

## **Wine Rack Refrigeration Air Handler System**

- Requires a qualified HVAC technician to install and charge unit
- For use with R-134a refrigerant
- Electric connections for evaporator from fuse panel are hard wired to the condenser
- Industrial grade condensing unit for long life span
- Indoor and outdoor condensing units available
- Optional humidifier and dehumidifier accessories available for optimal climate control
- System is ducted for more quiet, aesthetically pleasing operation
- Field supplied ductwork, drain line, refrigerant, and electric connections required

## **Supplies and materials needed for installation**

1. Insulated duct work with appropriate vapor barrier and ducting materials
2. Condenser pad
3. Required electrical services
  - A. Dedicated service for condenser
  - B. Dedicated service for air handler (to and from condenser)
  - C. Service to air handler location for accessories.
  - D. Low voltage wiring from condenser to thermostat and/or humidifier and duct heater. A 12-conductor 18-gauge wire is needed for complete system
4. R-134a refrigerant for system
5. An accurate digital, thermocouple style thermometer (Laser or infrared is not recommended)
6. 1/4" copper hot water line for systems with humidification
7. Miscellaneous hardware, brackets, sealant, reducers, etc...
8. Tools and equipment needed to perform the installation
9. If the line set is purchased with the unit, additional refrigerant line if line set exceeds 50 ft. in length. See Table 1 on page 4 for proper line set sizes longer than 50 equivalent feet. Copper reducers and other fittings.

## **Supplies and Materials Furnished with Equipment**

1. Condenser with pre-wired control panel
2. Pre-assembled outdoor upgrade kit, if ordered
3. Air handler modified for system
4. Thermostat
5. Humidifier if ordered
6. Duct heater, if ordered
7. 50 ft. of 5/16" x 5/8" line set (if ordered with unit)
8. Filter drier
9. Sight glass
10. Condenser fan speed control, mounted and wired
11. Wiring diagrams
12. Installation instructions with copy of Diagnostic Sheet
13. Warranty information.

A **qualified service technician** must record all the information on the diagnostic sheet **before** calling for technical assistance. The technician **must** be able to identify the unit with the order number and serial numbers to receive accurate trouble shooting assistance. All recommendations for repair or adjustment will be based on the information provided by the **service technician**. Any incorrect recommendations based on incorrect or insufficient data are not covered by the warranty.

## Installation Instructions

**Caution:** A qualified technician must install this refrigeration equipment. Please read, understand, and follow all instructions in this manual prior to start up. Failure to install and adjust this refrigeration unit in compliance with these instructions will void the warranty.

A temperature pressure chart for R-134a can be found on page 28.

1. Select a suitable location for the evaporator with respect to air circulation, ductwork, drain, refrigerant and electrical lines. Before installing any unit, the installer must determine that the floor, wall, or ceiling can safely support the weight of the unit. Provide adequate clearance for maintenance. Check local codes for additional precautions. Do not install the air handler outside or in other unconditioned spaces.
2. Place the condenser at the desired location outside the wine cellar in a well-ventilated area or outdoors. **Indoor condensers must be placed in a space of 3170 cubic feet or larger to prevent excessive condensing temperatures.** Check local codes for proper venting of mechanical rooms. Field supplied vibration absorbing mounting pads and insulated compressor jackets effectively reduce noise transmitted by the unit. Condenser face must be at least 12" from any obstruction and entering air must not exceed 110° F. When installing an outdoor condenser, be sure that it is located so that leaves or snow do not accumulate and block the airflow. This can be accomplished by setting the condenser on a concrete slab, blocks, etc. Place the unit so prevailing winds do not blow rain, snow, and debris into the open ends of the outdoor cover. Avoid placing the outdoor condenser in direct sunlight, especially in warm climates. Condenser air directed toward or away from the dwelling may cause undesirable noise for owners and their neighbors. This must be considered when placing the unit outdoors.

**Protect the thermostatic expansion valve sensing valve with a wet rag or heat absorbing paste when brazing. Failure to do so will damage the thermostatic expansion valve.**

3. Remove the nitrogen holding charge from the condensing unit. Open the suction side backseat valve and allow the nitrogen to flow out. Open the high side backseat valve. The Schrader core in the access tee must be depressed to release the nitrogen. Connect a refrigerant hose with a Schrader depressor and allow the nitrogen holding charge to flow out of the open hose. The high side back seat valve must remain open 1/2 to 1 turn during evacuation and during normal use to allow the condenser fan motor speed control to transducer to sense the head pressure.

Using a silver/phosphorus/copper alloy with at least 15% silver content, braze the refrigerant line set to the condenser connections with nitrogen flowing through the lines to eliminate carbon deposit build up on the inside of the joints that will contaminate the refrigerant and restrict the drier and thermostatic expansion valve. **Do not** sand nickel plated valves prior to brazing. Use brazing flux on all fittings with a nickel finish. **Do not** overheat the backseat valves when brazing. **Thoroughly** heat the pipe (it should glow red) **before** applying heat to the valve fitting. For back seat valves with two access ports, the port furthest from the valve stem will never close; leave it securely capped off.

You **must** install the line set according to **Table 1** on the following page. Failure to do so voids the warranty. The evaporator and/or condensing unit may have different fitting sizes than the line set, so field supplied reducers are necessary. Run the line set according to Table 1 and reduce at the condenser and evaporator connections. Field supplied copper reducers and other fittings will be required.

**Maximum line length is 200 equivalent feet.** Long sweep elbows and any bends in soft copper are equivalent to 5 linear feet. Line lengths in excess of 200 equivalent feet may cause compressor damage and will void the warranty. Example: To determine the equivalent length of the line set add up the linear feet of suction line. Multiply the number of elbows by 5 and add it to the total length of suction line.

Example:

Horizontal pipe	60 linear ft.
Vertical pipe	10 linear feet
8 elbows x 5	<u>40 equivalent feet</u>
Total equivalent feet	110 equivalent feet

Following Table 1 and guidelines for vertical risers below, the correct line set size is 5/16" liquid line and 3/4" suction line. The 10 linear feet of vertical suction line is 5/8"

Proper piping practices must be followed. The line set must be securely fastened to the building structure for its entire length. The suction line must be insulated the entire length of the run. Horizontal line runs must slope 1/2" per 10' towards the condenser for proper oil return. No dips, sags or other low spots that will trap refrigerant oil are permitted. This prevents starving and slugging the compressor with oil. We highly recommend using rigid copper for this reason.

For systems with condensers 10 feet or more above the evaporator, reduce the suction line size by one. For example, 5/8" line changes to 1/2" and 3/4" changes to 5/8" for the **vertical** section of the line only. Install a P trap at the bottom of the riser of the same size as the horizontal piping.

Line sets up to 100 equivalent feet will use 5/16" liquid line and 5/8" suction line.  
 Line sets 101 to 200 equivalent feet will use 5/16" liquid line and 3/4" suction line.

**Line sets longer than 200 equivalent feet will void the warranty. Minimum line set length is 15 linear feet.**

**Table 1**

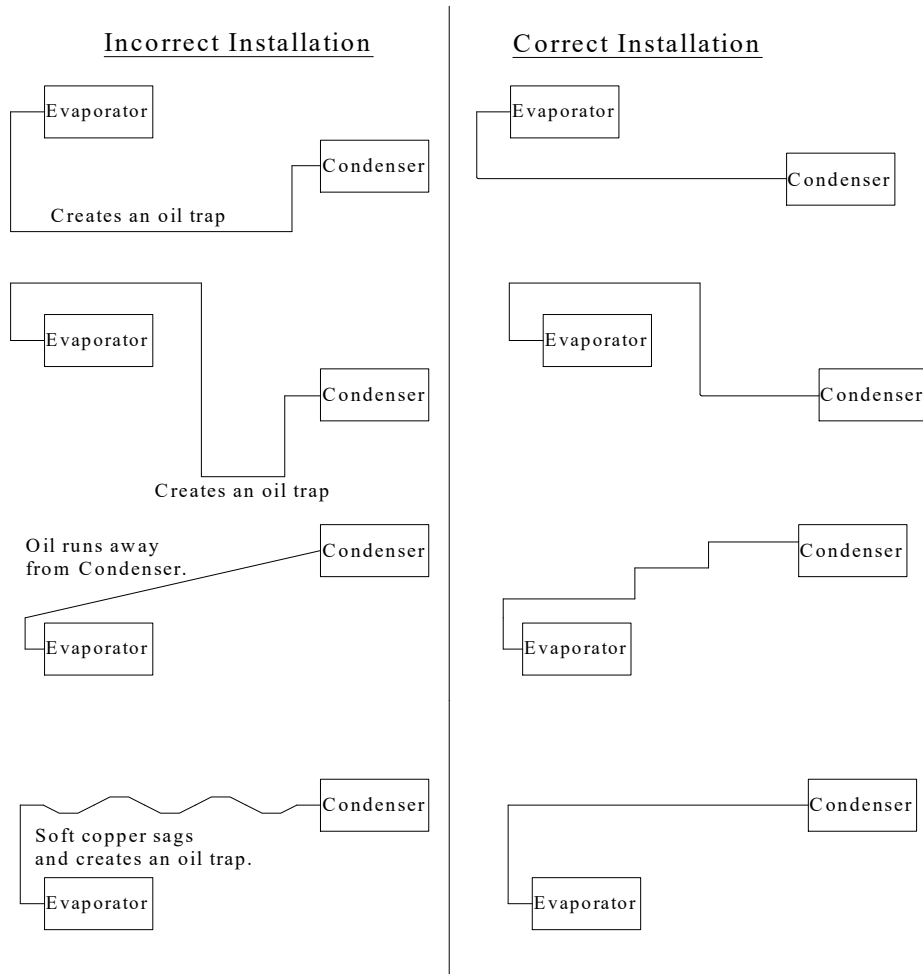
Unit	0'-100' Equivalent feet Line set	101'-200' Equivalent feet Line set
WRRAH4800a	5/16" x 5/8"	5/6" x 3/4"

**Minimum linear line set length is 15'**

Line set sizes differ from system component fitting sizes, so field supplied reducers are necessary. Run the line set according to Table 1 and reduce at the condenser or evaporator if necessary.

For outdoor units, cut or drill a hole through the most convenient stationary side of the condenser cover large enough for the line set to easily pass through. Cut the hole above the height of the compressor. Do not run the line set through the bottom of the unit or the air grilles at either end. Do not run the line set through a panel that moves when the lid is opened.

## Sample Piping Configurations



**Rule of thumb:** Once the suction line leaves the evaporator and turns downward, it cannot turn and go back up to get to the condenser. The only time a trap in the suction line is acceptable is at the bottom of a 10' or taller riser.

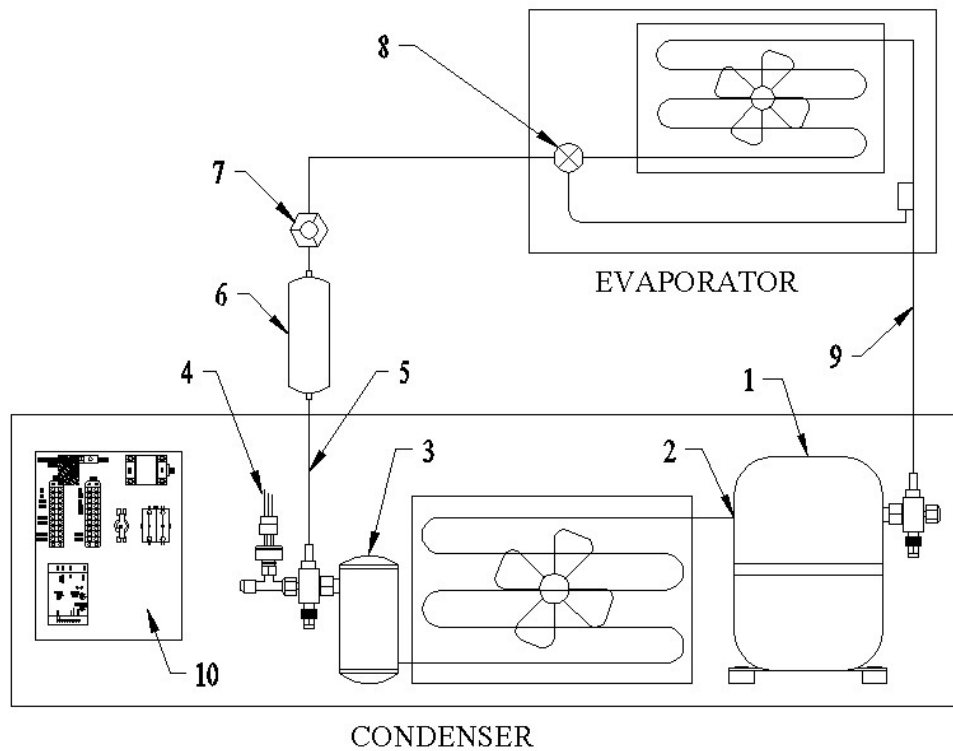
4. Install the filter drier and sight glass, if not already factory installed. Wrap with a wet rag to prevent over heating during brazing.
5. Perform leak test with dry nitrogen, but **never** expose the system to leak test pressures greater than 150 PSI. **Test all fittings including factory installed flare fittings on condenser and evaporator that may have loosened during shipping.** Leaks on unit(s) from a result of loose valves, interconnecting fittings, and/or field piping are not covered by the warranty. It is the installer's responsibility to locate and repair all leaks prior to start up.
6. Evacuate the system to 1000 microns for 1 hour, and the moisture indicator shows "Dry."
7. Install electrical wiring according to the Electrical Requirements on pages 10 and 11 and the appropriate wiring diagram. Follow all applicable codes.
8. After isolating the vacuum pump from the system, break the vacuum to a positive pressure using refrigerant connected to the liquid line. Add approximately 20 psi of refrigerant **vapor**. **Do not start unit for the first time with a full charge.** Adding more refrigerant prior to start up will damage the compressor.

9. **Apply power to units for 24 hours prior to start up to allow crankcase heater to warm the compressor and then start the unit.** Complete the charging process with the compressor running and add the balance of the charge into the suction line of the system. Liquid refrigerant should never enter the compressor directly. Use a metering device to prevent slugging when charging with liquid.
10. The ICM333 Head Pressure Control is factory set to maintain approximately 190 psi head pressure. Verify the head pressure remains at 190 psi or above. See page 22 and the charging table on page 23 for instructions on how to adjust the fan speed controller. The high side backseat valve must remain open during normal use for the condenser motor fan speed control transducer to sense the head pressure **Never** adjust the pressure control to bring on the condenser fan motor above 190 psi. Slowly add refrigerant until the bubbles in the sight glass disappear. The condenser fan motor must be running to complete the charge.
11. After the system has run for 10 minutes check the sight glass again. During normal operation with R-134a there should be no bubbles in the sight glass. If bubbles are present, the system is low on refrigerant. Add refrigerant to eliminate the bubbles. Charge the system to approximately 5° of sub-cooling. To calculate sub-cooling for R-134a subtract the liquid line temperature from the saturation temperature corresponding to the head pressure. Measure the liquid line temperature between the receiver and filter drier with an accurate, digital, thermocouple style thermometer.
12. Allow the wine room temperature to fall to 55°F. **Check the super heat.** Measure the suction pressure at compressor access port. From refrigerant pressure-temperature tables, determine the saturation temperature R-134a at the observed suction pressure. Measure the suction line temperature at the compressor. Subtract the saturation temperature from the measured suction line temperature. The difference is the superheat. Refer to the temperature pressure chart on page 28 in these instructions.

The superheat should be 8° to 12°F. If the superheat is not in this range, the thermostatic expansion valve must be adjusted. To adjust the expansion valve, remove the seal cap from the bottom of the valve. Turn the adjustment screw clockwise to increase superheat and counterclockwise to decrease superheat. **Caution: There are 10 turns on the adjustment stem. When stop is reached while turning the superheat adjustment stem, any further turning will damage the valve.** One complete 360° turn changes the superheat approximately 3°-4°F. As much as 30 minutes may be required for the system to stabilize after the adjustment is made. Replace and hand tighten the seal cap. Always replace the evaporator face plate between TXV adjustments.

13. Perform the final check of the refrigeration unit. The cellar temperature must be between 53° and 58° F. Check the sight glass and gauge readings again. The super heat must be 8°-12° F (see step 12). The hot gas line temperature must not exceed 225° F. Never exceed the maximum amp draw (RLA) for the compressor. Adjust the TXV, and charge as necessary. All measurements should be taken with the condenser fan motor running. All temperature readings should be taken with a digital probe style thermometer.
14. If the recommended system pressures and temperatures cannot be achieved, refer to the troubleshooting chart on pages 26 and 27.

## Piping Diagram



1. Compressor.
2. Discharge (hot gas) line. The vapor line between the compressor outlet and the condenser coil inlet. Measure the discharge (hot gas) line temperature here, approximately 12" from the compressor outlet. This temperature should never exceed 225 degrees.
3. Receiver. Measure the head pressure at the receiver service valve. This backseat valve must remain open 1/2 to 1 turn during normal use to allow the condenser fan motor speed control transducer to sense the head pressure. See step 3 on page 3 for brazing instructions.
4. ICM333 Head Pressure Control. See step #10 on page 6.
5. Liquid line. Measure the liquid line temperature here to determine sub-cooling.
6. Filter Drier
7. Sight glass.
8. Thermostatic expansion valve. See step 12 on page 6.
9. Suction line. Measure the suction pressure at the compressor suction service valve. Measure the suction line temperature near the compressor service valve. See step 3 on page 3 for brazing instructions.
10. Condenser control panel. Contains the system electrical components.

## Service and Maintenance

<u>Service Parts</u>	<u>Maintenance Procedures</u>	<u>Period</u>
Indoor air filter	Replace air filter.	Monthly
Condensate drain	Inspect drain pan. Wipe clean or vacuum as necessary. Check water flow. Clear out drain if necessary	Twice per year
Evaporator/condenser coil	Remove any dirt or debris stuck to coil. Wash evaporator coil as necessary. Wash condenser coil thoroughly with appropriate cleanser. Oil all motors unless sealed.	Once a year, by a qualified technician
Check refrigerant charge	Add refrigerant if necessary. Check safety devices and settings. Check fan cycle control settings.	Once a year, by a qualified technician

## Air Handler

1. Receives 115 volts from Terminals AH LOAD and AH N on TB1 in the condenser control panel.
2. Not a weather tight unit and must be installed indoor, away from the elements.
3. Requires field installed drain with trap. The drain may need to be insulated to prevent sweating in high ambient conditions or heated to prevent freezing in low ambient conditions.
4. An auxiliary drain pan is required for installations where water damage could result.
5. The unit jacket may need to be insulated for installations in areas of high temperature and/or humidity such as attics and garages. All unit penetrations such as drain, electric and line set connections must be sealed to prevent air from outside the cellar entering the air handler and/or ductwork. This includes the air handler filter slot.
6. The location structure must safely support the weight of the air handler, ductwork, and accessories. The unit should be pitched slightly (1/8") toward the condensate opening for proper drainage.
7. The air handler must be grounded in accordance with the National Electric Code. Check local codes for additional precautions and ordinances to installation.
8. See pages 21 and 22 for specs and drawings for each unit.
9. See page 9 for suggested duct sizes.



## Ducting Requirements

1. The ductwork is to be sealed with aluminum tape or painted with waterproof duct sealant
2. The ductwork must be wrapped with a minimum of 2” insulation with a suitable vapor barrier. Use of joist spaces and flex duct is not acceptable for return air ducts. Flex duct is acceptable for supply ducts only and must be sized appropriately. See the chart and notes below.
3. More insulation may be required on systems located in attics, garages or other areas with excessive temperatures and uncontrolled humidity. Consider using lined duct, then wrap with insulation. The unit jacket may need additional insulation to prevent condensation from forming on the air handler.
4. Use 6” x 14” boot sizes at a minimum for duct up to 8” in diameter. Larger diffusers should be used for ducts greater than 8” in diameter.
5. We recommend using filter grilles for returns, and removal of the filter slot included with the unit. If the unit filter slot is used, it must be sealed to prevent air from outside the cellar entering the return air.
6. There should be at least three feet of straight ductwork preceding the coil inlet. When the connecting return air duct is smaller than the coil inlet opening, the transition should be constructed so that the vertical and horizontal dimensions of the transition piece do not increase more than one inch for every seven inches of the length of the transition piece.

Unit-Air Handler	CFM-Fan Speed	Supply Trunk	Return Air Trunk	Round Supply Pipe to Metal Register	Metal Supply Register	Metal Return Air Filter Grille	Metal or Wood Return Air Grille	Round Supply Pipe to Wooden Register	Wooden Supply Register
WRAH4800a - DVB04JAS	405-MED	12 X 8	14 X 8	2-8”	14 X 6	20 X 16	16 X 14 Or 30 X 8	4-7”	14 X 6

For non-standard duct sizes, choose supply ducts based on .08 ESP and return air ducts on .05 ESP. For flex duct, increase the round pipe size by 1”. If 7” rigid duct is indicated, use 8” flex, and so on.

The above table shows minimum guidelines only. Insufficient or poorly installed ductwork is the most common cause of poor system performance. Symptoms include, but are not limited to, reduced capacity, excessive noise, uncontrolled humidity, and nuisance freeze ups. **It is the installer’s responsibility to ensure the ductwork, boots, registers, and grilles are sized to adequately and quietly deliver the necessary air volume.**

This is a generic guide to registers and grilles. The manufacturer’s specifications should be consulted to determine the number and size of supply registers and return air grilles. First decide if the supply registers and grilles will be metal or wooden before determining the number and size of the supply registers. Wooden registers are restrictive and often require more and larger registers be used. Refer to the chart above.

All ductwork must be sealed, insulated, and surrounded by a suitable vapor barrier, including the unit filter slot. Avoid facing the evaporator coil directly into the cellar through a sidewall. This allows undesirable mechanical noise directly into the cellar. We recommend facing the unit away from the cellar and attaching properly sized ductwork including a minimum of one 90° turn in the return air. Keep any turns or transitions at least 3 ft. upstream of the coil. **Every measure must be taken to ensure even airflow across the entire face of the evaporator coil.** Use of turning vanes may be necessary. Flexible duct connectors also effectively reduce noise transmitted by the unit.

## Field Wiring for WRRAH4800a

### Condensing Unit Control Panel

#### **Terminal Board 1**

Terminal L1\*- 230 line voltage from service panel for condenser  
Terminal L2\*- 230 line voltage from service panel for condenser  
Terminal CCH- Crankcase Heater  
Terminal CCH- Crankcase Heater  
Terminal AH L1\*- 115 line voltage from service panel for air handler fan motor  
Terminal AH N\* -115 volt neutral from service panel for air handler fan motor  
Terminal AH N - 115 volt neutral to air handler fan motor  
Terminal AH Load- 115 load voltage to air handler fan motor  
System Ground Lug above Terminal Boards

**\* Both the condenser and evaporator power circuits are run to the condenser. Two disconnects are required at the condenser. See condenser specifications for proper fuse size.**

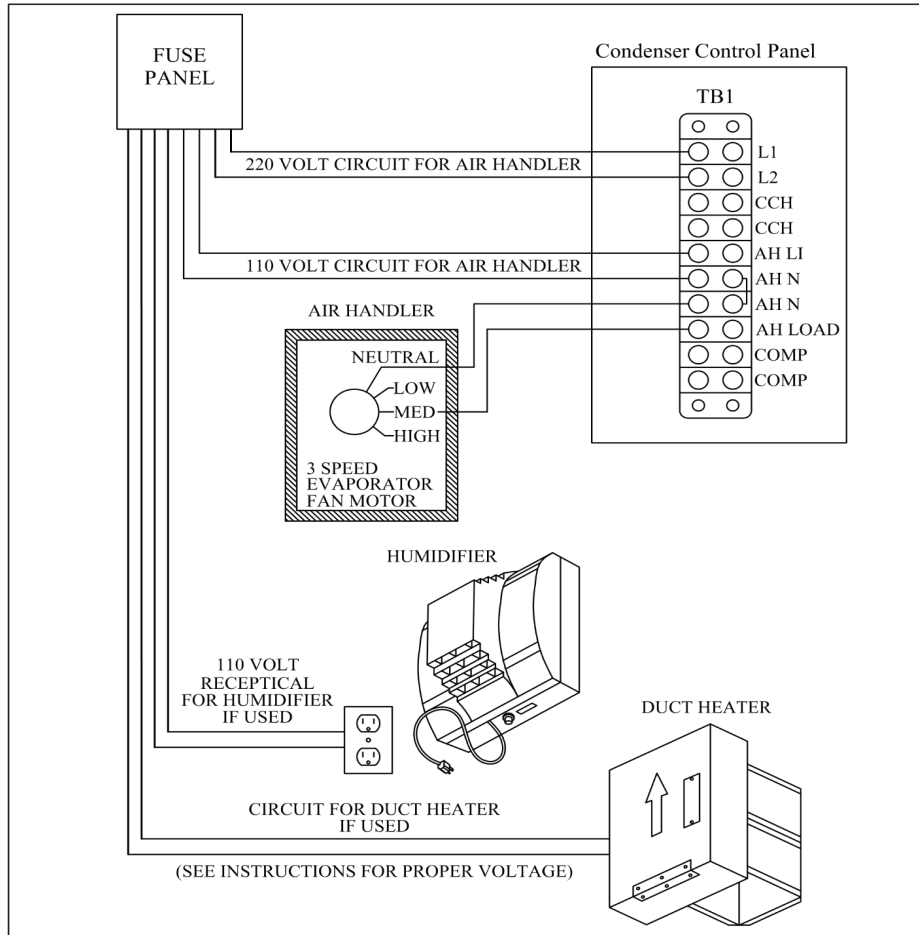
#### **Terminal Board 2**

Terminal C - 24 VAC common  
Terminal W1 - Heat, if used  
Terminal G - Fan  
Terminal A - Humidification  
Terminal Y1 - Cool  
Terminal Y2 - Dehumidification, if used  
Terminal R - 24 VAC Power  
HTR - 24 VAC to duct heater, if used  
HUM - 24 VAC to humidifier, if used

### Electrical Requirements

1. Check the Copeland rating plate for proper voltage, maximum fuse, and wire size.
2. Line voltage from service panel for both the condenser **and** evaporator to be **run to the condenser**. The condenser 230V circuit connects to terminals L1 and L2 on TB1 in the condenser control panel.
3. Air handler requires a 115-volt 15-amp circuit to the condenser. The air handler line voltage will connect to terminals AH L1 and AH N on TB1 in the condenser control panel. The air handler fan motor will receive load voltage from terminals AH N and AH LOAD on TB1 in the condenser control panel.
4. The humidifier requires a dedicated 115-volt receptacle.
5. The duct heater for dehumidification requires a dedicated 230-volt circuit.
6. Check the duct heater for proper voltage, maximum fuse, and wire size.
7. Terminal Board 2 is for low voltage control wiring for the thermostat, humidifier, and duct heater.
8. All equipment must be installed according to the National Electric Code and all local codes and ordinances.

## Line Voltage for WRAH4800a



1. Run a 230-volt circuit from the service panel to terminals #1 and #2 on TB1 in the condenser control panel. Check the Copeland rating plate or page 25 for the proper fuse and wire size. Attach the ground wire to the lug in the upper left-hand corner of the condenser control panel.
2. Run a 115-volt, 15-amp circuit from the service panel to terminals AH L1 and AH N on TB1 in the condenser control panel.
3. Two disconnects may be required at the condenser. Check local codes.
4. Load voltage for the air handler will come from terminals AH LOAD and AH N on TB1 in the condenser control panel. Connect AH LOAD to the medium speed tap on the air handler fan motor.
5. The humidifier, if used, requires a dedicated 115-volt receptacle.
6. The duct heater, if used, requires a dedicated circuit. See heater specifications for proper voltage and fuse size.
7. Each unit must be installed in accordance with the National Electric code. Check local codes for additional precautions and ordinances to installation.

**Note:** A minimum of two (2) power circuits is required for a cooling only air handler system. 1–230-volt circuit for the condenser and 1-115 volt circuit for the air handler are necessary. More circuits are required for units with humidification and dehumidification.

## Thermostat Installation

Mount the Peco thermostat in the cellar approximately 5 feet above the floor in an area of good air circulation of average cellar temperature. Do not install it where it will be affected by the evaporator supply air, lighting, wall switches, concealed pipes or chimneys, or warm exterior walls, sunlight, etc. Use quality 18-gauge thermostat wire. Read and follow the manufacturer's installation instructions. Carefully read and understand the instructions supplied with the thermostat before attempting to operate or install this thermostat. The following thermostat installation instructions are a summary of the install and set up for using this thermostat with a Wine Rack Refrigeration cooling unit. For detailed installation and troubleshooting instructions please refer to the manufacturer's instructions included with the thermostat.

### Install the Wallplate

1. Position the wallplate on the wall with the directional arrow pointing up and the terminal blocks facing outward.
2. Pull equipment wires through the wallplate wiring passage.
3. Use a level to determine the best horizontal wallplate mounting position.
4. Mark positions of screw holes (two at minimum) with a pencil and remove wallplate.
5. Drill holes at pencil-marked locations (3/16" for drywall, 7/32" for plaster).
6. Insert the wall anchors in the holes, tapping them into place.
7. Mount the wallplate onto the wall and insert screws through the mounting holes. Assure that all loose wires come through the center opening of the wallplate.
8. Cap off any unused wire and terminate properly according to local building codes.

### Attach Wires to Thermostat Wallplate

1. Select the terminal designations that correspond to the system type. Follow the table below:

**Warning: Disconnect power before beginning installation.**

**Caution: Copper wire only. Insulate or wire-nut all unused leads.**

Use care to avoid electrostatic discharge to thermostat.

**Note 1: Do not connect wire to A if a humidifier is not installed.**

**Note 2: Do not connect wire to Y2 or W1 if a duct heater is not installed.**

2. Using a small flathead screwdriver, loosen the screws on the terminal blocks that correspond to the system type.
3. Strip the insulation of each wire at a proper length (about 1/4")
4. On the wallplate, insert wires into the terminal blocks that correspond to the system type, then re-tighten each screw for each terminal.

**Note: Do not over-tighten or use excessive force.**

5. Assure that no uninsulated wires are exposed: Cap off and place a wire nut on any unused wires. Assure that the attached wires fit into the cavity on the back of the thermostat.

<b>Conventional Terminal Letters</b>	
<b>C</b>	Unswitched side, 24 VAC
<b>W1</b>	Stage 1 Heat
<b>W2</b>	Not used
<b>G</b>	Fan
<b>A</b>	Humidity
<b>E</b>	Not used
<b>Y1</b>	Stage 1 Cool
<b>Y2</b>	Dehumidify
<b>RH</b>	Power for Heating Switched Side, 24 VAC
<b>RC</b>	Power for Cooling, Switched Side 24 VAC
<b>SC</b>	Sensor Common, if used
<b>S1</b>	Indoor remote sensor, if used
<b>S2</b>	Not used
<b>S3</b>	Not used

## Connect Power to the Thermostat Wallplate

### Power Options

The T12000 Series will operate on 24 VAC power and/or two AA batteries (both are recommended). Using 24 VAC with AA battery backup is highly recommended.

### Wiring 24 VAC Common

Single-Transformer system. Connect the common side of the transformer to the “C” screw terminal of the thermostat wallplate. Assure that the metal jumper connects “RC” and “RH.” Connect power side to the RC/RH and assure that the jumper remains in place

### Install Batteries and Remove Tab

1. Insert two AA batteries (included) into the back compartment of the thermostat.
2. Remove the plastic insulator tab from the back side of the thermostat. IMPORTANT: The insulator tab must be removed before setting the real-time clock.

### Set the Clock, Month, Day

When power is first applied to the thermostat, it will activate the clock display. It is recommended that the time and day are entered before performing advanced configuration. On the touchscreen area, press the Clock key and use the up and down arrows to set the hour mode, clock hour, minutes, year, month, and numerical date. Press Done to finish.

### Verify System Setting is Turned Off

1. Press any part of the touchscreen area to enter the Home Display.
2. Press System to enter system mode
3. Press System repeatedly until “Off” flashes, then press Done.
4. Press Fan key to enter fan mode.
5. Press Fan repeatedly until “Auto” flashes, then press Done.

### Perform Advanced Configuration

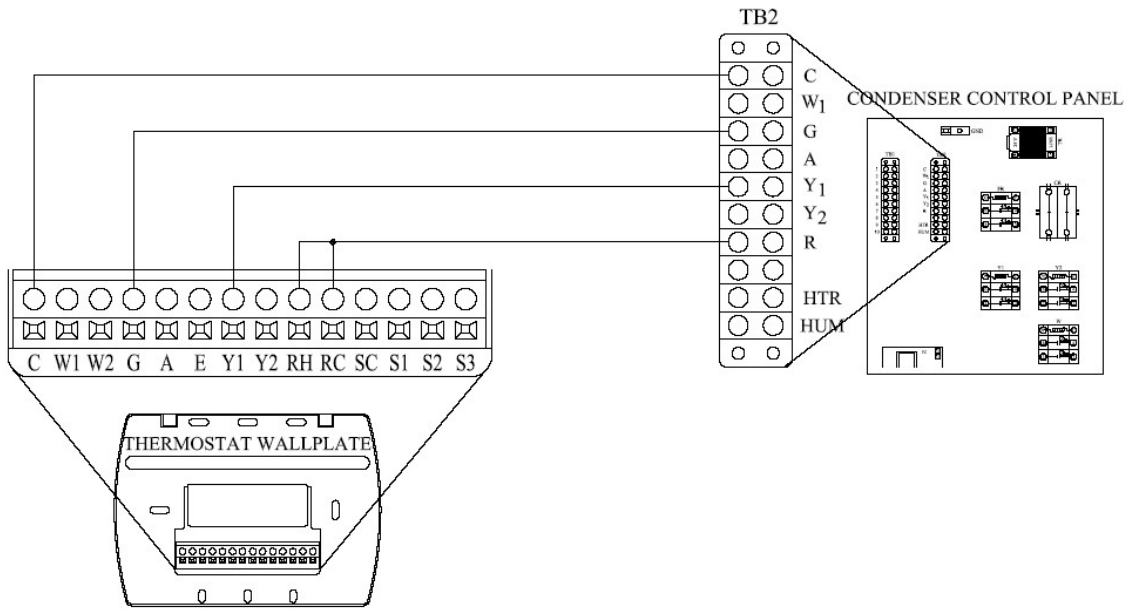
Perform advanced configuration before attaching the thermostat to the wallplate. Advanced configuration is done by simultaneously pressing the lower left and lower right touchscreen area for about 5 seconds, which gives user access to Service Menus. Use the following table to set each desired Service Menu item. Advanced configuration allows the user to configure the thermostat to match the system type and to customize several thermostat settings. System type for Wine Rack Refrigeration units is 1 Stage Cool/1 Stage Electric Heat. Changed values are automatically retained. Press Done only if you wish to exit Advanced Configuration. Service menu availability is dependent upon system type and upon system configuration.

<b>Menu</b>	<b>Feature</b>	<b>Options</b>	<b>Default</b>	<b>Recommended Setting</b>
100	Schedule Format	0-3	1	0= Nonprogrammable
101	Daylight Saving Time	0,1	0	1= Enabled (2007 U.S. Format)
110	System Type	1-13	1	1= 1 Heat/1 Cool conventional
120	Fan Control (heating)	0,1	0	1= Electric furnace (thermostat controls heating fan)
150	Backlight	0,1	0	0= Backlight temporarily on
170	Remote Sensor	0-5	0	0= No sensor 1= Indoor sensor (if used)
180	Heat Pump Compressor Lockout	0-45	0	0= No sensor
190	Heat Pump Auxiliary Lockout	0-60	0	0= None
230	Furnace Filter Change Reminder	0; 30; 60; 90; 120; 365	0	0= Off

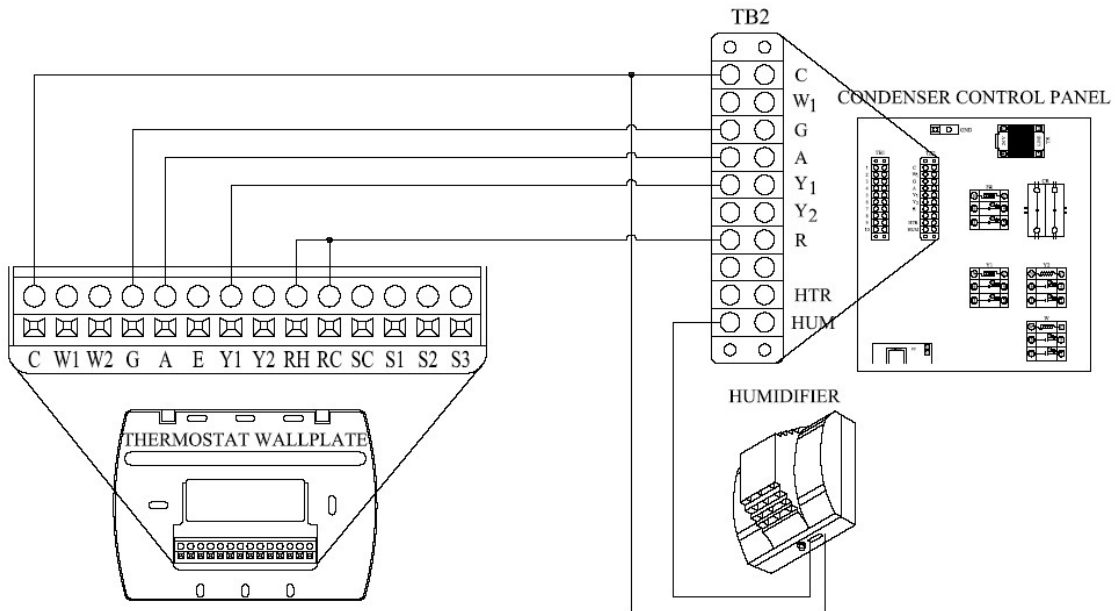
240	Number of Program Periods	2; 4	4	4= 4 Events per day
250	Clock Format	12 or 24	12	12= 12-hour clock mode
260	Temperature Format F or C	0,1	1	1= Fahrenheit
270	Fan Off Delay Heat	0-99	0	20= 20 Seconds
280	Fan Off Delay Cool	0-99	0	20= 20 Seconds
290	Range Low	50-90	50	50, Choose the lowest selectable setpoint
300	Range High	50-90	90	68, choose the highest selectable setpoint
310	Setback Low	Off, 50-82	55	0= Off
320	Setback High	Off, 58-90	90	0= Off
330	Zone Temp Offset	+/-9	0	0= No offset
340	Keypad Lockout	0-3	0	0= No Keypad lockout
341	Enable Pin Access	0,1	0	0= Disable
350	Fan Mode Enable	1-3	3	3= On or Auto: allows user to select
360	System Mode Enable	0-3	1	1= Off, Heat, Cool. Auto
370	Economizer/Outside Air Damper	0-4	0	0= Off
380	Minimum Deadband Adjustment	3-10	3	3= Selects change over deadband value between heating and cooling modes to prevent short cycling
390	Pre-Occupancy Purge	0-3	0	0= Select to energize fan for selected number of hours (0-3) prior to all occupied events.
395	Maximum Override Time Limit	0, 1-4	3	3= 3 Hours
400	Cycles Per Hour Cooling Stage 1	0-6	3	3= Defines number of cycles per hour for cooling
420	Cycles Per Hour Heating Stage 1	0-12	5	5= Defines number of cycles per hour for heating
460	Heat Recovery Rate	0-18	5	0= Disable ramp recovery
470	Cool Recovery Rate	0-18	5	0= Disable ramp recovery
480	Minimum Off Time	1-10	4	4= 4 Minutes off time for both heat and cool output
490	Humidity Control Enable *	0-3	0	Selects how humidity will be controlled. When dehumidify is enabled the Y2 terminal becomes dehumidify. Note: If option 3 is selected, Service Menu 491 becomes available. 0= Disable (Humidity not displayed on touchscreen). 1= Dehumidify 2= Humidify 3= Dehumidify and Humidify
491	Humidity Deadband	5-50	5	10= 10% RH deadband between humidify and dehumidify
500	Programmable/Intermittent Fan	0-2	0	0= Disable
510	Power Harvesting	0-3	0	0= No power harvesting available
520	Default Display Icons	0-4	0	0= Time, Temp, SP
530	Revision	-	-	Not Adjustable
540	Factory Default Reset	0,1	0	0=Disable
600	System Test Main Output (Cool)	0-2	0	0= Disable
610	System Test Main Output (Heat)	0-3	0	0= Disable
620	System Test Fan Output	0,1	0	0= Disable
630	System Test Emergency Output	0,1	0	0= Disable emergency output
640	System Test Economizer	0,1	0	0= Disable economizer output

**\*IMPORTANT! Some humidity control must be selected to view the humidity on the thermostat. If no humidity options are installed, DO NOT connect wires to terminals A or Y2. Only connect wire to A if a humidifier is installed. Only connect wire to Y2 if a duct heater is installed.**

## Low Voltage Wiring, Cooling Only

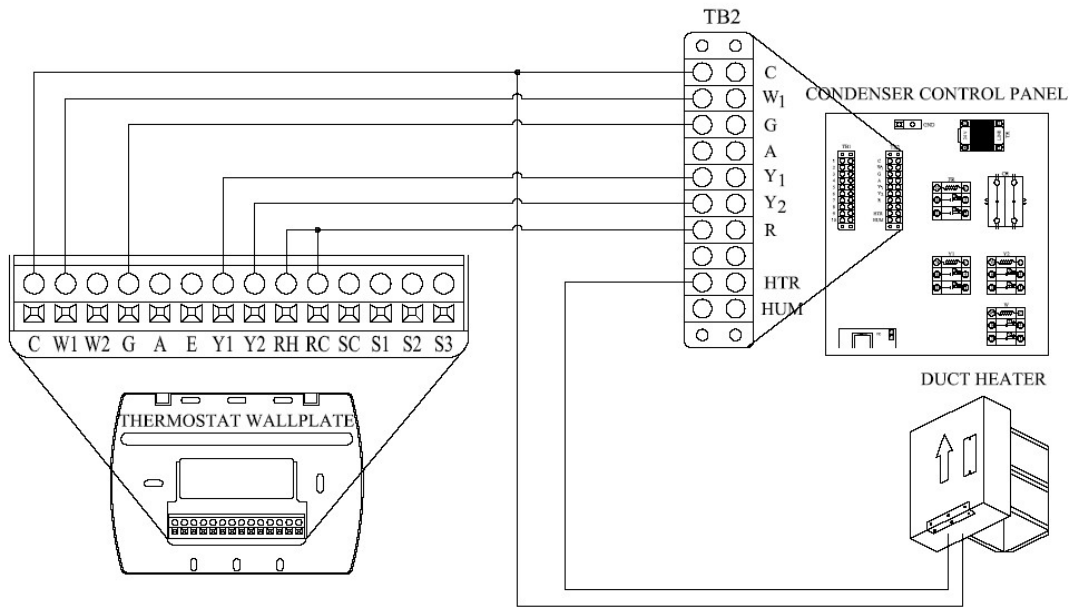


## Low Voltage Wiring, Cooling and Humidification

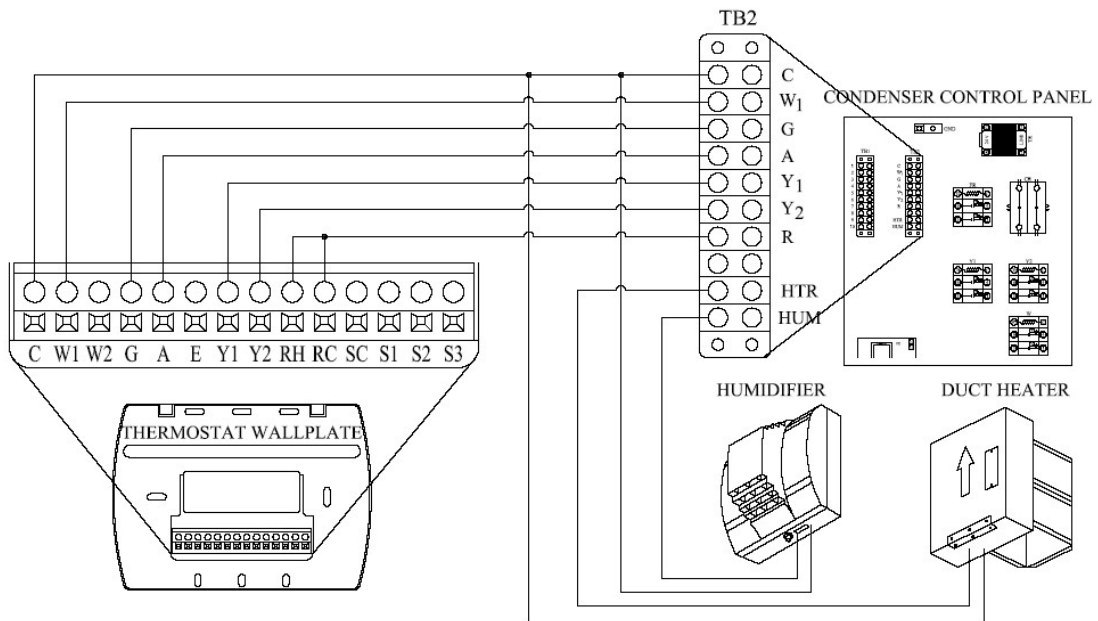


**Caution:** Ensure the power is off before attempting to make wiring connections. Failure to do so may result in equipment damage and/or bodily injury.

## Low Voltage Wiring, Cooling, Dehumidification, and Heat



## Low Voltage Wiring, Cooling, Humidification, Dehumidification, and Heat



**Caution:** Ensure the power is off before attempting to make wiring connections. Failure to do so may result in equipment damage and/or bodily injury.



### Mount the T12000 Onto the Wallplate

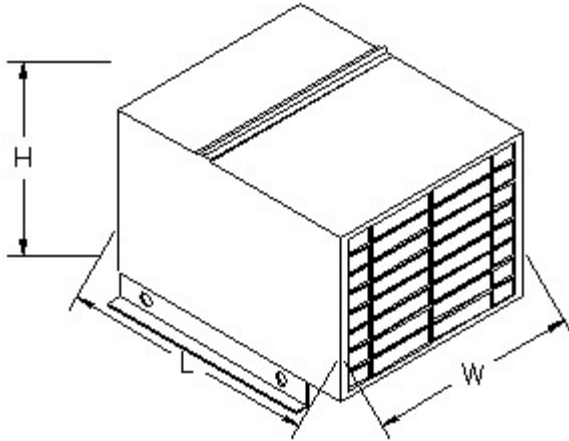
1. Position the thermostat slightly above the mounted wallplate, then secure the hooks on the backside of the thermostat to hinge pockets on the wallplate. **Note: The top of the thermostat should slip into the hinge pockets easily. Do not use excessive force.**
2. Align the pins on the back side of the thermostat with the terminal blocks on the wallplate.
3. Gently bring down the thermostat onto the wallplate so the pins on the back of the thermostat fit into the terminal blocks on the wallplate.

### Verify Thermostat Operation

Press the desired button until the preferred selection blinks. Press Done to select and save the selection.

1. Set the system to Off. Nothing should operate, including the Fan.
2. Set the fan to Auto
3. Set the system to On. Press the up and down arrows to adjust the temperature. Adjust the temperature setpoint above the cellar temperature displayed on the touchscreen.
4. Set the Fan to On. The indoor fan should come on.
5. Set the Fan to Auto. The indoor fan should go off.
6. Adjust the temperature setpoint below the cellar temperature displayed on the touchscreen. The condenser and indoor fan should come on.
7. If a humidifier is installed, adjust the Humidity setpoint above the humidity displayed on the touchscreen. The humidifier should come on. Set the humidity setpoint below the humidity displayed on the touchscreen. The humidifier should go off.
8. If a duct heater is installed, adjust the Dehumidify setpoint below the humidity displayed on the touchscreen and verify the duct heater **does not** come on. The duct heater should never come on during a call for cooling. Adjust the Dehumidify setpoint above the humidity displayed on the touchscreen.
9. Adjust the temperature setpoint above the cellar temperature displayed on the touchscreen. The condenser and indoor fan should go off. Nothing should be running.
10. Set the Humidity setpoint above the humidity displayed on the touchscreen. The humidifier and air handler should come on.
11. Adjust the Dehumidify setpoint below the humidity displayed on the touchscreen. The humidifier should go off. The condenser, duct heater and indoor fan should come on.
12. Set the temperature to 55°, the Humidity to 60% and Dehumidify to 70%.
13. Repeat these steps in the Heat and Auto System modes as necessary. The condenser should never come on during a call for heat. The duct heater should never come on during a call for cooling.

## Condenser Specifications



### Outdoor Condenser

You must install a line set according to Table 1.

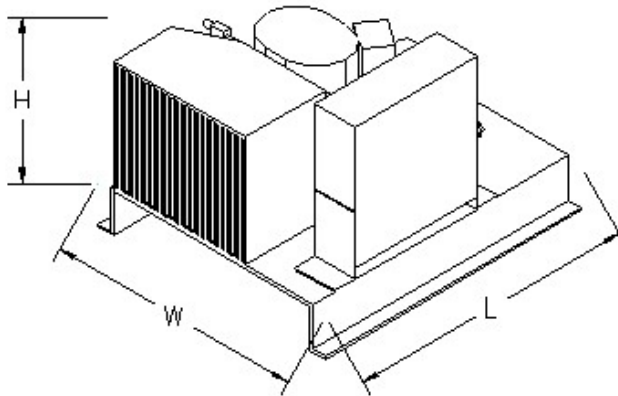
Field supplied reducers may be required. Reduce at evaporator and condenser connections.

Minimum of 12” clearance required on each side of unit. Minimum of 36” clearance required above unit.

For outdoor units, cut or drill a hole through the most convenient stationary side of the condenser cover large enough for the line set and electric to easily pass

through. Cut the hole above the height of the compressor. Do not run the line set or electric through the bottom of the unit or the air grilles at either end. Do not run the line set through a panel that moves when the lid is opened.

Model	dB	Length in inches	Width in inches	Height in inches	Liquid Line Fitting	Suction Line Fitting	Wt. In lbs.	Power Supply	Min Circuit Amps	Max Fuse
WRRAH4800a	53	27	20	20	3/8 SW	1/2 SW	117	208-230/60/1	8.6	15



### Indoor Condenser

You must install a line set according to Table 1.

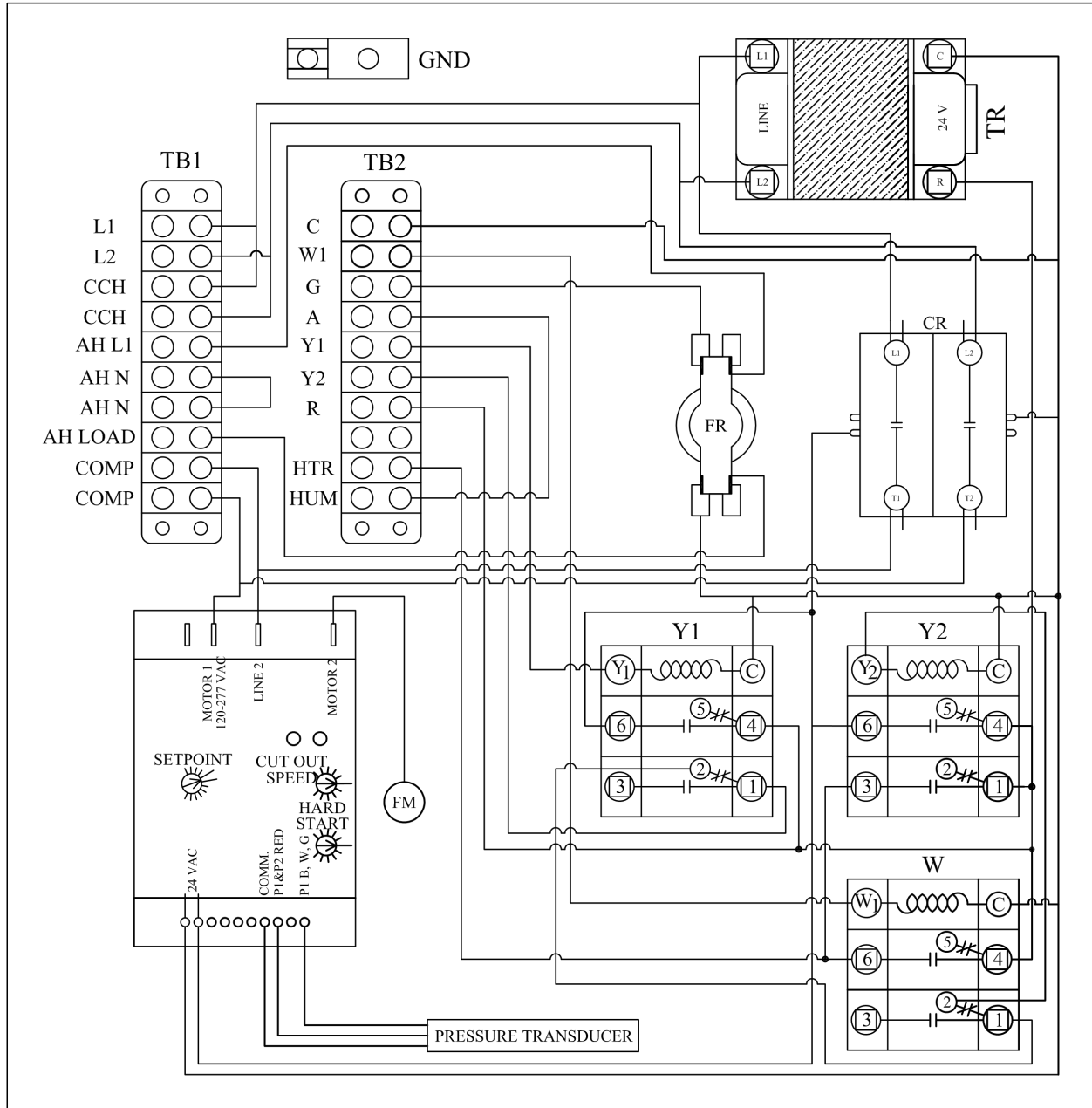
Field supplied reducers may be required. Reduce at the evaporator and condenser connections.

Minimum of 12” clearance required on each side of unit.

Must be installed in a space of 3170 cubic feet or larger.

Model	dB	Length in inches	Width in inches	Height in inches	Liquid Line Fitting	Suction Line	Wt. in lbs.	Power Supply	Min Circuit Amps	Max Fuse
WRRH4800a	53	25	20	16.75	3/8 SW	1/2 SW	92	208-230/60/1	8.6	15

## WRAH4800a Condenser Control Panel



	<b>Legend</b>		<b>TB1</b>		<b>TB2</b>
<b>CR</b>	Compressor relay	<b>L1</b>	230V line voltage from service panel	<b>C</b>	24 VAC common
<b>FR</b>	Evaporator fan relay	<b>L2</b>	230V line voltage from service panel	<b>W1</b>	Heat
<b>FC</b>	Cond. fan cycle control	<b>CCH</b>	Crankcase Heater	<b>G</b>	Fan
<b>GND</b>	Ground	<b>CCH</b>	Crankcase Heater	<b>A</b>	Humidification
<b>TB1</b>	Terminal Board 1	<b>AH L1</b>	115V line voltage from service panel	<b>Y1</b>	Cool
<b>TB2</b>	Terminal Board 2	<b>AH N</b>	115V neutral from service panel	<b>Y2</b>	Dehumidification
<b>R</b>	Transformer	<b>AH N</b>	115V neutral to evaporator	<b>R</b>	24 VAC power
<b>W</b>	Heat relay	<b>AH LOAD</b>	115V load voltage to evaporator	<b>HTR</b>	Duct Heater
<b>Y1</b>	Cooling relay	<b>COMP</b>	Compressor	<b>HUM</b>	Humidifier
<b>Y2</b>	Dehumidification relay	<b>COMP</b>	Compressor		

## Condenser Fan Speed Control

The Wine Rack Refrigeration condensing unit uses an ICM333 fan speed controller to maintain the proper head pressure.

When the condenser fan motor starts running it will start for a length of time dictated by the hard start dial setting. After the hard start time has elapsed, the motor speed is controlled by the pressure transducer reading. The green light turns on when the motor runs at full speed.

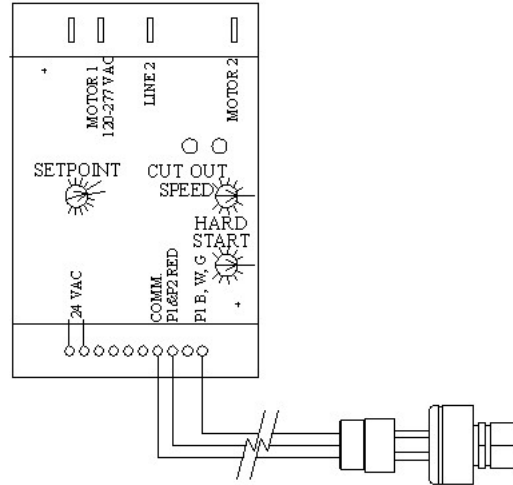
As the sensed pressure decreases, the output voltage decreases. The yellow light turns on during motor variable speed. The output voltage may decrease to the determined cutout speed dictated by the cutout speed dial. Upon reaching the cutout speed setting, the output voltage goes to zero volts and the yellow light turns off.

The fan cut out speed is factory set to the minimum speed for sleeve bearing motors.

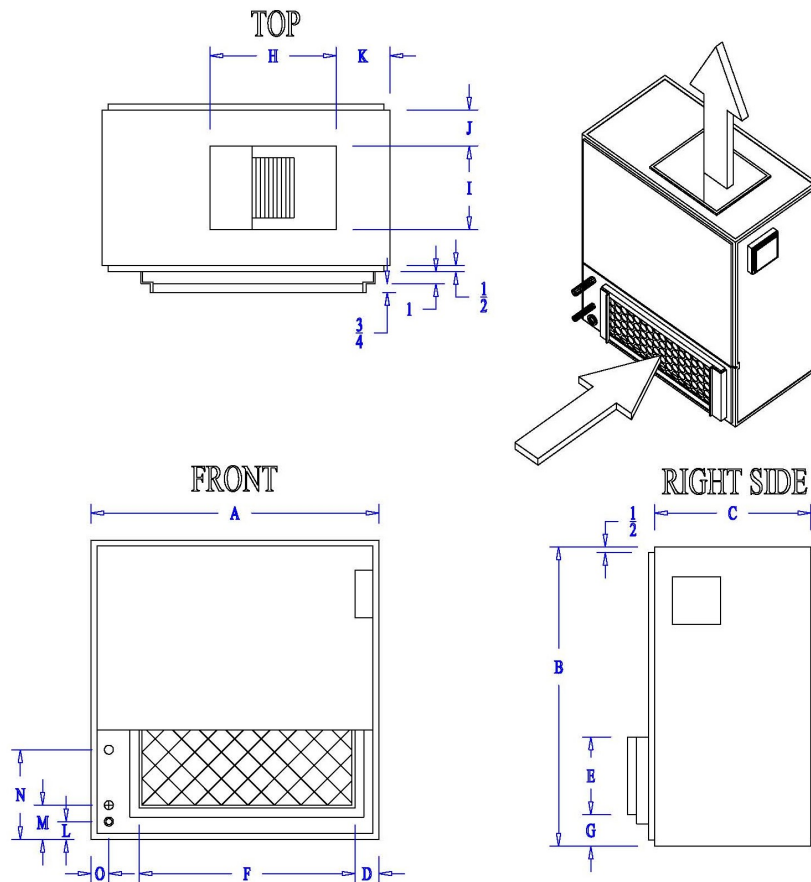
The fan hard start time is factory set to the minimum for sleeve bearing motors.

Adjust the set point dial to maintain 190 psi head pressure when the condenser ambient is at or below 90° F. The control will maintain condenser pressure between 20 psig above and 20 psig below dialed Pressure Setpoint.

**Make sure that supply voltage to the system and ICM333 Head Pressure Control are disconnected before installation or service.**



## Vertical Air Handler



### Cabinet Dimensions

System	Air Handler Model #	Cabinet			Return Opening				Blower Opening			
		A	B	C	D	E	F	G	H	I	J	K
WRRAH4800a	DVB04JAS	24	25	13	2	6.5	18	2.5	10.5	7	3	4.5

### Vertical Air Handler Specifications

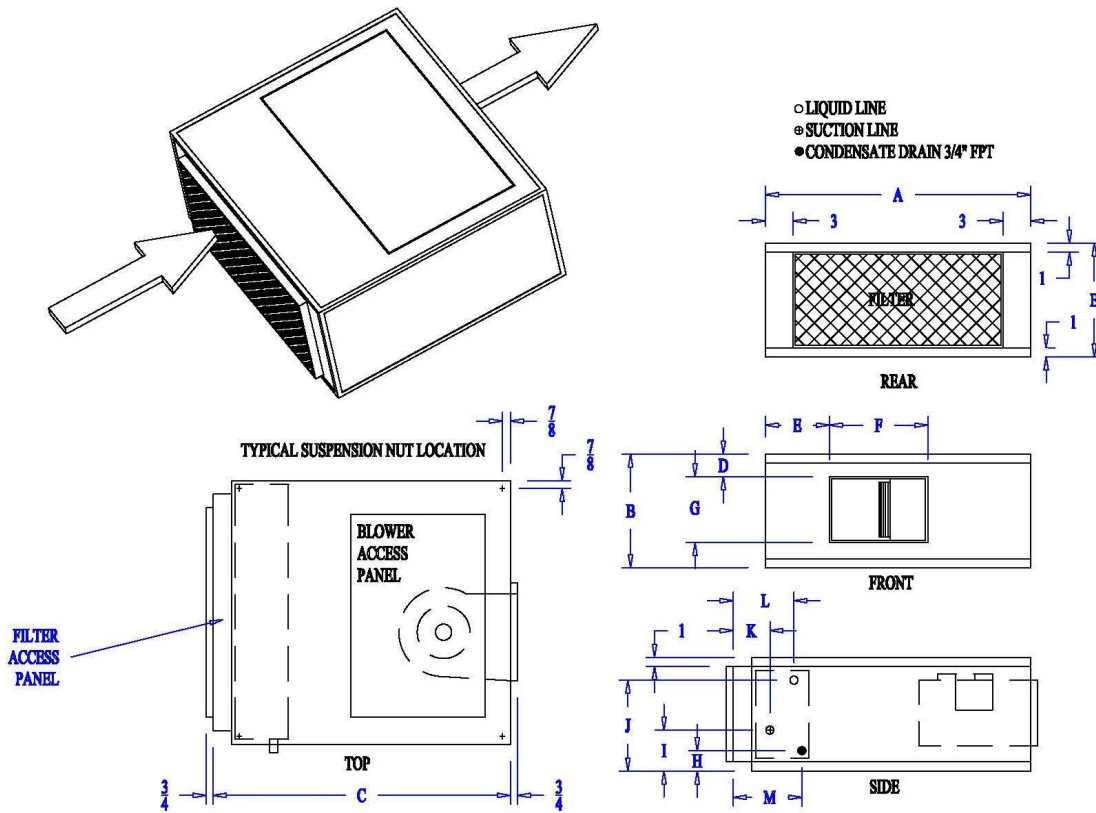
Air Handler Model #	Liquid Line OD Sweat	Suction Line OD Sweat	Drain Line	Weight	Power Supply	Motor HP//Amp	Max. Fuse Size	7/8 Filter Size
DVB04JAS	1/4	5/8	3/4 FPT	68 lbs	115/60/1	1/10//1.2	15	8 x 19.25

Field supplied reducers required. **You must install a line set according to Table 1.** Never install a line set larger in diameter than the condenser fitting size. Unit access panel is on the front of the unit over the return opening. The back of the unit is removable for access too. **1" clearance required on all sides.**

<b>DVX</b>						
<b>CFM vs. External Static Pressure For Vertical Air Handlers</b>						
Model	Fan Speed	.10 ESP	.20 ESP	.30 ESP	.40 ESP	.50 ESP
<b>DVB04JAS</b>	High	515	485	455	415	370
	Medium	405	385	355	320	275
	Low	280	265	245	225	190

The shaded areas in the tables above do not apply. Calculate supply duct sizing at .08" ESP and return air duct sizing at .05" ESP. .10 ESP is the absolute minimum for supply duct sizing.

## Horizontal Air Handler



### Cabinet Dimensions

System	Air Handler Model #	Cabinet			Blower Opening				Return Opening
		A	B	C	D	E	F	G	
WRAH4800a	DHB04JCR	29	12.5	32.5	2.5	7	10.75	7.25	23 x 10.5

### Horizontal Air Handler Specifications

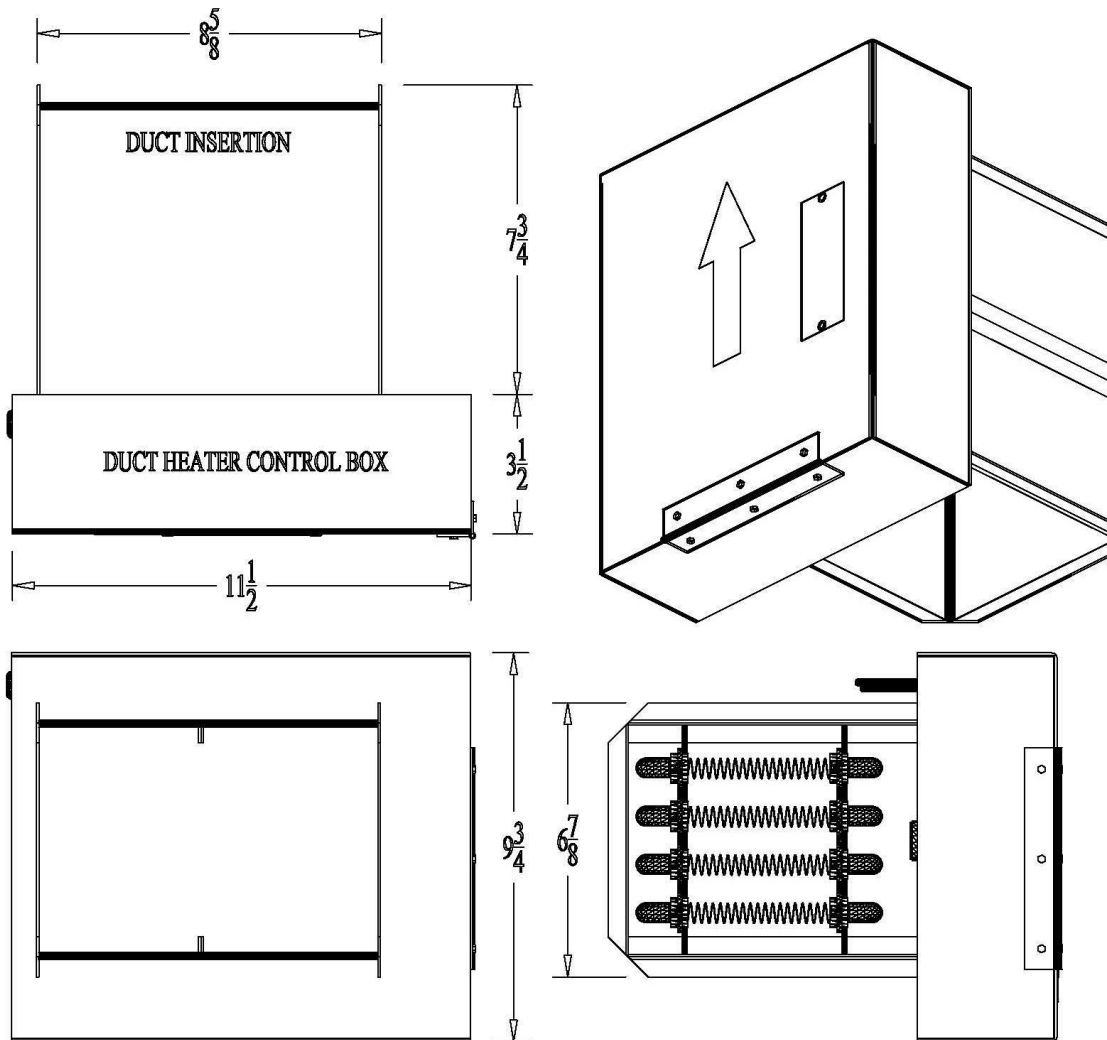
Air Handler Model #	Liquid Line OD Sweat	Suction Line OD Sweat	Drain Line	Weight	Power Supply	Motor HP//Amp	Max. Fuse Size	7/8 Filter Size
DHB04JCR	1/4	5/8	3/4 FPT	102 lbs	115/60/1	1/10//1.2	15	11.75 x 24.4

Field supplied reducers required. **You must install a line set according to Table 1. Never install a line set larger in diameter than the condenser fitting size.** Installer field configures unit to top or bottom access and left or right coil connections. **1" clearance required on all sides.**

<b>DHX</b>						
<b>CFM vs. External Static Pressure For Horizontal Air Handlers</b>						
Model	Fan Speed	.10 ESP	.20 ESP	.30 ESP	.40 ESP	.50 ESP
<b>DHB04JCR</b>	High	590	570	555	525	490
	Medium	420	410	395	380	350
	Low	315	300	280	255	225

The shaded areas in the tables above do not apply. Calculate supply duct sizing at .08" ESP and return air duct sizing at .05" ESP. .10 ESP is the absolute minimum for supply duct sizing.

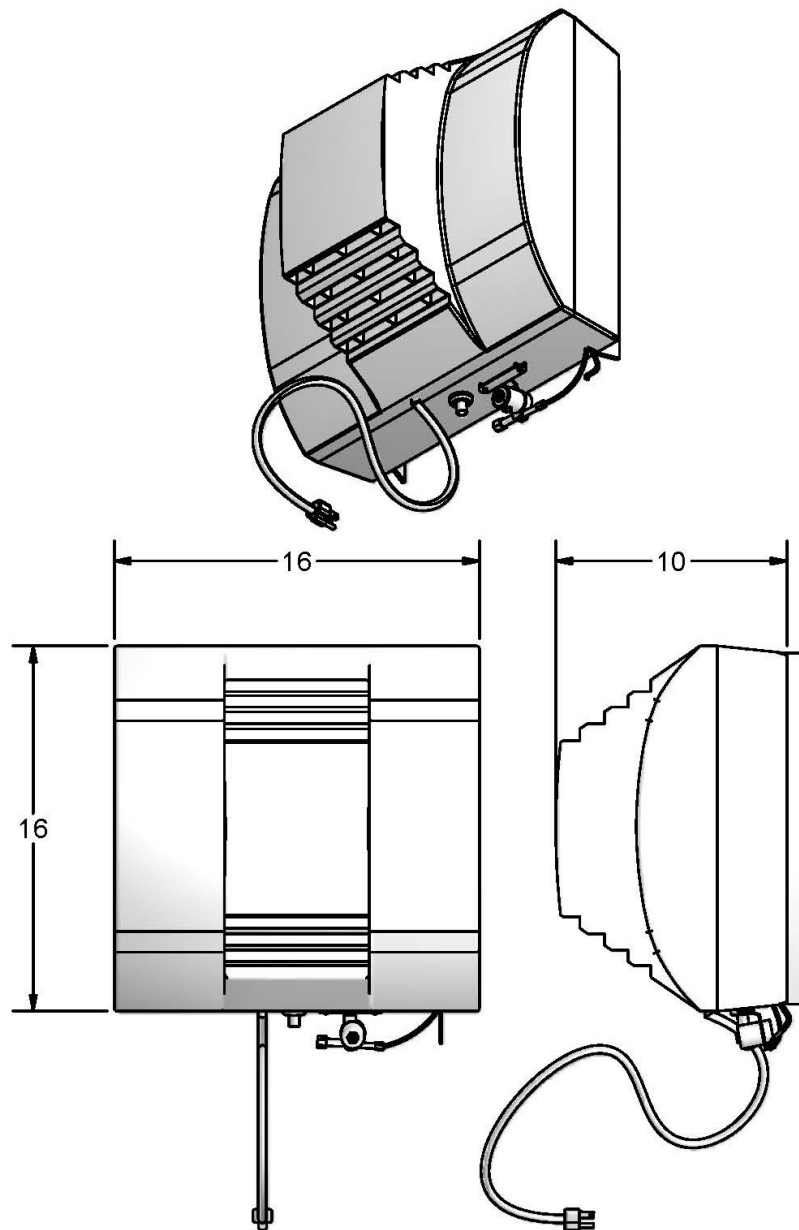
## Reheat Element for Air Handler Systems



1. At least 4' downstream from air source or elbow. If closer than 4', it may require turning vanes, baffles, or other devices to ensure an even distribution of air over the face of the heater.
2. At least 2' before an elbow or may require devices as in #1.
3. Transitions to and from a duct heater should be limited to 20% of the duct area per linear foot.
4. Always mount in the side of a vertical or horizontal duct. Never mount from top or bottom of a horizontal duct.
5. All duct materials must be suitable for 250° F operation
6. Low voltage connects to terminals HTR and C on TB2 in the condenser control panel.
7. Thoroughly seal with silicon to supply duct.
8. Follow manufacturer's instructions.
9. Not all of the air in the duct must pass through the heater. There is no need to reduce the duct size to match the size of the heater duct insertion.

Unit	Output in Kw	Amps	Power Supply	Max. Fuse
<b>WRAH4800a</b>	1.50	6.2	240/60/1	15

## Humidifier for Air Handler Systems



1. Requires a dedicated 115-volt receptacle
2. Mount and thoroughly seal on metal duct only, preferably the return air duct
3. Requires hot water supply
4. Low voltage connects to terminals HUM and C on TB2 in the condenser control panel.
5. Aprilaire humidistat supplied with unit is not used.
6. Requires trap in drain line upstream of air gap. ½" ID vinyl tubing recommended.
7. Follow manufacturer's instructions.



## Installation Check List

1. Ensure the electric voltage, breaker and wire size are correct for all electrical components.
2. Make sure the line set is less than 200 equivalent feet in length, the proper diameter and contains no oil traps.
3. Make sure the line set has passed a leak test and has been evacuated below 1000 microns.
4. Check the evaporator drain and make sure it is clear of obstructions, free of traps, and has sufficient slope.

## Quick Start Procedure

**Caution:** A qualified technician must install this refrigeration equipment. The following quick start procedure is not a substitute for proper installation techniques and procedures. Please read, understand, and follow all instructions in this manual prior to start up. Failure to install and adjust this refrigeration unit in compliance with the installation instructions will void the warranty.

1. Break the vacuum to a positive pressure of approximately 20 PSI. **DO NOT** start the unit for the first time with a full charge.
2. Apply power to the unit for 24 hours to allow the crankcase heater to warm the compressor.
3. Start the unit.
4. Slowly add charge to system through the compressor suction access port. **DO NOT** allow liquid refrigerant to directly enter the compressor. Use a metering device to prevent liquid from directly entering the compressor.
5. Adjust the condenser fan cycle control to maintain 190 PSI head pressure with condenser ambient temperatures at or below 90° F.
6. Continue to add refrigerant until the sight glass is clear.
7. Allow the unit run and cool the room to 55° F.
8. Compare the saturation temperature corresponding to the suction pressure at the compressor to the sensible suction line temperature at the compressor. Adjust the thermostatic expansion valve as necessary to ensure a superheat of 8° to 12°.
9. Add refrigerant to maintain approximately 5° of sub-cooling.
10. Check the discharge (hot gas) line temperature midway between the compressor outlet and condenser coil inlet. It should never exceed 225°.
11. Check the compressor amp draw. It should never exceed the RLA on the condensing unit rating plate.
12. Disconnect refrigerant gauges.

Normal Operating Pressures for R-134a			
Outdoor Temperature (°F Dry bulb)	Condenser Inlet	Suction Pressure	Head Pressure
110		32	252
90		30	190
70		29	190*

Return air temperature of 55° dry bulb. Supply air temperature of 41 -44° dry bulb.

\*Fan speed controller may influence head pressure.

Charge to 5 ° sub-cooling. Superheat 8-12 °

Approximate charge weight of 3.6 lbs. R134a refrigerant with 50' line set.

Approximate weight of R-134a per foot of 5/16" liquid line is 0.41 ounces.

Approximate weight of R-134a per foot of 3/8" liquid line is 0.65 ounces.

## TROUBLE SHOOTING

<u>FAULT</u>	<u>CAUSE</u>	<u>SOLUTION</u>
Unit does not run	Blown fuse or breaker Room at set point Thermostat not calling for cooling Short cycle time delay active	Replace fuse/reset breaker Reduce temperature setting Reduce temperature setting Wait five minutes
Unit runs but does not cool	Lack of air flow  Ductwork Leaks Unit low on refrigerant Compressor not running Unit undersized	Check filter, make sure registers and grilles are unobstructed Set fan speed to HI Clean evaporator if necessary Ensure duct work is sufficient Properly seal the ductwork Call a qualified technician Call a qualified technician Call a qualified technician
Evaporator coil freezes	Air filter dirty Coil and/or fan wheel dirty Supply or return air duct blocked Set point temperature too low Evaporator fan on wrong speed Condenser fan speed control set too low Insufficient duct work System low on refrigerant	Replace the air filter Clean the evaporator and/or fan wheel Clear/open registers and grilles Raise set point to 55° F. Set fan speed to MED Adjust fan speed control settings Call a qualified technician Call a qualified technician
Water leaking from unit	Condensate drain clogged No trap in condensate drain Evaporator coil frozen	Blow out drain Install trap in drain line See above
Water dripping from duct work	No insulation or not insulated well enough Insulation vapor barrier insufficient	Properly insulate duct work  Remove insulation and re-insulate with foil or plastic batted insulation
Evaporator fan runs but compressor does not	Unit calling for humidification Compressor and/or starting components faulty	Normal Call a qualified technician
Compressor runs but evaporator fan motor does not	Blown fuse or breaker Faulty fan motor/capacitor Faulty fan relay	Replace fuse/reset breaker Call a qualified technician Call a qualified technician
Compressor short cycles	Unit low on refrigerant Condensing fan motor faulty Compressor and/or start components faulty	Call a qualified technician Call a qualified technician Call a qualified technician

Humidifier does not run	Blown fuse or breaker Humidifier not plugged in Thermostat not wired correctly Thermostat configuration incorrect Humidification relay faulty	Replace fuse/reset breaker Plug in humidifier Call a qualified technician Call a qualified technician Call a qualified technician
Dehumidification does not come on	Thermostat calling for cooling or heat  Blown fuse or breaker Thermostat not wired correctly Thermostat configuration incorrect Dehumidification relay faulty	Wait for cellar temperature to satisfy, check again Replace fuse/reset breaker Call a qualified technician Call a qualified technician Call a qualified technician
Humidity in cellar too high/low	Humidifier not working Dehumidification not working Return air duct leaks Humidifier connected to cold water Cellar vapor barrier not sufficient  Improper doors/windows in cellar  Insufficient duct work Fan on wrong speed	See above See above Properly seal the ductwork Connect humidifier to hot water source Install proper vapor barrier. Seal around all openings into cellar Use exterior grade doors and windows use proper seals and sweeps Call a qualified technician Set fan speed to MED
Unit over cools cellar	Blown fuse or breaker Faulty time delay Faulty duct heater or relay Thermostat wired for dehumidification with no duct heater installed	Replace fuse/reset breaker Call a qualified technician Call a qualified technician Remove wire from Y2 and W1 or install duct heater
Condenser fan motor short cycles/fails to run	Unit low on charge Improper fan speed control settings Low ambient condition exists Condenser fan speed control faulty Condenser fan speed controller does not sense pressure	Call a qualified technician Call a qualified technician This is normal Call a qualified technician Receiver backseat valve closed

A **qualified service technician** must record all the information on the diagnostic sheet **before** calling for technical assistance. The technician **must** be able to identify the unit with the order number and serial numbers to receive accurate trouble shooting assistance. All recommendations for repair or adjustment will be based on the information provided by the **service technician**. Any incorrect recommendations based on incorrect or insufficient data are not covered by the warranty.

°F	R-134a PSIG		°F	R-134a PSIG
0	6.5		76	80.2
2	7.5		78	83.4
4	8.5		80	86.7
6	9.6		82	90.0
8	10.8		84	93.5
10	11.9		86	97.0
12	13.1		88	100.6
14	14.4		90	104.3
16	15.7		92	108.1
18	17.0		94	112.0
20	18.4		96	115.9
22	19.9		98	120.0
24	21.3		100	124.2
26	22.9		102	128.4
28	24.5		104	132.8
30	26.1		106	137.2
32	27.8		108	141.7
34	29.5		110	146.4
36	31.3		112	151.1
38	33.1		114	156.0
40	35.0		116	160.9
42	37.0		118	166.0
44	39.0		120	171.2
46	41.1		122	176.5
48	43.2		124	181.8
50	45.4		126	187.4
52	47.7		128	193.0
54	50.0		130	198.7
56	52.4		132	204.6
58	54.9		134	210.6
60	57.4		136	216.7
62	60.0		138	222.9
64	62.7		140	229.2
66	65.4		142	235.7
68	68.2		144	242.3
70	71.1		146	249.1
72	74.1		148	255.9
74	77.1		150	262.9

**Superheat**

Subtract the saturation or dew temperature corresponding to the suction pressure in the evaporator from the suction line temperature to determine superheat.

Adjust thermostatic expansion valve to maintain 8-12° superheat.

**Sub-cooling**

Charge to 5° sub-cooling and a full sight glass with R-134a

**DIAGNOSTIC SHEET** for customer order # \_\_\_\_\_

**A qualified service technician must record all the information on this diagnostic sheet before calling for technical assistance.** The technician **must** be able to identify the unit with the order number and serial numbers to receive accurate trouble shooting assistance. All recommendations for repair or adjustment will be based on the information provided by the **service technician**. Any incorrect recommendations based on incorrect or insufficient data are not covered by the warranty. **The condenser fan motor must be running and the return air temperature must be between 53° and 58°F when recording this data.**

**Refrigerant:** \_\_\_\_\_

Condenser Model # \_\_\_\_\_  
Condenser Serial # \_\_\_\_\_

Evaporator Model # \_\_\_\_\_  
Evaporator Serial # \_\_\_\_\_

Voltage at compressor: \_\_\_\_\_  
Compressor amp draw: \_\_\_\_\_

Line set size: \_\_\_\_\_ X \_\_\_\_\_

Line set length: \_\_\_\_\_

Number of elbows in suction line, including  
all 45 and 90 degree bends in soft copper: \_\_\_\_\_

Suction pressure at compressor: \_\_\_\_\_

Head pressure: \_\_\_\_\_

Suction line temperature at compressor: \_\_\_\_\_

Discharge (hot gas) line temperature: \_\_\_\_\_

Liquid line temperature: \_\_\_\_\_

Condenser ambient temperature: \_\_\_\_\_

Return air temperature, see above: \_\_\_\_\_

Supply air temperature: \_\_\_\_\_

**This area to be filled out for air handler installations only:**

Supply trunk size: \_\_\_\_\_

Number and size of supply registers: \_\_\_\_\_ @ \_\_\_\_\_

Return air trunk line size: \_\_\_\_\_

Customer name: \_\_\_\_\_

For the property located at: \_\_\_\_\_

Warranty card filled out by: \_\_\_\_\_

Date: \_\_\_\_\_

Company: \_\_\_\_\_

Telephone # \_\_\_\_\_ Fax# \_\_\_\_\_ E-Mail \_\_\_\_\_

**Wine Rack Refrigeration**

**2194 State Route 28**

**Goshen, OH 45122**

**513-678-6523**