
INSTALLATION INSTRUCTIONS

WALL MOUNTED PACKAGE HEAT PUMPS & LOW VOLTAGE CONTROL CIRCUIT WIRING

MODELS

J18H1

J24H1

J30H1

J36H1

J42H1

J48H1

J60H1



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GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code ANSI/NFPA 70

Standard for the Installation ANSI/NFPA 90A
of Air Conditioning and Ventilating Systems

Standard for Warm Air ANSI/NFPA 90B
Heating and Air Conditioning Systems

Load Calculation for ACCA Manual J
Residential Winter and Summer Air Conditioning

Duct Design for Residential ACCA Manual D
Winter and Summer Air Conditioning and Equipment
Selection

FOR MORE INFORMATION, CONTACT THESE PUBLISHERS:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

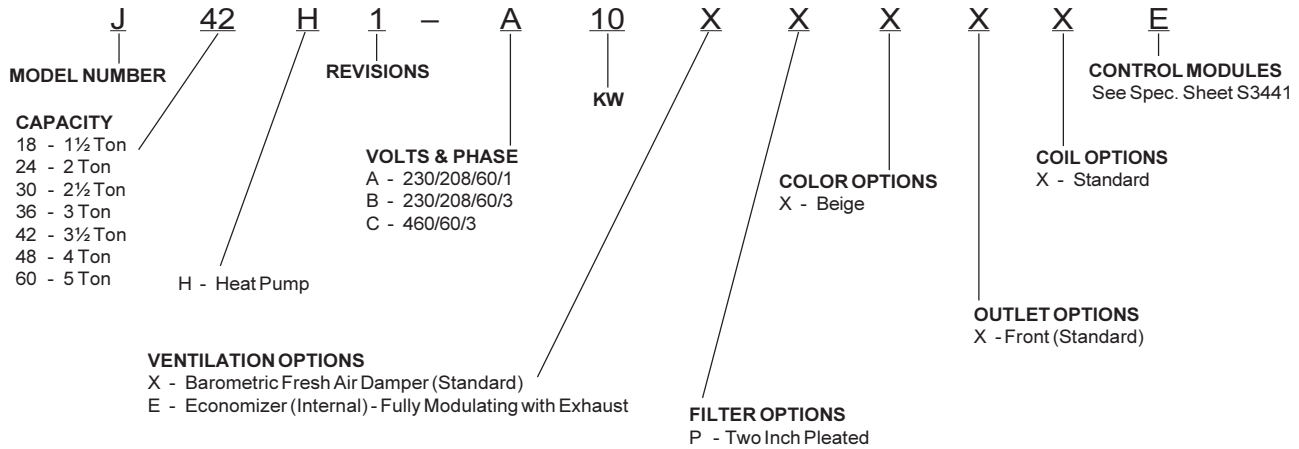
ASHRAE **American Society of Heating, Refrigeration
and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA **National Fire Protection Association**
Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

Manufactured under the following
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5,485,878; 5,301,744

WALL MOUNT GENERAL INFORMATION

HEAT PUMP WALL MOUNT MODEL NOMENCLATURE



NOTE: Vent option X is without exhaust capability. May require separate field supplied barometric relief in building. See Table 15 for field installment options.

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier’s agent.

GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly “Starting Procedure” and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Page 3 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss/gain calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCT WORK

All duct work, supply and return, must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Maximum ESP of operation Electric Heat Tables 12.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

Models J18 & J24 are approved for zero inch clearance to the supply duct. For model series J30, J36, J42, J48 and J60 a 1/4 inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3 and 4 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8 inch.

Any grille that meets with 5/8 inch louver criteria may be used. It is recommended that Return Air Grille Kit RG2 through RG5 or RFG2 through RFG5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.

FILTERS

A 1-inch throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the filter access panel. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by bending two (2) tabs down on each side of the filter support bracket.

FRESH AIR INTAKE

All units are built with fresh air inlet slots punched in the service door.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed. See Figure 1.

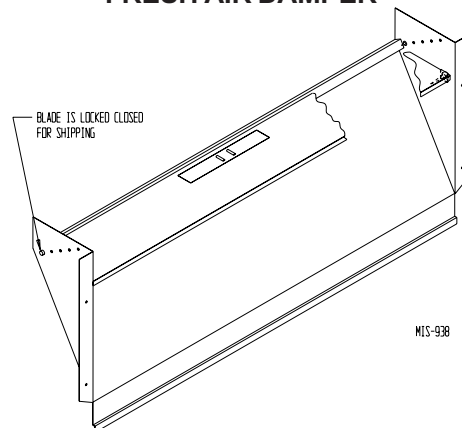
All capacity, efficiency and cost of operation information is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.


**FIGURE 1
FRESH AIR DAMPER**



INSTALLATION INSTRUCTIONS

WALL MOUNTING INFORMATION

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3A - 3C.
2. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installed unit.


WARNING

Failure to provide the 1/4 inch clearance between the supply duct and a combustible surface for the first 3 feet of duct can result in fire causing damage, injury or death.

MOUNTING THE UNIT

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The unit itself is suitable for 0 inch clearance, but the supply air duct flange and the first 3 feet of supply air duct require a minimum of 1/4 inch clearance to combustible material for model series J30, J36, J42, J48 and J60. However, it is generally recommended that a 1-inch clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figure 3 for details on opening sizes.
3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figure 3A - 3C.
4. Mount bottom mounting bracket.
5. Hook top rain flashing, attached to front - right of supply flange for shipping, under back bend of top.
6. Position unit in opening and secure with 5/16 lag bolts; use 7/8 inch diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 3A - 3C.
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
9. On side-by-side installations, maintain a minimum of 20 inches clearance on right side to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

Clearances Required for Service Access and Adequate Condenser Airflow

| MODELS | LEFT SIDE | RIGHT SIDE |
|------------------------|-----------|------------|
| J18H, J24H, J30H, J36H | 15" | 20" |
| J42H, J48H, J60H | 20" | 20" |

See J**H Specification S3441.

Minimum Clearances Required to Combustible Materials

| MODELS | SUPPLY AIR DUCT FIRST THREE FEET | CABINET |
|--------------------|-------------------------------------|---------|
| J18H / J24H | 0" | 0" |
| J30H / J36H | 1/4" | 0" |
| J42H / J48H / J60H | 1/4" | 0" |

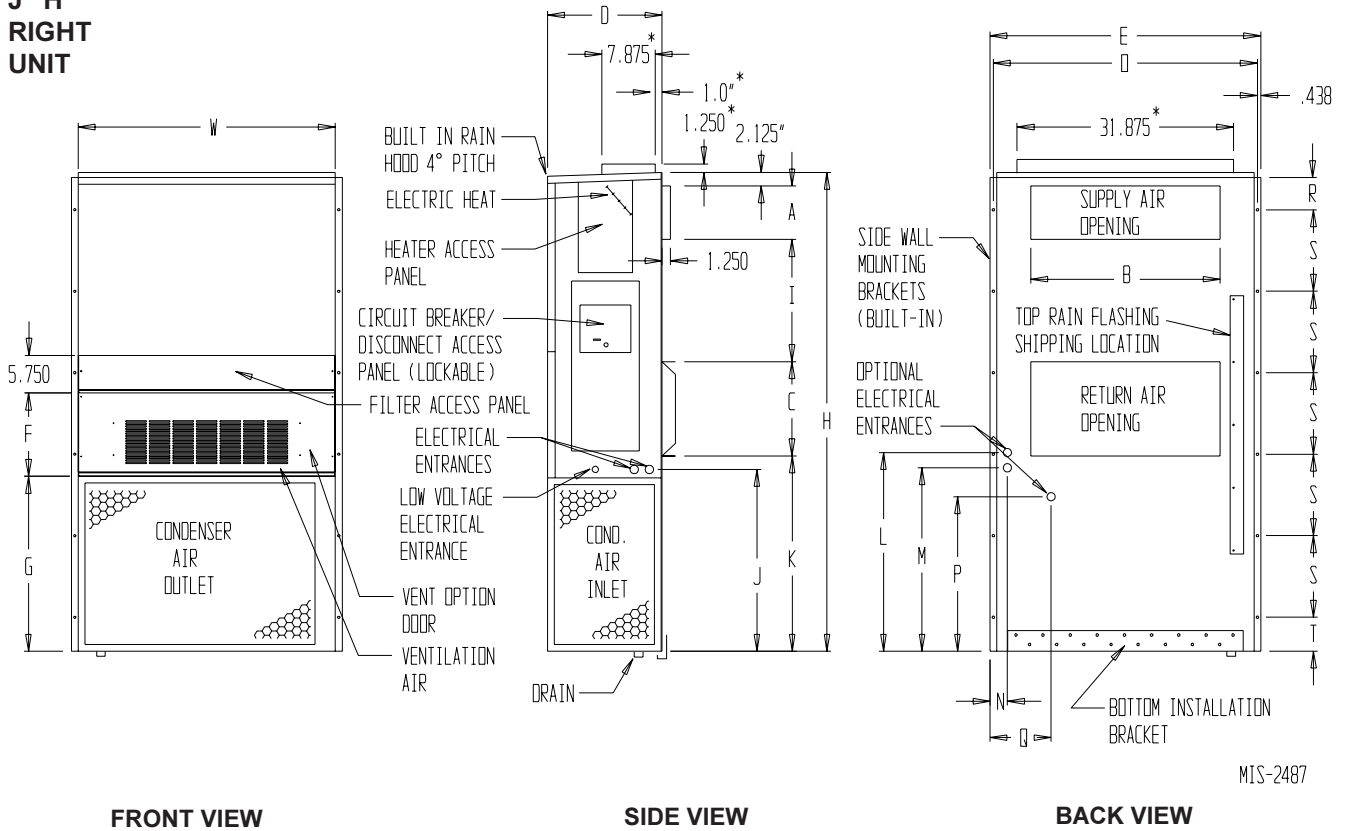
FIGURE 2

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

| MODEL | WIDTH (W) | DEPTH (D) | HEIGHT (H) | SUPPLY | | RETURN | | | | | | | | | | | | | | | | |
|----------------|-----------|-----------|------------|--------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|-------|------|
| | | | | A | B | C | B | E | F | G | I | J | K | L | M | N | O | P | Q | R | S | T |
| J18H1 J24H1 | 33.300 | 17.125 | 70.563 | 7.88 | 19.88 | 11.88 | 19.88 | 35.00 | 18.50 | 25.75 | 20.56 | 26.75 | 28.06 | 29.25 | 27.00 | 2.63 | 34.13 | 22.06 | 10.55 | 5.00 | 12.00 | 5.00 |
| J30H1 J36H1 | 38.200 | 17.125 | 70.563 | 7.88 | 27.88 | 13.88 | 27.88 | 40.00 | 18.50 | 25.75 | 17.93 | 26.75 | 28.75 | 29.25 | 27.00 | 2.63 | 39.13 | 22.75 | 9.14 | 5.00 | 12.00 | 5.00 |
| J42H1 J48H1 | 42.075 | 22.432 | 84.875 | 9.88 | 29.88 | 15.88 | 29.88 | 43.88 | 19.10 | 31.66 | 30.00 | 32.68 | 26.94 | 34.69 | 32.43 | 3.37 | 43.00 | 23.88 | 10.00 | 1.44 | 16.00 | 1.88 |
| J60H1 | 42.075 | 22.432 | 94.875 | 9.88 | 29.88 | 15.88 | 29.88 | 43.88 | 13.56 | 41.66 | 30.00 | 42.68 | 36.94 | 44.69 | 42.43 | 3.37 | 43.00 | 33.88 | 10.00 | 1.44 | 16.00 | 1.88 |

All dimensions are in inches. Dimensional drawings are not to scale.

JH
RIGHT
UNIT**



MIS-2487

*Optional top outlet (factory installed only) for J30H and J36H models only.

FIGURE 3A
J18H1, J24H1
MOUNTING INSTRUCTIONS

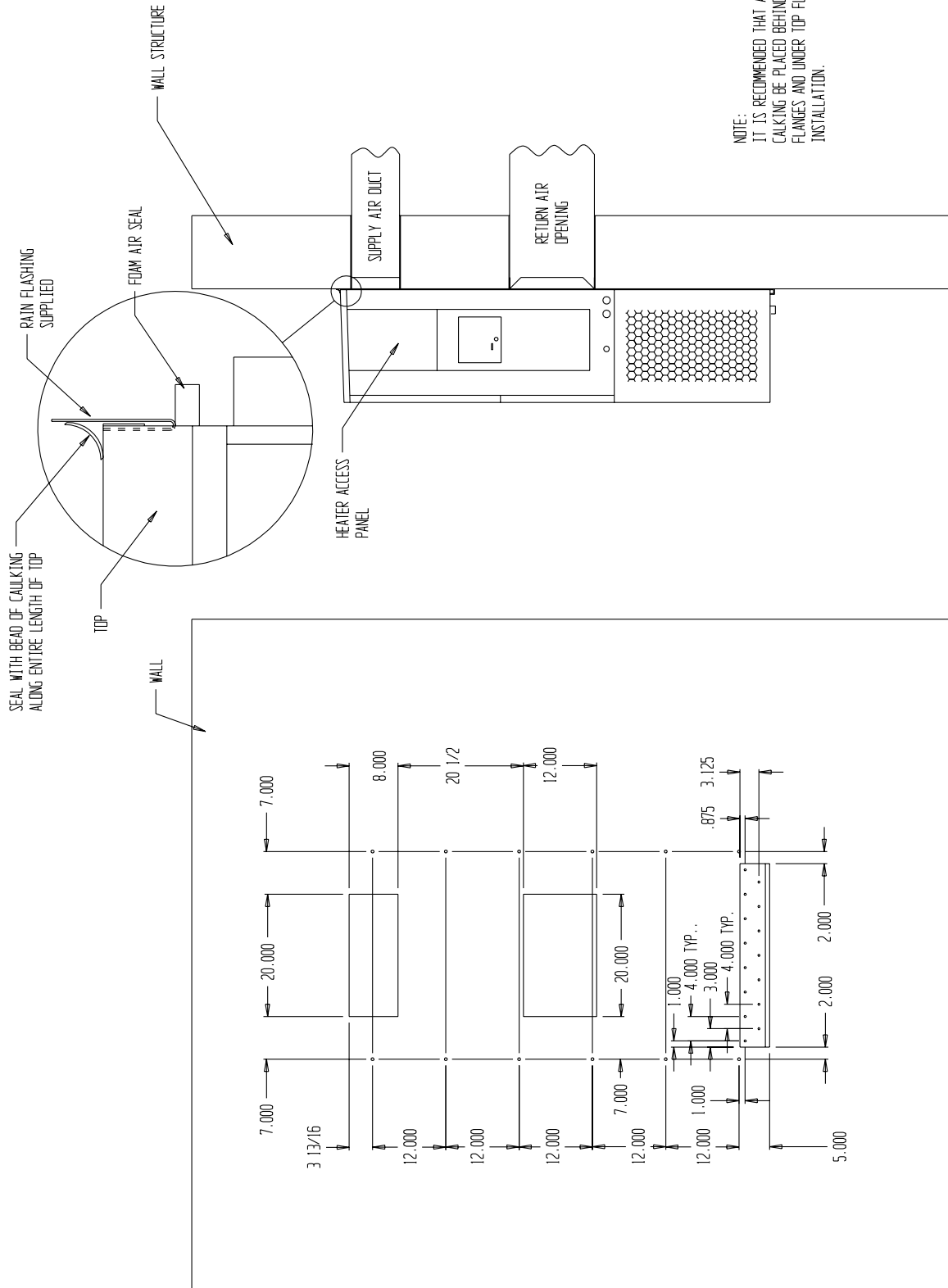


FIGURE 3B
J30H1, J36H1
MOUNTING INSTRUCTIONS

| | A | B | C | D | E |
|---|--------|-------|-------|---------|--------|
| REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS | 28 1/2 | 8 1/2 | 5 1/4 | 3 13/16 | 17 5/8 |
| REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS | 30 | 10 | 4 1/2 | 4 9/16 | 16 7/8 |

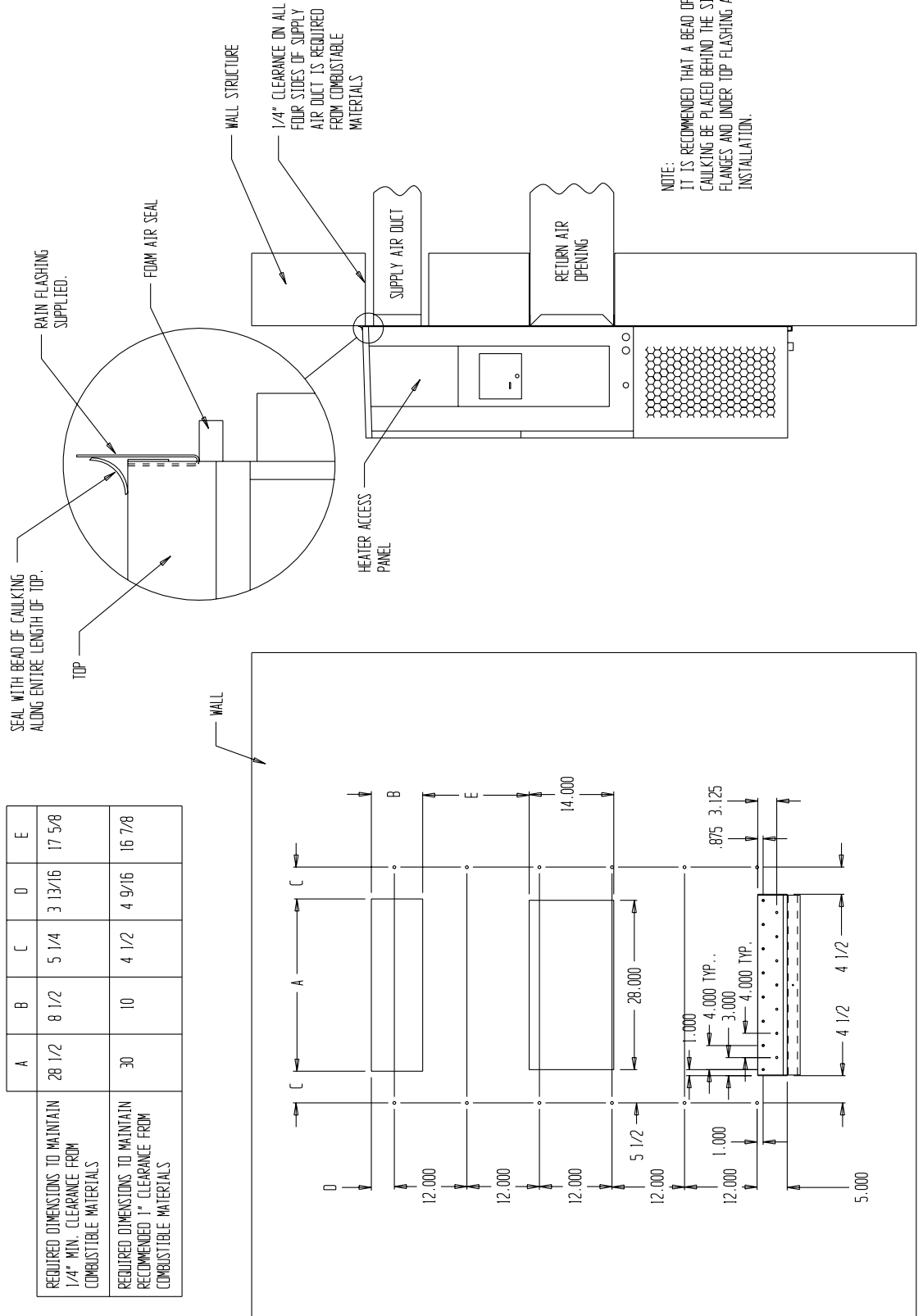
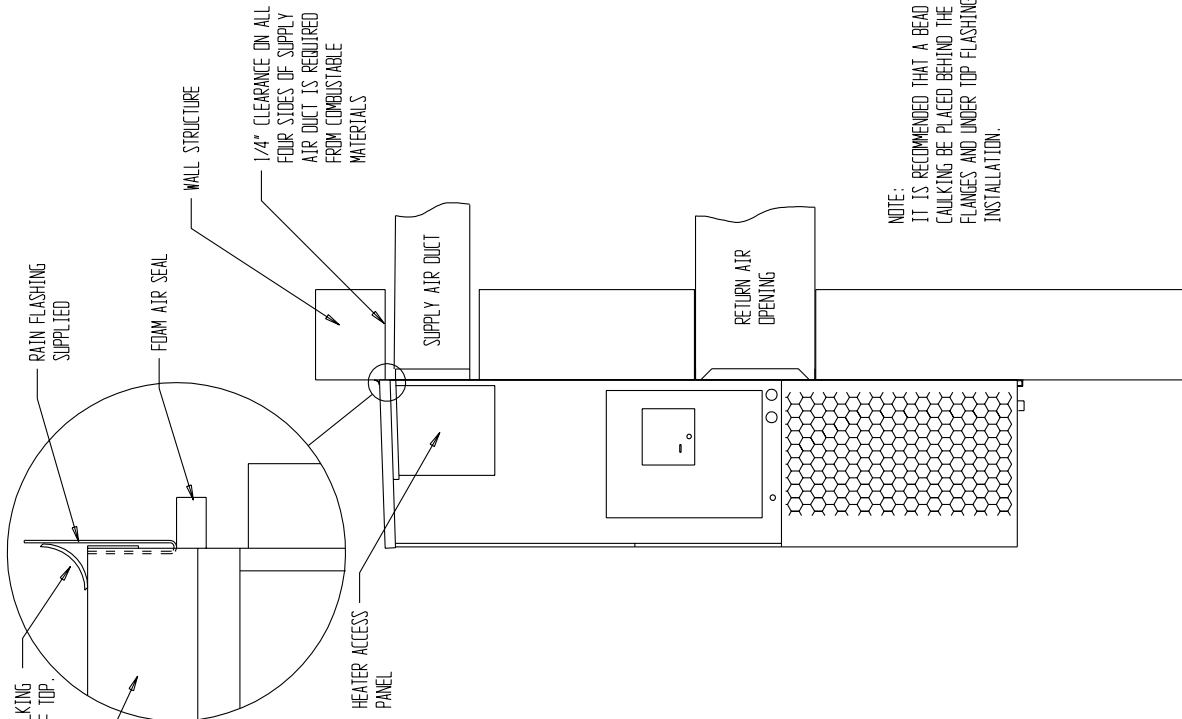


FIGURE 3C
J42H1, J48H1, J60H1
MOUNTING INSTRUCTIONS



NOTE:
 IT IS RECOMMENDED THAT A BEAD OF SILICONE
 CAULKING BE PLACED BEHIND THE SIDE MOUNTING
 FLANGES AND UNDER TOP FLASHING AT TIME OF
 INSTALLATION.

| | A | B | C | D | E |
|---|--------|--------|-------|-------|--------|
| REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS | 30 1/2 | 10 1/2 | 6 1/4 | 1 1/4 | 29 3/4 |
| REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS | 32 | 12 | 5 1/2 | 2 | 29 |

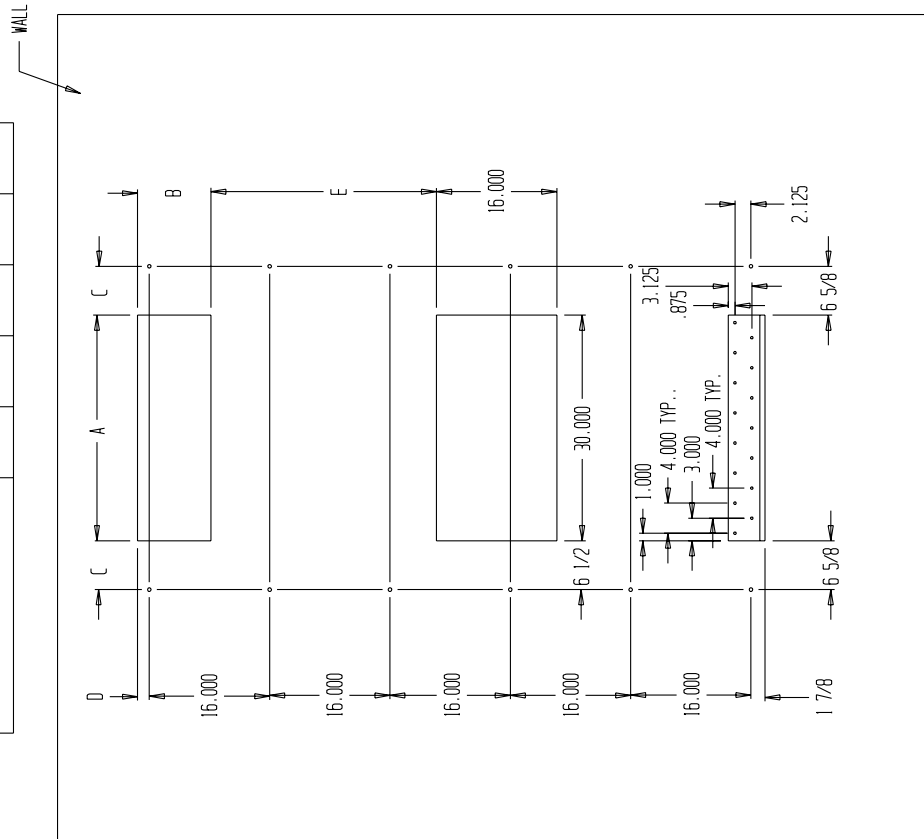
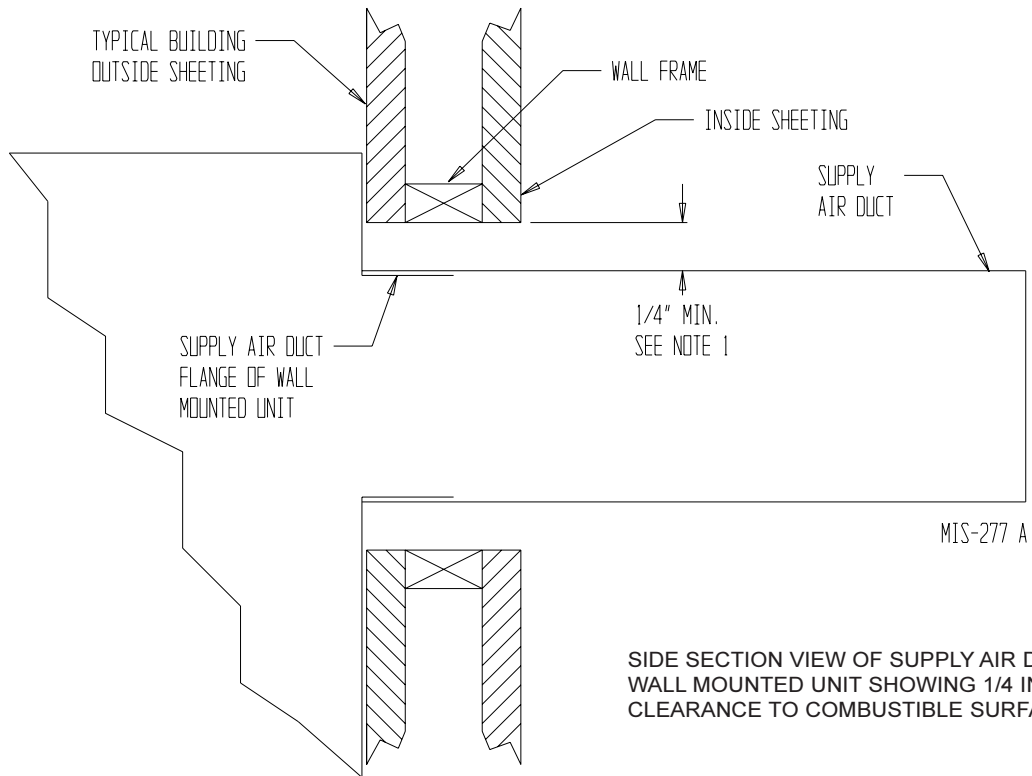


FIGURE 4
ELECTRIC HEAT CLEARANCE
J30H1, J36H1, J42H1, J48H1, J60H1



SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1/4 INCH CLEARANCE TO COMBUSTIBLE SURFACES.

WARNING

A *minimum* of 1/4 inch clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.

It is important to insure that the 1/4 inch minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

FIGURE 5 WALL MOUNTING INSTRUCTIONS

SEE FIGURE 3 – MOUNTING INSTRUCTIONS

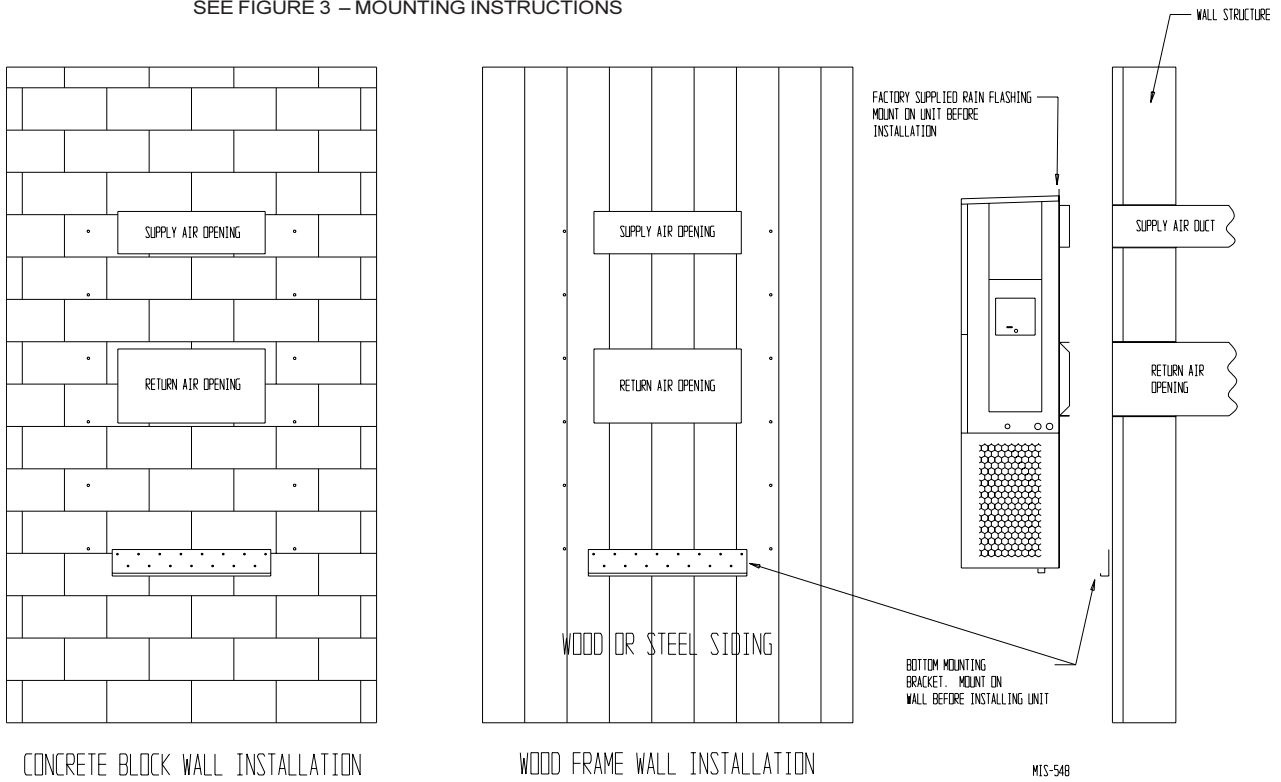
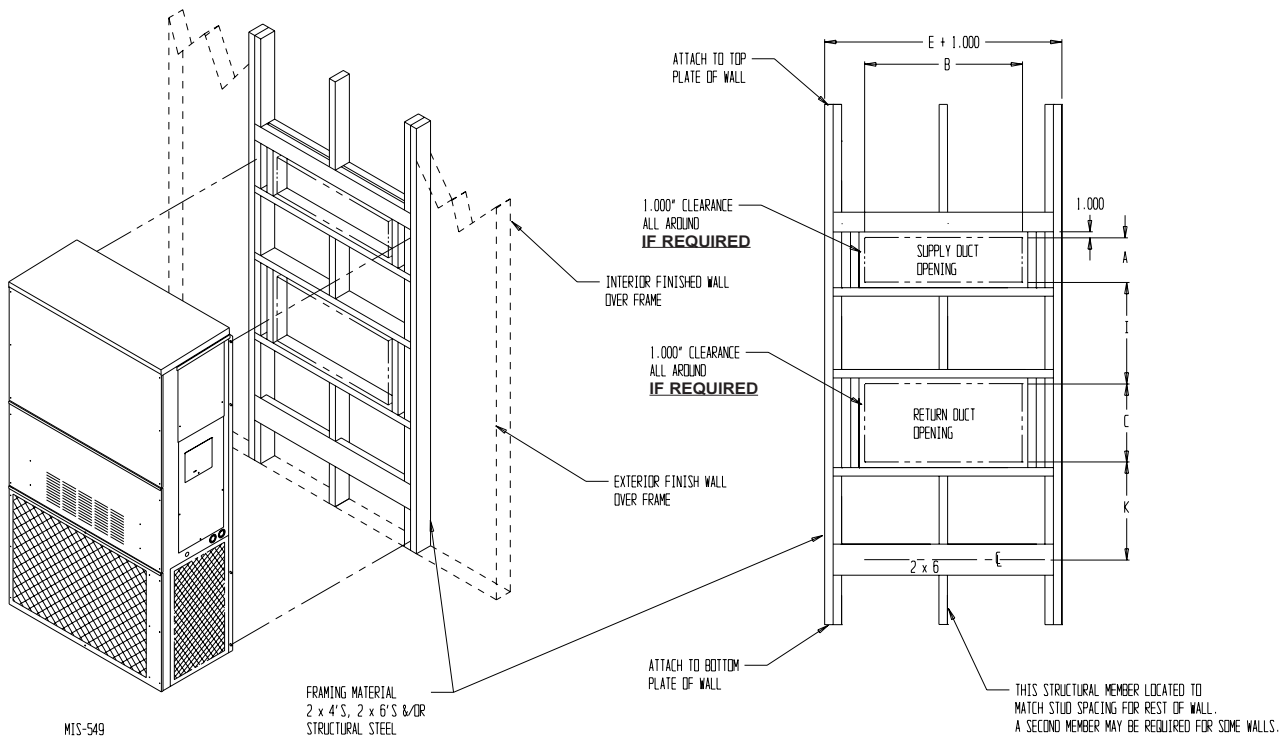
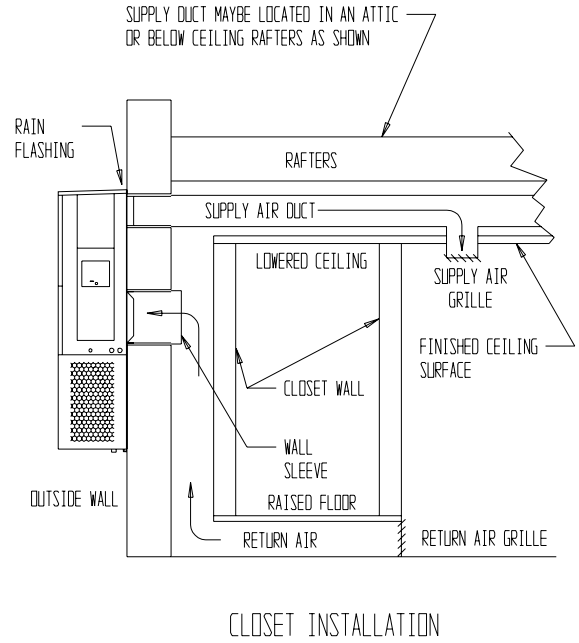
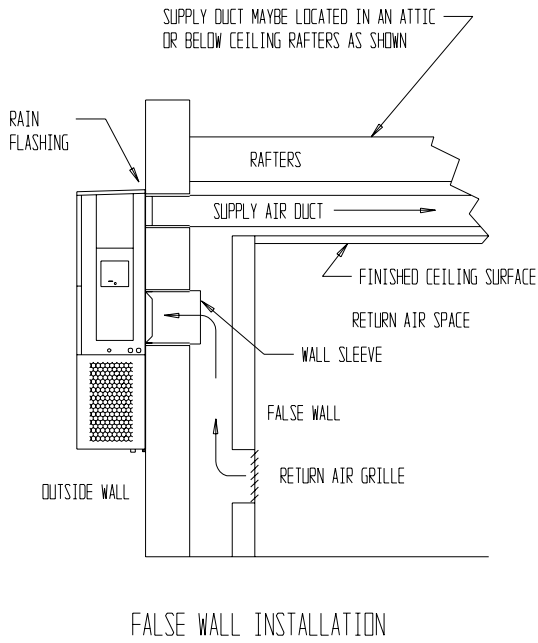
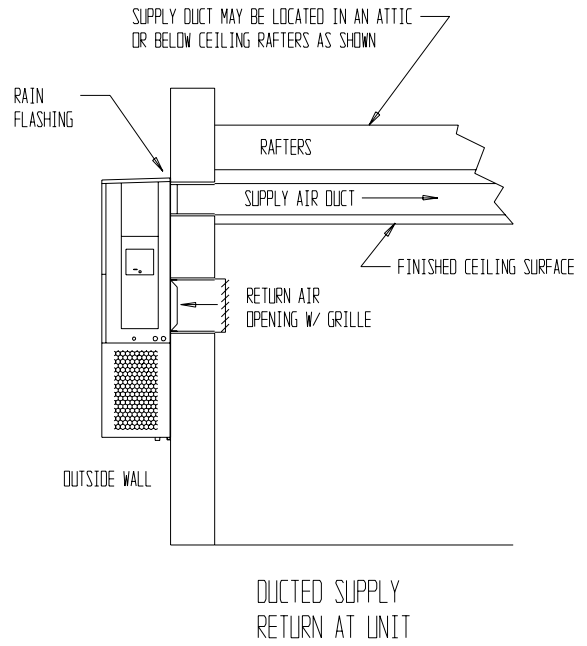
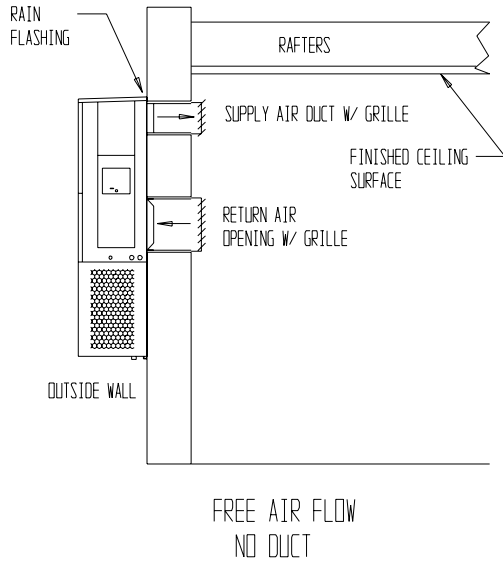


FIGURE 6 WALL MOUNTING INSTRUCTIONS

SEE UNIT DIMENSIONS, FIGURE 2,
FOR ACTUAL DIMENSIONS



**FIGURE 7
COMMON WALL MOUNTING INSTALLATIONS**



MIS-550 A

**TABLE 1
DIAGRAM TO USE WITH UNIT AND VENTS**

| System Type | Model Series | No Vents | | Economizer | |
|-------------|--------------|------------|--------------|------------|--------------|
| | | Electronic | Programmable | Electronic | Programmable |
| Heat Pump | J**H | 1 | 1 | N/A | 5 |

WIRING – MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or “HACR” type circuit breaker size. Each outdoor unit is marked with a “Minimum Circuit Ampacity”. This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked “Use Copper Conductors Only”. These instructions *must be* adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75°C copper) for all models including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a “Maximum Time Delay Relay Fuse” or “HACR” type circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left-hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

See “Start Up” section for important information on three phase scroll compressor start ups.

See Table 9 for Electrical Specifications.

**TABLE 3
THERMOSTAT WIRE SIZE**

| Transformer VA | FLA | Wire Gauge | Maximum Distance In Feet |
|----------------|-----|------------|--------------------------|
| 55 | 2.3 | 20 gauge | 45 |
| | | 18 gauge | 60 |
| | | 16 gauge | 100 |
| | | 14 gauge | 160 |
| | | 12 gauge | 250 |

WIRING – LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase equipment contain dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240V and 208V taps are:

**TABLE 2
OPERATING VOLTAGE RANGE**

| TAP | RANGE |
|------|-----------|
| 240V | 253 – 216 |
| 208V | 220 – 187 |

NOTE: The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

An 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown in this Manual. See Table above.

Low Voltage Connection

These units use a grounded 24-volt AC low voltage circuit.

The “R” terminal is the *hot* terminal and the “C” terminal is *grounded*.

“G” terminal is the *fan input*.

“Y” terminal is the *compressor input*.

“B” terminal is the *reversing valve input*. The reversing valve must be energized for heating mode.

“R” terminal is the *24 VAC hot*.

“C” terminal is the *24 VAC grounded*.

“L” terminal is *compressor lockout output*. This terminal is activated on a high or low pressure trip by the electronic heat pump control. This is a 24 VAC output.

“W2” terminal is *second stage heat* (if equipped).

“W3” terminal is *spare*; use as needed.

“DH” terminal is used if outdoor thermostat installed.

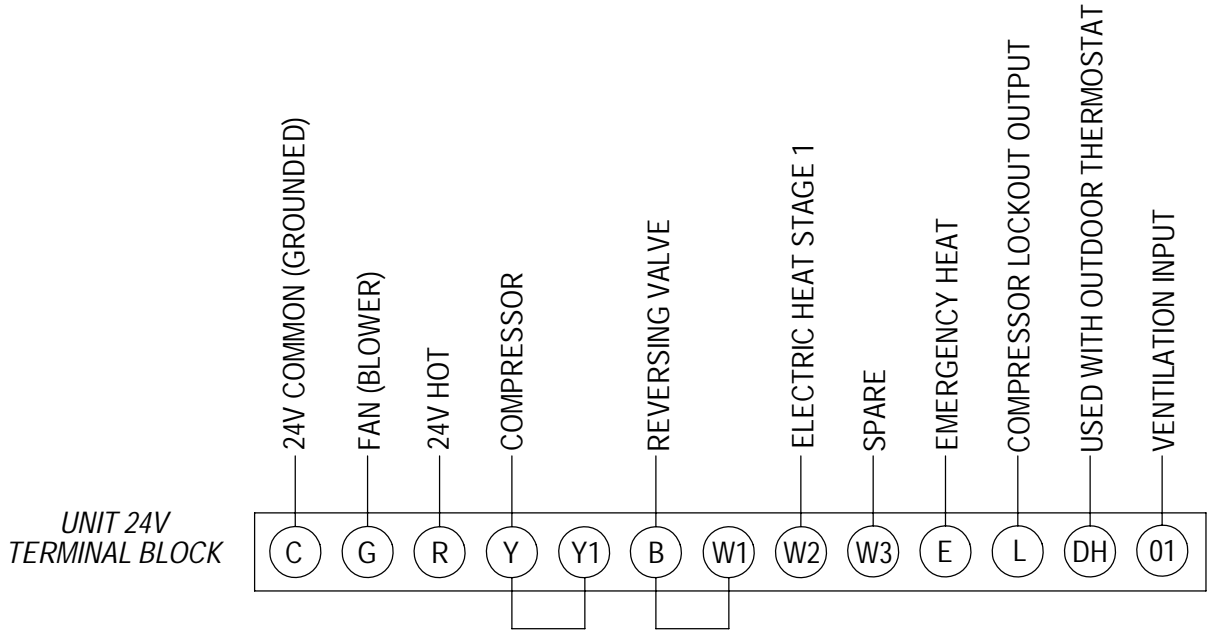
“OI” terminal is the *ventilation input*. This terminal energizes any factory installed ventilation option.

“E” terminal is the *emergency heat input*. This terminal energizes the emergency heat relay.

LOW VOLTAGE CONNECTIONS FOR DDC CONTROL

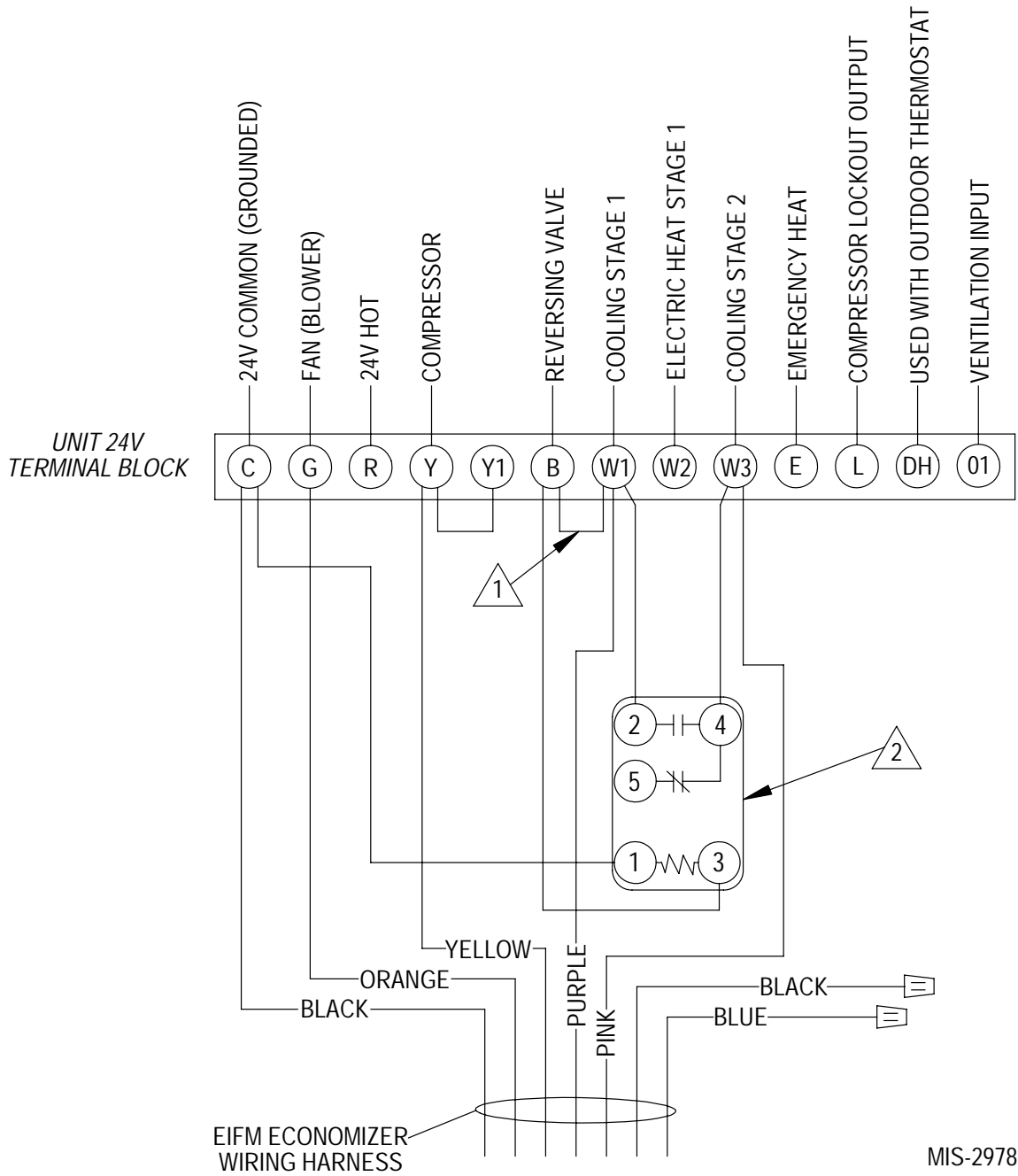
| | |
|---|----------------------|
| Fan Only | Energize G |
| Cooling Mode | Energize Y, G |
| Heat Pump Heating | Energize Y, G, B |
| 2nd Stage Heating w/Heat Pump (if employed) | Energize G, W2, Y, B |
| Ventilation | Energize G, O1 |
| Emergency Heat | Energize B, W2, E, G |

FIGURE 8
BASIC HEAT PUMP WITH OPTIONAL ELECTRIC HEAT
NO ECONOMIZER



MIS-2977

**FIGURE 9
BASIC HEAT PUMP WITH OPTIONAL ELECTRIC HEAT
WITH EIFM ECONOMIZER**

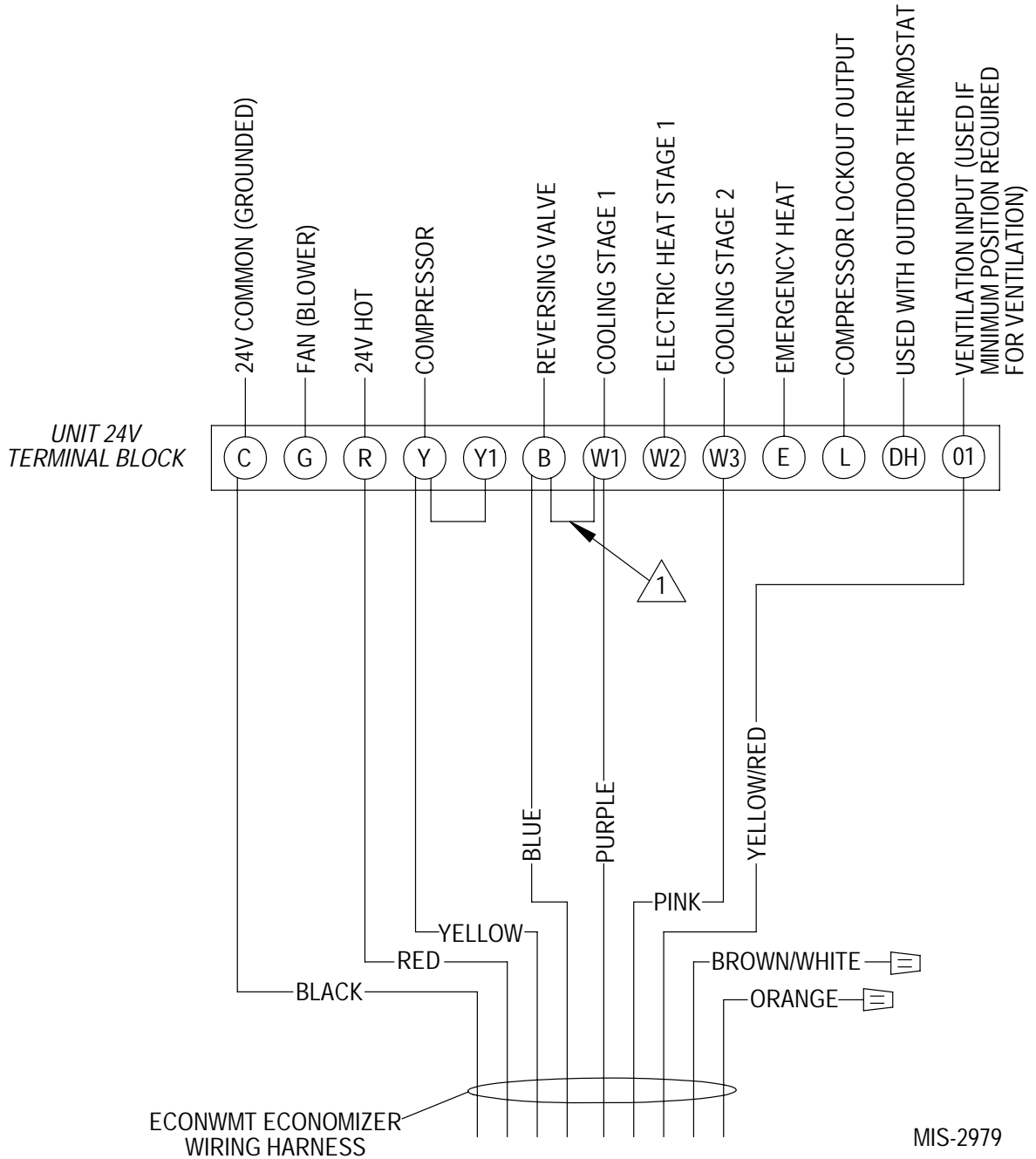


MIS-2978

1 REMOVE FACTORY INSTALLED JUMPER.

2 RELAY MUST BE FIELD INSTALLED. USE BARD RELAY PART #8620-218 OR EQUIVALENT.

FIGURE 10
BASIC HEAT PUMP WITH OPTIONAL ELECTRIC HEAT
WITH ECONWM* ECONOMIZER



MIS-2979

1 REMOVE FACTORY INSTALLED JUMPER.

START UP

THESE UNITS REQUIRE R-410A REFRIGERANT AND POLYOL ESTER OIL.

GENERAL:

1. Use separate service equipment to avoid cross contamination of oil and refrigerants.
2. Use recovery equipment rated for R-410A refrigerant.
3. Use manifold gauges rated for R-410A (800 psi/250 psi low).
4. R-410A is a binary blend of HFC-32 and HFC-125.
5. R-410A is nearly azeotropic - similar to R-22 and R-12. Although nearly azeotropic, charge with liquid refrigerant.
6. R-410A operates at 40-70% higher pressure than R-22, and systems designed for R-22 cannot withstand this higher pressure.
7. R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.
8. R-410A compressors use Polyol Ester oil.
9. Polyol Ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
10. A liquid line dryer must be used - even a deep vacuum will not separate moisture from the oil.
11. Limit atmospheric exposure to 15 minutes.
12. If compressor removal is necessary, always plug compressor immediately after removal. Purge with small amount of nitrogen when inserting plugs.

TOPPING OFF SYSTEM CHARGE

If a leak has occurred in the system, Solair recommends reclaiming, evacuating (see criteria above), and charging to the nameplate charge. If done correctly, topping off the system charge can be done without problems.

With R-410A, there are no significant changes in the refrigerant composition during multiple leaks and recharges. R-410A refrigerant is close to being an azeotropic blend (it behaves like a pure compound or single component refrigerant). The remaining refrigerant charge, in the system, may be used after leaks have occurred and then “top-off” the charge by utilizing the charging charts on the inner control panel cover as a guideline.

REMEMBER: When adding R-410A refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to insure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.



WARNING

Failure to conform to these practices could lead to damage, injury or death.

SAFETY PRACTICES:

1. Never mix R-410A with other refrigerants.
2. Use gloves and safety glasses, Polyol Ester oils can be irritating to the skin, and liquid refrigerant will freeze the skin.
3. Never use air and R-410A to leak check; the mixture may become flammable.
4. Do not inhale R-410A – the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-410A. This decomposition produces hazardous vapors. Evacuate the area if exposed.
6. Use only cylinders rated DOT4BA/4BW 400.
7. Never fill cylinders over 80% of total capacity.
8. Store cylinders in a cool area, out of direct sunlight.
9. Never heat cylinders above 125°F.
10. Never trap liquid R-410A in manifold sets, gauge lines or cylinders. R-410A expands significantly at warmer temperatures. Once a cylinder or line is full of liquid, any further rise in temperature will cause it to burst.

START UP (Continued)

IMPORTANT INSTALLER NOTE

For improved start up performance wash the indoor coil with a dish washing detergent.

HIGH & LOW PRESSURE SWITCH

All J**H wall mounted air conditioner series models are supplied with a remote reset for the high and low pressure switch. If tripped, this pressure switch may be reset by turning the thermostat off then back on again.

THREE PHASE SCROLL COMPRESSOR START UP INFORMATION

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, verification of proper rotation must be made.

Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as substantially reduced current draw compared to tabulated values.

Verification of *proper rotation* must be made at the time the equipment is put into service. If improper rotation is corrected at this time, there will be no negative impact on the durability of the compressor. However, reverse operation for over one hour may have a negative impact on the bearing due to oil pump out.

NOTE: If compressor is allowed to run in reverse rotation for several minutes, the compressor's internal protector will trip.

All three phase ZP compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

The direction of rotation of the compressor may be changed by reversing any two line connections to the unit.

PHASE MONITOR

All units with three phase scroll compressors are equipped with a 3 phase line monitor to prevent compressor damage due to phase reversal.

The phase monitor in this unit is equipped with two LEDs. If the Y signal is present at the phase monitor and phases are correct the green LED will light.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. ***Do not reverse any of the unit factory wires as damage may occur.***

CONDENSER FAN OPERATION

Applies to J42, J48 and J60 models only. The condenser fan motor on 230/208 volt, one and three phase, 60 HZ units is a two-speed motor that comes factory wired on high speed for peak performance. If ambient conditions permit, it can be reconnected to low speed (red wire) for lower sound level. See wiring diagram.

SERVICE HINTS

1. Caution owner/operator to maintain clean air filters at all times. Also, not to needlessly close off supply and return air registers. This reduces airflow through the system, which shortens equipment service life as well as increasing operating costs.
2. Check all power fuses or circuit breakers to be sure they are the correct rating.
3. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

SEQUENCE OF OPERATION

COOLING – Circuit R-Y makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. The G (indoor motor) circuit is automatically completed on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation.

HEATING – A 24V solenoid coil on reversing valve controls heating cycle operation. Two thermostat options, one allowing “Auto” changeover from cycle to cycle and the other constantly energizing solenoid coil during heating season, and thus eliminating pressure equalization noise except during defrost, are to be used. On “Auto” option a circuit is completed from R-W1 and R-Y on each heating “on” cycle, energizing reversing valve solenoid and pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor. Heat pump heating cycle now in operation. The second option has no “Auto” changeover position, but instead energizes the reversing valve solenoid constantly whenever the system switch on subbase is placed in “Heat” position, the “B” terminal being constantly energized from R. A Thermostat demand for heat completes R-Y circuit, pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor.

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Pressure tables can be found later in the manual covering all models. It is imperative to match the correct pressure table to the unit by model number. See Tables 7 & 8.

DEFROST CYCLE

The defrost cycle is controlled by temperature and time on the solid state heat pump control. See Figure 11.

When the outdoor temperature is in the lower 40°F temperature range or colder, the outdoor coil temperature is 32°F or below. This coil temperature is sensed by the coil temperature sensor mounted near the bottom of the outdoor coil. Once coil temperature reaches 30°F or below, the coil temperature sensor sends a signal to the control logic of the heat pump control and the defrost timer will start.

After 60 minutes at 30°F or below, the heat pump control will place the system in the defrost mode.

During the defrost mode, the refrigerant cycle switches back to the cooling cycle, the outdoor motor stops, electric heaters are energized, and hot gas passing through the outdoor coil melts any accumulated frost. When the temperature rises to approximately 57°F, the coil temperature sensor will send a signal to the heat pump control which will return the system to heating operations automatically.

If some abnormal or temporary condition such as a high wind causes the heat pump to have a prolonged defrost cycle, the heat pump control will restore the system to heating operation automatically after 10 minutes.

The heat pump defrost control board has an option of 30, 60 or 90-minute setting. All models are shipped from the factory on the 60-minute pin. If special circumstances require a change to another time, remove the wire from the 60-minute terminal and reconnect to the desired terminal. The manufacturer’s recommendation is for 60-minute defrost cycles. Refer to Figure 10.

There is a cycle speed up jumper on the control. This can be used to reduce the time between defrost cycle operation without waiting for time to elapse.

Use a small screwdriver or other metallic object, or another ¼ inch QC, to short between the *SPEEDUP* terminals to accelerate the HPC timer and initiate defrost.

Be careful not to touch any other terminals with the instrument used to short the *SPEEDUP* terminals. It may take up to 10 seconds with the *SPEEDUP* terminals shorted for the speedup to be completed and the defrost cycle to start.

As soon as the defrost cycle kicks in remove the shorting instrument from the SPEEDUP terminals. Otherwise the timing will remain accelerated and run through the 1-minute minimum defrost length sequence in a matter of seconds and will automatically terminate the defrost sequence.

There is an initiate defrost jumper (sen jump) on the control that can be used at any outdoor ambient during the heating cycle to simulate a 0° coil temperature.

This can be used to check defrost operation of the unit without waiting for the outdoor ambient to fall into the defrost region.

By placing a jumper across the *SEN JMP* terminals (a ¼ inch QC terminal works best) the defrost sensor mounted on the outdoor coil is shunted out and will activate the timing circuit. This permits the defrost cycle to be checked out in warmer weather conditions without the outdoor temperature having to fall into the defrost region.

In order to terminate the defrost test the *SEN JMP* jumper must be removed. If left in place too long, the compressor could stop due to the high pressure control opening because of high pressure condition created by operating in the cooling mode with outdoor fan off. Pressure will rise fairly fast as there is likely no actual frost on the outdoor coil in this artificial test condition.

There is also a 5-minute compressor time delay function built into the HPC. This is to protect the compressor from short cycling conditions. The board’s LED will have a fast blink rate when in the compressor time delay. In some instances, it is helpful to the service technician to override or speed up this timing period, and shorting out the *SPEEDUP* terminals for a few seconds can do this.

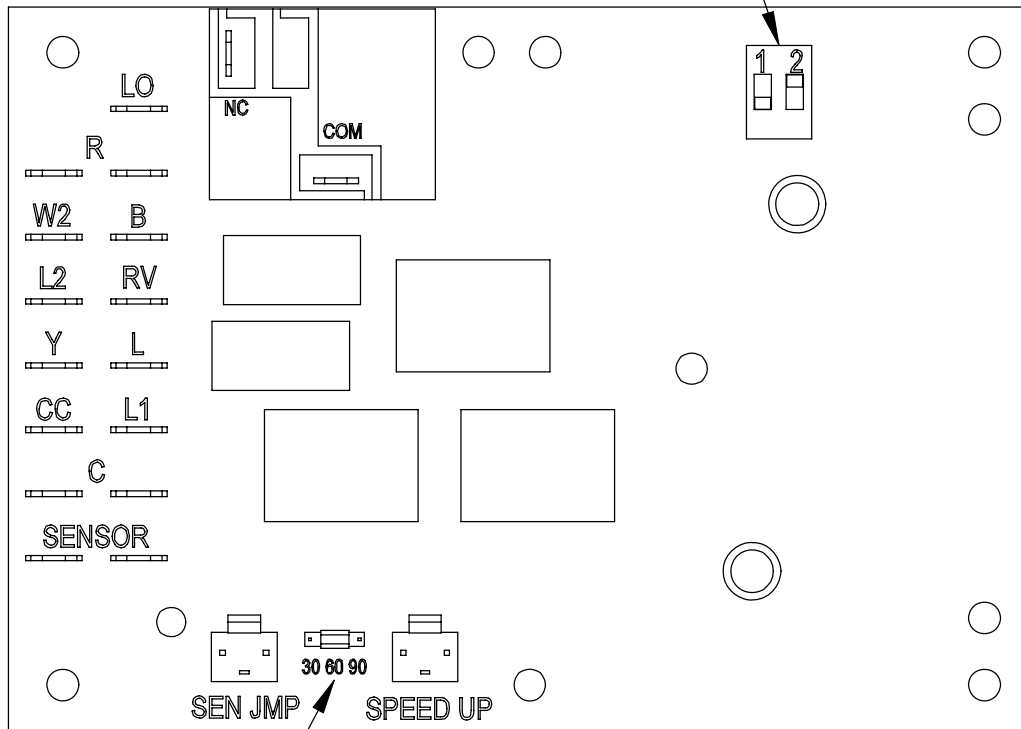
Low Pressure Switch Bypass Operation - The control has a selectable (SW1) low pressure switch bypass set up to ignore the low pressure switch input during the first (30, 60, 120 or 180 seconds) of “Y” operation.

After this period expires, the control will then monitor the low pressure switch input normally to make sure that the switch is closed during “Y” operation.

**FIGURE 11
DEFROST CONTROL BOARD**

LOW PRESSURE BYPASS TIMER SWITCH
(FACTORY SETTING 120 SECONDS)

| SW 1 | SW 2 | TIME (SEC) |
|------|------|------------|
| OFF | OFF | 30 |
| ON | OFF | 60 |
| OFF | ON | 120* |
| ON | ON | 180 |



COMPRESSOR ANTI-SHORT CYCLE TIMER
(FACTORY SETTING 60 MIN.)

MIS-2668

TROUBLESHOOTING

SOLID STATE HEAT PUMP CONTROL TROUBLESHOOTING PROCEDURE

- NOTE:** A thorough understanding of the defrost cycle sequence is essential. Review that section earlier in this manual prior to troubleshooting the control. Turn on AC power supply to unit.
- Turn thermostat blower switch to “fan on” – the indoor blower should start. (If it doesn’t, troubleshoot indoor unit and correct problem.)
- Turn thermostat blower to “auto” position. Indoor blower should stop. **NOTE:** Many models have a 1-minute blower time delay on “off” command; wait for this to time-out.

- Set system switch to “heat” or “cool”. Adjust thermostat to call for heat or cool. The indoor blower, compressor and outdoor fan should start.

NOTE: If there was no power to 24 volt transformer, the compressor and outdoor fan motor will not start for 5 minutes. This is because of the compressor short cycle protection.

CODES

Slow Blink

Fast Blink

1 Blink

2 Blink

3 Blink

FUNCTION

Normal Operation

Compressor Time Delay

Low Pressure Switch Failure

High Pressure Switch Failure

Defrost Mode Active

**TABLE 4
TROUBLESHOOTING**

| Symptom | Description, Check & Possible Causes | What & How to Check / Repair |
|---|--|---|
| Compressor will not start (heating or cooling) | 1. Check for LED illumination. Is there an LED illuminated on the board (flashing)? | Yes = go to Step #2; No = go to Step #3 |
| | 2. Check for error codes. Is the LED flashing a Code? | Yes = go to Step #4; No = go to Step #8 |
| | 3. Check for power at board. Is there 24 volts AC between R and C? | Yes = go to Step #13; No = go to Step #9 |
| | 4. Check codes. What code is blinking? | Code "1", go to Step #6; Code "2", go to Step#7; Fast Blink, go to Step #5 |
| | 5. Compressor delay active. Wait for 5 minute delay or jump board's "speed up pins". | Check for proper operation; if still needed, go back to Step #1. |
| | 6. Low pressure fault. | Check wiring circuit and unit pressures. |
| | 7. High pressure fault. | Check wiring circuit and unit pressures. |
| | 8. Check for Compressor input signal. Is there 24 volts AC between Y and C? | Yes = go to Step #10; No = go to Step #11 |
| | 9. No power to board. | The unit either does not have unit voltage, the transformer is bad or the unit wiring is incorrect. |
| | 10. Check for Compressor output signal. Is there 24 volts AC between CC & C? | Yes = go to Step #12; No = go to Step #13 |
| | 11. No "Y" compressor input signal. | Check thermostat wiring, incorrect phase of unit (see section on Phase Monitor), and finally unit wiring. |
| | 12. No "CC" compressor output signal. | Check compressor contactor for proper operation and finally check compressor. |
| | 13. Faulty board. | Replace defrost board. |
| Fan outdoor motor does not run (cooling or heating except during defrost) | Heat pump control defective | Check across fan relay on heat pump control. (Com-NC) Replace heat pump control. |
| | Motor defective | Check for open or shorted motor winding. Replace motor. |
| | Motor capacitor defective | Check capacitor rating. Check for open or shorted capacitor. Replace capacitor. |
| Reversing valve does not energize (heating only) | Heat pump control defective | Check for 24V between RV-C and B-C. 1. Check control circuit wiring. 2. Replace heat pump control |
| | Reversing valve solenoid coil defective | Check for open or shorted coil. Replace solenoid coil. |
| Unit will not go into defrost (heating only) | Temperature sensor or heat pump control defective | Disconnect temperature sensor from board and jumper across "SPEEDUP" terminals and "SEN JMP" terminals. This should cause the unit to go through a defrost cycle within one minute. 1. If unit goes through defrost cycle, replace temperature sensor. 2. If unit does not go through defrost cycle, replace heat pump control. |
| Unit will not come out of defrost (heating only) | Temperature sensor or heat pump control defective. | Jumper across "SPEEDUP" terminal. This should cause the unit to come out of defrost within one minute. 1. If unit comes out of defrost cycle, replace temperature sensor. 2. If unit does not come out of defrost cycle, replace heat pump control. |

CHECKING TEMPERATURE SENSOR OUTSIDE UNIT CIRCUIT

1. Disconnect temperature sensor from board and from outdoor coil.
2. Use an ohmmeter and measure the resistance of the sensor. Also use ohmmeter to check for short or open.
3. Check resistance reading to chart of resistance. Use sensor ambient temperature. (Tolerance of part is $\pm 10\%$.)
4. If sensor resistance reads very low, then sensor is shorted and will not allow proper operation of the heat pump control.
5. If sensor is out of tolerance, shorted, open or reads very low ohms then it should be replaced.

TEMPERATURE F VS. RESISTANCE R OF TEMPERATURE SENSOR

| F | R | F | R | F | R | F | R |
|-------|--------|------|-------|------|-------|-------|------|
| -25.0 | 196871 | 13.0 | 56985 | 53.0 | 19374 | 89.0 | 7507 |
| -24.0 | 190099 | 14.0 | 55284 | 52.0 | 18867 | 90.0 | 7334 |
| -23.0 | 183585 | 15.0 | 53640 | 53.0 | 18375 | 91.0 | 7165 |
| -22.0 | 177318 | 16.0 | 52051 | 54.0 | 17989 | 92.0 | 7000 |
| -21.0 | 171289 | 17.0 | 50514 | 55.0 | 17434 | 93.0 | 6840 |
| -20.0 | 165487 | 18.0 | 49028 | 56.0 | 16984 | 94.0 | 6683 |
| -19.0 | 159904 | 19.0 | 47590 | 57.0 | 16547 | 95.0 | 6531 |
| -18.0 | 154529 | 20.0 | 46200 | 58.0 | 16122 | 96.0 | 6383 |
| -17.0 | 149355 | 21.0 | 44855 | 59.0 | 15710 | 97.0 | 6239 |
| -16.0 | 144374 | 22.0 | 43554 | 60.0 | 15310 | 98.0 | 6098 |
| -15.0 | 139576 | 23.0 | 42295 | 61.0 | 14921 | 99.0 | 5961 |
| -14.0 | 134956 | 24.0 | 41077 | 62.0 | 14544 | 100.0 | 5827 |
| -13.0 | 130506 | 25.0 | 39898 | 63.0 | 14177 | 101.0 | 5697 |
| -12.0 | 126219 | 26.0 | 38757 | 64.0 | 13820 | 102.0 | 5570 |
| -11.0 | 122089 | 27.0 | 37652 | 65.0 | 13474 | 103.0 | 5446 |
| -10.0 | 118108 | 28.0 | 36583 | 66.0 | 13137 | 104.0 | 5326 |
| -9.0 | 114272 | 29.0 | 35548 | 67.0 | 12810 | 105.0 | 5208 |
| -8.0 | 110575 | 30.0 | 34545 | 68.0 | 12492 | 106.0 | 5094 |
| -7.0 | 107010 | 31.0 | 33574 | 69.0 | 12183 | 107.0 | 4982 |
| -6.0 | 103574 | 32.0 | 32634 | 70.0 | 11883 | 108.0 | 4873 |
| -5.0 | 100260 | 33.0 | 31723 | 71.0 | 11591 | 109.0 | 4767 |
| -4.0 | 97064 | 34.0 | 30840 | 72.0 | 11307 | 110.0 | 4663 |
| -3.0 | 93981 | 35.0 | 29986 | 73.0 | 11031 | 111.0 | 4562 |
| -2.0 | 91008 | 36.0 | 29157 | 74.0 | 10762 | 112.0 | 4464 |
| -1.0 | 88139 | 37.0 | 28355 | 75.0 | 10501 | 113.0 | 4367 |
| 0.0 | 85371 | 38.0 | 27577 | 76.0 | 10247 | 114.0 | 4274 |
| 1.0 | 82699 | 39.0 | 26823 | 77.0 | 10000 | 115.0 | 4182 |
| 2.0 | 80121 | 40.0 | 26092 | 78.0 | 9760 | 116.0 | 4093 |
| 3.0 | 77632 | 41.0 | 25383 | 79.0 | 9526 | 117.0 | 4006 |
| 4.0 | 75230 | 42.0 | 24696 | 80.0 | 9299 | 118.0 | 3921 |
| 5.0 | 72910 | 43.0 | 24030 | 81.0 | 9077 | 119.0 | 3838 |
| 6.0 | 70670 | 44.0 | 23384 | 82.0 | 8862 | 120.0 | 3757 |
| 7.0 | 68507 | 45.0 | 22758 | 83.0 | 8653 | 121.0 | 3678 |
| 8.0 | 66418 | 46.0 | 22150 | 84.0 | 8449 | 122.0 | 3601 |
| 9.0 | 64399 | 47.0 | 21561 | 85.0 | 8250 | 123.0 | 3526 |
| 10.0 | 62449 | 48.0 | 20989 | 86.0 | 8057 | 124.0 | 3452 |
| 11.0 | 60565 | 49.0 | 20435 | 87.0 | 7869 | | |
| 12.0 | 58745 | 50.0 | 19896 | 88.0 | 7686 | | |

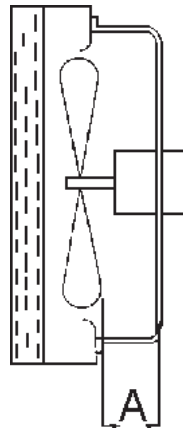
TROUBLESHOOTING

FAN BLADE SETTING DIMENSIONS

Shown in Figure 12 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 5 for unit specific dimension.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

**FIGURE 12
FAN BLADE SETTING**



MIS-1724

**TABLE 5
FAN BLADE DIMENSION**

| Model | Dimension A |
|-------------------------|-------------|
| J18H1 J24H1 | 1.00" |
| J30H1 J36H1 | 1.25" |
| J42H1 J48H1 J60H1 | 1.75" |

REMOVAL OF FAN SHROUD

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Remove screws holding fan shroud to condenser and bottom. Nine (9) screws.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade, and shroud assembly out the left side of the unit.
6. Service motor/fan as needed.
7. Reverse steps to reinstall.

R-410A

REFRIGERANT CHARGE

AHRI capacity and efficiency ratings are based on testing done with the unit charged to the serial plate charge. This unit has been charged to the serial plate charge. The following pressure tables and sub-cooling or superheat charts show nominal pressures and temperatures for the unit. Many different problems can affect the pressure and temperatures. These should only be used by certified technicians as a guide for evaluating proper charge. They shall not be used to adjust charge. If charge is in doubt, reclaim, evacuate and recharge the unit to the serial plate charge.

Optimum unit performance will occur with a refrigerant charge resulting in a suction line temperature (6" from compressor) as shown in Table 6.

**TABLE 6
REFRIGERANT CHARGE**

| Model | Rated Airflow | 95°F OD Temperature | 82°F OD Temperature |
|-------|---------------|---------------------|---------------------|
| J18H1 | 600 | 57 - 61 | 62 - 66 |
| J24H1 | 800 | 58 - 62 | 58 - 63 |
| J30H1 | 1000 | 58 - 62 | 62 - 66 |
| J36H1 | 1100 | 58 - 62 | 57 - 61 |
| J42H1 | 1400 | 61 - 65 | 65 - 69 |
| J48H1 | 1550 | 60 - 64 | 63 - 67 |
| J60H1 | 1650 | 60 - 64 | 65 - 69 |

The suction line temperatures in Table 6 above are based upon 80°F dry bulb / 67°F wet bulb (50% R.H.) temperature and rated airflow across the evaporator during cooling cycle.

**TABLE 7
COOLING PRESSURE TABLE**

Air Temperature Entering Outdoor Coil °F

| Model | Return Air Temperature | Pressure | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 |
|-------|--------------------------|-----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| J18H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 132 292 | 134 311 | 137 332 | 138 353 | 140 376 | 142 400 | 144 424 | 146 450 | 148 477 | 150 505 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 141 299 | 143 319 | 146 340 | 148 362 | 150 386 | 152 410 | 154 435 | 156 462 | 158 489 | 160 518 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 146 309 | 148 330 | 151 352 | 153 375 | 155 400 | 157 424 | 159 450 | 161 478 | 164 506 | 166 536 |
| J24H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 124 329 | 126 351 | 128 373 | 131 398 | 133 423 | 135 449 | 137 475 | 138 503 | 140 531 | 142 561 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 133 337 | 135 360 | 137 383 | 140 408 | 142 434 | 144 460 | 146 487 | 148 516 | 150 545 | 152 575 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 138 349 | 140 373 | 142 396 | 145 422 | 147 449 | 149 476 | 151 504 | 153 534 | 155 564 | 157 595 |
| J30H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 125 326 | 128 350 | 131 373 | 133 398 | 136 423 | 137 448 | 139 472 | 141 496 | 143 522 | 145 547 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 134 334 | 137 359 | 140 383 | 142 408 | 145 434 | 147 459 | 149 484 | 151 509 | 153 535 | 155 561 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 139 346 | 142 372 | 145 396 | 147 422 | 150 449 | 152 475 | 154 501 | 156 527 | 158 554 | 160 581 |
| J36H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 122 329 | 124 351 | 126 375 | 128 399 | 130 424 | 132 449 | 135 476 | 137 503 | 138 530 | 141 559 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 131 337 | 133 360 | 135 385 | 137 409 | 139 435 | 141 461 | 144 488 | 146 516 | 148 544 | 151 573 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 136 349 | 138 373 | 140 398 | 142 423 | 144 450 | 146 477 | 149 505 | 151 534 | 153 563 | 156 593 |
| J42H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 127 354 | 130 372 | 132 392 | 134 413 | 135 437 | 136 461 | 137 488 | 137 516 | 137 546 | 136 578 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 136 363 | 139 382 | 141 402 | 143 424 | 144 448 | 145 473 | 146 500 | 146 529 | 146 560 | 145 593 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 141 376 | 144 395 | 146 416 | 148 439 | 149 464 | 150 490 | 151 518 | 151 548 | 151 580 | 150 614 |
| J48H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 129 352 | 132 374 | 134 398 | 136 422 | 137 449 | 139 476 | 141 505 | 143 535 | 145 566 | 146 600 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 138 361 | 141 384 | 143 408 | 145 433 | 147 460 | 149 488 | 151 518 | 153 549 | 155 581 | 156 615 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 143 374 | 146 397 | 148 422 | 150 448 | 152 476 | 154 505 | 156 536 | 158 568 | 160 601 | 161 637 |
| J60H1 | 75 deg. DB 62 deg. WB | Low Side High Side | 126 332 | 128 352 | 131 373 | 133 397 | 135 421 | 137 448 | 139 476 | 141 505 | 143 536 | 145 568 |
| | 80 deg. DB 67 deg. WB | Low Side High Side | 135 341 | 137 361 | 140 383 | 142 407 | 144 432 | 147 459 | 149 488 | 151 518 | 153 550 | 155 583 |
| | 85 deg. DB 72 deg. WB | Low Side High Side | 140 353 | 142 374 | 145 396 | 147 421 | 149 447 | 152 475 | 154 505 | 156 536 | 158 569 | 160 603 |

Low side pressure ± 4 PSIG

High side pressure ± 10 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated and recharged to serial plate charge weight.

NOTE: Pressure table based on high speed condenser fan operation. If condensing pressures appear elevated check condenser fan wiring. See "Condenser Fan Operation".

**TABLE 8
HEATING PRESSURES – (ALL TEMPERATURES °F)**

| Model | Return Air Temperature | Pressure | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 |
|-------|------------------------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| J18H | 70 deg. | Low Side | 48 | 52 | 56 | 61 | 66 | 72 | 79 | 87 | 95 | 104 | 114 | 124 | 135 |
| | | High Side | 290 | 285 | 282 | 282 | 285 | 290 | 297 | 307 | 319 | 334 | 352 | 372 | 394 |
| J24H | 70 deg. | Low Side | 57 | 55 | 55 | 57 | 59 | 64 | 70 | 77 | 86 | 96 | 108 | 121 | 135 |
| | | High Side | 292 | 296 | 301 | 307 | 314 | 323 | 332 | 342 | 354 | 367 | 380 | 395 | 411 |
| J30H | 70 deg. | Low Side | 53 | 53 | 55 | 58 | 61 | 66 | 72 | 80 | 88 | 97 | 108 | 119 | 132 |
| | | High Side | 254 | 266 | 278 | 290 | 301 | 312 | 322 | 332 | 342 | 351 | 360 | 369 | 377 |
| J36H | 70 deg. | Low Side | 47 | 49 | 51 | 55 | 59 | 64 | 70 | 77 | 85 | 93 | 103 | 113 | 124 |
| | | High Side | 281 | 282 | 283 | 287 | 292 | 300 | 308 | 317 | 331 | 345 | 361 | 379 | 398 |
| J42H | 70 deg. | Low Side | 50 | 50 | 52 | 54 | 58 | 62 | 68 | 75 | 84 | 93 | 104 | 115 | 128 |
| | | High Side | 299 | 300 | 303 | 308 | 314 | 322 | 331 | 342 | 355 | 370 | 386 | 404 | 423 |
| J48H | 70 deg. | Low Side | 42 | 45 | 49 | 54 | 59 | 64 | 70 | 77 | 84 | 92 | 100 | 109 | 118 |
| | | High Side | 268 | 270 | 274 | 278 | 284 | 291 | 298 | 307 | 317 | 327 | 339 | 352 | 366 |
| J60H | 70 deg. | Low Side | 39 | 43 | 47 | 52 | 58 | 63 | 70 | 76 | 84 | 92 | 100 | 109 | 118 |
| | | High Side | 294 | 296 | 300 | 305 | 311 | 319 | 328 | 338 | 349 | 362 | 376 | 391 | 408 |

TABLE 9

Electrical Specifications — JH Series**

| Model | Rated Volts and Phase | No. Field Power Circuits | Single Circuit | | | | Dual Circuit | | | | | | | |
|--|-----------------------|--|-----------------------------------|---------------------------------------|----------------------------|------------------------------|----------------------------|----------------------|---|----------------------|-------------------------|-------------------|----------------------|----------------------|
| | | | ① Minimum Circuit Ampacity | ① Maximum External Fuse or Ckt. Brkr. | ② Field Power Wire Size | ② Ground Wire | ① Minimum Circuit Ampacity | | ① Maximum External Fuse or Ckt. Breaker | | ② Field Power Wire Size | | ② Ground Wire Size | |
| | | | | | | | Ckt. A | Ckt. B | Ckt. A | Ckt. B | Ckt. A | Ckt. B | Ckt. A | Ckt. B |
| J18H1- A00, A0Z A04 ③ A08 | 230/208-1 | 1 1 1 | 16 37 58 | 20 40 60 | 12 8 6 | 12 10 10 | | | | | | | | |
| J24H1- A00, A0Z A04 ③ A08 | 230/208-1 | 1 1 1 or 2 | 24 44 65 | 25 50 70 | 10 8 6 | 10 10 8 | 44 | 21 | 45 | 25 | 8 | 10 | 10 | 10 |
| J24H1- B00, B0Z B06 | 230/208-3 | 1 1 | 17 35 | 20 40 | 12 8 | 12 10 | | | | | | | | |
| J24H1- C00, C0Z C06 | 460-3 | 1 1 | 11 21 | 15 25 | 14 10 | 14 10 | | | | | | | | |
| J30H1- A00, A0Z* A05* ③ A10* | 230/208-1 | 1 1 1 or 2 | 24 50 76 | 35 50 80 | 8 8 4 | 10 10 8 | 50 | 26 | 50 | 30 | 8 | 10 | 10 | 10 |
| J30H1- B00, B0Z* B06 ③ B09* | 230/208-3 | 1 1 1 | 18 36 45 | 25 40 45 | 10 8 8 | 10 10 10 | | | | | | | | |
| J30H1- C00, C0Z* C06 ③ C09* C15 | 460-3 | 1 1 1 1 | 11 20 25 26 | 15 20 25 30 | 14 12 10 10 | 14 12 10 10 | | | | | | | | |
| J36H1- A00, A0Z* A05 ③ A10* ③ A15 | 230/208-1 | 1 1 1 or 2 1 or 2 | 29 55 81 84 | 40 60 90 90 | 8 6 4 4 | 10 10 8 8 | 55 55 | 26 52 | 60 60 | 30 60 | 6 6 | 10 6 | 10 10 | 10 10 |
| J36H1- B00, B0Z* B06 ③ B09* ③ B15 | 230/208-3 | 1 1 1 1 | 23 41 50 51 | 30 45 50 60 | 10 8 8 8 | 10 10 10 10 | | | | | | | | |
| J36H1- C00, C0Z* C06 ③ C09* C15 | 460-3 | 1 1 1 1 | 12 21 25 26 | 15 25 25 30 | 14 10 10 10 | 14 10 10 10 | | | | | | | | |
| J42H1- A00, A0Z A05 ③ A10 ③ A15 | 230/208-1 | 1 1 or 2 1 or 2 1 or 2 | 36 62 88 88 | 50 70 90 90 | 8 6 3 3 | 10 8 8 8 | 36 36 36 | 26 52 52 | 50 50 50 | 30 60 60 | 8 8 8 | 10 6 6 | 10 10 10 | 10 10 10 |
| J42H1- B00, B0Z B06 ③ B09 ③ B15 | 230/208-3 | 1 1 1 1 | 26 44 53 53 | 35 50 60 60 | 8 8 6 6 | 10 10 10 10 | | | | | | | | |
| J42H1- C00, C0Z C06 ③ C09 ③ C15 | 460-3 | 1 1 1 1 | 13 22 26 26 | 15 25 30 30 | 14 10 10 10 | 14 10 10 10 | | | | | | | | |
| J48H1- A00, A0Z A04 A05 ③ A10 ③ A15 ③ A20 | 230/208-1 | 1 1 1 or 2 1 or 2 1 or 2 1 or 2 | 37 58 63 89 89 111 | 50 60 70 90 90 125 | 8 6 6 3 3 2 | 10 10 8 8 8 6 | 37 37 37 59 | 26 52 52 52 | 50 50 50 60 | 30 60 60 60 | 8 8 8 6 | 10 6 6 6 | 10 10 10 10 | 10 10 10 10 |
| J48H1- B00, B0Z B06 ③ B09 ③ B15 ③ B18 | 230/208-3 | 1 1 1 1 1 or 2 | 29 47 56 60 62 | 35 50 60 60 70 | 8 8 6 6 6 | 10 10 10 10 10 | 34 | 28 | 40 | 30 | 8 | 10 | 10 | 10 |
| J48H1- C00, C0Z ③ C09 ③ C15 | 460-3 | 1 1 1 | 14 27 27 | 20 30 30 | 12 10 10 | 12 10 10 | | | | | | | | |
| J60H1- A00, A0Z A05 ③ A10 ③ A15 ③ A20 | 230/208-1 | 1 1 or 2 1 or 2 1 or 2 1 or 2 | 41 67 93 93 111 | 60 80 100 100 125 | 8 4 3 3 2 | 10 8 8 8 6 | 41 41 41 59 | 26 52 52 52 | 60 60 60 60 | 30 60 60 60 | 8 8 8 6 | 10 6 6 6 | 10 10 10 10 | 10 10 10 10 |
| J60H1- B00, B0Z ③ B09 ③ B15 ③ B18 | 230/208-3 | 1 1 1 1 or 2 | 28 55 60 62 | 40 60 60 70 | 8 6 6 6 | 10 10 10 10 | 34 | 28 | 40 | 30 | 8 | 10 | 10 | 10 |
| J60H1- C00, C0Z ③ C09 ③ C15 | 460-3 | 1 1 1 | 16 28 28 | 20 30 30 | 12 10 10 | 12 10 10 | | | | | | | | |

- ① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.
- ② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.
- ③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

* Top outlet supply option is available only factory installed and only on the selected models.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

**TABLE 10
RECOMMENDED AIRFLOW**

| Model | Rated CFM * | Rated ESP * | Recommended Airflow Range | Factory Speed Connection |
|-------|-------------|-------------|---------------------------|--------------------------|
| J18H | 600 ① | .30 | 575 - 725 | High |
| J24H | 800 | .20 | 700 - 950 | High |
| J30H | 1000 | .40 | 930 - 1300 | High |
| J36H | 1100 | .30 | 930 - 1350 | High |
| J42H | 1400 | .30 | 1600 - 1150 | High |
| J48H | 1550 | .20 | 1750 - 1285 | High |
| J60H | 1650 | .30 | 1950 - 1375 | High |

* Rated CFM and ESP on high speed tap.

① Rated CFM and ESP on low speed tap.

**TABLE 11
INDOOR BLOWER PERFORMANCE**

| E.S.P. In H ₂ O | J18H, J24H | | J18H | | J30H, J36H | | | | J42H, J48H | | | | J60H | | | |
|----------------------------------|------------|----------|-----------|----------|------------|----------|-----------|----------|------------|----------|-----------|----------|------------|----------|-----------|----------|
| | High Speed | | Low Speed | | High Speed | | Low Speed | | High Speed | | Low Speed | | High Speed | | Low Speed | |
| | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil | Dry Coil | Wet Coil |
| .0 | 1020 | 975 | 750 | 700 | 1395 | 1315 | 950 | 935 | 1885 | 1800 | 1650 | 1600 | 2200 | 2000 | 1600 | 1450 |
| .1 | 960 | 905 | 735 | 675 | 1340 | 1270 | 930 | 915 | 1770 | 1665 | 1550 | 1500 | 2100 | 1900 | 1525 | 1375 |
| .2 | 865 | 800 | 710 | 650 | 1285 | 1190 | 910 | 885 | 1635 | 1540 | 1450 | 1400 | 2000 | 1800 | — | — |
| .3 | 820 | 735 | 660 | 600 | 1205 | 1100 | 855 | 830 | 1500 | 1400 | 1350 | 1300 | 1875 | 1700 | — | — |
| .4 | 735 | 650 | 605 | 550 | 1110 | 1000 | 800 | 755 | 1370 | 1285 | 1300 | 1175 | 1775 | 1600 | — | — |
| .5 | 615 | 535 | 540 | 490 | 1005 | 870 | — | — | 1250 | 1150 | — | — | 1650 | 1475 | — | — |

**TABLES 12
MAXIMUM ESP OF OPERATION
ELECTRIC HEAT ONLY**

| Model | | ESP |
|-------|-----------|-----|
| J18H1 | A00 | .50 |
| | A04 | .50 |
| | J24H1 A08 | .40 |
| J24H1 | B00 | .50 |
| | B06 | .50 |
| J24H1 | C00 | .50 |
| | C06 | .50 |

| Model | Front Outlet | | Top Outlet | | |
|----------------|--------------|------------|------------|------------|-----|
| | Low Speed | High Speed | Low Speed | High Speed | |
| J30H1 J36H1 | A00 | .50 | .50 | .50 | .50 |
| | A05 | .40 | .50 | .40 | .50 |
| | A10 | .35 | .40 | .25 | .40 |
| | A15 | .35 | .40 | NA | NA |
| J30H1 J36H1 | B00 | .50 | .50 | .50 | .50 |
| | B06 | .40 | .50 | NA | NA |
| | B09 | .35 | .45 | .30 | .40 |
| | B15 | .35 | .45 | NA | NA |
| J30H1 J36H1 | C00 | .50 | .50 | .50 | .50 |
| | C06 | .50 | .50 | NA | NA |
| | C09 | .30 | .40 | .35 | .45 |
| | C15 | .30 | .40 | NA | NA |

| Model Speed KW | J42H1 | | J48H1 | | J60H1 | |
|-------------------|------------|-----------|------------|-----------|------------|-----------|
| | High Speed | Low Speed | High Speed | Low Speed | High Speed | Low Speed |
| -A00 | .50 | .50 | .50 | .50 | .50 | .40 |
| -A04 | ---- | ---- | .50 | .50 | ---- | ---- |
| -A05 | .50 | .50 | .50 | .50 | .50 | .25 |
| -A10 | .50 | .45 | .50 | .45 | .50 | .25 |
| -A15 | .50 | .45 | .50 | .45 | .50 | .25 |
| -A20 | ---- | ---- | .50 | .45 | .50 | .25 |
| -B00 | .50 | .50 | .50 | .50 | .50 | .40 |
| -B09 | .50 | .45 | .50 | .45 | .50 | .30 |
| -B15 | .50 | .45 | .50 | .45 | .50 | .30 |
| -B18 | ---- | ---- | .50 | .45 | .50 | .30 |
| -C00 | .50 | .50 | .50 | .50 | .50 | .40 |
| -C09 | .50 | .40 | .50 | .40 | .50 | .35 |
| -C15 | .50 | .40 | .50 | .40 | .50 | .35 |

**TABLE 13
ELECTRIC HEAT**

| Models | 240V-1 | | 208V-1 | | 240V-3 | | 208V-3 | | 460V-3 | | |
|--------|--------|------|--------|------|--------|-------|--------|-------|--------|-------|-------|
| | KW | Amps | BTUH | Amps | BTUH | Amps | BTUH | Amps | BTUH | Amps | BTUH |
| 4 | | 16.7 | 13650 | 14.4 | 10240 | | | | | | |
| 5 | | 20.8 | 17065 | 18.1 | 12800 | | | | | | |
| 6 | | | | | 14.4 | 20500 | 12.5 | 15360 | 7.2 | 20500 | |
| 8 | | 33.3 | 27300 | 28.8 | 20475 | | | | | | |
| 9 | | | | | 21.7 | 30600 | 18.7 | 23030 | 10.8 | 30700 | |
| 10 | | 41.6 | 34130 | 36.2 | 25600 | | | | | | |
| 12 | | | | | | | | | 14.4 | 40950 | |
| 15 | | 62.5 | 51250 | 54.0 | 38400 | 36.2 | 51200 | 31.2 | 38400 | 18.0 | 51200 |
| 18 | | | | | 43.3 | 61430 | 37.5 | 46100 | | | |
| 20 | | 83.2 | 68260 | 72.1 | 51200 | | | | | | |

**TABLE 14
OPTIONAL ACCESSORIES**

| Part Number | J18H1-A | J24H1-A | J24H1-B | J24H1-C | J30H1-A | J30H1-B | J30H1-C | J36H1-A | J36H1-B | J36H1-C | J42H1-A | J42H1-B | J42H1-C | J48H1-A | J48H1-B | J48H1-C | J60H1-A | J60H1-B | J60H1-C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|--|---|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|----------|---|---|---|--|--|---|--|--|---|--|--|--|--|--|--|--|--|--|--|
| HEATER KITS | | | | | | | | | | | | | | | | | | | | | EHWH02A-A04 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH02A-A08 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW24H-A04 | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW24H-A08 | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW24H-B06 | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH30-A05 | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH30-A10 | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH36-A05 | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH36-A10 | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH36-A15 | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH03-B06 | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW36H-B06 | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH03-B09 | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW30H-B15 | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWC03A-C06 | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH42-A05 | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH42-A10 | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH42-A15 | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH-04-A20 | | | | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH05-B06 | | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH05-B09 | | | | | | | | | | | | X | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH05-B15 | | | | | | | | | | | | X | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH42-C06 | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH05A-C09 | | | | | | | | | | | | | | X | | X | | | X | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH05A-C15 | | | | | | | | | | | | | | X | | X | | | X | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH04-A15 | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHWH04-A10 | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | EHW05H-B18 | | | | | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | CIRCUIT BREAKER (WMCB) & PULL DISCONNECT (WMPD) | | | | | | | | | | | | | | | | | | | | | WMCB-02A | X | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | WMCB-02B | | | X | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | WMCB-03A | | X | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | WMCB-03B | | | | | | X | | | X | | | | | | | | | | |
| WMCB-06A | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WMCB-05B | | | | | | | | | | | X | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WMCB-07B | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WMCB-08A | | | | | | | | | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WMCB-09A | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WMPD-01C | | | | X | | | X | | | X | | | X | | | X | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**TABLE 15
VENT & CONTROL OPTIONS**

| Part Number | Description | J18, J24 | J30, J36 | J42, J48, J60 |
|--------------------|--|-----------------|-----------------|----------------------|
| BFAD-2 | Barometric Fresh Air Damper - Standard | X | | |
| EIFM-2B | Economizer | X | | |
| BFAD-3 | Barometric Fresh Air Damper - Standard | | X | |
| EIFM-3C | Economizer | | X | |
| BFAD-5 | Barometric Fresh Air Damper - Standard | | | X |
| EIFM-5C | Economizer | | | X |