor and water control valve or loop pump(s) are activated.
4. Verify that the water flow rate is correct by measuring the pressure drop through the heat exchanger using the P/T plugs and comparing to unit capacity data in specification catalog.
5. Check the temperature of both the supply and discharge water (Refer to Unit Operating Parameters tables).
6. Check for an air temperature drop of 15°F to 25°F across the air coil, depending on the fan speed and entering water temperature.
7. Adjust the cooling setpoint above the room temperature and verify that the compressor and water valve or loop pumps deactivate.
8. Initiate a control signal to place the unit in the heating mode. Heating set point must be set above room temperature.
9. Check the temperature of both the supply and discharge water (Refer to Unit Operating Parameters tables).
10. Check for an air temperature rise of 20°F to 35°F across the air coil, depending on the fan speed and entering water temperature.
11. Adjust the heating setpoint below room temperature and verify that the compressor and water valve or loop pump deactivate.
12. During all testing, check for excessive vibration, noise or water leaks. Correct or repair as required.
13. Set system to desired normal operating mode and set temperature to maintain desired comfort level.
14. Instruct the owner/operator in the proper operation of the thermostat and system maintenance.

**Note:** Be certain to fill out and forward all warranty registration papers.

# Operating Parameters

## Single Speed Models

| Entering Water Temp °F | Water Flow GPM/Ton | Cooling | | | | | |
|---|---|---|---|---|---|---|---|
| | | Suction Pressure PSIG | Discharge Pressure PSIG | 09-18 Superheat | 09-18 Subcooling | Water Temp Rise °F | Air Temp Drop °F DB |
| 50 | 1.5 | 127 - 144 | 205 - 225 | 5 - 10 | 10 - 14 | 18 - 22 | 18 - 22 |
| | 3.0 | 120 - 140 | 185 - 205 | 7 - 15 | 5 - 10 | 8 - 10 | 18 - 22 |
| 70 | 1.5 | 139 - 154 | 280 - 300 | 8 - 11 | 8 -12 | 18 - 22 | 18 - 22 |
| | 3.0 | 137 - 152 | 250 - 270 | 9 - 12 | 7 - 11 | 8 - 10 | 18 - 22 |
| 90 | 1.5 | 143 - 158 | 360 - 380 | 8 - 11 | 9 - 13 | 18 - 22 | 16 - 20 |
| | 3.0 | 141 - 156 | 330 - 350 | 9 - 12 | 8 - 12 | 8 - 10 | 16 - 20 |

| Entering Water Temp °F | Water Flow GPM/Ton | Heating | | | | | |
|---|---|---|---|---|---|---|---|
| | | Suction Pressure PSIG | Discharge Pressure PSIG | 09-18 Superheat | 09-18 Subcooling | Water Temp Drop °F | Air Temp Rise °F DB |
| 30 | 1.5 | 73 - 79 | 279 - 304 | 7 - 13 | 2 - 6 | 7 -10 | 18 - 24 |
| | 3.0 | 79 - 85 | 285 - 310 | 8 - 14 | 2 - 6 | 3 - 6 | 20 - 26 |
| 50 | 1.5 | 103 - 109 | 308 - 333 | 8 - 12 | 4 - 8 | 8 - 11 | 20 - 26 |
| | 3.0 | 110 - 116 | 315 - 340 | 9 - 13 | 4 - 8 | 4 - 7 | 22 - 28 |
| 70 | 1.5 | 140 - 146 | 330 - 365 | 10 - 14 | 7 - 11 | 11 - 14 | 26 - 32 |
| | 3.0 | 146 - 153 | 340 - 375 | 10 - 14 | 7 - 11 | 7 - 10 | 28 - 34 |

Note: Cooling performance based on entering air temperatures of 80º F DB, 67º F WB.
Heating performance based on entering air temperature of 70º F DB.

# Operating Limits

| *Operating Limits* | Cooling | | Heating | |
|---|---|---|---|---|
| | (°F) | (°C) | (°F) | (°C) |
| ***Air Limits*** | | | | |
| Min. Ambient Air | 45 | 7.2 | 45 | 7.2 |
| Rated Ambient Air | 80 | 26.7 | 70 | 21.1 |
| Max. Ambient Air | 100 | 37.8 | 85 | 29.4 |
| Min. Entering Air | 50 | 10.0 | 40 | 4.4 |
| Rated Entering Air db/wb | 80.6/66.2 | 27/19 | 68 | 20.0 |
| Max. Entering Air db/wb | 110/83 | 43/28.3 | 80 | 26.7 |
| ***Water Limits*** | | | | |
| Min. Entering Water | 30 | -1.1 | 20 | -6.7 |
| Normal Entering Water | 50-110 | 10-43.3 | 30-70 | -1.1 |
| Max. Entering Water | 120 | 48.9 | 90 | 32.2 |

**Notes:**

Minimum/maximum limits are only for start-up conditions, and are meant for bringing the space up to occupancy temperature. Units are not designed to operate at the minimum/maximum conditions on a regular basis. The operating limits are dependant upon three primary factors: 1) water temperature, 2) return air temperature, and 3) ambient temperature. When any of the factors are at the minimum or maximum levels, the other two factors must be at the normal level for proper and reliable unit operation.

DEALER: _____

PHONE #: _____ DATE: _____

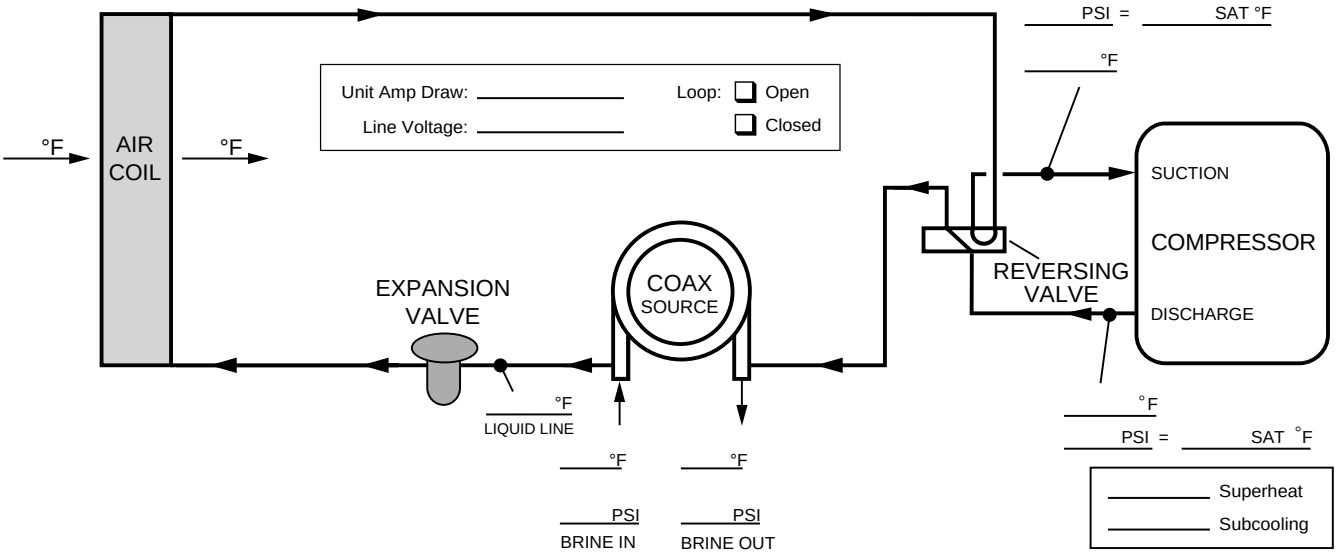
PROBLEM: _____

MODEL #: _____

SERIAL #: _____

## Startup/Troubleshooting Form

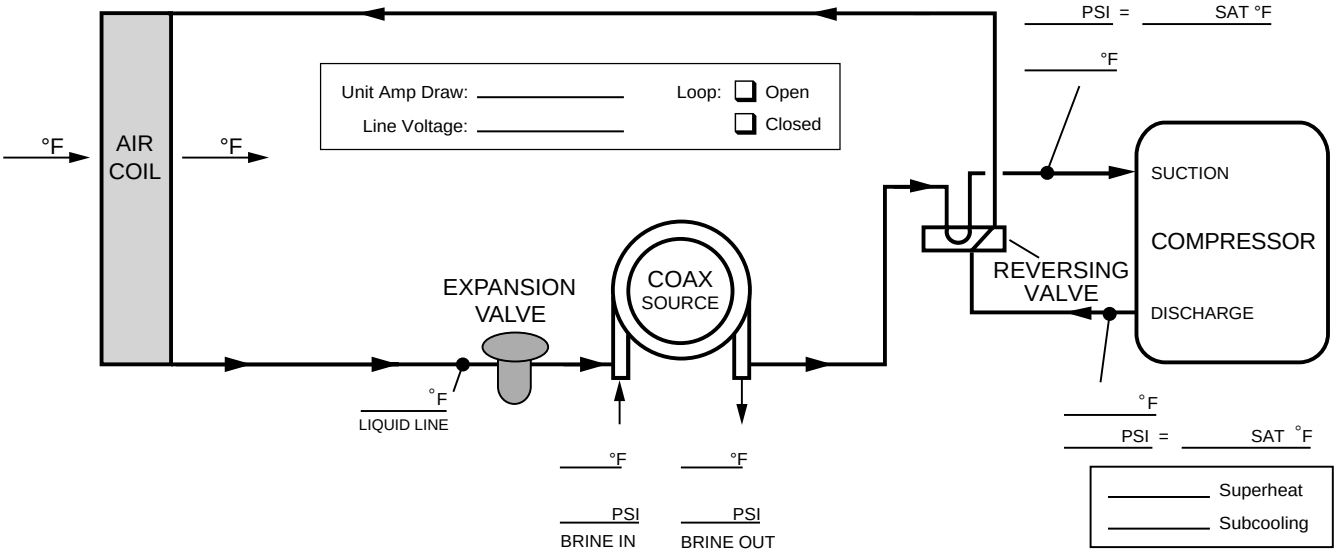
## COOLING CYCLE ANALYSIS




**Heat of Extraction/Rejection = GPM x 500 (485 for water/antifreeze) x ΔT**

**Note: DO NOT** hook up pressure gauges unless there appears to be a performance problem.

## HEATING CYCLE ANALYSIS



# Pressure Drop

| Model | GPM | Pressure Drop (psi) | | | | |
|---|---|---|---|---|---|---|
| | | 30°F | 50°F | 70°F | 90°F | 110°F |
| **09** | 1.2 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 |
| | 1.8 | 2.3 | 2.2 | 2.0 | 1.9 | 1.8 |
| | 2.5 | 3.8 | 3.7 | 3.5 | 3.3 | 3.1 |
| **12** | 1.5 | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 |
| | 2.3 | 1.7 | 1.5 | 1.4 | 1.3 | 1.1 |
| | 3.5 | 3.0 | 2.7 | 2.5 | 2.4 | 2.2 |
| **15** | 2.0 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| | 3.0 | 3.3 | 3.2 | 3.0 | 2.9 | 2.8 |
| | 4.5 | 5.7 | 5.5 | 5.3 | 5.1 | 4.9 |
| **18** | 3.0 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| | 4.0 | 4.1 | 4.0 | 3.9 | 3.7 | 3.6 |
| | 5.5 | 7.9 | 7.6 | 7.4 | 7.2 | 6.9 |

3/4/08

# Preventive Maintenance

## Water Coil Maintenance

1. Keep all air out of the water. An open loop system should be checked to ensure that the well head is not allowing air to infiltrate the water line. Lines should always be airtight.
2. Keep the system under pressure at all times. It is recommended in open loop systems that the water control valve be placed in the discharge line to prevent loss of pressure during off cycles. Closed loop systems must have positive static pressure.

**Note:** On open loop systems, if the installation is in an area with a known high mineral content (125 PPM or greater) in the water, it is best to establish with the owner a periodic maintenance schedule so the coil can be checked regularly. Should periodic coil cleaning be necessary, use standard coil cleaning procedures which are compatible with either the cupronickel or copper water lines. Generally, the more water flowing through the unit the less chance for scaling.

## Other Maintenance

### Filters

Filters must be clean to obtain maximum performance. They should be inspected monthly under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

### Condensate Drain

In areas where airborne bacteria produce a slime in the drain pan, it may be necessary to treat chemically to minimize the problem. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect twice a year to avoid the possibility of overflow.

### Blower Motors

Blower motors are equipped with sealed ball bearings and require no periodic oiling.

### Air Coil

The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum (with a brush attachment) clean. Care must be taken not to damage the aluminum fins while cleaning.

**CAUTION: Fin edges are sharp.**

# Replacement Procedures

### Obtaining Parts

When ordering service or replacement parts, refer to the model number and serial number of the unit as stamped on the serial plate attached to the unit. If replacement parts are required, mention the date of installation of the unit and the date of failure, along with an explanation of the malfunctions and a description of the replacement parts required.

### In-Warranty Material Return

Material may not be returned except by permission of authorized warranty personnel. Contact your local distributor for warranty return authorization and assistance.

# Notes

# Revision Guide

| Pages: | Description: | Date: | By: |
|---|---|---|---|
| All | Updated with All-Aluminum Air Coils | 10 Mar 2014 | DS |
| All | First Published | 30 Oct 2013 | DS |

| | |
|---|---|
| Product: | **Affinity Console Series** |
| Type: | Geothermal/Water Source Heat Pumps |
| Size: | 0.75-1.5 Ton |
| | |
| Document Type: | Installation Manual |
| Part Number: | IM1010CK6 |
| Release Date: | 03/14 |