The Whalen Company

Installation, Operation, and Maintenance Manual

CAS*Packaged WSHP
CASH/V006-060
Rev:23 April 2020RP

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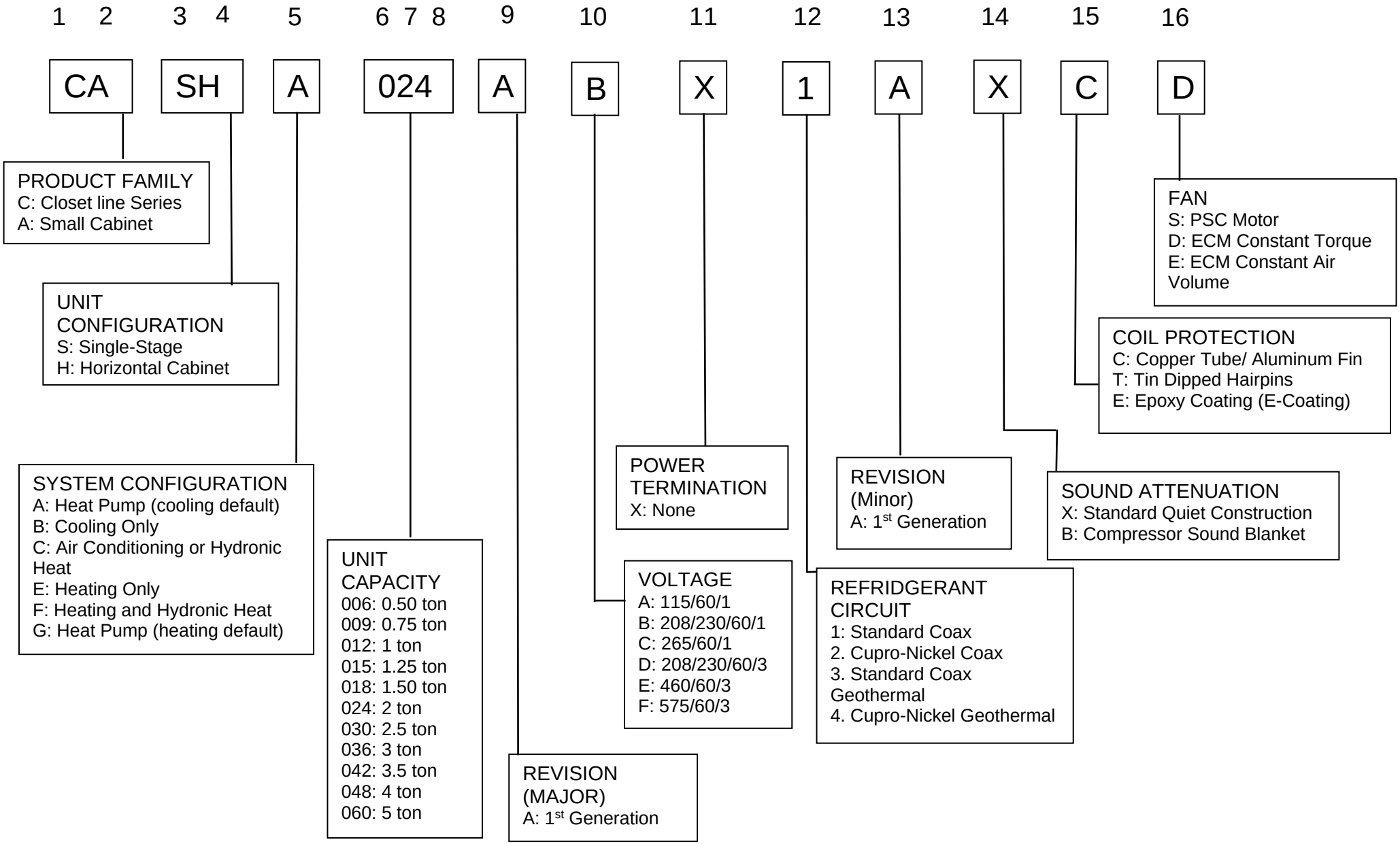
Whalen Nomenclature



Safety Precautions

Please be sure to familiarize yourself with all sections of this manual before beginning installation, maintenance, or service.

Inspection: Upon the unit(s) arrival it is the customers job to ensure the units received are accounted for versus the bill of lading or purchase order. Once units are accounted inspect each unit for signs of damage. Any damage discovered should be noted by the freight carrier and a common carrier inspection report should be filed. Internal or concealed damage that was not discovered during delivery must be reported to the carrier within 15 days of its receipt of shipment. The freight company can deny the claim for reports exceeding 15 days. Please note, it is the purchaser's responsibility to report any damages.

Storage: If units are not going to be immediately installed, they must be stored in a dry, clean area where they will not be susceptible to damage. Do not remove any packaging, pallets, or other shipping material until units are ready to be installed. Units should be stored in an upright position, and stacked to a maximum of 2 units high.

Pre-Commissioning: If units are going to be installed, but not immediately commissioned, care must be taken to protect the units from dust contamination and other building debris.

Safety: Throughout this manual, and on the unit itself, there are Warning, Danger, Caution, and Notices that must be observed. Please read each of these thoroughly before beginning installation, or attempting any service or maintenance. Product damage or personal injury may occur.

When installing, servicing, or performing maintenance on any unit, make sure protective clothing, gloves, and safety goggles are worn.

WARNING

WARNING: This indicates a situation which could be potentially hazardous, and if not avoided could result in serious injury or death.

DANGER

DANGER: This indicates a situation which is immediately hazardous, and if not avoided will result in serious injury or death.

CAUTION

CAUTION: This indicates a situation which could be potentially hazardous, and if not avoided could result in serious injury, property damage, or unit damage.

NOTICE

NOTICE: This indicates a item or situation that is not hazardous, but important to system operation, installation, or maintenance.

Pre-Installation:

Location: The area where the units are to be installed should be selected carefully. Installation area should provide adequate service access, and access to utilities and ductwork. Units are designed for ceiling plenums, above false ceilings, and mechanical rooms. The installation site should have adequate clearance around the unit.

Sound: All units should utilize flex connectors in the supply and return ductwork. Vertical units should be placed on a foam or plastic vibration isolation pad. Horizontal units that are installed in a suspended application must utilize vibration isolation grommets, or other materials to reduce vibration. Should horizontal units be installed in a non-suspended application, a vibration isolation pad must be used.

Packaging Removal: Remove all packaging and wrapping from the unit prior to installation. Check inside the unit for additional supports, or other shipping protection materials. All packaging materials should be properly disposed of.

Water Quality: The condenser water system must be clean and contain minimum oxygen levels to prevent corrosion. Condenser water pH, total dissolved solids and total suspended solids must be maintained within proper limits to prevent equipment failure. Total dissolved solids should not exceed 1000 ppm for a glycol system and 300 ppm for a water-only system. Total suspended solids should not exceed 75 ppm. PH should be between 6.8 and 8.4. Corrosive fluids can degrade unit heat exchangers, cause leaks potentially damaging the unit, and the space it is installed in.

! CAUTION !

CAUTION: Units should never be used as a source of space heating or cooling while building construction is in-progress. Equipment damage from clogged air filters/air coils can occur, and will not be covered under warranty.

Pre-Installation Checklist:

- ☐ Confirm the unit data plate for the model number or tag number with ordering information and shipping information to verify the correct unit is being installed.
- ☐ Inspect the exterior of the unit for any damage, or other items which would hinder installation.
- ☐ The cabinet should be covered and protected with original packaging until units are ready for installation.
- ☐ Check the unit data for electrical data, and then verify the supplied service is correct.
- ☐ Remove internal supplement packaging such as blower supports, compressor shipping brackets, manuals, etc.
- ☐ Remove air filter(s) and check for any visible damage to the air coil. (if applicable)
- ☐ Verify internally that refrigerant/ water tubing is free of dents or kinks and is not in contact with other materials.
- ☐ Ensure all high and low voltage electrical connections are clean tightly secured.

! WARNING !

WARNING: Units, accessories, and all relevant components and parts must be installed in accordance with any and all local regulations. The installer is responsible for determining what codes and standards apply for their particular application.

Installation:

Piping: Unit loop and water connections utilize ¾,1" swivel FPT connections with nylon O-washers. Fittings should be hand-tightened only. Over- tightening connections can cause leaks, or other equipment damage.

When connecting the unit to the building loop, a hose kit or other connection fitting with P/T ports should be utilized.

On units equipped with brazed-plate heat exchangers, a 20 Mesh strainer on the inlet loop connection is required to prevent damage due to debris.

Condensate Drain: When connecting the condensate drain, make sure there is adequate spacing around the cabinet before connecting piping. All condensate drains must be pitched away from the unit a minimum of 1/4" per foot for proper drainage (see page 10).

NOTICE

NOTICE: Water connections must follow local plumbing and building codes.

High Voltage Wiring: All line voltage wiring should enter through the appropriate knockout, and be held with a strain relief connector. Refer to the unit data plate, or unit electrical data table, for unit electrical requirements. Copper conductors are the only approved line voltage wiring.

Low Voltage Wiring: All low voltage wiring should enter through the appropriate knockout, and be held with a strain relief connector.

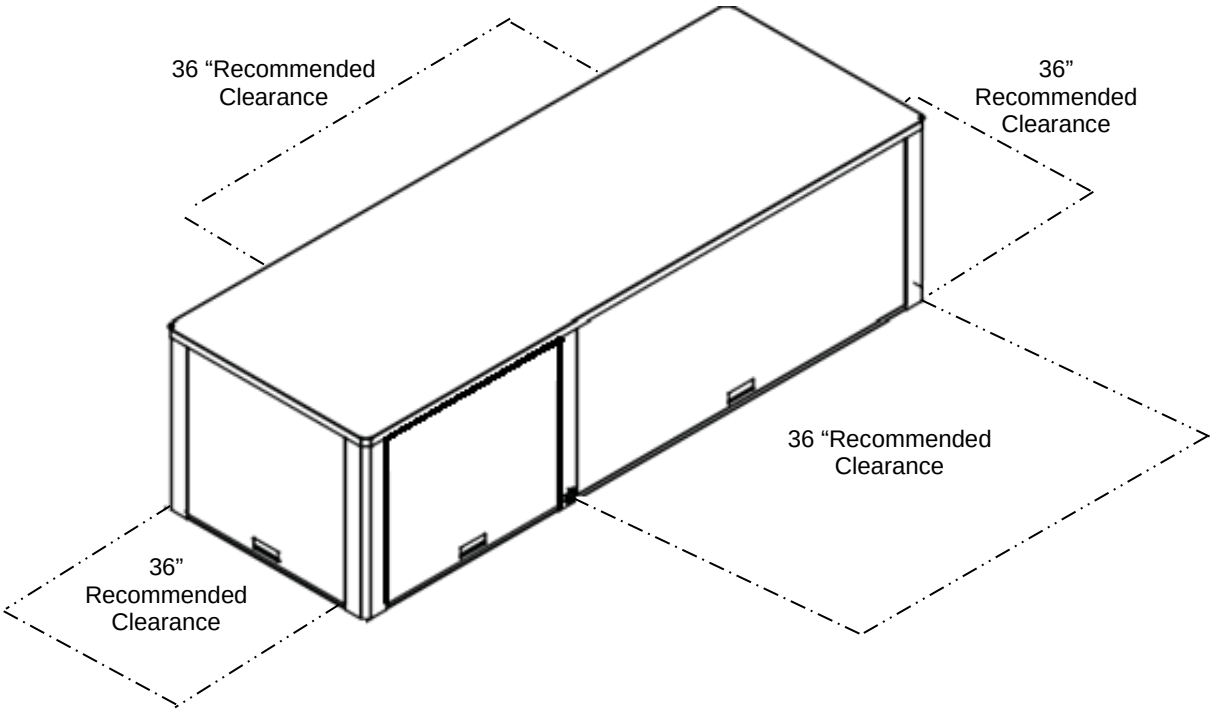
Wiring Connections: All high and low voltage wiring should be connected to the appropriate terminals as shown on the unit wiring diagram.

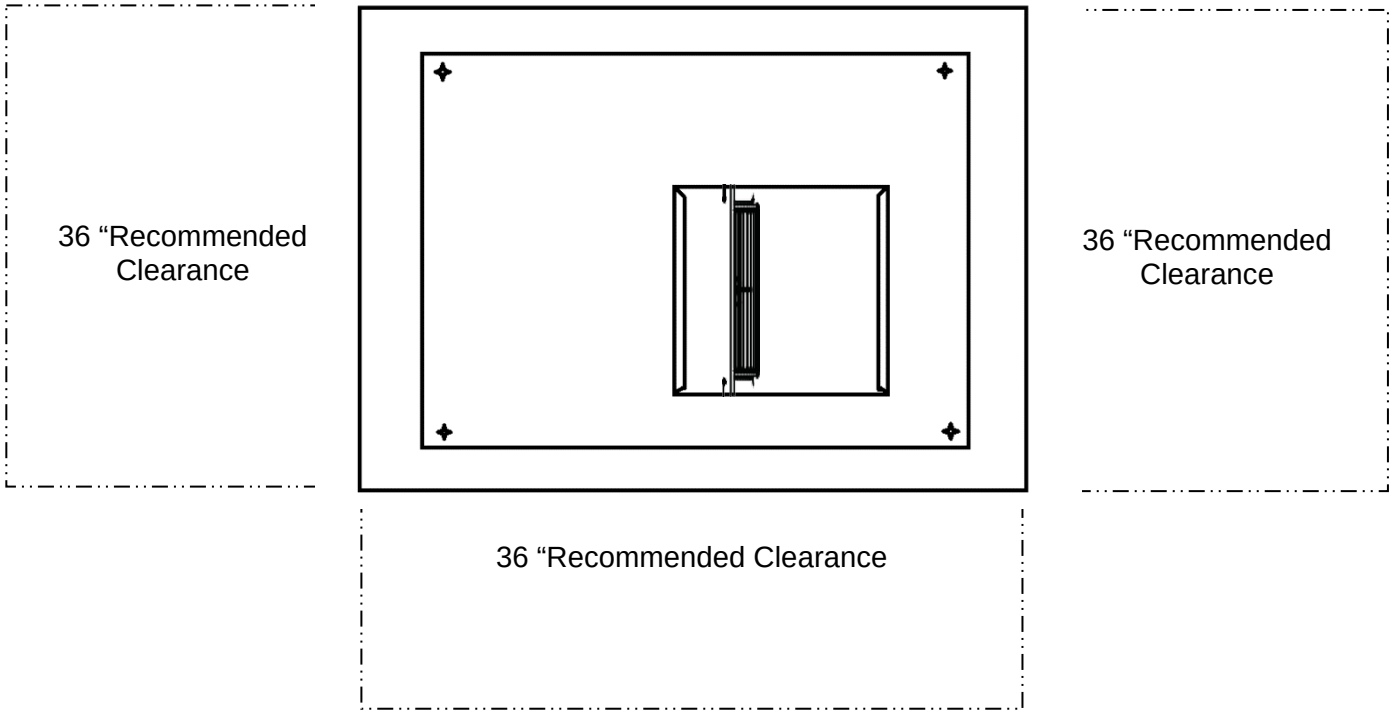
WARNING

WARNING: The installation of water source heat pumps that include installation shall be in accordance of all authorities having jurisdiction and must conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with all applicable codes and regulations.

CAUTION

CAUTION: Three phase components must have correct rotation verified at start up. Verify by checking compressor and motor amp draw will be considerably lower than nameplate values. Reverse rotation results in a compressor overload trip and is associated with a loud buzzing noise.


36 “Recommended Clearance
36” Recommended Clearance
36 “Recommended Clearance
36” Recommended Clearance


36 “Recommended Clearance
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Mounting Horizontal Cabinets

Location

Horizontal cabinets are typically suspended in a false ceiling or plenum with field provided threaded rods. Threaded rods are attached to four (4) hangar brackets that are provided with the unit. Refer to the instructions and images 3-4 below when installing threaded rods.

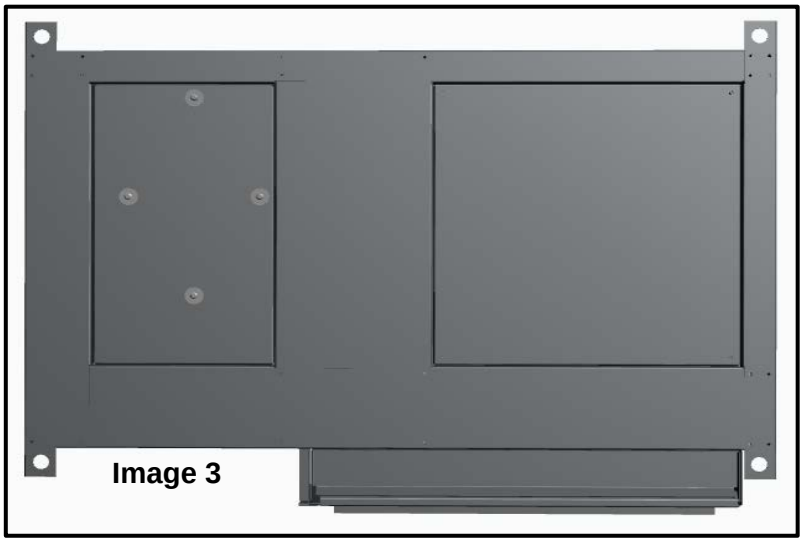


Image 3

Units are required to have adequate clearance around the cabinet for maintenance accessibility such as:

1. Filter Replacement
2. Drain Pan Cleaning
3. Control Box/Electrical Accessibility
4. Fan and Motor Maintenance
5. Servicing Evaporator Coils
6. Access to Water Fittings and Valves.
7. Disconnect Switch operation
8. Unit Removal

Mounting

Whalen horizontal units include hanging bracket kits for mounting the unit (see image 4)

The following parts are including in the hanger kit:

1. Brackets (4)
2. Screws
3. Washers
4. Rubber Isolators

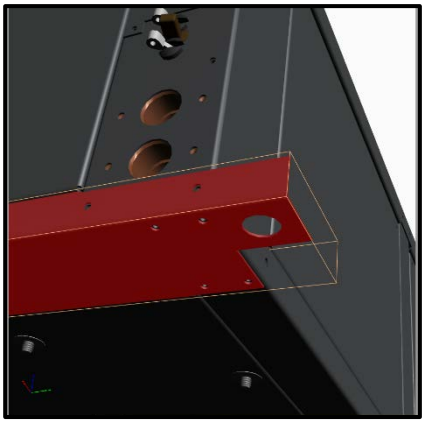


Image 4

Mounting locations shown in figure 4, use bolts provided from kit. Do not use factory sheet metal screws to mount the brackets.

⚠ NOTICE ⚠

Units are required to be pitched to enhance condensate drainage. Its recommended to pitch the unit ¼ toward the drain connection (image 5).

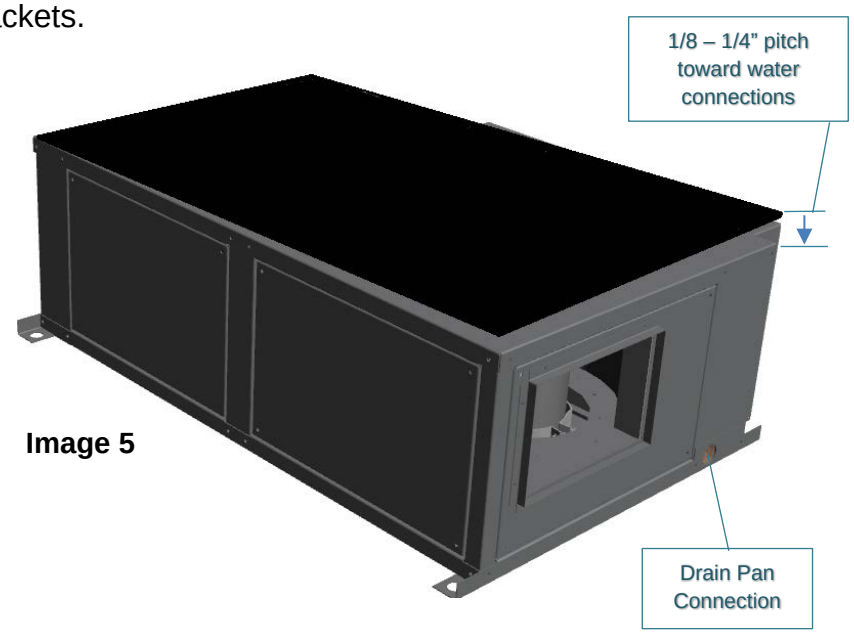


Image 5

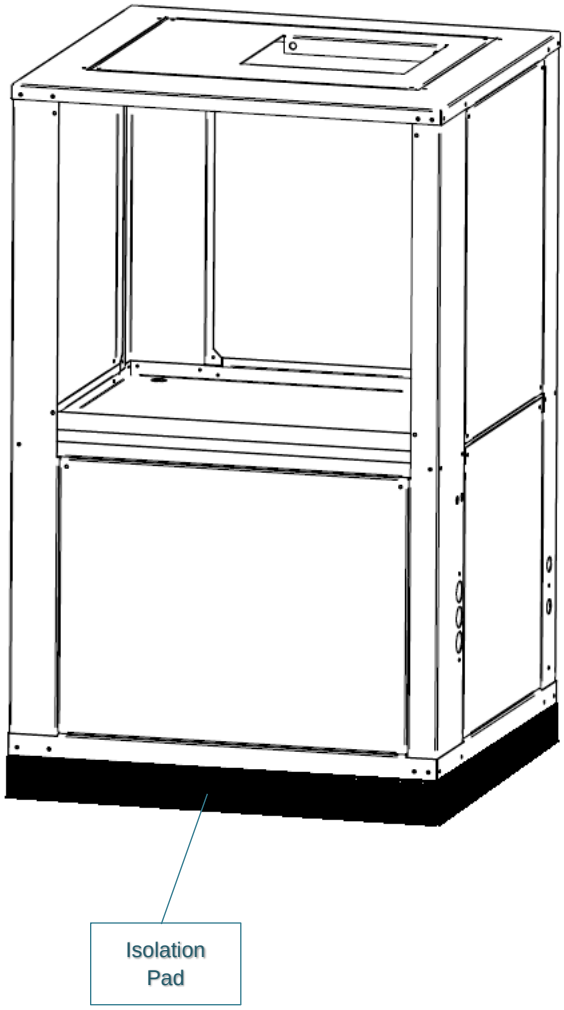
Mounting Vertical Cabinets

Vertical cabinets are typically mounted on top of a vibration absorbing pad that is larger than the cabinet. The absorption pad minimizes vibration from the cabinet, and the unit should not come into direct contact with the building. To further reduce sound transmission flexible duct connection must be used on all ducted applications.

Units are required to have adequate clearance around the cabinet for maintenance accessibility such as:

1. Filter Replacement
2. Drain Pan Cleaning
3. Control Box/Electrical Accessibility
4. Fan and Motor Maintenance
5. Servicing Evaporator Coils
6. Access to Water Fittings and Valves.
7. Disconnect Switch operation
8. Unit Removal

Please note that majority of vertical packaged WSHP are installed in mechanical rooms or closets and will require a louvered door for air to pass through the unit.



NOTICE

NOTICE: Never install units outdoors or areas indoors where humidity levels can cause cabinet condensation or are subject to freezing.

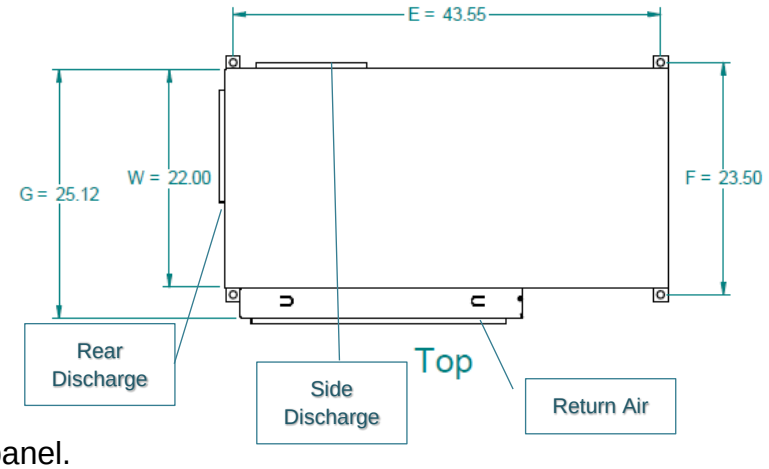
WARNING

Warning: Follow all applicable codes requirements when hanging this unit. All hanging units must conform to local codes.

Air Discharge Conversion

Whalen units have a variety of air discharge conversions. It is recommended to complete this step prior to hanging the unit, if the unit is suspended you must lower the unit before this conversion.

Image 6 Horizontal Top View



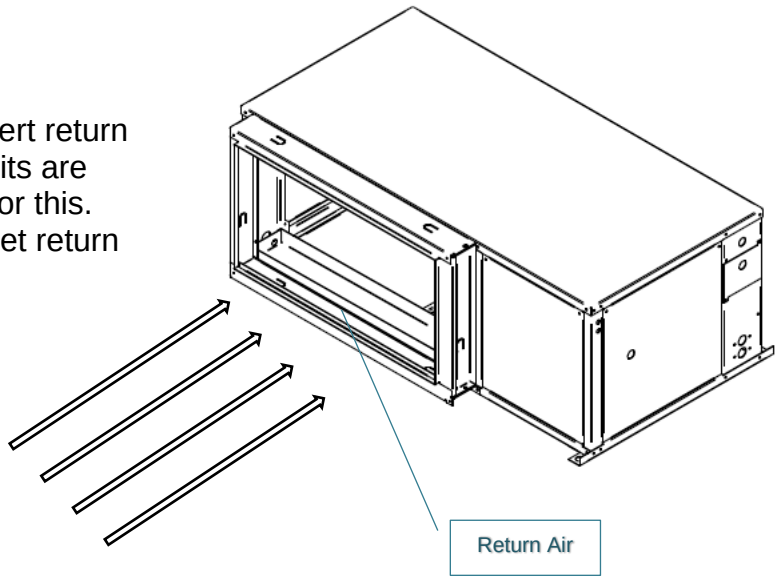
Horizontal Supply Air Discharge

Horizontal units can be converted from side to rear or rear to side discharge. Follow the steps below when converting discharge panels:

1. Switch off the disconnect switch or unit power.
2. Remove the screws from the side discharge or rear discharge. There are four (4) screws per panel.
3. Remove the access panel
4. Unplug the motor harness through the access panel opening.
5. Remove the screws from the blower discharge panel, then remove the blower and motor assembly.
6. Swap panels to your desired orientation, while ensuring the blower does not come into contact with the evaporator coil or piping.
7. Reroute the motor harness to the motor before reinstalling panels. Electrical connections should not be in contact with other components or in tension.
8. Reinstall the blower discharge panel.
9. By hand spin the fan wheel. The wheel should spin freely without coming into contact with the blower housing.
10. Reinstall the access panel.

Return Air Discharge

Horizontal and Vertical units are unable to convert return panels due to refrigeration piping. Horizontal units are available in left or right orientations to account for this. Vertical units can be rotated 180 degrees to meet return requirements.



Vertical Supply Air Discharge

Vertical units can be converted to several variations

- (1) Top
- (2) Front
- (3) Rear
- (4) Side (opposite to return)

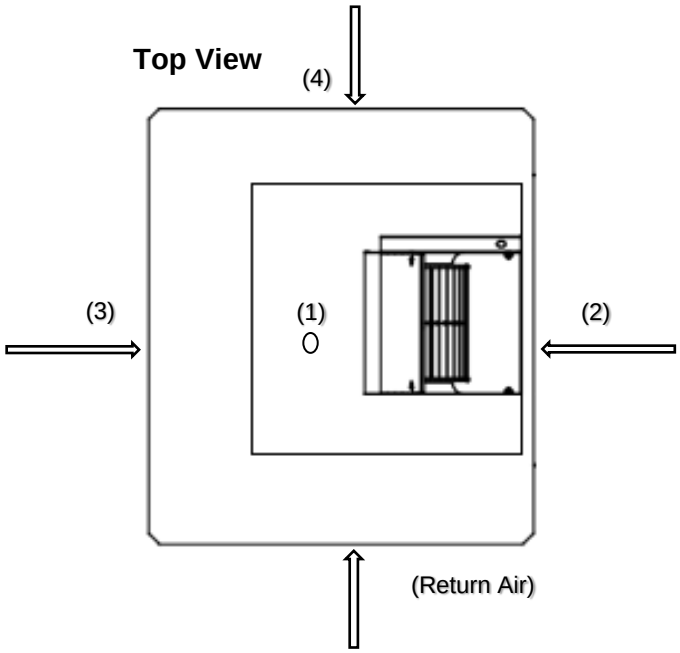
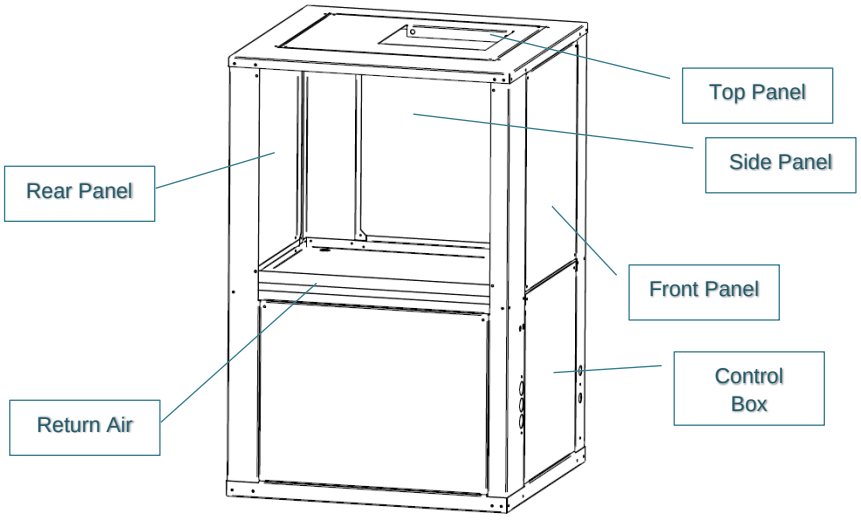


Image 8



Follow the steps below when converting discharge panels:

1. Switch off the disconnect switch or unit power.
2. Remove the screws from the side discharge or rear discharge. There are four (4) screws per panel.
3. Remove the access panel
4. Unplug the motor harness through the access panel opening.
5. Remove the screws from the blower discharge panel, then remove the blower and motor assembly.
6. Swap panels to your desired orientation, while ensuring the blower does not come into contact with the evaporator coil or piping.
7. Reroute the motor harness to the motor before reinstalling panels. Electrical connections should not be in contact with other components or in tension.
8. Reinstall the blower discharge panel.

By hand spin the fan wheel. The wheel should spin freely without coming into contact with the blower housing.

Duct Installation

Uniform and adequate airflow is critical to the performance of the unit. Airflow through the cabinet must be at the specified air flow provided in the design guide.

All units contain return duct flanges and supply air duct connections. Flexible duct connector is recommended on metal ducting for both supply and return.

If the unit is installed in existing ductwork, the duct system must be checked to verify it has the capacity to handle the applications rated airflow. If the duct system is unable to handle the required airflow new duct work must be installed. Verify the existing duct work is free of leaks and repairs.

NOTICE

NOTICE: You must follow ASHRAE procedures for proper duct installation and sizing.

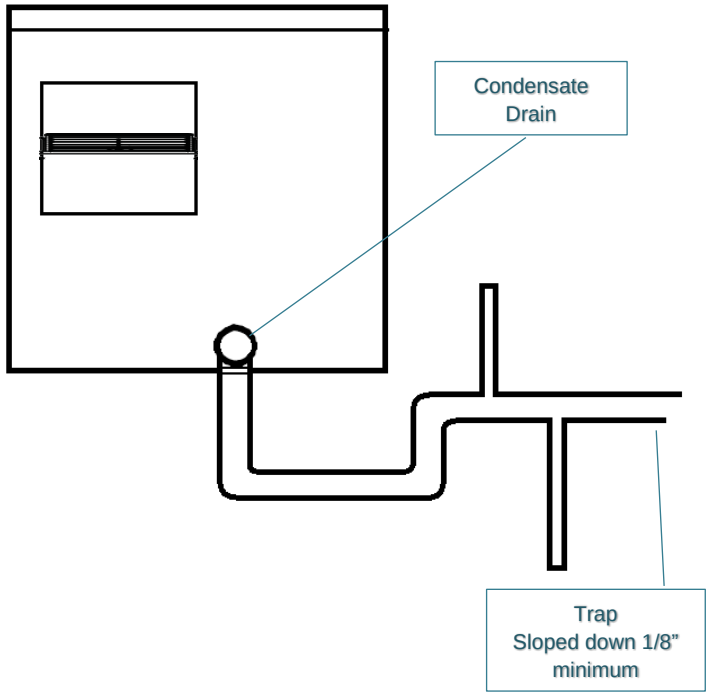
Condensate Drain

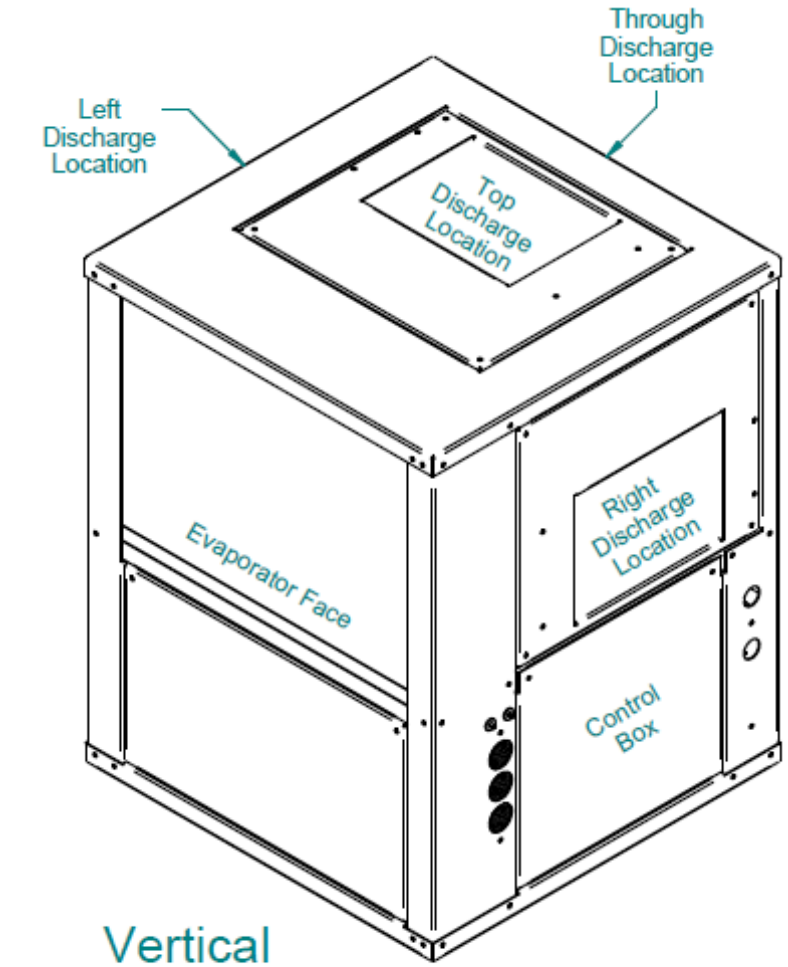
Units are required to have a pitched condensate drain line to direct condensate away from the unit. All connections must be in conformance off all plumbing/building codes.

Drain line must be pitched opposite to the unit at a minimum of 1/8 inch per foot. Within the drain line a trap is required, which helps free condensate flow. Distance of the trap is dependent on the amount of air pressure the drain pan is receiving during operation.

Units must be pitched to a minimum of ¼" both horizontally and vertically to improve condensate drainage. See mounting horizontal cabinets above.

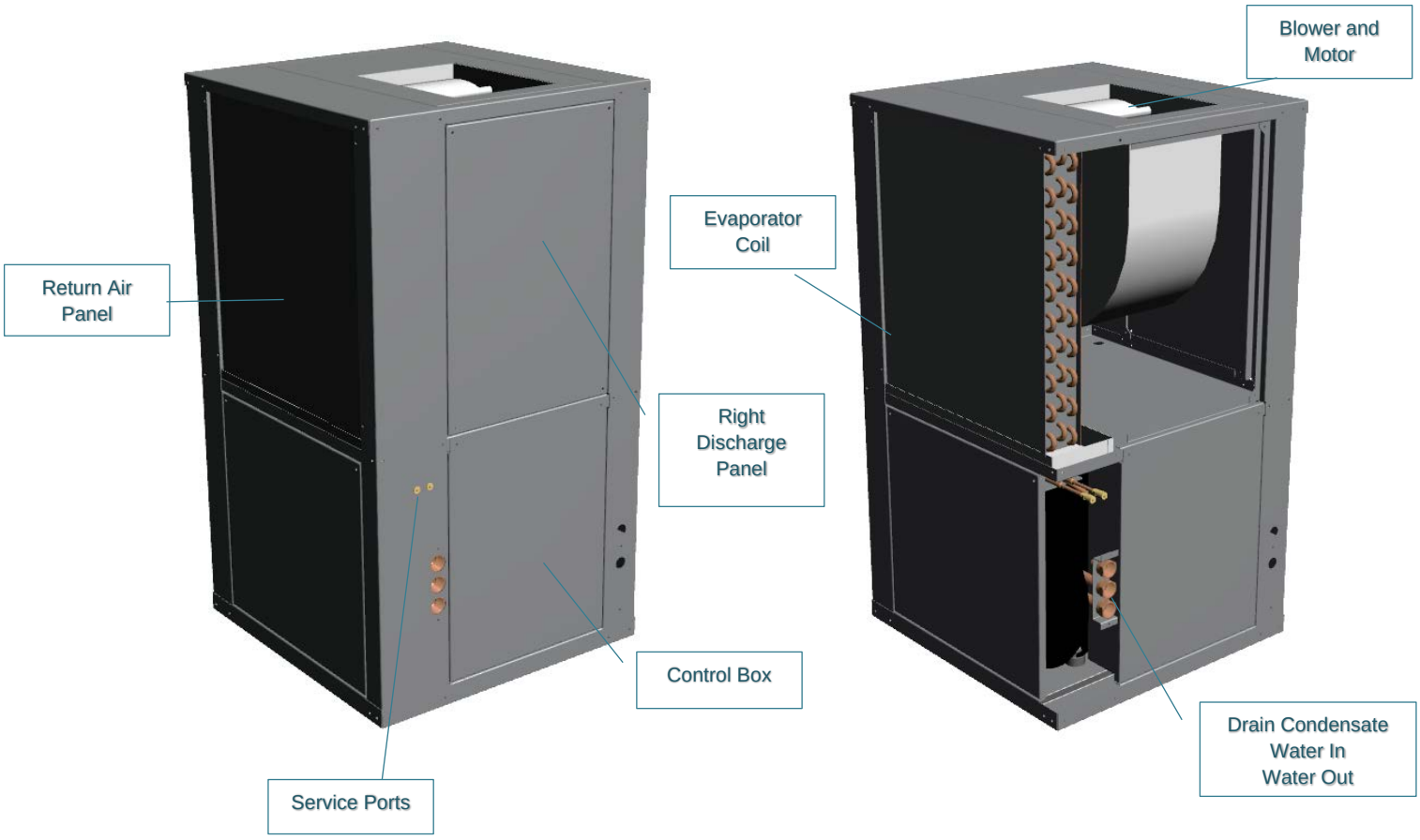
Warning: Over pitching units can result in condensate leaks within the cabinet.

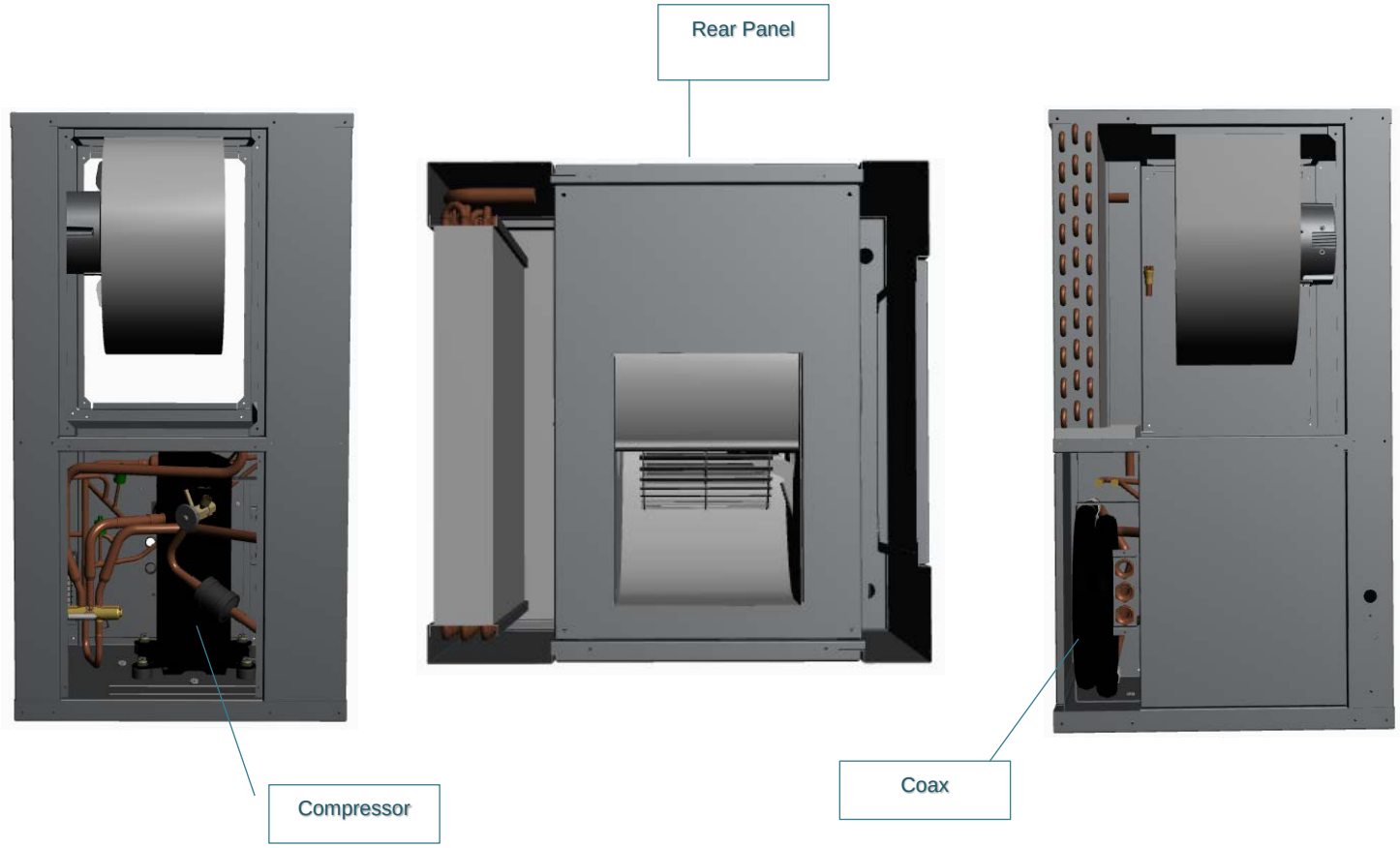


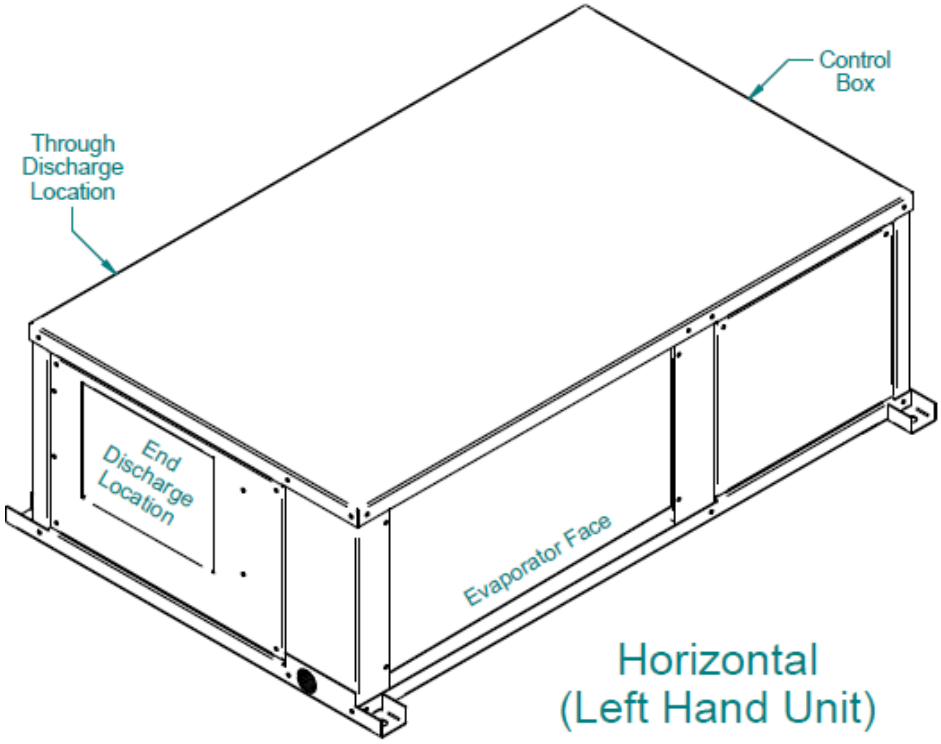


Vertical
(Left Hand Unit)

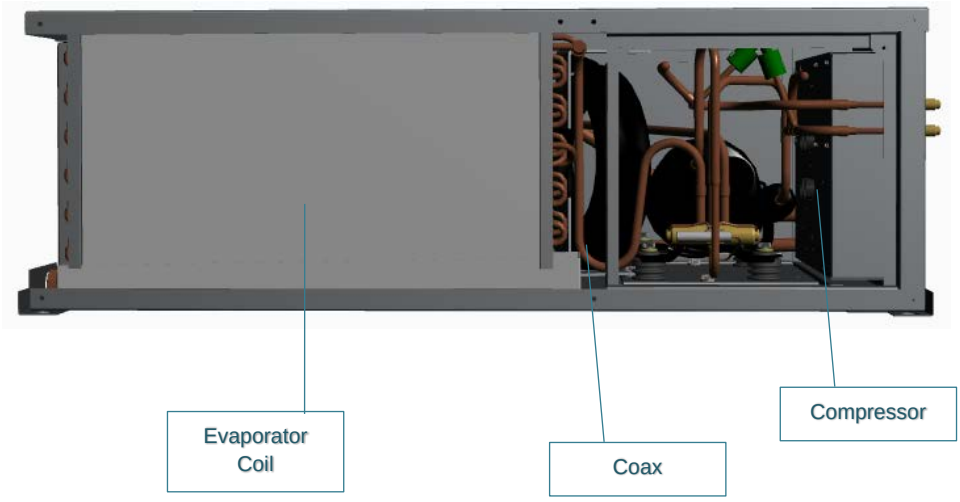
Vertical Cabinet Dimensions						
Size	**Cabinet**	**Width**	**Depth**	**Height**	**Evap. Width**	**Evap. Height**
006	A	19	19	24	16	12
009		19	19	24	16	12
012		19	19	24	16	12
015	B	22	22	36	18.5	19
018		22	22	36	18.5	19
024	C	22	22	40	18.5	20
030	D	26	25	40	22.5	20
036	E	26	25	45	22.5	23
042		26	25	45	22.5	23
048	F	32	25	45	28.5	23
060		32	25	45	28.5	23

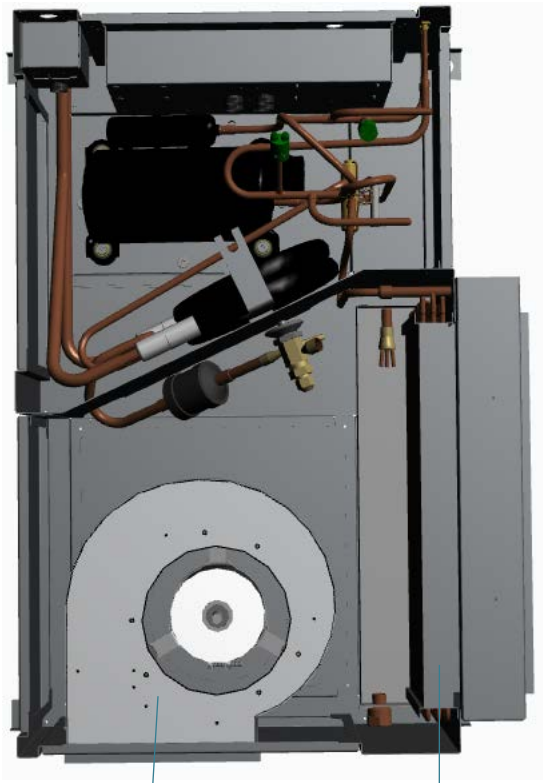

Blower and Motor
Evaporator Coil
Return Air Panel
Right Discharge Panel
Control Box
Service Ports
Drain Condensate Water In Water Out

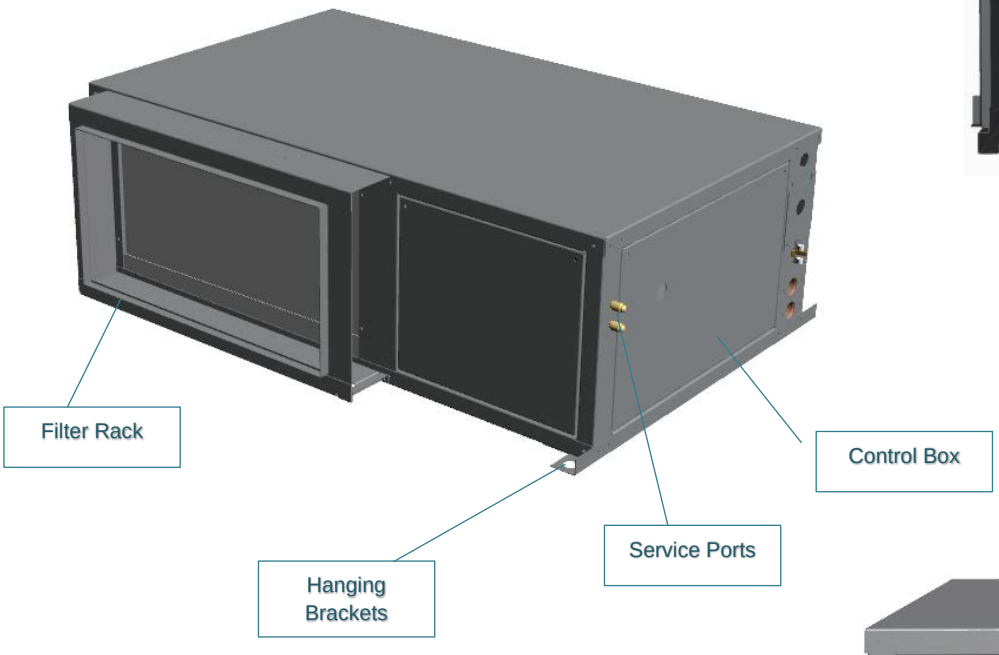

Rear Panel
Compressor
Coax



Horizontal Cabinet Dimensions						
Size	**Cabinet**	**Width**	**Depth**	**Height**	**Evap. Width**	**Evap. Height**
006	A	20	34	11.5	18	9
009		20	34	11.5	18	9
012		20	34	11.5	18	10
015	B	22	43	17	24	16
018		22	43	17	24	16
024	C	22	45	17	26	16
030		22	45	17	26	16
036	D	22	55	19	33	18
042	E	22	55	22	33	20
048	F	25	55	22	33	20
060		25	55	22	33	20


Evaporator Coil
Coax
Compressor


Blower and Motor
Evaporator Coil


Filter Rack
Control Box
Service Ports
Hanging Brackets


Water In
Water Out
Condensate Drain

Unit Start-Up:

Pre-Start-Up Checklist:

Verify the Following:

- ☐ High voltage wiring and breakers are installed and properly sized.
- ☐ Low voltage control wiring is connected to the proper terminals.
- ☐ Any connected loop and load pumps, or water control valves are installed and wired properly. And have been cleaned prior to start-up.
- ☐ All applicable piping such as loop, load, hot water, and condensate drain are properly connected.
- ☐ Any installed shutoff valves have been opened, and all air and debris have been purged from all circuits.
- ☐ Ductwork is in-place and secure, and air filter is in-place. (if applicable)
- ☐ Any internal shipping materials have been removed, and the blower wheel turns freely. (if applicable)
- ☐ All unit access panels are in-place and secure. Leave controls access panel off during unit start-up and check out.
- ☐ Any connected thermostat, building automation system, or controller is in the “Off” configuration

Start-Up Steps:

1. Have the Unit Start-Up form at hand to record all readings during start-up.
2. Turn on all electrical breakers connected to the unit.
3. Check high voltage to insure it is within the proper range according to the unit data plate.
4. Verify that the included display is active and displaying similar to below.

5. Select the mode to run the unit in, either heat or cooling.
6. Check for proper loop flow via the P/T (field provided) ports on the “In” and “Out” loop connections on all connected circuits.
7. During operation, check high voltage readings to ensure it is within the ranges specified in the Unit Electrical Data Table.
8. Check the temperature difference between the loop(s) “In” and “Out” loop connection P/T (field provided) ports. Allow 10 - 15 minutes of unit operation before checking.
9. Check the temperature difference between the return and supply air. Allow 10 - 15 minutes of unit operation before checking. (if applicable)

Once all start-up steps have been completed, and the unit is operating within normal parameters, install any open access panels, and complete the unit start-up form.

Unit Start-Up Form

Installation Date:		Start-Up Date:	
Customer Name:		Unit Tag Number:	
Customer Address:			
Model Number:		Serial Number:	
Technician Name:			
Contractor Name:			

Building Loop Type:		Unit Voltage:	
Controller Type:		Unit Breaker Size:	
		Unit Wire Size:	

Functional Check:	**Heating Mode:**				**Cooling Mode:**			
Loop “In” Pressure: (PSI) or (kPa)			Flow Rate:				Flow Rate:	
Loop “Out” Pressure: (PSI) or (kPa)								
Load “In” Pressure: (PSI) or (kPa)			Flow Rate:				Flow Rate:	
Load “Out” Pressure: (PSI) or (kPa)								
HW “In” Pressure: (PSI) or (kPa)			Flow Rate:				Flow Rate:	
HW “Out” Pressure: (PSI) or (kPa)								
Loop “In” Temperature: (°F) or (°C)			Differential:				Differential:	
Loop “Out” Temperature: (°F) or (°C)								
Load “In” Temperature: (°F) or (°C)			Differential:				Differential:	
Load “Out” Temperature: (°F) or (°C)								
HW “In” Temperature: (°F) or (°C)			Differential:				Differential:	
HW “Out” Temperature: (°F) or (°C)								
Supply Air Temperature: (°F) or (°C)			Differential:				Differential:	
Return Air Temperature: (°F) or (°C)								
Compressor Electrical:	Volts:		Amps:		Volts:		Amps:	
Blower Electrical:	Volts:		Amps:		Volts:		Amps:	
Pump Electrical:	Volts:		Amps:		Volts:		Amps:	

Auxiliary Electric Heat (if applicable)

Supply Air Temperature: (°F) or (°C)				Differential:
Return Air Temperature: (°F) or (°C)				
Auxiliary Heat Electrical:	Volts:		Amps:	

Air Filters:

Unit air filters should be checked every 30 days. Dirty or clogged air filters can degrade unit performance, and potentially increase energy usage. Always make sure the unit is not operating when checking the air filter.

⚠ CAUTION ⚠

CAUTION: Do not operate units without air filters or prior to the completion of the building. Doing so will result in extensive unit clean up, fouled machinery, and will void warranty.

Drain Pan:
The drain pan should be thoroughly inspected before summer operation with the removal of all debris to allow the proper flow of condensate.
Periodic inspection of the drain pan should be performed during the cooling operation to prevent any possibility of it becoming clogged with
foreign matter. Use a bactericide or bacteriostatic drain pan conditioner that is pH neutral. Follow directions of product used to assure proper
bacteria control. Never use a chlorine-based cleaning solution on Whalen units.

Return Air Filter:
THE UNIT RETURN AIR FILTER IS ONE OF THE MOST IMPORTANT PARTS OF THE WHALEN SYSTEM. Proper system maintenance MUST include changing of the filter monthly to assure the unit air coil remains free of dust and other materials. Upgrading the filter to a higher efficiency level (MERV Rating) up to a MERV 8 will provide more filtration of particles in the air and will result in a longer life of the heat pump and a cleaner environment. Whalen strongly recommends the use of high efficiency filters. The units are provided to the installing contractor with a “construction grade” filter.

Whalen offers three efficiency upgrades of filters that greatly exceed the MERV 4 construction grade filters. Each grade progressively increases the filtration performed. Table 1 below compares the minimum particle size each filter can remove from the airstream and the percentage of

MERV Rating	Particle Size (in microns)			Particle Examples
	0.3 - 1.0	1.0 – 3.0	3.0 – 10.0	
4	-	-	> 20%	Pollen, Dust Mites, Sanding Dust
8	-	-	> 70%	Mold Spores, Cement Dust
11	-	65-80%	>85 %	Auto Emissions, Lead Dust
13	> 75 %	>90 %	>90 %	Tobacco Smoke, Bacteria

those particles that the filter will remove. The filters are: MERV 4, MERV 8, MERV 11, and MERV 13.

Drive Fan:
Variable speed units are equipped with a small axial fan to help circulate air over the compressor drive for cooling. The drive should be checked for dust buildup during annual maintenance. Compressed air can be used to clean the fan.

Air Coil: Its recommended to clean the evaporator air coil prior to start-up. Cleaning the air coil will maximize the efficiency of the coil. Use a 10% dishwater detergent solution around the coil, followed by a rinse.

Filter Selection: The use of high efficiency filters increases the external static pressure on the fan and motor. The fan and motor must be sized properly to be capable of this extra static pressure. Upgrades to MERV 8 filters usually will not deteriorate unit performance. Upgrades to MERV 11 or MERV 13 require analysis of the fan motor and any ductwork.. Consult with the factory for proper sizing and selection.

Typical Packaged WSHP Operating Temperatures:

A handheld temperature gun can be used for the supply and return air temperature measurements. Run the unit under normal conditions and compare readings with the information below**:**

Packaged WLHP	Value
Cap of distributor tube temperature at coil	55 – 58 °F
Evaporator Saturated Suction Temperature	43 – 50 °F
Suction Line Temperature (with superheat)	57 – 65 °F
Superheat at compressor	15 °F
Subcooling	8 - 15 °F
Discharge Line Temperature	125 – 140 °F
Condensing Temperature Cooling	95 – 105 °F
Condensing Temperature Heating	
Air Temperature into Evaporator Coil	Ambient
Air Temperature off of Evap Coil in Cooling	20 °F lower than ambient
Air Temperature off of Evap Coil in Heating	20 – 25 °F higher than ambient
Entering Water Temperature Cooling	60 – 120 °F
Leaving Water Temperature Cooling	8 – 10 °F higher than E.W.T
Entering Water Temperature Heating	60 – 140 °F
Leaving Water Temperature Heating	8 – 10 °F lower than E.W.T
Rated water flow rate	3.0 gpm/ton
Minimum Rated Flow Rate	2.0 gpm/ton
Low Pressure cut-out/cut-in	40 / 80 psig
Low temperature cut-out/cut-in	36 / 56 °F
High pressure cut-out/ cut-in	600 / 500 psig

Trouble Diagnosis:
Trouble diagnosis should only be attempted by qualified maintenance personnel. Before any troubleshooting is performed, verify that the thermostat has been programmed as required for proper operation on the installation in question. The thermostat must include a minimum 4-minute compressor anti-cycle timer.

***Fan Motor Fails to Start**:*
1. Verify that all main power and circuit breakers are on and not tripped.
2. Turn system switch on and select HI or LO fan speed.
3. Remove grille and front panel and carefully remove cover to electrical control panel in cabinet.
4. Refer to wiring diagram on front panel, identify incoming power black and red or black and white wires and determine if unit is being supplied with correct voltage with Volt Ohm-meter (VOM).
5. If fan will not run on either LO or HI, verify 24 Volt transformer is operating correctly by checking voltage with VOM between black and white with green stripe wires in the thermostat plug. If 24 volts is not present, check low voltage output from transformer by checking with VOM at blue and yellow wires on transformer. If 24 volts is not present, replace transformer. If 24 volts is present, check continuity of the black or red wire connecting transformer to thermostat.
6. If transformer is ok, disconnect power at either the building breaker panel or unit disconnect switch. Remove thermostat cover and inspect for visible indications of system ground or short. Also check for proper wiring connections between thermostat and unit, to assure colors match per wiring diagram and that insulation is intact. Check “pin” terminals for good contact on thermostats equipped with polarized quick-connect plugs VERIFY PINS ARE FULLY PRESSED INTO THE CONNECTOR PLUG.
7. Determine if fan motor is being supplied correct voltage. If not, check the 24-volt relays that connect power to the fan motor. If relay normally open contacts do not close when thermostat is calling for fan and relay is energized, replace relay.
8. If fan has power and hums, turn off power and make sure fan rotates freely.
9. Remove fan and motor and inspect fan motor and fan motor capacitor wiring; verify wiring is correct. If capacitor wiring or shield is burned, replace wires. Check capacitor by removing wires from capacitor and measure capacitance with meter. Capacitance should measure within 6% of capacitor rating. If not, replace capacitor.
10. If fan motor is hot, it may be off on internal overload. Let cool and attempt to re-start. If fan runs, start and stop several times to
determine if a starting problem. If fan continues to run, reinstall fan in cabinet and run for at least 10 minutes.
11. If fan will not run or cuts out on internal overload, replace motor.

***Heat Pump Chassis Fails to Start**:*
Complete steps 1 -·3 of Fan Motor Fails to Start.
2. If Circuit Breakers are tripping when Heat Pump Chassis is turned on, unplug heat pump chassis. If circuit breakers continue to trip, check control box wiring and field connections and verify unit is wired in accordance with wiring diagram.
3. If chassis caused circuit breakers to trip, identify red and black wires from heat pump chassis plug and determine if red or black lead is shorted to ground with VOM. If wires are shorted, compressor replacement is Required by a qualified HVAC service technician.
4. Feel compressor in heat pump chassis. If hot, allow to cool and attempt to restart. If the compressor starts, see the appropriate section below. If heat pump fails to restart, open heat pump chassis control box and check for loose connections or burnt wiring. If none found, check the compressor thermal overload for continuity (if no continuity, overload is defective). If overload is ok, unplug chassis and check compressor resistance with VOM between the red and black wires at the chassis plug. Infinite ohms means that the internal overload is probably still open and compressor needs more time to cool. 2-5 ohms is the normal compressor winding resistance and indicates the compressor is O.K., but the capacitor may be bad or there may be a faulty connection at the control box plug or a starter problem in the control box.
5. If capacitor wiring or shield is burned, replace wires. Check capacitor by removing wires from capacitor and

measure capacitance with meter. Capacitance should measure with 6% of capacitor rating. If not, replace capacitor.

***Heat Pump Chassis Starts but Cuts Off Cooling Only Units**:*

1. After unit cuts off, determine if there is ice formation on the evaporator coil or if the condenser coil is extremely hot.
2. If there is ice formation on the coil, check for poor seal between inner panel and coil. Check for proper air flow. Check for discharge grilles closed, blocked filters, etc. Is the room too cool (below 68°F)? If the supply water is 75°F or less, there may be premature freezing of the evaporator coil. If air flow and water temperatures are O.K., unit may be low on charge. If so, service is required by a qualified HVAC service technician.
3. If condenser water coil is hot, check for proper water supply with flow meter, if available. Check water temperatures. With proper water flow, there should be a temperature rise of about 10°F from supply to return, and the supply water should be 95°F or less. If no water flow, check electric water control valve for proper operation (if provided). The control valve is energized by the compressor contactor and is normally closed, power to open. If the control valve is operating properly, shut unit off and perform air venting procedure described in INSTALLING HEAT PUMP CHASSIS on page 4.
4. Inspect safety lock-out circuit. The chassis is provided with a high-pressure switch that senses the refrigerant circuit condensing pressure and a low temperature switch that senses the refrigerant circuit suction temperature. These switches are normally open, fail to close and are automatic resetting devices. The switches are wired in series with a lock-out relay that energizes when either switch energizes on a failure condition. The lock-out relay interrupts the control voltage to the compressor contactor and prevents the compressor from running. The lock-out circuit will reset when the call for compressor (Y circuit from the thermostat) or power to the chassis is turned off and reset.

Heat Pump Chassis Starts but Cuts Off Heating and Cooling (Reverse Cycle Units)

1. If problem occurs in cooling, see checks under cooling only units.
2. If in heating and the unit cuts out, determine if there is ice formation on the evaporator coil or if the condenser air coil is extremely hot.
3. If there is ice formation on the evaporator coil or it is extremely cold, check for proper water flow and entering water temperatures between 65°F and 75°F. With proper water flow, there should be a temperature decrease of about 8°F from supply to return. If no water flow, check electric water control valve for proper operation (if provided). The control valve is energized by compressor contactor and is normally closed, power to open. If the control valve is operating properly, shut unit off and perform air venting procedure described in INSTALLING HEAT PUMP CHASSIS on page 4. If water flow and temperature is O.K., unit may be low on charge. If so, service is required by a qualified HVAC service technician.
4. If condenser air coil is extremely hot and compressor is hot, check for proper air flow. Select HI fan speed if fan is on LO speed and check for poor air seal between inner panel and coil, discharge grilles closed, blocked filters, etc. Is the room too hot (above 80°F)?
5. Check the safety lock-out circuit as described for Cooling Only units.

Heat Pump Chassis Operating but not Cooling

1. Feel evaporator air coil and condenser water coil. If the air coil is not cool and condenser coil is not warm, system may not be properly charged or compressor is defective. Service is required by a qualified HVAC service technician.

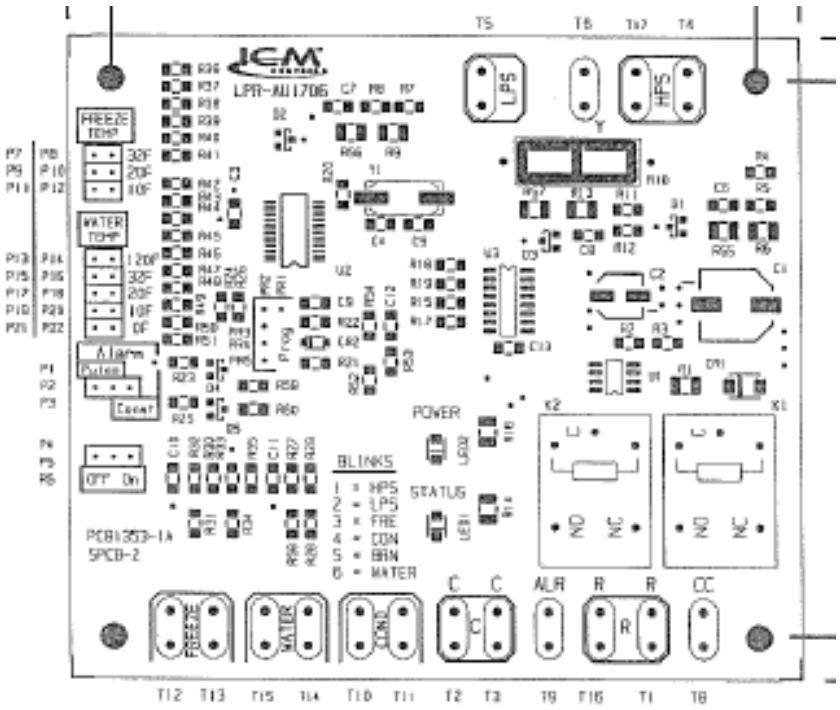
Heat Pump Chassis Operating but not Heating (Reverse Cycle Only)

1. Feel condenser air coil and evaporator water coil. If the water coil is not cool and the condenser coil not warm, system may not be
properly charged or compressor is defective. If so, service is required by a qualified HVAC service technician.
2. If chassis is cooling when heating is selected, verify that thermostat is set to correctly control the reversing valve. Refer to wiring diagram and locate blue (or orange) wire in control box and determine if it is supplying correct voltage to reversing valve solenoid coil. If correct voltage is supplied, shift unit rapidly from heating to cooling and listen for clicking sound in heat pump chassis. If no voltage, check wiring harness for proper connections (loose wires, etc). If valve is clicking but not reversing, the valve has malfunctioned and requires replacement by a qualified HVAC service technician.

Hot Water Heat Not Working

1. Complete steps 1-3 of Fan Motor Fails to Start.
2. Remove discharge grille and inner panel to access hot water heat coil.
3. Inspect coil for foreign material, breaks in the coil or shorted out control valve.
4. Check control valve for blockage

Solid State Board Configuration



The solid-state board starts and stops the compressor and performs the safety functions of High pressure cut-out, Low pressure cut-out, Freeze protection cut-out (low suction temperature and low water temperature), Condensate pan overflow and Brown-out (under voltage). The board also has a built-in 300 sec. +- 20%-time delay between compressor starts. The Freeze protection circuitry includes two jumpers on the board to select the freeze protection alarm temperature set-points. The Freeze Temp jumper should be set on 320F for standard condenser water loop systems and the Water Temp jumpers should be set on 360F for standard condenser water loop systems. Lower settings are available for ground loop systems that include anti-freeze solutions. These jumpers are factory set and should be verified during start-up. The solid-state board has a green LED that indicates the board has power and is operating and a red LED that blinks from 1 to 6 times when a safety lock-out has occurred twice within a 1-hour period. The board is provided with a "TEST" jumper that is factory set on "OFF". This jumper is used for service testing and should be kept in the "OFF" position for normal operation. The sensors can be checked for proper operation by using a VOM and testing the chassis wiring plug as shown below.

Solid State Board Failure Codes

LOCK-OUT LED blinks 1 time.	High pressure Lockout circuit is energized. Check for high pressure switch failure by checking for continuity across pressure switch after system pressures have equalized. If no continuity, switch is defective. If so, service is required by a qualified HVAC service technician. To clear alarm, cycle unit power.
LOCK-OUT LED blinks 2 times.	Low pressure Lockout circuit is energized. Check for low pressure switch failure by checking for continuity across pressure switch after system pressures have equalized. If no continuity, switch is defective. If so, service is required by a qualified HVAC service technician. To clear alarm, cycle unit power.
LOCK-OUT LED blinks 3 times.	Freeze sensor Lockout circuit is energized. Check for sensor failure by checking resistance across sensor. Sensor is a 10K Ohm device. If the resistance is zero or infinite (shorted), sensor is defective. If so, replace the sensor. To clear alarm, cycle unit power.
LOCK-OUT LED blinks 4 times.	Condensate overflow Lockout circuit is energized. Check that wire leads in drain pan are at equal height and are not touching or shorted to the cabinet. Clean drain and trap. To clear alarm, cycle unit power.
LOCK-OUT LED blinks 5 times.	Voltage brownout Lockout circuit is energized. Incorrect or missing main power voltage. Check incoming power, disconnect and fuses. To clear alarm, cycle unit power.
LOCK-OUT LED blinks 6 times.	Low Temperature sensor(s) is out of range or is in the Lock-out mode. To clear alarm, cycle unit power.

Note: All sensors must be isolated before testing.

Notes:

Table 2: Document Revision Guide

Date:	Page:	Description:	By:
10 Aug 2018	All	Production IOM	RP

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