DUCTLESS SPLIT SYSTEM
Service and Technical Guide

P/N 240-2985, Rev. 1.2 [07/01]

GENERAL INFORMATION

This guide is intended for use by EMI contractors, distributors, installers, representatives, and service technicians to gain a better understanding of EMI Ductless Split Systems.

This guide will supplement the information found in the *Installation, Operation, & Maintenance Guide* and the *Specifications & Performance Guide* for your unit. EMI also publishes *Policy Bulletins* pertaining to specific installation and service issues. These bulletins can be found in the full line catalog and topics include (but are not limited to):

- Equipment Matching
- Labor Allowances
- Return Policies
- Run Length/Lift
- Tubing Size Requirements
- Warehousing Charges

EMI recommends technicians and installers read this material prior to installing or servicing an EMI Split System. Any questions can be directed to our customer service department at (315) 336-3716.

SYSTEM DESIGN

EMI manufactures two series of straight-cool condensing units and limited range heat pumps that can be matched with any corresponding size EMI-manufactured air handler.

America Series Single Zone Outdoor Units*

- SCC: Models 9-36 (straight cool)
- CCB: Models 42-48 (straight cool)
- SHC: Models 9-36 (heat pump)
- CHD: Models 42-48 (heat pump)

America Series Multi-Zone Outdoor Units**

- MC2/MC4: 2-4 Zone (straight cool)
- MH2/MH4: 2-4 Zone (heat pump)

** Single Zone indicates that each unit has one compressor to be connected to a single air handler.*

*** Multi-zone describes a unit with more than one compressor for more than one air handler.*

EMI manufactures the most extensive line of multi-zone circuit options in the Ductless Split industry. Due to running changes and advances, unit decoding and option availability can become confusing.

The following will answer some Frequently Asked Questions regarding EMI multi-zone condenser options:

• The MH unit is a *limited range* heat pump (see section on "Maximum Range vs. Limited Range Heat Pumps").

• **Circuit Numbering:**

9 (9,000 BTU/h)
2 (12,000 BTU/h)
5 (15,000 BTU/h)
8 (18,000 BTU/h)
4 (24,000 BTU/h)
3 (30,000 BTU/h)
0 (No Compressor)

• The MC/MH2 is only available in three capacities and only in dual zones. This means you can order any combination of two circuits in either the MC or MH units. The capacities are 9, 2, and 5 (as noted above).

• With an MC/MH4, you cannot mix and match any 15,000 BTU/h or 30,000 BTU/h unit with other capacities in a heat pump (ex: An MC4 2203 is a good combination while an MH4 2203 is not).

• The only capacities available in 4 zones are 9,000, 12,000, and 15,000 BTU/h circuits. If an 18,000, 24,000, or 30,000 BTU/h capacity is incorporated, the maximum number of circuits falls to three (3). A unit model number with three (3) circuits will have a "0" in the model number (ex: MC4 9208). If the capacities required are any combination of 18,000, 24,000, or 30,000 BTU/h, the number of circuits equals two (2) and the unit model number will have two zeros (ex: MC4 0803).

• The MC and MH units utilize separate refrigeration circuits that are independent from each other. Each circuit has its own compressor and control circuit. There is one condenser fan that is operating continuously when one or all of the circuits are functioning. If the heat pump (MH) model is selected, the user can run one circuit in cooling mode and one in heat mode if desired.

• Air handlers that can be matched with the preceding condensing units are CAH, CSP/CHP, FSP/FHP, TBH, and WHP.

SITE INFORMATION/REQUIREMENTS

• Do not install units in high traffic areas, drip lines of roofs, or overhangs.

• EMI condensers require a minimum 12" intake air clearance and 48" discharge air clearance for proper unit operation. We also recommend a minimum 12" clearance to the side and 48" to the front and rear be-

tween multiple condensers for ease of service and to ensure adequate air flow to each unit. Air recirculation can cause high system pressure that could lead to compressor failure.

• Adequate clearance between units is important. If units are installed too close together, air flow is restricted and this can result in premature compressor operation or performance problems and failure.

• Heat pump models will produce condensate in the heating mode that will cause water to drain from the base. When temperatures are below freezing, this water becomes ice.

• Consider possible icing when installing unit(s) near sidewalks or walkways.

• Heat pumps require airflow clearance in the winter for heat mode and should be mounted above the level of maximum anticipated snowfall.

MAXIMUM RANGE VS. LIMITED RANGE HEAT PUMPS

EMI manufactures 2 types of heat pumps that have different operating characteristics.

A maximum range heat pump is a standard unitary industry-style heat pump that utilizes hot gas defrost (reverse cycle) for continuous heating operation at low ambient temperatures. Utilization of a solid state defrost board, defrost termination switch, and an outdoor ambient sensor assists the EMI maximum range heat pump to operate as designed and tested in mechanical heating mode.

The EMI SHC 09-36 & CHD 42/48 single zone series are the maximum range heat pump units that are presently produced.

The SHC/CHD condenser utilizes a reversing valve to provide reverse cycle operation. This means that the outdoor unit can act either as a condenser or an evaporator, thereby providing either comfort cooling or heating to the indoor space. The reversing valve is energized in cooling. Therefore, should the valve fail to actuate, the system will still provide indoor heat.

• To check for reversing valve operation, place a jumper wire across terminals "R" and "O." You should hear a click to verify that the solenoid is energizing and actuating the valve.

• To check for compressor and condenser fan operation, place a jumper wire across terminals "R" and "Y." This will energize the contactor, providing power to the compressor and condenser fan.

NOTE: If the SHC condenser is equipped with *low ambient* fan control for cooling, The fan will remain off (while in cooling mode) until the condenser pressure reaches 275psi. The fan will then energize and run until the condenser pressure falls below 210psi. This will happen only in the cooling mode (or when the reversing valve is energized). In heating (reversing valve not energized), the fan will run continuously so long as the connection is made between "R" and "Y."

Defrost Controls with Short Cycle Protection

The SHC condenser is equipped with a logic control circuit designed to keep the system operating at peek efficiency. The 24v circuit provides control to the indoor and outdoor systems along with 3 minute anti-short cycle compressor protection.

The defrost control circuit is designed to keep the condenser coil free from ice and frost during heating mode. This is accomplished through the precise switching of the outdoor fan, reversing valve, and indoor auxiliary heater.

Defrost Initiation

The defrost-sensor is located on either the end plate or the return bend of the condenser coil. A defrost cycle will initiate after the sensor closes (approx. 20° F) and remains closed for the length of time selected on the control board (Factory setting is 60 minutes for SHC 36 or 90 minutes for SHC 9-30).

During defrost, the condenser will cycle the reversing valve and enter a cooling mode. The condenser fan will also switch off, allowing pressure and temperature to build in the condenser coil, thereby melting off any ice buildup. At the same time, the indoor electric heat will energize to dampen the cold air being discharged from the evaporator unit. This will continue until either the defrost-sensor opens (approx. 60° F) or 10 minutes has elapsed. Defrost times will vary depending on outdoor temperature and moisture conditions. When defrost is complete the unit will resume heating.

Testing Defrost Operation using test pins

Defrost operation can be checked using the test pins located on the circuit board of the condensing unit. "Defrost Test Operation" will be a time-compressed version of the actual defrost cycle.

With the system "off" and using two small alligator clips, jumper the following sets of test pins:

"R and DF2" and **"DFT TST"**

Place the indoor unit in heating mode with the set point temperature well above room temperature to ensure that the condenser remains on during the entire defrost test operation.

The condenser will operate in heating for

approximately 20 seconds. At that point the unit will enter defrost mode for approximately 2 seconds. During this time the condenser fan will switch off, the reversing valve will energize and the defrost board will energize the indoor electric heat relay through the "W" terminal. After the 2 second defrost cycle is complete, the unit will switch back to heating operation for another twenty seconds. This process will repeat until the jumpers are removed from the test pins.

NOTE: If the condenser coil is heavily frosted with ice, it is likely that the "Defrost Sensor" is already closed so the "R and DFT" jumper can be eliminated. To initiate defrost, momentarily jump "DFT TST" until the defrost cycle begins but DO NOT leave the jumper in place. The unit will remain in defrost mode until the condenser coil is defrosted and will then resume heating mode.

Limited Range Heat Pump

A limited range heat pump is a model that does not utilize a defrost sequence in heating mode since this unit will not operate during periods of outdoor temperatures below 35° F.

The EMI limited range heat pumps are designed to cease operation at 35° F. (+/- 3° F) and automatically switch into electric resistance or hydronic heating only, as long as the evaporator has been supplied with supplemental heat from the factory (it is recommended that supplemental heat be ordered as an option with ALL heat pump evaporators).

The specific control that is used to monitor the extreme cold conditions and break power to the compressor is called a Changeover Thermostat ("C.O. T'stat" on wire diagram). This device has a long sensing bulb on its body that is strategically placed from the factory for best sensing capability.

The EMI MH2 & MH4 series condensers are manufactured as limited range heat pumps. The capacities available range from 9,000 BTU/h up to 30,000 BTU/h nominal capacity.

MIXING & MATCHING EQUIPMENT IN A SPLIT SYSTEM (STRAIGHT COOL ONLY)

It is possible to mate EMI air handlers and condensing units with other manufacturers' products in **Straight Cool Applications** if the following conditions are met properly (see EMI Policy Bulletin #910503).

- All equipment capacities must have the same BTU/h rating and efficiency rating (SEER).
- A transformer must be added to the outdoor unit if not standard.
- If a thermostat is not supplied by EMI it must have an independent "G"signal capability to operate the fan.
- EMI must test and/or approve any non-EMI equipment if heat pump applications require manufacturer mixing.

NOTE: If EMI equipment is installed in a mixed equipment system without prior approval, EMI will void ALL warranties.

GENERAL WIRING PROCEDURES

EMI systems require the following electrical wiring for proper operation:

- 24v transformer (standard in all EMI condensers).

NOTE: It may be necessary to install a transformer if using another manufacturer's straight cool condenser (see "Mixing & Matching Equipment" in this guide.)

- Indoor and outdoor unit high-voltage supply and accompanying wiring must match unit specifications.
- If optioned, low voltage thermostat wiring must run between the indoor and outdoor units (also wall-mounted thermostat NEC class II wiring).

EMI *AmericaSeries* condensers are designed to operate with EMI *AmericaSeries* evaporators. Both the condenser (outdoor unit) and evaporator (indoor unit) have a *high volt* service connection and are intended to be independently connected to the electrical service panel (see the unit name plate for correct breaker types and sizes).

The outdoor and indoor units are also connected to each other through *low volt* interconnect wiring. A 24v transformer located in the condensing unit provides the low volt power source.

The control circuit operates on a 24v a/c power supply. Control of the condenser is provided either by the indoor evaporator unit or a wall mounted remote thermostat.

For example, Model SHC condensing units are designed to independently connect to a high volt power supply (see name plate for required voltage and circuit breakers). The high volt connection is made through three 6-inch lead wires located in the control section (refer to wiring diagram). Wiring connections must abide by NEC and any local electrical codes.

Low volt connections are made through the 5-position terminal located in the control section. This circuit is an NEC Class-II low volt circuit. The low volt terminal block is labeled C, Y, O, W2, and R.

Condenser Operation

The transformer located in the condensing unit provides 24v control power to both the condenser (outdoor unit) and the evaporator (indoor unit). The 24v power supply can be measured across terminals "R" and "C."

NOTE: Follow supplied wiring diagram exactly. If you plan to upgrade (i.e., add electric heat) the system in the future, it is important to install wiring with the correct amperage rating for the upgrade.

INTERCONNECT TUBING

Use the following guidelines when running suction and liquid lines.

- **Maximum tubing run of 100 feet, including 35 feet of lift** (see EMI Policy Bulletin).
- **DO NOT** change tubing set size, no matter how long the run/lift. This is important for proper compressor oil return. Tubing size is documented in all *Specification Sheets*.

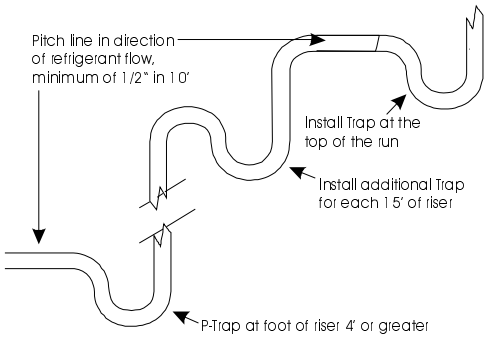
NOTE: Use of improper tubing sizes will void the unit's warranty.

- Always insulate the suction (gas) line. DO NOT insulate the liquid line. The expansion device is in the evaporator.
- Tubing should be run as short and direct as possible.
- To avoid oil trapping, tubing should be routed neatly without any dips in the horizontal runs. Horizontal suction lines should be pitched down in the direction of flow with a drop of at least 1/2" per 10' to aid oil flow.
- Install a liquid line filter drier in interconnecting tubing (if not standard). Position it as close to the condensing unit as possible. Filter must be a *bi-flow* type if installed in a heat pump system (see "Installing Filter Driers" in this guide).
- EMI recommends installation of P-traps in suction (gas) line vertical lifts (35' max.) at the base, at 15' intervals, and at the top of the tubing run.

P-trap Installation Procedure

- Any vertical suction (gas) line riser taller than 4' should have a P-trap installed at the base to facilitate oil return when the condenser is above the evaporator (Fig. 1).
- When the evaporator is installed above the compressor, the trap will prevent the flow of liquid back to the compressor in the off cycle.

NOTE: Avoid excessive oil buildup. The P-trap should have a shallow depth and a short horizontal section.



(Figure 1)

- Prefabricated wrought copper traps are available from your local refrigeration supply warehouse. You may fabricate one using 2 street elbows and 1 standard elbow.
- P-traps are not required at the foot of the hot gas risers due to increased oil flow at higher temperatures.
- Long vertical risers in suction (gas) lines require additional traps at the 15' level.

INSTALLING FILTER DRIERS

- EMI installs standard filter driers in all 9, 12, and 15 BTU/h systems that utilize rotary compressor technology (straight cool and heat pump).
- Always install a new filter drier whenever the system is open for repairs. Make sure to align the arrow on the liquid line drier with the flow direction for the unit. Use a bi-flow drier for heat pump installation.

NOTE: An additional refrigerant charge will be necessary to compensate for the new filter drier. Check drier specifications for charge recommendations.

ANTI-SHORT CYCLE TIMER (ASCT)

Anti-short cycle timer (ASCT) is standard on most EMI models. It is also available in kit form as necessary. Consult the factory for the latest information on ASCT.

LOW AMBIENT OPTIONS

Factory installed on heat pump only. Field installed kit available for cooling only. Components include:

- Fan cycle switch and crank case heater (09 ,12, 15)
- Fan cycle switch only (18 and up)

Cooling Only- The low ambient option is intended for use on systems that operate in cooling mode at outdoor temperatures below 60° F.

- Single compressor units utilize a cycling condenser

fan on the high pressure side of the system.

• Multiple compressor units also utilize a single cyling condenser fan on the high pressure side of the system. The operating range is 210-275 psi. This enables cooling down to approximately 0° F.

NOTE: Multiple compressor units use one (1) fan for all of the compressors.

Heat Pump- The low ambient option is available on single zone heat pump systems. These units also utilize a single cycling condenser fan, with a relay that allows the fan to run continuously in heating mode.

• Multiple compressor heat pump units use a hot gas bypass method. The system uses an automatic expansion valve (AXV) to prevent coil freeze up. This allows hot gas to bypass to the suction side under low ambient conditions.

Low Ambient Troubleshooting

If the condenser motor cycles rapidly or does not operate at all, check for the following:

• Power to the motor

• Total system undercharge- System cannot obtain minimum pressures to signal the motor to cycle (refer to STG for charging information)

• If the unit is charged properly and operating under low ambient conditions (65° dry bulb F or lower), the motor should cycle rapidly between 210 (motor off) and 275 (motor on) psi on the high side.

• If the outdoor temperatures coincide with EMI system performance charts (65° F and above), in most cases, the motor will run continuously. In some cases, under normal operating conditions the motor may have periods when it will cycle in the 65-75° F temperature range. This is not abnormal and is not cause for alarm.

CONDENSATE PUMPS & DRAIN

EMI recommends one trap (required on the TBC/TBH models) for the drain line after it leaves the unit. Never double trap the drain line. Pour water into the drain pan after installation to ensure proper drainage.

• When installing the condensate line, make certain the unit is not installed at a distance/height that is greater than the capability of the factory installed pump (see "Pump Specifications"). EMI factory installed pumps have a maximum lift of 4 feet from the bottom of the unit.

NOTE: Before completing installation, test pump action.

• EMI offers external pumps for installations that require more than 4 feet of lift.

SYSTEM TROUBLESHOOTING

If your EMI system does not seem to operate properly, or the pressure/temperature readings are not correct, refer to this section and the "Troubleshooting Guide" in this manual. Run through the following checklist to properly diagnose a problem with your EMI system.

• Is the unit switched on?
• Are the controls calling for heat or cool?
• Is the evap fan running properly?
• Is the condenser fan running properly?
• Is condenser air flow adequate and unrestricted?
• Is the compressor running?
• Is subcooling excessive? (see explanation below)
• Is superheat too high/low? (see explanation below)
• Is the supplied voltage for the unit correct and within normal tolerances?

Excessive subcooling is caused by non-condensables (air/water), overcharge, dirty coil, or a restriction. Purge and draw vacuum to determine if non-condensables are the problem. If it doesn't solve the problem, remove refrigerant until subcooling is no longer excessive. If the system was overcharged, this will solve the problem. If it does not solve the problem, check superheat readings.

WARNING!! It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods & tools when installing or servicing equipment.

High superheat is caused by an undercharge, leak, or restriction. If refrigerant is added to the system to normalize subcooling and the superheat is still high, then there is a restriction (possible underfeeding expansion device). If superheat is no longer high, the system was undercharged. Locate any leaks and repair. When no leaks are found or remain, recharge the system.

Low superheat (floodback) is caused by an overcharge, overfeeding expansion device, or inefficient compressor. If refrigerant is removed and both subcooling and super heat readings are normal, the system was overcharged. Check the efficiency of the compressor if subcooling is low. If the compressor is normal, the expansion device is overfeeding.

NOTE: Condensing units built before January 1, 1994, require the service panel be placed over the service opening when performing tests to get true readings.

COMPRESSOR REPLACEMENT

Before replacing the compressor, test it to make sure it is defective. Check the complete electrical system to the compressor and its internal electrical system to be sure that it is not out on internal overload. Reset the manual high pressure switch (if equipped with one).

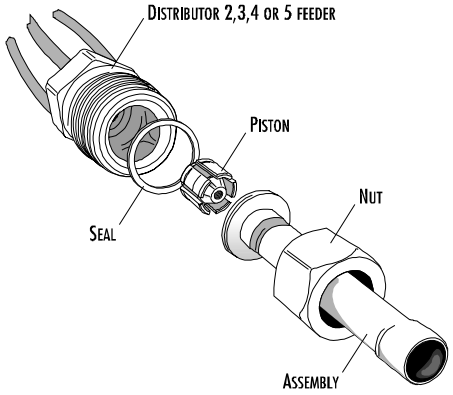
A complete evacuation of the system must be made whenever you have a defective compressor or suspect it may be. If the compressor has been operating for some time, a careful analysis must be made to determine why the compressor failed.

Many compressor failures are caused by the following conditions:

- Poor initial installation of the system.
- Changes to the system after installation.
- Improper airflow over the evaporator.
- Overcharged refrigerant system causing liquid to be returned to the compressor.
- Restricted refrigerant system.
- Lack of lubrication (horizontal and excess tubing must be sloped towards the compressor).
- Lack of p-traps in risers.
- Liquid refrigerant returning to compressor causing oil to be washed out of bearings.
- Non-condensables such as air and moisture in the system. Moisture is extremely destructive to a refrigerant system.
- Acid present in a sealed system.

Recommended Procedure for Compressor Replacement

- Perform all necessary electrical and refrigeration tests to be sure the compressor is actually defective before replacing the compressor.
- Be sure power source is off and disconnect all wiring at compressor.
- Capture (reclaim) all refrigerant.



TYPICAL EMI INDOOR EXPANSION ASSEMBLY

- After all refrigerant has been captured, disconnect suction as discharge lines from the compressor and remove compressor. Be certain to have both suction and liquid line gauge ports and/or process tube open to atmosphere.
- Disconnect both liquid and suction line connections at the unit and inspect inside the fittings for any foreign particles that may have collected there. (The foreign particles can consist of pieces of valves, windings, or thermal overload particles, and other related items normally located within the compressor shell.)
- If any foreign particles are present, they must be removed.
- Carefully capture a small amount of oil from the defective compressor by pouring from the compressor.

NOTE: It is not possible to pour oil from a rotary type compressor. On rotary compressor systems, oil must be collected from the system tubing after properly recapturing refrigerant.

- Use an acid test kit (one-shot or conventional kit) to test the oil for acid content according to the instructions with the kit.
- If any evidence of a burnout is found, no matter how slight, the system should be flushed with nitrogen.
- Replace the liquid line filter drier if you have a compressor burnout. It is recommended that the next larger filter drier be installed and a suction filter drier be added, following instructions in the filter drier section.

REMEMBER: Remove the suction line drier after a few days of continuous operation.

- Install the replacement compressor.
- Pressurize with nitrogen and leak test all connections with a leak detection fluid (i.e., soap). Discharge nitrogen and repair any leaks found. Repeat until all leaks are repaired.
- Evacuate the system with a vacuum pump capable of a final vacuum of 200 microns. The system should be evacuated through both liquid and suction lines and gauge ports. While the unit is being evacuated, seal all openings on the defective compressor. Compressor manufacturers will void warranties on received units that are not properly sealed. Do not distort the manufacturer's tube connections.
- Recharge the system with the correct amount of refrigerant. Use an accurate measuring device, such as a charging cylinder, electronic scales, or similar device, if necessary. It is necessary to add additional refrigerant to compensate for the volume of the driers for a basic system charge. See "Charging the System" in this manual.

• Re-test the oil after 48 hours. If acid is still present, install a new suction drier. If acid is not present, remove suction drier.

EVAPORATOR COIL FREEZE-UPS

If your EMI indoor coil freezes in the straight cooling mode, it is probably caused by one of the following:

- System undercharge
- Very low primary voltage
- Stuck compressor contacts
- Refrigeration circuit restriction
- Incorrect expansion device (too restrictive)
- Very low indoor load (low indoor temperature)
- Airflow problem (defective motor, plugged filter, unit blocked by curtains, furniture, etc.)
- Low ambient cooling without low ambient controls. If the system is asked to cool indoor space while outdoor space is consistently below 60° F, the system must be fitted with low ambient components. For these cases, EMI offers an optional low ambient field installed kit.

NOTE: EMI technical service can help you diagnose problems with your unit(s). Feel free to call us Monday through Friday from 8am-5pm at (315) 336-3716.

CHILLED WATER PIPING (WCP/CCP/FCP)

Standard connections provided are sweat type. See specifications for line size and actual unit connections.

NOTE: Water pipe sizes are given in I.D.

- Use pipe unions or compression fittings to aide future service. Use isolation valves to aide in unit removal.
- Connections can be brazed or soft-soldered.
- **Follow manufacturer's instructions for any field installed control valves.**
- **Unit control is provided for a 24v normally closed/ power open valve.**

NOTE: Consult factory if other types of valves are used.

- Insulate supply and return piping with closed cell foam tube insulation.
- Avoid necessary bends.
- Avoid kinks by using a tubing bender.
- Make sure glycol solution is compatible with all valves, unions, and compression fittings. Ethylene or propylene is recommended.
- Bleed air from system prior to start-up. Units are equipped with a standard air bleeder on the highest point of the unit piping.

CAUTION: Disconnect power when bleeding system. Make certain liquid does not contact any electrical components.

Finish all piping before balancing the system. Bleed system, adjust temperature and/or water flow rate until desired results are achieved.

The unit filter must be in place and able to be removed easily for maintenance. To avoid vibration, check chilled water lines to ensure they are not in contact with each other. The unit(s) must be mounted securely and level. (See *Installation, Operation & Maintenance Guide* for complete instructions.)

WSP/WHP & FSP/FHP UNIT MOUNTED ELECTRONIC CONTROLS (FEATURES)

- Large 3/4" LCD Display
- Operational range adjustable between 55°and 90° F in 1.0° increments
- Anti-Short Cycle Compressor Protection
- Fan Purge (fan remains on for 60 seconds after heat/ cool call is dropped for improved efficiency)
- Indoor Coil Freeze Protection (available in Straight Cool, Cooling Only With Optional Electric Heat, Cool/ Heat Pump With Electric Strip Heat, and Two Stage Heating).
- Fan Operation (Auto, High, Low)

Auto Fan Operation- Automatically selects fan speed according to heating or cooling demand.
Constant Fan Operation- Manually selected High or Low Speed.

- Optional Hand Held Infrared Controller (a separate Hand Held Remote used to command the Onboard Controls).
- Test Operation (allows ease of unit testing after installation by eliminating all timers).

DIPSWITCH SETTINGS

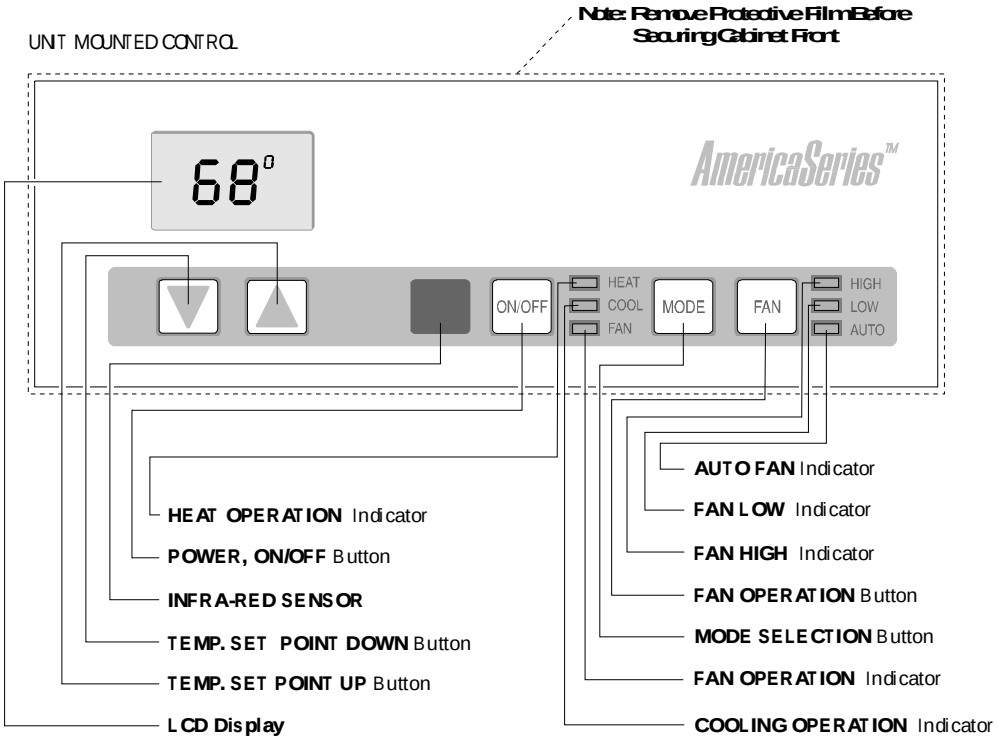
Dipswitches are located in the control section on the universal relay board. They must be set according to the unit application (i.e., straight cool, electric heat, heat pump).

The dipswitches must be set prior to installation and before either the indoor or outdoor units are connected to power (use the following table as a guide).

Switch	1	2
Cooling Only	off	off
Cool/Electric Heat	on	on
All Heat Pumps	off	on

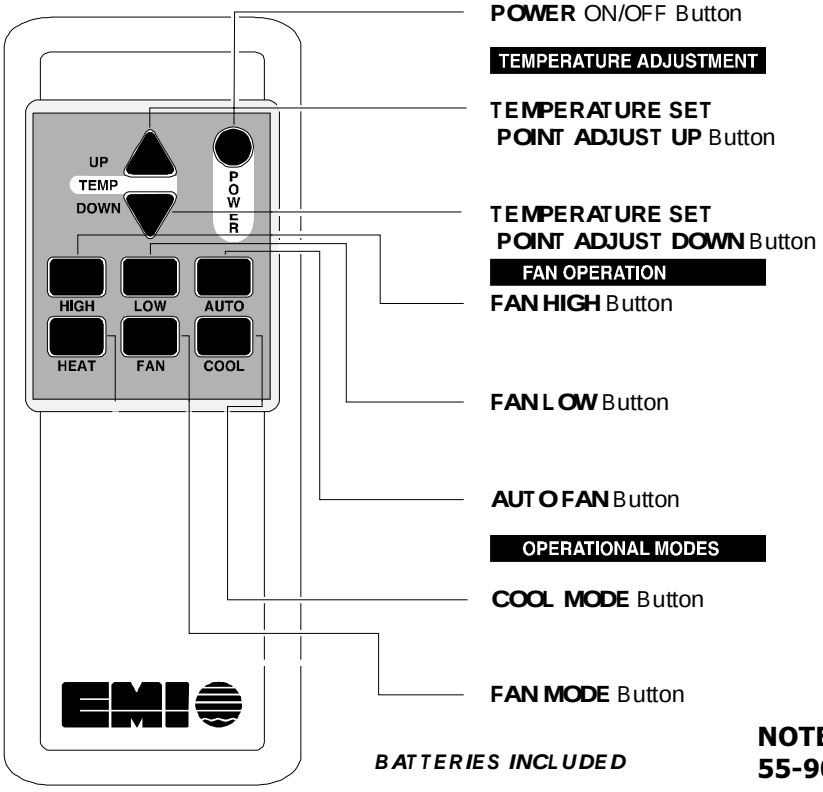
CONTROL OPTIONS

UNIT MOUNTED CONTROL



DEFAULT TEMPERATURE SETTING 72 degrees F

OPTIONAL REMOTE CONTROL



BATTERIES INCLUDED

NOTE: Operational range is 55-90° F in 1.0° increments.

The control board can be accessed by removing the return air grill and control box cover with a flat blade screwdriver or a nutdriver.

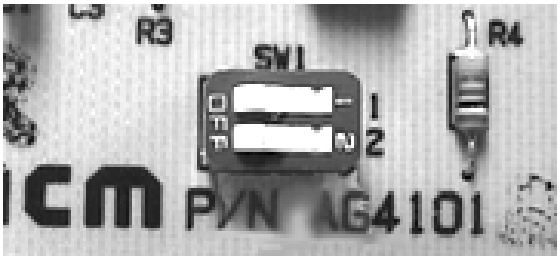


Image of Dipswitch on Control Board

NOTE: The microprocessor will read the dipswitch settings during power up. If the settings need to be changed, disconnect the low volt power to the evaporator for at least 1 minute. In some cases this also means switching the power to the condenser off. Reapply power for settings to take effect.

TROUBLESHOOTING WSP/WHP & FSP/FHP UNIT MOUNT INFRARED COMPATIBLE CONTROL*

** When troubleshooting the WHP or FSP/FHP units, refer to the wiring diagram on the back of the removeable return air grill. If you are unable to locate this diagram, please call (315) 336-3716 and a copy can be faxed or mailed.*

EMI *AmericaSeries* evaporators are designed to operate with EMI *AmericaSeries* condensers. Both the evaporator (indoor unit) and condenser (outdoor unit) have a line volt service connection and are intended to independently connect to the electrical service panel (see the unit name plate for the correct breaker type and size).

The indoor and outdoor units are also connected to each other via 24v interconnect wiring. A transformer located in the condensing unit provides the low volt power source. The number of low volt conductors will be three to five depending on heating options. Cooling only and cooling with electric heat units have three (3) low volt wires while heat pumps with electric heat have five.

Cooling Only Units

On cooling only units there are three low volt wires on both the indoor and outdoor units. The yellow, red, and brown wires of the air handler should be connected to the corresponding yellow, red, and brown wires of the condenser. A 24v transformer located in the condensing unit provides low volt control power to both the air handler and condenser.

The 24v power supply can be measured across the red (R) and brown (C) wires. The air handler will switch on and off the condenser through the yellow (Y) wire. When the air handler is calling for cooling, 24v can be measured between terminals (wires) Y and C.

NOTE: Most condenser manufacturers do not supply low volt transformers with their condensers. When connecting an EMI evaporator to a non-EMI condenser, a transformer may have to be added to the system to provide 24v power.

Cooling Only with Electric Heat Units

Units with electric heat have a strip heater located behind the evaporator coil. The control relay for the heater in located on the circuit board in the control box. A limit switch located on the heater end plate will interrupt power to the heater should the airflow become compromised. If temperatures rise above the limit setting a non-resetting one time fuse link will burn and the heater will remain off.

The following current values apply when the unit is connected to a 230v power supply. These values include fan motor current:

3kw (13.5 amps)
4 kw (18 amps)
5kw (22.3 amps)

Heat Pump with Electric Heat

Heat pump units with electric heat have five interconnecting *low volt* wires on both the indoor and outdoor units. The yellow, red, white, orange, and brown wires of the air handler should be connected to the corresponding yellow, red, white, orange, and brown wires of the condenser. A 24v transformer located in the condensing unit provides low volt control power to both the air handler and condenser.

With high volt power supplied to the condenser, 24v can be measured across the red (R) and brown (C) wires at all times.

Cooling

The air handler will cycle the condenser on and off through the yellow (Y) wire. To check for a condenser signal, place the indoor unit in cooling mode and choose a setpoint temperature that is below room temperature. Then, with a voltmeter, check for 24 volts across the yellow (Y) and brown (C) wires.

EMI's heat pump systems utilize a reversing valve is that is energized in the cooling mode. The reversing-valve signal is provided through the orange (O) low volt wire. It will remain energized constantly as long as the unit remains in cooling mode. To check for 24v reversing valve voltage, place a voltmeter across the brown (C) and orange (O) wires while the indoor unit is in the cooling mode.

Heating

This unit is designed to utilize two-stage heating. The first stage being the compressor and the second electric heat. The air handler will cycle the condenser on and off through the yellow (Y) wire as it does in cooling; however; the reversing valve will **not** be energized. To check for a condenser signal:

Step 1- Place the indoor unit in heating mode with the *Mode* button.

Step 2- Using the *Up* arrow, place the setpoint temperature one degree above room temperature.

Step 3- With a voltmeter, check for 24 volts across the yellow (Y) and brown (C) wires. The electric heat should be off at this point.

Step 4- With the *Up* arrow, select a setpoint temperature that is more than two degrees above the room temperature. The electric heat should energize along with the 24v compressor signal between Y and C. Check to see that the amp draw corresponds with the electric heat rating.

The following current values apply when the unit is connected to a 230v power supply. These values include fan motor current:

3kw (13.5 amps)
4kw (18 amps)
5kw (22.3 amps)

Units with electric heat have a strip heater located behind the evaporator coil. The control relay for the heater in located on the circuit board in the control box. A limit switch located on the heater end plate will interrupt power to the heater should the airflow become compromised. If temperatures rise above the limit, setting a non-resetting one-time fuse link will burn and the heater will remain off.

Units with Condensate Pumps

Models WSP or WHP are available with an optional condensate pump. Condensate pumps are recommended when it is not possible to gravity drain the condensation from the indoor unit. The condensate pump is located behind the front control panel and has a maximum lift capability of 4 feet from the base of the unit.

NOTE: Condensation generated by the evaporator will collect in the pump reservoir. When the water level is high enough, a float switch will close and energize the pump, clearing the water from the reservoir. Should, for any reason, the water exceed the maximum preset level, a secondary float will open a safety switch, thereby cutting the (Y) signal to the condenser. This will prevent the evaporator from generating more condensation and spilling out of the unit.

FREEZE PROTECTION

The indoor fan coil unit is protected in the event of freeze up. If the evaporator falls below 32° F for more than three minutes, the compressor is forced off. When the evaporator temperature returns to 50° F, normal cooling operation resumes. If the evaporator returns to above 32° F but remains below 50° F for 10 minutes, cooling operation will also resume.

OPERATIONAL MODES

- Fan only
- Cooling only
- Cooling with optional indoor electric strip heat
- Cooling/Heatpump with optional electric strip heat

On/Off Switch

The *On/Off* switch is used to turn the equipment on or off. In the *Off* mode, the LCD will be blank and all LED indicator lights will be dark. To turn the unit on press the *On/Off* button once. The LCD will display the room temperature and LED indicators will light up to show fan speed and mode selection.

Initial Startup

Upon initial power-up the unit will start in *Fan* only mode at *High* speed. These are the default settings of the microprocessor. Once temperature and mode selections have been made, they will be stored in the microprocessor memory when the unit is switched off. The next time the unit is switched back on via the *On/Off* switch, the stored settings will be used and the unit will resume operation. If power is lost, the equipment will return to an *Off* state (if it was on) and any temperature or mode settings will be lost.

Mode Switch (System Switch)

The *Mode* button will allow the selection of the desired mode. Colored LED indicators will light next to the selected mode. With each successive press of the *Mode* button, selection will rotate between *Heat, Cool* and *Fan*. There is a 7 second time delay after the mode button is released before the execution of the selection to prevent the unit from starting prematurely.

Fan Operation

These units utilize a two-speed motor with three operational fan modes. The *Fan* button will allow the selection of the desired fan mode. With each successive press of the *Fan* button, selection will rotate between *High, Low,* and *Auto*. In *Fan* mode, *Auto* is bypassed and only *High* or *Low* are available. An amber LED indicator will light next to the fan speed selection. If *Auto* fan speed is selected then an LED indicator will also light next to *Auto*. *High* and *Low* selections are constant fan settings.

Auto fan mode can only be selected if the unit is in *Heat* or *Cool*. In Auto mode the fan will cycle with the call for *Heat* or *Cool*. Fan speed will be determined by the microprocessor and speed adjustments will be made according to room temperature and setpoint. The fan will switch to *High* speed when room temperature deviates by more than 2° F from setpoint. The fan will switch to low speed if the deviation is 1° F. When the room temperature reaches setpoint temperature the heat/cool call is dropped. The fan will then stay on for an additional 60 seconds to purge the unit of any residual energy.

Cooling Only Operation

To select *Cool* mode, turn the unit on via the *On/Off* switch. The LCD will display room temperature. Select *Cool* mode via the *Mode* button. Then, by depressing either the *Up* or *Down* arrow once, the setpoint temperature will appear in the LCD display. The setpoint temperature can then be changed with each successive press of the *Up* or *Down* arrow or by holding the button in. Place the setpoint temperature below the room temperature. The compressor will start and cooling will continue as long as the setpoint is below the room temperature.

Once room temperature is satisfied, the compressor will cycle off. The fan will operate as described in "Fan Operation." Once the compressor is switched off (or if power is lost), there is a three-minute delay before restarting.

Optional Electric Heat Operation (Straight Cool Units Only)

To select *Heat* mode, turn the unit on with the *On/Off* switch. The LCD will display room temperature. Select *Heat* mode via the *Mode* button. Then, by depressing either the *Up* or *Down* arrow once, the setpoint temperature will appear in the LCD display. The setpoint temperature can then be changed with each successive press of the *Up* or *Down* arrow or by holding the button in. The electric heat will energize and heating will continue as long as the setpoint is above the room temperature. The fan will operate as described in "Fan Operation."

Optional Heat Pump with Electric Heat (2-stage Heating)

To select *Heat* mode, turn the unit on with the *On/Off* switch. The LCD will display room temperature. Select *Heat* mode via the *Mode* button. Then, by depressing either the *Up* or *Down* arrow once, the setpoint temperature will appear in the LCD display. The setpoint temperature can then be changed with each successive press of the *Up* or *Down* arrow or by holding the button in. Place the setpoint temperature above the room temperature. The compressor will start heating and run as long as the setpoint is above the room temperature.*

** Some EMI heat pump condensers are equipped with a low temperature cutout that will shut down the compressor & energize the indoor electric heat when outdoor temperatures fall below 0° F.*

Once the room temperature is satisfied, the compressor will cycle off. The fan will operate as described in "Fan Operation." Once the compressor is switched off (or power is lost), there is a three-minute delay before it will re-start. Should the room temperature fall more than 2° F below the setpoint, the electric heat will energize along with the heat pump (2-stage heating).

The electric heat will continue to run until the deviation between room temperature and setpoint temperature is less than 2° F. At that time the electric heat is switched off and the heat pump will take over the heating demand. This will continue until the room temperature reaches setpoint temperature and heating demand is satisfied. The fan will operate as described in "Fan Operation."

CHARGING EMI SPLIT SYSTEMS

EMI publishes a variety of charts that are to be used as a general guideline for properly charging EMI systems. We make available the following "Charge Tables and Operation Charts" to assist the installer at time of startup.

It is very important to note that they should be utilized whenever starting up a complete EMI Split System combination. However, there are a wide range of variables that will cause your readings to deviate from published data somewhat.

NOTE: EMI highly recommends using the "Superheat" values from the Operation Charts as a final fine-tune of system charge.

Recommended System Charging Procedure

Step 1- Following proper evacuation (to 200 microns or less), release factory charge from condenser throughout the system by backseating the refrigerant valves. This is enough refrigerant for a system that has little to no interconnect (enough refrigerant for condenser and evaporator only).

Step 2- Use supplied "Refrigerant Charge Tables" for deciding how much refrigerant you will need to weigh into your system to bring it close to optimum. EMI recommends that, when weighing in refrigerant per chart information, you initially leave the charge short (3-5 ounces) as your exact combination or ambient conditions may cause a small deviation from chart value.

Step 3- With your refrigerant gauges on the system high and low side, let the system settle out and compare values to the supplied "Operation Chart" values for your combination. You can now fine tune your system charge by adding (or reclaiming) enough refrigerant

to obtain values of Suction/Discharge pressures and Superheat/Subcooling.

Note the Superheat value before disconnecting the system. All EMI systems are designed to operate at optimum capacity and efficiency when running 10° F Superheat (+/- 2° F) at ARI rating condition of 80/67° F indoors and 95° F outdoors. Since most startups are not done at these exact conditions, it is critical to follow the superheat chart values for given outdoor conditions when fine tuning the system charge. The other values should be close under most conditions.

REMOTE THERMOSTAT PLACEMENT

EMI systems can be installed with remote mounted (wall) thermostat control (24v Class-II low voltage circuit). Use a thermostat that will provide a signal to the "G" terminal.

NOTE: A signal must be present at the "G" terminal to operate the evaporator fan in heat mode.

The thermostat should be mounted 60 inches from the floor on a "warm" (i.e., INSIDE) or post away from doors, drafts, or high traffic areas.

FIELD INSTALLED KITS

EMI provides certain kits to modify your existing unit. We have kits available for widespread use in EMI systems, including:

- Low Ambient Kits (cooling only- ALWAYS field installed)
- Hard Start Kits (ALWAYS field installed)
- Condensate Pump Kits (field installed for certain evaporator models)
- Specific Control Changeover Kits (i.e., "Unit Mount to Remote T-stat") for some older model EMI evaporators.

Consult factory technical service representative to choose the exact kit that you will need for your EMI model unit. Kits change periodically so a kit that worked in one model year may not work for a unit manufactured in a different model year.

NOTE: EMI does not stock or recommend electric heat add-on kits for field installation. It is critical that, if you can foresee the need for electric heat in your EMI evaporator, you initially order it as a factory installed option.

Adding an electric heater in the field has proved to be complicated and difficult due to space constraints and/or the unit being mounted into position already.

EMI will not accept responsibility for the rework performed. EMI's safety approval listing (ETL) becomes void at the time a field rework that involves an electric heater takes place since several items, including breaker size, wire size, and unit rating are immediately effected.

SYSTEM DATA

If, after routine inspection and adjustments, the system is not performing up to standards, call EMI Customer Service for assistance. It is important that the "System Data Form" (see following page) be completely filled out and, if possible, FAXED to our service group at 1-800-232-9364. With this information in hand, we can prepare to help you and handle the situation in a timely and effective manner.

Complete parts listings are available from your distributor or from the EMI factory. All parts orders must be entered with the distributor who supplied the original equipment order. If assistance is needed for identifying a part number or description, please call EMI Customer Service.

When calling EMI for service assistance and/or parts orders, you will need to provide the complete unit model number and serial number as obtained from the rating plate attached to the equipment.

For your convenience, this space is provided to record the necessary information specified above. Please complete this section at the time of installation:

Model#: _____

Serial #: _____

Install Date: _____

ENVIROMASTER INTERNATIONAL CORPORATION
PHONE:(315)336-3716
FAX:1-800-232-9364

SYSTEM DATA SHEET

Model# (Condenser): _____ **Air Handler:** _____

Serial# (Condenser): _____ **Air Handler:** _____

Mode: **Heating** ☐ **Cooling** ☐

Outdoor Ambient: _____**dry bulb**_____**wet bulb**

Indoor Ambient: _____**dry bulb**_____**wet bulb**

Temperature Entering Evap Coil: _____

Temperature Leaving Evap Coil (supply air temperature): _____

Suction Pressure: _____

Discharge Pressure: _____

Superheat: _____

Liquid Line Temperature: _____

Subcooling: _____

Suction Temperature at Compressor: _____

Voltage (Running): _____

AMP Draw: _____

Run Length: _____

Run Lift: _____

Line Size: _____**Liquid**_____**Suction** _____

Indoor Motor Volts: _____ **Hign Speed CFM:** _____

Indoor Motor Amps: _____ **Low Speed CFM:** _____

Indoor Motor RPM: _____

Brief Job History: _____

_____

_____

_____

REFRIGERANT CHARGE TABLES - AA SYSTEMS SINGLE ZONE (STRAIGHT COOL)

LCC-09

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
LCW-09	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	27 oz	30 oz. 33 oz. 40 oz.

LCC-12

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
LCW-12	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	30 oz	33 oz. 36 oz. 43 oz.

LCC-15

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
LCW-15	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	30 oz	33 oz. 36 oz. 43 oz.

LCC-18

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
LCW-18	.56 oz.	10 25 50	6 oz. 14 oz. 18 oz.	46 oz	52 oz. 60 oz. 64 oz.

LCC-24

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
LCW-24	.56 oz.	10 25 50	6 oz. 14 oz. 18 oz.	49 oz	55 oz. 63 oz. 67 oz.

To determine charge adjustment and system charge for any evaporator and tubing length:

Total Adjustment= (Line Charge/FT) x Line Length

System Total= Factory Charge +Total Adjustment

NOTE: Round down to nearest ounce and allow for gauges and hoses.

REFRIGERANT CHARGE TABLES - SINGLE ZONE (STRAIGHT COOL)

SCC-09

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-12 WSP/WHP-12 FSP/FHP-12 TBC/H-12 CAH12	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	26.5 oz	29 oz. 32 oz. 39 oz.

SCC-12

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-12 WSP/WHP-12 FSP/FHP-12 TBC/H-12 CAH12	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	29.5 oz	32 oz. 35 oz. 42 oz.

SCC-15

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-15 WSP/WHP-15 FSP/FHP-15 TBC/H-15 CAH15	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	43.5 oz	46.5 oz. 49.5 oz. 56.5 oz.

SCC-18

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-24 WSP/WHP-24 FSP/FHP-24 TBC/H-24 CAH24	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	35 oz	41 oz. 49 oz. 63 oz.

SCC-24

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	Syste-m Total
CSP/CHP-24 WSP/WHP-24 FSP/FHP-24 CAH24	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	50 oz	56 oz. 64 oz. 78 oz.

SCC-30

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-30 WSP/WHP-30 FSP/FHP-30 CAH30	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	64 oz	70 oz. 78 oz. 92 oz.

SCC-36

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-36 WSP/WHP-36 FSP/FHP-36 CAH36	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	65 oz	71 oz. 71 oz. 93 oz.

CCB-42

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-42 WSP/WHP-42 FSP/FHP-42 CAH42	.65 oz.	10 25 50	7 oz. 16 oz. 33 oz.	101 oz	108 oz. 117 oz. 134 oz.

CCB-48

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-48 WSP/WHP-48 FSP/FHP-48 CAH48	.674 oz.	10 25 50	7 oz. 17 oz. 34 oz.	102 oz	109 oz. 119oz. 136 oz.

To determine charge adjustment and system charge for any evaporator and tubing length:

Total Adjustment= (Line Charge/FT) x Line Length

System Total= Factory Charge +Total Adjustment

NOTE: Round down to nearest ounce and allow for gauges and hoses.

REFRIGERANT CHARGE TABLES - SINGLE ZONE (HEAT PUMP)

SHC-09

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-09 FHP-09 WHP-09 TBH-09 CAH-09	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	44 oz	47oz. 50 oz. 57oz.

SHC-12

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-12 FHP-12 WHP-12 TBH-12 CAH-12	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	42 oz.	45oz. 48 oz. 55 oz.

SHC-15

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-15 FHP-15 WHP-15 TBH-15 CAH-15	.25 oz.	10 25 50	3 oz. 6 oz. 13 oz.	48 oz.	51oz. 54oz. 61oz.

SHC-18

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-24 FHP-24 WHP-24 TBH-24 CAH-24	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	41 oz	47 oz. 55oz. 69oz.

SHC-24

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-24 FHP-24 WHP-24 TBH-24 CAH -24	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	44 oz	50 oz. 58oz. 72oz.

SHC-30

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP- 30 FHP- 30 WHP- 30 CAH - 30	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	68 oz	74 oz. 82oz. 93oz.

SHC-36

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-36 FHP-36 CAH-36	.56 oz.	10 25 50	6 oz. 14 oz. 28 oz.	65 oz.	71 oz. 79oz. 93oz.

CHD-42

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-42 FHP-42 CAH -42	.65 oz.	10 25 50	7 oz. 16 oz. 33 oz.	101 oz.	108 oz. 117oz. 134 oz.

CHD-48

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-48 FHP-48 CAH-48	.674 oz.	10 25 50	7 oz. 17 oz. 34 oz.	102 oz	109 oz. 119oz. 136 oz.

To determine charge adjustment and system charge for any evaporator and tubing length:

Total Adjustment= (Line Charge/FT) x Line Length

System Total= Factory Charge +Total Adjustment

NOTE: Round down to nearest ounce and allow for gauges and hoses.

EX- MC4-24/CSP-24 with 18' line length
(.56) 18= 10oz. (Total Adjustment)
60oz.+10oz.= 70oz. (System Total)

Refrigerant Charge Tables- Multi-Zone (Straight Cool)

MC-09/12

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-12 FSP/FHP-12 WSP/WHP-12 TBC/H-12 CAH-12	.25	10 25 50	3 oz. 6 oz. 13 oz.	23 oz.	26 oz. 29 oz. 36 oz.

MC-15

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-15 FSP/FHP-15 WSP/WHP-15 TBC/H-15 CAH-15	.25	10 25 50	3 oz. 6 oz. 13 oz.	39.5 oz.	42 oz. 45 oz. 52 oz.

MC-18

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-24 FSP/FHP-24 WSP/WHP-18 TBC/H-24 CAH-24	.56	10 25 50	6 oz. 14 oz. 28 oz.	35 oz.	41 oz. 49 oz. 63 oz.

MC-24

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-24 FSP/FHP-24 WSP/WHP-24 TBC/H-24 CAH-24	.56	10 25 50	6 oz. 14 oz. 28 oz.	44 oz.	50 oz. 58 oz. 72 oz.

MC-30

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-30 FSP/FHP-30 WSP/WHP-30 TBC/H-30 CAH-30	.56	10 25 50	6 oz. 14 oz. 28 oz.	64 oz.	70 oz. 78 oz. 92 oz.

Refrigerant Charge Tables- Multi-Zone (Heat Pump)

MH-09/12

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-12 FHP-12 WHP-12 CAH-12	.25	10 25 50	3 oz. 6 oz. 13 oz.	29 oz.	32 oz. 35 oz. 42 oz.

MH-15

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	Syste-m Total
CHP-15 FHP-15 WHP-15 CAH-15	.25	10 25 50	3 oz. 6 oz. 13 oz.	45 oz.	48 oz. 51 oz. 58 oz.

MH-18

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CSP/CHP-24 FSP/FHP-24 WSP/WHP-24 TBC/H-24 CAH-24	.56	10 25 50	6 oz. 14 oz. 28 oz.	41 oz.	47 oz. 55 oz. 69 oz.

MH-24

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-24 FHP-24 WHP-24 CAH-24	.56	10 25 50	6 oz. 14 oz. 28 oz.	45 oz.	51 oz. 59 oz. 73 oz.

MH-30

Evap Model	Line CHG/FT	Line Length (ft)	Total Adjust	Factory Charge	System Total
CHP-30 FHP-30 WHP-30 CAH-30	.56	10 25 50	6 oz. 14 oz. 28 oz.	68 oz.	74 oz. 82 oz. 96 oz.

OPERATION CHARTS (MULTI-ZONE) MC/MH
Cooling-Based on 80/67º F Indoor Temp.

*Suction temperature taken 6" from Compressor Suction Port (O.D. = Outdoor)

"Suction" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30
65	74.5	68.5	68.0	64.0	62.5	66.0
70	76.5	70.0	70.0	67.5	64.5	72.0
75	78.0	71.0	71.0	70.5	66.5	72.0
80	80.0	72.0	72.0	73.0	68.5	73.0
85	81.5	73.5	74.5	75.0	70.5	75.0
90	85.0	74.5	76.0	77.0	72.5	76.0
95	85.0	76.0	77.0	78.0	74.5	77.0
100	86.5	77.0	79.0	78.5	76.5	78.0

"Superheat" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30
65	25.0	24.0	23.0	33.0	29.5	30.0
70	25.5	25.0	22.0	26.5	31.5	30.0
75	24.5	24.5	22.0	21.5	31.5	30.0
80	22.5	23.0	20.0	17.0	29.0	27.0
85	19.0	20.0	17.0	13.5	24.5	24.0
90	15.0	15.5	15.0	11.0	17.5	15.0
95	9.5	10.5	8.0	9.5	8.5	8.0
100	3.0	3.0	1.0	9.0	-	-

"Discharge" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30
65	162.5	191.5	200.0	160.5	196.0	205.0
70	176.5	202.0	205.0	175.0	202.0	210.0
75	191.0	213.5	220.0	189.5	210.0	225.0
80	205.0	226.5	228.0	204.0	220.0	235.0
85	219.0	240.5	245.0	219.0	232.5	250.0
90	233.5	256.5	260.0	233.5	247.0	275.0
95	247.5	273.0	280.0	248.0	263.5	290.0
100	262.0	291.0	295.0	262.5	282.5	305.0

"Sub-Cooling" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30
65	19.0	28.0	27.0	10.0	35.0	26.0
70	18.5	27.5	27.0	11.5	28.0	22.0
75	17.5	26.5	26.0	12.5	22.5	20.0
80	17.0	26.0	26.0	12.5	18.5	18.0
85	16.0	25.5	24.0	12.5	18.5	16.0
90	15.5	24.5	23.0	11.0	14.5	16.0
95	15.0	24.5	22.0	9.5	14.5	14.0
100	14.0	23.0	20.0	7.0	16.0	12.0

OPERATION CHARTS (MULTI-ZONE) MH
Heating-Based on 70º F Indoor Temp.

"Suction" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30
40	49.0	45.5	47.0	47.0	49.5	47.0
45	57.0	52.0	50.0	54.5	54.0	52.0
50	63.2	58.5	55.0	60.5	59.0	57.0
55	69.0	64.0	62.0	65.5	63.5	63.0
60	72.5	69.0	68.0	69.0	68.0	69.0
65	74.5	73.0	72.0	71.5	73.0	73.0

"Superheat" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30
40	8.0	9.5	12.0	13.5	10.5	10.0
45	8.5	11.5	13.0	14.5	10.0	13.0
50	10.0	13.5	14.0	15.5	10.5	12.0
55	12.0	15.5	16.0	17.0	12.5	16.0
60	15.0	17.5	18.0	18.0	16.0	19.0
65	18.5	19.5	18.0	19.0	20.5	21.0

"Discharge" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30
40	188.0	216.0	202.0	200.0	231.5	228.0
45	200.0	226.5	210.0	212.5	241.0	240.0
50	212.0	237.0	220.0	223.5	251.5	255.0
55	215.0	247.5	230.0	233.5	263.5	230.0
60	219.0	258.0	242.0	242.0	277.0	285.0
65	219.5	268.5	264.0	249.5	291.5	300.0

"Sub-Cooling" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30
40	7.0	19.5	20.0	18.0	23.0	22.0
45	7.0	19.0	20.0	18.5	23.0	21.5
50	7.0	18.5	20.0	19.0	23.0	21.5
55	7.0	18.5	19.0	19.0	23.0	21.5
60	7.0	17.0	19.0	20.5	23.0	21.5
65	7.0	16.5	18.0	20.5	23.0	21.5

OPERATION CHARTS (SINGLE-ZONE) SCC/SHC
Cooling-Based on 80/67º F Indoor Temp.

*Suction temperature taken 6" from Compressor Suction Port
(O.D. = Outdoor)

"Suction" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30	36
65	73.5	60.0	69.0	68.5	56.5	67.5	65.0
70	75.0	67.0	70.5	69.5	61.5	69.0	68.0
75	76.5	69.0	72.0	71.0	65.5	70.5	69.0
80	78.0	71.0	74.5	72.5	69.0	72.5	72.0
85	79.5	72.5	76.0	73.5	72.5	74.0	74.0
90	81.0	74.5	77.5	75.0	75.5	75.5	75.0
95	82.5	76.5	79.0	76.0	77.0	77.0	76.0
100	84.0	78.5	80.5	77.0	78.5	78.5	77.0

"Superheat" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30	36
65	24.0	32.0	23.0	22.5	43.5	32.5	30.0
70	23.5	29.5	22.5	21.0	38.0	30.0	26.0
75	22.5	27.0	22.0	20.0	32.0	27.5	23.0
80	20.5	23.5	20.0	18.5	26.5	24.0	20.0
85	17.5	20.0	15.0	17.0	21.0	19.5	16.0
90	14.5	16.0	14.0	15.5	15.5	15.0	13.0
95	10.5	11.5	10.0	14.0	10.0	9.5	10.0
100	6.0	6.5	5.0	12.5	4.0	3.0	7.0

"Discharge" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30	36
65	194.5	177.0	190.0	166.5	168.5	177.0	190.0
70	191.5	189.0	202.0	177.5	183.0	193.5	212.0
75	193.0	201.5	220.0	190.0	197.5	210.0	221.0
80	198.5	215.5	235.0	203.5	212.0	226.0	237.0
85	208.5	230.5	252.0	218.0	227.0	242.5	253.0
90	223.0	246.0	270.0	233.5	241.5	259.0	270.0
95	241.5	263.0	285.0	250.5	256.0	275.5	285.0
100	264.0	280.5	300.0	268.5	270.5	292.0	302.0

"Sub-Cooling" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30	36
65	34.5	28.5	21.0	19.5	24.5	22.0	23.0
70	27.0	27.0	21.0	19.0	24.0	23.5	23.0
75	21.5	26.0	21.0	19.0	24.0	24.0	22.0
80	17.5	25.0	20.0	18.5	24.0	24.5	22.0
85	15.5	25.0	20.0	18.0	24.0	24.0	21.0
90	14.5	25.0	19.0	17.5	23.5	23.5	19.0
95	15.5	25.5	18.5	17.0	23.5	22.5	17.0
100	18.0	26.0	18.5	17.0	23.5	20.5	15.0

OPERATION CHARTS (SINGLE-ZONE) SHC
Heating-Based on 70º F Indoor Temp.

"Suction" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30	36
40	52.0	50.5	47.0	51.0	48.0	49.5	50.0
45	56.0	55.0	50.0	58.0	55.5	54.0	54.0
50	61.0	60.0	54.0	63.5	62.0	58.5	58.0
55	66.5	64.5	58.0	69.0	67.0	62.5	62.0
60	73.0	69.0	63.0	73.0	71.0	67.0	66.0
65	80.0	74.0	67.5	76.5	74.0	71.5	70.0

"Superheat" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30	36
40	15.0	12.0	15.0	17.0	13.5	8.0	14.0
45	14.0	14.5	16.0	12.5	10.5	10.0	16.0
50	13.5	16.5	17.0	10.5	9.5	12.0	17.0
55	14.5	18.5	19.0	11.5	11.0	14.0	18.0
60	16.0	21.0	20.0	15.0	14.0	16.0	18.0
65	19.0	23.0	22.0	21.0	19.0	18.0	20.0

"Discharge" in PSiG

O.D.Temp Degrees F	09	12	15	18	24	30	36
40	203.5	239.5	202.0	206.5	230.5	213.0	240.0
45	205.0	250.0	205.0	214.5	240.0	227.0	245.0
50	210.5	260.5	212.0	222.5	250.5	239.0	250.0
55	220.0	271.5	223.0	231.0	262.5	248.0	260.0
60	233.5	282.0	235.0	239.0	276.0	255.0	270.0
65	251.0	292.5	254.0	247.0	290.5	260.0	280.0

"Sub-Cooling" in Degrees F

O.D.Temp Degrees F	09	12	15	18	24	30	36
40	15.0	22.0	13.0	17.0	23.5	13.0	6.0
45	14.5	22.0	12.0	17.5	21.3	14.0	6.0
50	14.5	22.0	12.0	17.5	20.0	14.5	8.0
55	14.0	22.0	12.0	17.0	19.5	13.5	10.0
60	14.0	22.0	11.0	15.5	19.5	12.0	12.0
65	13.5	22.0	8.0	13.0	13.00	9.0	8.0

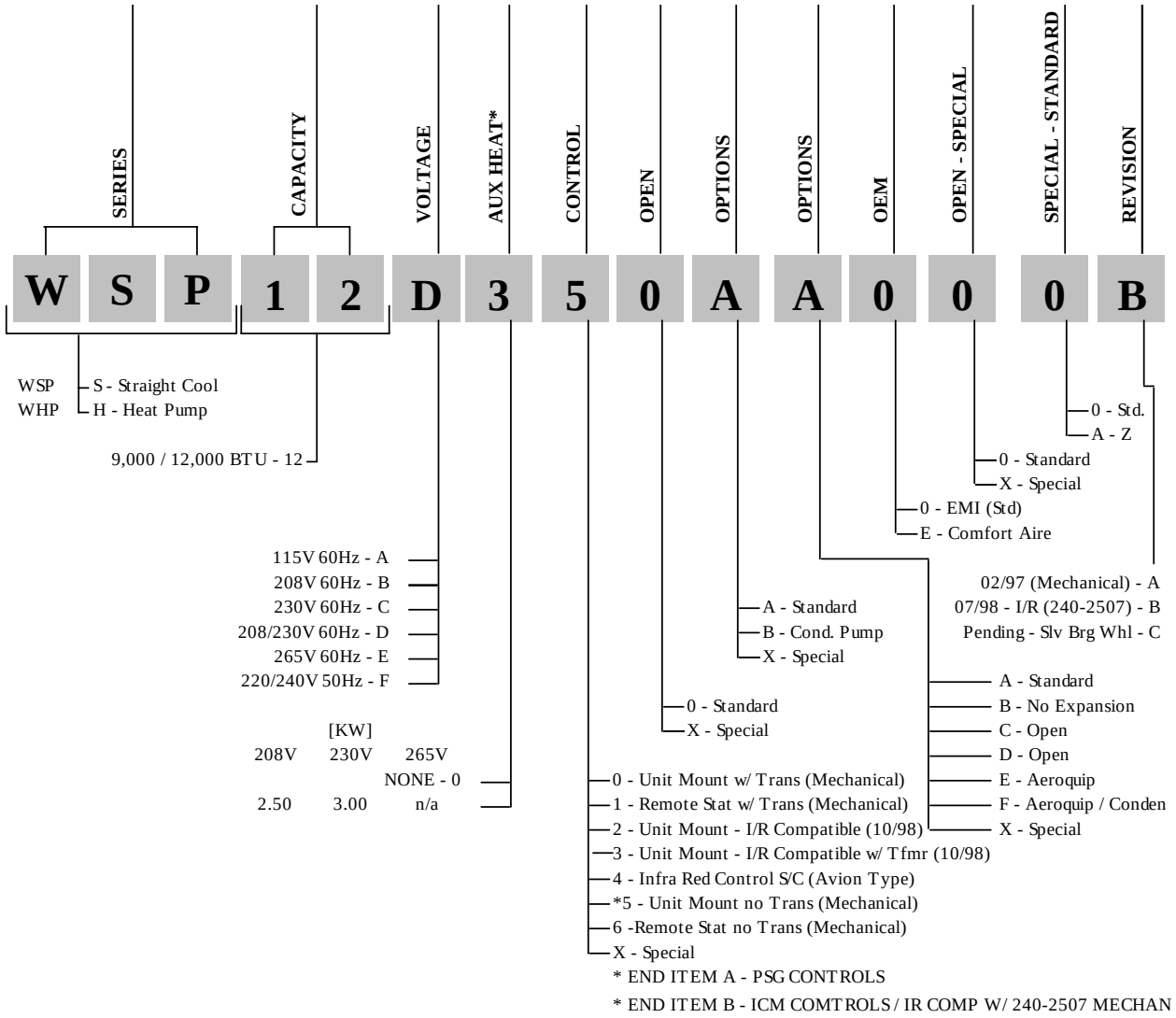
TROUBLESHOOTING GUIDE

SYMPTOM / CHECK	MODE	Power supply	Hi-volt wiring	Comp O.L.	Run Cap.	Contactor/relay contacts	Low-volt wiring	Control transformer	Thermostat	Contactor/ relay coil	Stuck compressor	Inefficient compressor	Undercharge	Overcharge	High evap load	Non-condensibles	Restricted O.D. airflow	O.D. air recirculation	Superheat problem	Restricted I.D. airflow	Refrigeration circuit restriction	TXV (if used) stuck open
Head pressure high	C													X	X	X	X	X			X	
	H													X		X				X	X	
Head pressure low	C											X	X						X		X	X
	H											X	X						X		X	X
Suction pressure high	C											X		X	X	X			X			X
	H											X		X		X			X			X
Suction pressure low	C												X			X			X	X	X	
	H												X			X	X	X	X		X	
Liquid floodback	C													X			X	X	X	X		X
	H													X			X	X	X	X		X
I.D. coil frosting	C								O.L. = Over Load				X						X	X	X	
	H																					
Compressor runs inadequate cooling	C											X	X		X	X	X	X	X	X	X	
	H											X	X			X	X	X	X	X	X	
Compressor and O.D. fan won't run	C	X	X		X		X	X	X	X												
	H	X	X		X		X	X	X	X												
Compressor off but O.D. fan on	C		X	X	X	X					X											
	H		X	X	X	X					X											
O.D. fan won't start	C		X		X	X																
	H		X		X	X																
Compressor hums, won't start	C	X			X	X					X											
	H	X			X	X					X											
Compressor cycles on O.L.	C	X	X	X	X	X					X	X	X	X	X		X	X	X		X	
	H	X	X	X	X	X					X	X	X	X	X				X	X	X	
I.D. blower won't start	C	X	X				X	X	X													
	H	X	X				X	X	X													

C=Cooling H=Heating I.D. = Indoor O.D. = Outdoor

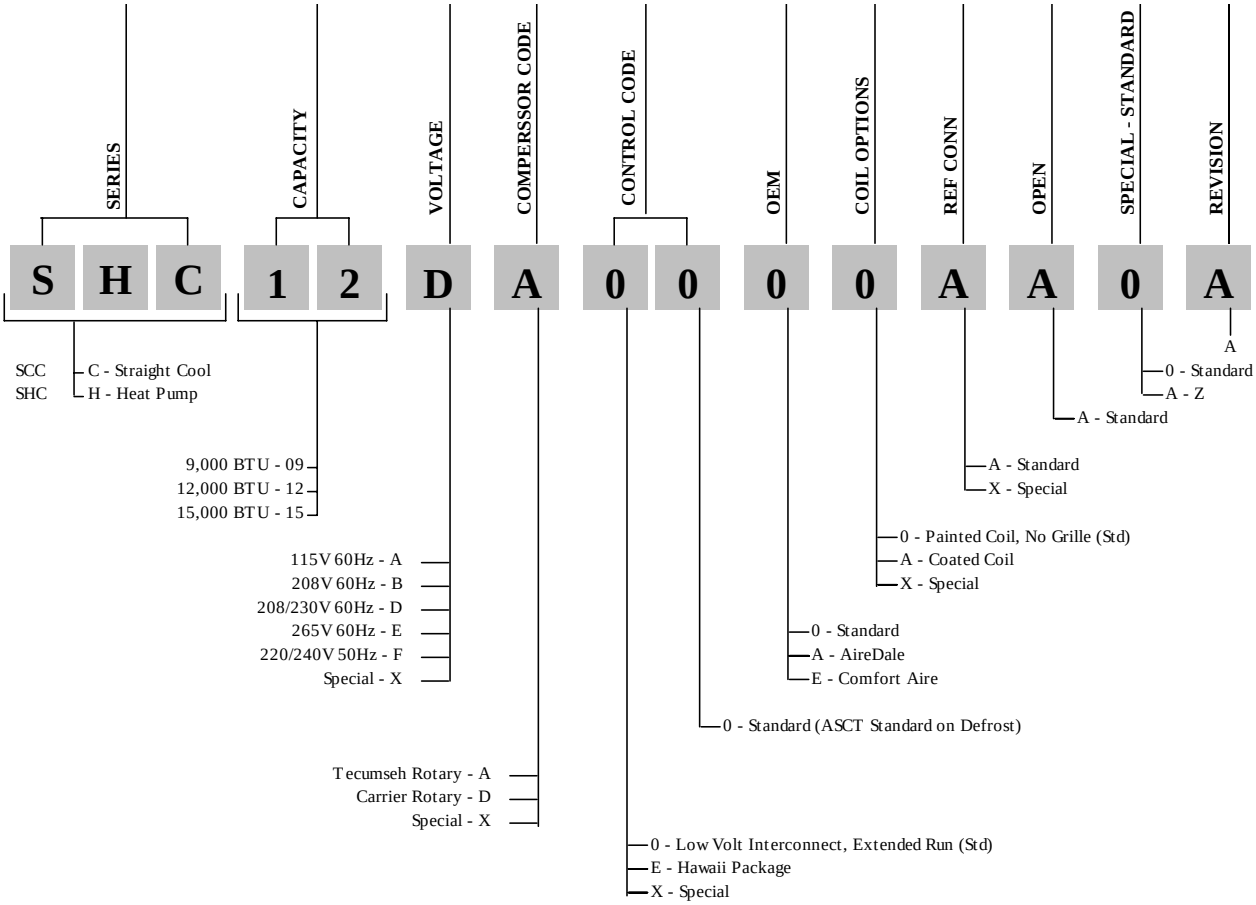
SAMPLE UNIT DECODING

Model number breakdown for Air Handler# WSP12D350AA000B.



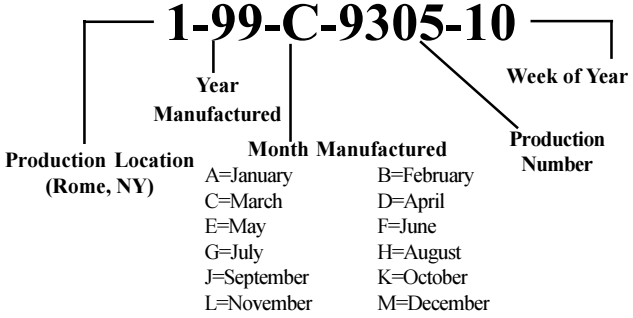
SAMPLE UNIT DECODING

Model number breakdown for Condenser# SHC12DA0000AA0A



SERIAL NUMBER DECODING

Each EMI product is assigned a serial number that contains information about that specific piece. This serial number is found on the bottom left of the rating plate (above the bar code) and breaks down as follows:



SYSTEM NOTES

ENVIROMASTER INTERNATIONAL CORPORATION
PHONE: (315) 336-3716
FAX: 1-800-232-9364
WEB: HTTP://WWW.ENVIROMASTER.COM

ALL PRODUCT LIMITED WARRANTY

Enviromaster International LLC (EMI) warrants to the purchaser/owner that EMI products will be free from defects in material and workmanship under the normal use and maintenance for a period of twelve months for all components and sixty months on unit compressors from date of the original installation, or fifteen months for all components and sixty-three months on unit compressors from the date of original sale, whichever comes first.

WHAT WE WILL COVER

EMI will replace any defective part returned to EMI's approved service organization with a new or rebuilt part at no charge. The replacement part assumes that unused portion of this warranty.

WHAT WE DON'T COVER

THIS WARRANTY DOES NOT INCLUDE LABOR or other costs incurred for repairing, removing, installing, shipping, servicing, or handling of either defective or replacement parts.

EMI IS NOT RESPONSIBLE FOR

- Normal maintenance
- Damage or repairs required as a consequence of faulty installation or application by other.
- Failure to start due to voltage conditions, blown fuses, open circuit breakers, or other damages due to the inadequacy or interruption of electrical service.
- Damage or repairs needed as a consequence of any misapplication, abuse, improper servicing, unauthorized alteration, or improper operation.
- Damage as a result of floods, winds, fires, lightening, accidents, corrosive atmosphere, or other conditions beyond the control of EMI.
- Parts not supplied or designated by EMI.
- Products installed outside the United States or Canada.
- Any damages to person or property of whatever kind, direct or indirect, special or consequential, whether resulting from use or loss of use of the product.

LIMITATION OF WARRANTIES

This warranty is exclusive and in lieu of any implied warranties of merchantability and fitness for a particular purpose and all other warranties express or implied. The remedies provided for in this warranty are exclusive and shall constitute the only liabilities on the part of EMI including any statements made by any individual which shall be of no effect.

FOR SERVICE OR REPAIR:

(1) Contact the Installer
(2) Call the nearest Distributor
(3) Call or write:

PHONE: **(315) 336-3716**
FAX: **1-800-232-9364**
WEB: **HTTP://WWW.ENVIROMASTER.COM**