

RBCS2/BCS2 SERIES AIR HANDLER INSTALLATION INSTRUCTIONS /HOMEOWNERS INFORMATION MANUAL

These instructions must be read and understood completely before attempting installation.

Issue 0724

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AIR HANDLER SAFETY

Your safety and the safety of others are very important!

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.



This is the safety alert symbol.
This symbol alerts you to potential hazards that can kill or hurt you and others.
All safety messages will follow the safety alert symbol and either the word
“**DANGER**” or “**WARNING**”. These words mean:

WARNING

You can be killed or seriously injured if you don't follow instructions.

DANGER

You can be killed or seriously injured if you don't immediately follow instructions.

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what can happen if the instructions are not followed.

NOTE

These instructions are intended as a general guide and do not supersede national, state or local codes in any way.

These instructions must be left with the property owner.

INSTALLATION REQUIREMENTS

These instructions are intended as a general guide only and do not supersede any national or local codes in any way.

Compliance with all local, state, or national codes pertaining to this type of equipment should be determined prior to installation. Read this entire instruction manual, as well as the instructions supplied in separate equipment, before starting the installation. All models are designed for indoor installation only.

The installation of the air handler, field wiring, warm air ducts, etc., must conform to the requirements of the National Electrical Code, ANSI/NFPA No. 70 (latest edition) in the United States, and any state laws, and local ordinances (including plumbing or wastewater codes). Local authorities having jurisdiction should be consulted before installation is made. Such applicable regulations or requirements take precedence over the general instructions in this manual.

Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems (latest edition).

The air handler is provided with flanges for the connection of the plenum and ducts.

The filters must be listed as Class 2 furnace air filters.

The air handler can be used with R-22 or R410a from the factory. The air handler is shipped from the factory completely assembled. Some models are configured for upflow air discharge only, and some models are configured for upflow or horizontal left-hand air discharge. The air handler cabinet conforms to 2% or less air leakage.

Do not remove the cabinet knockouts until it has been determined which knockouts will need to be removed for the installation.

Select the final installation position which best suits the site conditions. Consider required clearances, space, and routing requirements for refrigerant line, condensate disposal, filters, ductwork, wiring, and accessibility for service. Refer to the air handler rating plate on the air handler for specific information.

WARNING

Product contains fiberglass wool. Disturbing the insulation in this product during installation, maintenance or repair will expose you to fiberglass wool. This material may cause respiratory, skin, and eye irritant. Breathing this may cause lung cancer. (Fiberglass wool is known to the state of California to cause cancer.)

Tools and Parts

Gather the required tools and parts before starting installation. Read and follow the instructions provided with any tools listed here.

Tools Needed

- **1/4" nut driver**
- **Level**
- **Screwdriver**
- **Adjustable Wrench**
- **Tape Measure**
- **Hammer**
- **Sealant**

Parts Needed

Check local codes, check existing electrical supply, and read "Ductwork Requirements", and "Electrical Requirements", before purchasing parts.

- UL Listed Wire Nuts
- Refrigerant metering orifice (if needed). See "Verify Orifice Size". The correct orifice size may be contained in the replacement orifice package located inside the control box or the outdoor unit. If this package does not contain the correct orifice for your air handler, you must purchase the correct sized orifice.

Outdoor System Requirements

The air handler is designed to match, and must be used with, outdoor units as rated. The indoor sections are manufactured with an interchangeable refrigerant metering orifice to provide optimum refrigerant control and system performance with a variety of different capacities or outdoor units.

In some cases, the rating of the outdoor unit may require that the air handler refrigerant metering orifice be changed or replaced by a thermal expansion valve to obtain rated performance.

Location Requirements

WARNING

! EXPLOSION HAZARD !

Keep flammable materials and vapors, such as gasoline, away from air handler.

Place air handler so that heating elements are at least 18 inches (46 cm) above the floor for a garage installation.

Failure to follow these instructions can result in death, explosion or fire.

NOTE: When used on cooling applications, excessive sweating may occur when the air handler is installed in a very humid space.

- If installed in an unconditioned space, sealant should be applied around the electrical wires, refrigerant tubing, and condensate lines where they enter the cabinet.
- Electrical wires should be sealed on the inside where they exit the conduit opening. Sealant is required to prevent air leakage into and condensate from forming inside the air handler, control box, and on electrical controls.
- The air handler must be installed in such a way as to allow free access to the coil/filter compartment and blower/control compartment.
- The air handler must be installed with a 3/4" drop in the horizontal position towards the drain pan to ensure proper condensate drainage.

IMPORTANT: The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HFC's) as of July 1, 1992. Approved methods of reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

Installation Clearances

Non-Ducted Return Closet Installation

The air handler can be installed in a closet with a false bottom to form a return air plenum or be installed with a return air plenum under the air handler.

Louvers or return air grilles are field supplied. Local codes may limit application of systems without a ducted return to single-story buildings.

- For a unit installed in a closet with a louvered return opening, the minimum open area for the louvers will be
 - 320 square inches for 18 and 24 models
 - 360 square inches for 30 and 36 models
 - 450 square inches for 42, 48 and 60 models
- If the free area is not known, assume a 25% free area for wood or a 75% free area for metal louvers or grilles. Using the louver dimensions and the 25% or 75% assumption, determine if the louver open area meets the minimum open area listed above.
- If the return air plenum is used, the return air grille should be immediately in front of the opening in the plenum to allow for the free flow of return air.
- When not installed in front of the opening, there must be adequate clearance around the air handler to allow for the free flow of return air.

Installation Configuration

For ease in installation, it is best to make any necessary coil configuration changes before setting air handler in place. See "Installation Configuration Options".

- Upflow air discharge only contains 1 drain pan.
- Upflow or Horizontal airflow contains 2 drain pans.

Vertical Installations

Upflow

The air handler must be supported on the bottom only and set on solid floor or field supplied supporting frame. Securely attach the air handler to the floor or supporting frame.

Horizontal Installations

Horizontal installations can be left-hand or right-hand air supply. Adequate support must be provided to ensure cabinet integrity. Ensure that there is adequate room to remove service and access panels if installing in the horizontal position. For correct horizontal coil installation, see "Installation Configuration Options".

IMPORTANT:

- This coil is provided with a secondary drain that should be trapped and piped to a location that will give the occupant a visual warning that the primary drain is clogged. See "Install Condensate Drain".
- When an evaporator coil is installed in an attic or above a finished ceiling, an auxiliary drain pan should be provided under the air handler as specified by most local building codes.

Conversion from Vertical to Horizontal

An upflow only air handler may be converted to horizontal air discharge by installing a horizontal drain pan kit. See "Accessories."

An upflow/horizontal air handler may be converted from horizontal left-hand discharge to horizontal right-hand discharge without additional parts.

Suspended Cabinet Installation

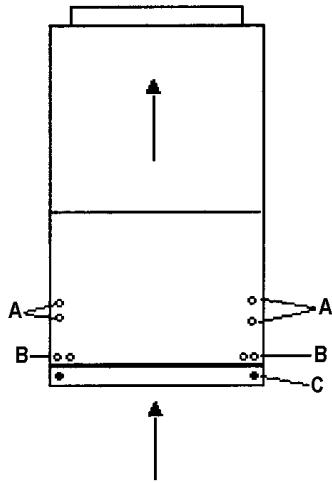
NOTE: Air handlers cannot be installed horizontally lying on or suspended from either the front or back of the air handler. It must be positioned with one side parallel to the floor when in the horizontal position.

The suspending means must be field fabricated, and should consist of 2 "cradles" made by attaching 2 rods to a length of angle iron or suitable gauge steel.

INSTALLATION CONFIGURATION OPTIONS

Upflow

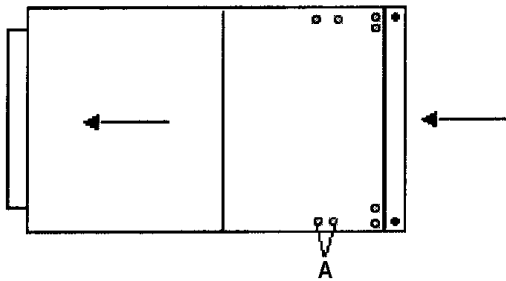
As shipped from the factory
(return in bottom)



A. Horizontal drain connections
(Left or Right Hand)

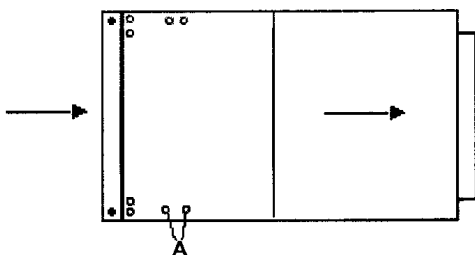
B. Upflow drain connections
C. Bottom/filter frame

Horizontal Left Factory ready (on some models)



A. Drain connections

Horizontal Right Requires drain pan location change



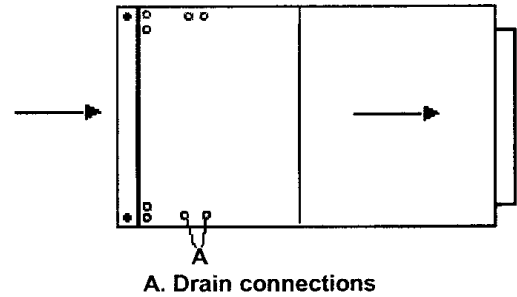
A. Drain connections

DRAIN PAN CONNECTIONS

Horizontal Installations can be either "Right" or "Left".

For horizontal right installations, a drain pan location change is required. Use drain connections "A" below.

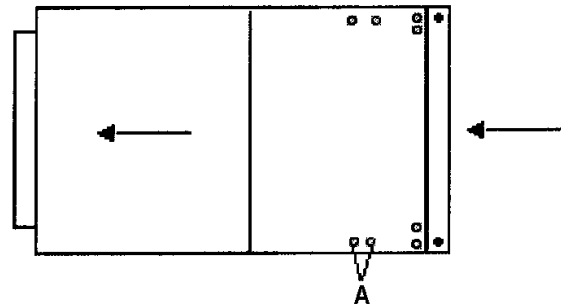
Horizontal Right Requires drain pan location change



A. Drain connections

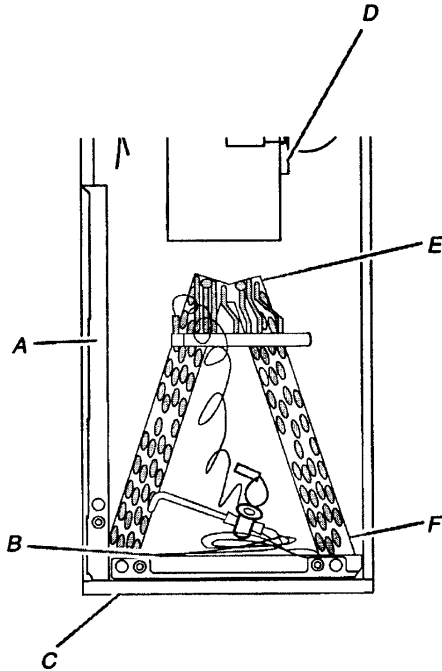
For horizontal left installations, use drain connections marked "A" below.

Horizontal Left Factory ready (on some models)



Follow the steps here to modify your drain pan for horizontal right configuration.

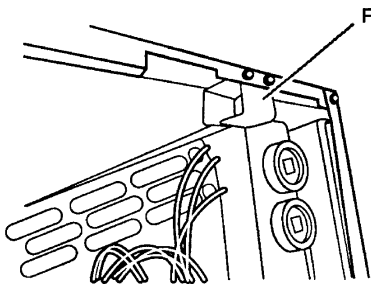
Before Conversion



- A. Side drain pan
- B. Bottom drain pan
- C. Filter access door
- D. Blower
- E. Top cap

1. Remove and set aside blower and coil access covers.
2. Remove the coil support bracket.
3. Filter access door

CAUTION
 Equipment damage, or personal injury. Take care when removing coil assembly from unit. Installation in this configuration may cause the coil to tip into unit once clear of the cabinet. Support the coil when moving.

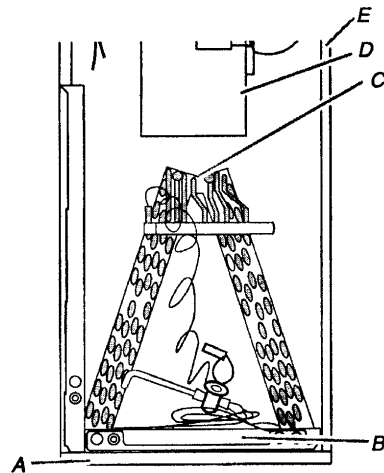


F. Coil support bracket

4. Move side drain pan to the opposite side
5. Install modified coil assembly back into air handler in the same orientation as before.
6. Install the coil support bracket on the opposite side of the air handler.

NOTE: For models 2.5 thru 5 ton the bracket attached to the top plate will need to be switched to the opposite side of the coil. This is to prevent blowoff in the horizontal position when the airflow is changed from left hand to right hand.

After Conversion



- A. Filter access door
- B. Bottom drain pan
- C. Top cap
- D. Blower
- E. Side drain pan

7. Determine knockouts required for drain line connections. Knock out and install drain lines.
8. Replace the blower and coil access covers.

Electrical Requirements

WARNING

ELECTRICAL SHOCK HAZARD

Electrically ground electric heater.

Connect ground wire to ground terminal marked "GND".

Use copper wire rated for supply connection.

Correct wire gauge is shown in the chart below.

Failure to follow these instructions can result in death or electrical shock.

Rating Plate Ampacity	AWG
21 - 30	10
31 - 40	8
41 - 60	6

- Supply plenum should be the same size as the flanged opening provided around the blower outlet and should extend ideally at least 3 ft. from the air handler before turning or branching off plenum into duct runs. The plenum forms an extension of the blower housing and minimizes air expansion losses from the blower.

NOTE: Use copper conductors only.

- All field wiring must be done in accordance with National Electrical Code, applicable requirements of UL and local codes, where applicable.
- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the air handler rating plate for maximum over-current protection, minimum circuit ampacity, as well as operating voltage.
- The power supply must be sized and protected according to the specifications supplied on the product.
- This air handler is factory-configured for 240 volts, single phase, 60 cycles. For 208 volt applications, see "208 Volt Conversion" in the "Make Electrical Connections" section.
- For optional electric heater applications, see "Accessories". Refer to the instructions provided with the instructions provided with the accessory for proper installation (**Models without Factory-Installed Electric Heat Only**).

IMPORTANT: The variable speed motor in the BCS2 air handler contains DC filter capacitors that will cause a surge or inrush of current when power is applied. Power is to remain applied to the motor except during servicing. Remove AC power before plugging or unplugging the input power to the motor. Do not install blower relays that interrupt line voltage to the motor.

Ductwork Requirements

- Install the conditioned air plenum, ducts and air filters (not provided) in accordance with NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems (latest edition).
- The air handler is provided with flanges for the connection of the plenum and ducts.
- The air handler is equipped with flanges that can form a filter rack for the installation of the air filter, or the filter may be installed as part of the return air duct system.
- Air filters must be listed as Class 2 furnace air filters/
- Supply and return ductwork must be adequately sized to meet the system's air requirements and static pressure capabilities. Ductwork should be insulated with a minimum of 1" thick insulation with a vapor barrier in conditioned areas or 2" minimum in unconditioned areas.

INSTALLATION INSTRUCTIONS

Inspect Shipment

WARNING

EXCESSIVE WEIGHT HAZARD

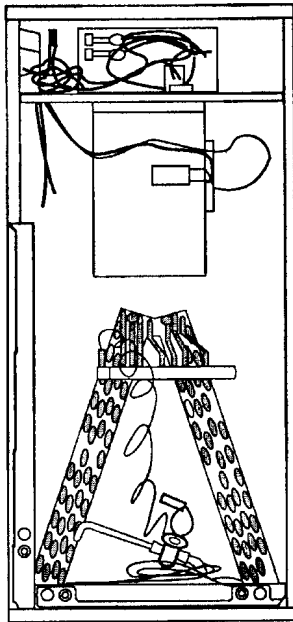
Use two or more people to move and install air handler. Failure to do so can result in back or other injury.

These air handlers are completely factory assembled, and all components are performance tested. Each unit consists of a blower assembly, refrigerant coil, and controls, in an insulated galvanized steel factory finished enclosure. Knockouts are provided for electrical wiring entrance.

- Check the unit rating plate to confirm specifications are as ordered.
- Upon receipt of equipment, thoroughly inspect it for possible shipping damage. Closely examine the unit inside the carton if the carton is damaged.
- If damage is found, it should be noted on the carrier's freight bill. Damage claims should be filed with carrier immediately. Claims of shortages should be filed with the seller within five (5) days.

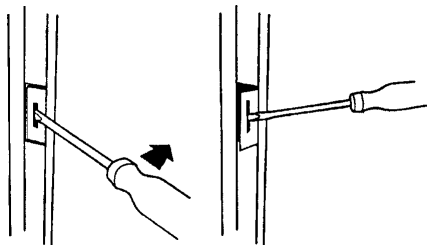
NOTE: If any damages are discovered and reported to the carrier, do not install the unit because your claim may be denied.

Filters



If a filter is to be installed at the air handler, a filter rack must be formed using factory-supplied flanges.

1. Lay air handler on its back
2. Pry filter rack tabs out



3. Place air handler in vertical position.

IMPORTANT: Filter access panel must be in place during unit operation. Excessive warm air entering the unit may result in water blow off problems.

Filter Size Chart

Model	Filter Size
18 / 24	16" X 20"
30 / 36	18" X 20"
42 / 48 / 60	18" X 25"

Install Condensate Drain

The air handler is provided with 3/4" NPT condensate drain connections.

A field-fabricated secondary drain pan, with a drainpipe to the outside of the building, is required in all installations over a finished living space or in any area that may be damaged by overflow from the main drain pan. In some localities, local codes may require a secondary drain pan for any horizontal installation. Make sure unit is level so that the drain pan will empty completely without water standing in the pan.

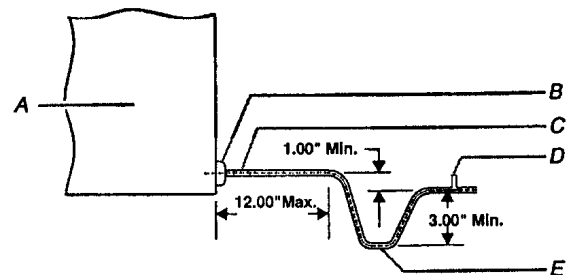
1. Remove the appropriate drain knockouts. See "Drain Pan Connections" section. You may need to remove the indoor coil assembly from the cabinet.
2. Remove any web from inside any threaded drain pan hole to which a drain line is to be connected. Gently remove the web so as not to damage the coil.
3. Connect primary drain line connection to the primary drain pan connection. The primary drain connection is flush with the bottom of the inside of the pan.

NOTE: When making drain fitting connections to the drain pan, hand tighten. Using a sealant is recommended. Over tightening the fittings can split connections on the drain pan.

4. Secondary drain connections, if used, should be connected to a separate drainage system. Run the secondary drain line to a place where the occupant would notice if water started coming from the secondary pan.
5. Install a 3" trap in both the primary and secondary drain lines as close to the unit as practical. Make sure the top of the trap is below the connection to the drain pan to allow complete drainage of the pan.

NOTE: Horizontal runs must also have an anti-siphon air vent (standpipe) installed ahead of the horizontal run. See "Typical Condensate Drain Connection". An extremely long horizontal run may require an oversized drain line to eliminate air trapping.

Typical Condensate Drain Connection (secondary drain not shown)



A. Air Handler
B. Drain connection
C. Drain Line

D. Anti-siphon I
F. Drain trap

NOTE: Do not operate air handler without drain trap. The condensate is on the negative pressure side of the blower; therefore, air being pulled through the condensate line will prevent positive drainage without a proper trap.

- Route the drain line to the outside or to an appropriate drain. Drain lines must be installed so they do not block service access to the front of the air handler. A 24" clearance is required for filter, coil, or blower removal and service access.

NOTE: Check local codes before connecting the drain line to an existing drainage system.

- Insulate the drain lines where sweating could cause water damage.

Test condensate drain pan and drain line after installation:

- Pour several quarts of water into drain pan, enough to fill drain trap and line.
- Check to make sure the drain pan is draining completely, no leaks are found in drain line fittings, and water is draining from the end of the primary drain line.
- Correct any leaks found.

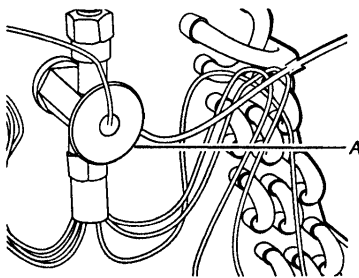
INSTALL DUCTWORK

IMPORTANT:

- Install ductwork in accordance with NFPA 90B and any local codes.
- Connect supply air duct to the flange on top of the air handler. If an isolation connector is used, it must be nonflammable.
- A return air duct system is recommended. If the unit is installed in a confined space or closet, a return connection must be run, full size, to a location outside the closet.

Verify Orifice Size

NOTE: Some models are equipped with Thermal expansion valve and do not require any orifice change.

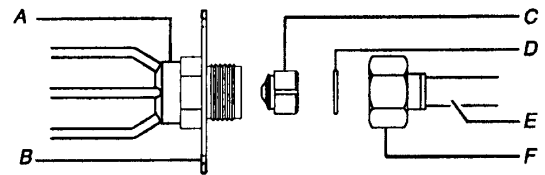


Thermal Expansion Valve

For factory installed thermal expansion valves you must, attach sending bulb to suction line with strap. Bulb should be positioned no further than 1 foot from header connection and situated at the 10 or 2 o'clock position. Secure tightly and cover with cork or foam insulation.

IMPORTANT: The proper orifice size is dependent on indoor coil/outdoor unit combination and application. The identification of the piston orifice size is located on a small white strip located on the liquid line inside the air handler.

- Consult the outdoor unit information to determine whether the indoor unit has the correct orifice installed.
- If a change of the orifice is required, loosen the brass hex nut and separate the orifice extension stub from the brass hex fitting.



- | | |
|------------------------|---------------------------|
| A. Distributor fitting | D. Ring seal (supplied) |
| B. Mounting flange | E. Orifice extension bulb |
| C. Piston orifice | F. 0.812" brass hex nut |

- Remove the orifice with an orifice extractor tool.
 - Insert the proper orifice into the fitting, seal end first. Make sure the orifice is free to move in the fitting.
 - Replace the brass hex nut.
- NOTE:** Over tightening (1/4 turn past snug) the brass hex nut will crush the gasket and may result in a system leak or stuck piston.
- Dispose of all packaging and unused parts.

Connect Refrigerant Lines

Refrigerant lines must be connected by a licensed, EPA certified refrigerant technician in accordance with established procedures.

IMPORTANT

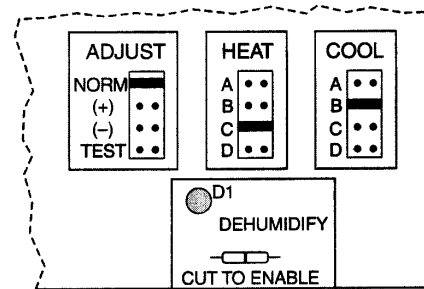
- Connecting refrigerant lines must be clean, dehydrated, refrigerant-grade copper lines. Air handler coils should be installed only with specific line sizes for approved system combinations.
- Handle the refrigerant lines gently during installation process. Sharp bends or possible kinking in the lines will cause a restriction.
- Do not remove the caps from the lines or system connection points, unit connections are ready to be completed.

1. Route the suction and liquid lines from the fittings on the indoor coil to the fittings on the outdoor unit. Run the lines in as direct a path as possible avoiding unnecessary turns and bends.
2. Make sure that the suction line is insulated over the entire exposed length and that both suction and liquid lines are not in direct contact with floors, walls, ductwork, floor joists, or other piping.
3. Connect the suction and liquid lines to the evaporator coil.
4. To avoid damaging the rubber grommets in the cabinet while brazing, slide the rubber grommets over the refrigerant lines until they are away from the heat source.
5. Braze with an alloy of silver or copper and phosphorus with a melting point above 1,100°F.
NOTE: Do not use soft solder.
6. Reinstall the rubber grommets after brazing is finished.
7. Make sure outdoor unit has been put in place according to the installation instructions and is connected to the refrigerant lines.

Variable Speed Motor

Locate the motor control board in the blower control box. Set the HEAT and COOL CFM taps by moving the board jumpers to the A, B, C, or D positions (see Figure below) based on the information found in the Application Table on page 10. The ADJUST tap on the control board can be used to raise or lower the table CFM's. The (+) tap will raise the table CFM by 10%, and the (-) tap will lower the table CFM by 12%.

IMPORTANT: When changing the control taps, the high voltage must be off in order for the new settings to take effect.



Motor Board Taps and Dehumidify Resistor

This model is designed for use with heat pumps as well as air conditioning systems. The motor control board needs to sense a signal on the "O" thermostat wire in order to use cooling delay timing. For a straight air conditioning system, connect the "O" wire to the 24 volt "R" wire.

The motor control board that provides airflow selection also features LED indicators that display operating mode, humidity control, and airflow CFM. In addition, the thermostat signals for emergency heat (EM), aux. Heat (W1), reversing valve (O), compressor stage 1 (Y1), compressor stage 2 (Y2), and blower (G) are all indicated by lit LED's on this board. If a humidistat is used, the dehumidify LED will light when the humidistat opens and the motor runs at reduced airflow. The control board also has a CFM LED that displays the operating CFM. This red LED flashes once for each 100 CFM. For example, if the operating CFM is 1200, the CFM LED will flash 12 times, then pause before repeating the 12-flash pattern.

Special note for units equipped with a humidistat:

If using a humidistat, the dehumidify resistor located on the bottom right of the control board must be removed (see Figure above). The HUM terminal on the board must be connected to the Normally Closed contact of the humidistat so that the board senses an open circuit on high humidity.

Application Table

The versatility of the variable speed motor enables the performance of the BCS2 with variable speed to be tailored to the different modes of operation encountered in heating and cooling. All BCS2's with variable speed are capable of operation at more than one nominal airflow rate. The

WARNING

ELECTRICAL SHOCK HAZARD

Disconnect all power supplies before servicing.

Replace all parts and panels before operating.

Failure to do so can result in death or electrical shock.

BLOWER MOTOR SETUP PROCEDURE

PSC Motor

For proper cooling operation, the airflow through the indoor coil should be between 350 and 450 CFM per ton (12,000 Btuh) of cooling capacity based on the rating of the outdoor unit.

The cooling blower speed is factory configured to provide correct airflow for an outdoor unit that matches the maximum cooling capacity rating of the air handler. If the outdoor unit is smaller than the maximum cooling capacity rating for the air handler, the cooling blower speed may need to be changed (see Table on page 13).

IMPORTANT: The cooling blower speed must be set to provide a minimum of 350 CFM airflow per ton (12,000 Btuh) of outdoor cooling capacity.

operation of a variable blower at different airflow rates is determined by the control board taps and the thermostat (see the **Application Table**). Before beginning the setup, become familiar with the information found in this table.

The data in the application table is categorized by unit size and mode of operation. Use the information provided to determine the CFM taps needed for cooling and heating.

Variable Speed Motor Application Table

MODEL	MODE	THERMOSTAT						Control Board Taps							
		HUM	EM	W1	O	Y2/Y1	G	COOL				HEAT			
								A	B	C	D	A	B	C	D
CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM	CFM		
BCS2M24V	Cont. Blower						X	400	350	350	350				
	Cooling	**			X	X		800	700	600	400				
	Heating					X		800	700	600	400				
	Aux. Heat			X		X		***	***	***	***	800	800	600	600
	Emer. Heat		X	X				***	***	***	***	800	800	600	600
BCS2M36V	Cont. Blower						X	600	500	400	350				
	Cooling	**			X	X		1200	1000	800	600				
	Heating					X		1200	1000	800	600				
	Aux. Heat			X		X		***	***	***	***	1200	1200	800	800
	Emer. Heat		X	X				***	***	***	***	1200	1200	800	800
BCS2M42V	Cont. Blower						X	700	600	500	400				
	Cooling	**			X	X		1400	1200	1000	800				
	Heating					X		1400	1200	1000	800				
	Aux. Heat			X		X		***	***	***	***	1400	1400	1000	1000
	Emer. Heat		X	X				***	***	***	***	1400	1400	1000	1000
BCS2M48V	Cont. Blower						X	800	700	600	500				
	Cooling	**			X	X		1600	1400	1200	1000				
	Heating					X		1600	1400	1200	1000				
	Aux. Heat			X		X		***	***	***	***	1600	1600	1200	1200
	Emer. Heat		X	X				***	***	***	***	1600	1600	1200	1200
BCS2M60V	Cont. Blower						X	900	800	700	600				
	Cooling	**			X	X		1800	1600	1400	1200				
	Heating					X		1800	1600	1400	1200				
	Aux. Heat			X		X		***	***	***	***	1800	1600	1400	1200
	Emer. Heat		X	X				***	***	***	***	1800	1600	1400	1200

NOTES:

** Humidistat will reduce cooling airflow by 10% in high humidity.

*** Airflow is greater of COOL and HEAT when both electric heat and heat pump are operating.

ADJUST tap (+) will increase airflow by 10%, while tap (-) will decrease airflow by 12%.

ADJUST tap TEST will cause the motor to run at 70% of full airflow. Use this for troubleshooting only.

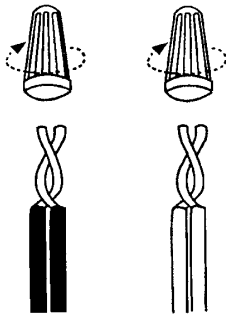
At the start of a call for cooling there is a short run at 82% of airflow for 7.5 minutes.

At the end of a call for cooling there is a blower delay of 1 minute.

Make Electrical Connections - Models without Factory - Installed Electric Heat

240-Volt Installations

1. Disconnect all power supplies.
2. Remove the air handler access panel.
3. Route the field supply wires to the air handler electrical connection box.
4. Using UL listed wire nuts, connect the field supply wires to the air handler (black to black and yellow to yellow).



208-Volt Conversion

1. Disconnect all power supplies.
2. Remove the air handler access panel.
3. Move the 2 connected black transformer leads from the 240-volt terminal on the transformer to the 208-volt terminal on the transformer. See "Wiring Diagram - Electric Heat and Blower".

Field Installed Electric Heat - Maximum Heat Allowed

Air Handler Model	Speed TAP	Max kW Heater
*BCS2M24V	A	10
	B	10
	C	10
	D	10
*BCS2M36V	A	15
	B	15
	C	10
	D	10
*BCS2M42V	A	15
	B	15
	C	15
	D	15
BCS2M48V	A	20
	B	20
	C	15
	D	15
BCS2M60V	A	20
	B	20
	C	15
	D	15

⚠ WARNING

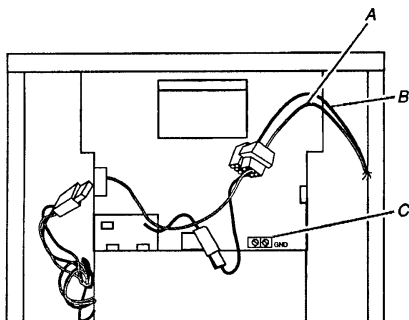
ELECTRICAL SHOCK HAZARD

Electrically ground air handler.

Connect ground wire to ground terminal marked "GND".

Failure to do so can result in death or electrical shock.

5. Connect ground wire to ground terminal marked "GND":.



- A. Connect yellow to yellow
- B. Connect black to black
- C. Connect ground wire to ground terminal marked "GND"

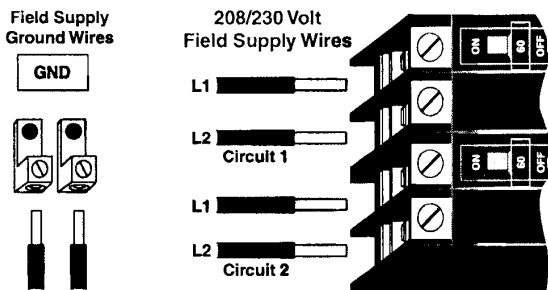
6. Replace the air handler access panel.

Make Electrical Connections - Models with Factory - Installed Electric Heat

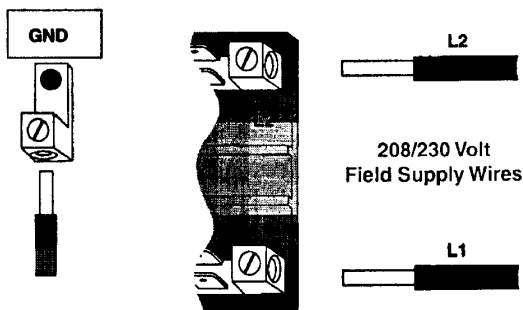
1. Determine the number of circuits needed to supply the heater with electrical power (1, 2, Or 3 circuits). See the air handler Accessory Kit label for number of circuits and ratings.
2. Disconnect all power supplies.
3. Knock out the correct number of knockouts (1, 2 or 3), and install UL listed wires and fittings.
4. Connect appropriate size wire to the circuit breaker terminals. If circuit breakers are not provided, a terminal block is provided.
5. Connect green ground wire(s) (1, 2 or 3) to ground terminal(s) (1, 2 or 3) marked "GND".

Connect to Circuit Breaker

NOTE: There are 2 ground terminals marked "GND" shown here. There may be 1, 2 or 3 ground terminals depending on the number of circuit breakers.



Connect to Terminal Block



6. Install conduit-opening plugs in any unused openings.
7. If circuit breakers or pull disconnects are used, the front panel knockouts will need to be removed.
8. Reinstall the air handler blower access panel.
9. Reconnect power.
10. Dispose of/recycle all remaining parts.

SYSTEM CHECK

Check Blower Operation

1. Set the thermostat to FAN ON.
2. The indoor blower should come on.

Check Electric Heater (if used)

1. Set thermostat to call for auxiliary heat (approximately 5°F above ambient temperature). The indoor blower and auxiliary heat should come on together. Allow a minimum of 3 minutes for all sequencers to cycle on.
2. Set the thermostat so it does not call for heat. Allow up to 5 minutes for all sequencers to cycle off.

Check Airflow

Cooling blower speed

- For proper cooling operation, the airflow through the indoor coil should be between 350 and 450 CFM per ton of cooling capacity (or 350 - 450 CFM per 12,000 Btuh) based on the rating of the outdoor unit.
- The cooling blower speed is factory configured to provide correct airflow for an outdoor unit that matches the maximum cooling capacity rating of the air handler.
- If the outdoor unit is smaller than the maximum cooling capacity rating for the air handler, the cooling blower speed may need to be changed. Refer to either variable speed or PSC blower performance charts.

IMPORTANT: The cooling blower speed must be set to provide a minimum of 350 CFM airflow per ton (12,000 Btuh) of outdoor cooling capacity.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Electrically ground air handler.

Connect ground wire to ground terminal marked "GND".

Failure to do so can result in death or electrical shock.

To change blower speed with PSC motor: Refer to "Wiring Diagram - Electric Heat and Blower".

1. Disconnect all power supplies
 2. Remove the air handler access panel
 3. Locate pin number 2 on the blower relay. Two black wires are connected to this terminal pin. One connects to pin number 5 on the blower relay; one connects to an inline splice connecting to a red or blue wire.
 4. Remove the wire going to the 4-pin blower motor connector from the splice.
 5. Connect the blower lead (Red [LO], Black [HI]) onto the splice from the 4-pin blower motor connector.
- NOTE:** Unused blower speeds are shipped from the factory covered with a plastic cap. Remove this cap from the new blower speed terminal and replace it over the factory - set blower terminal.
6. Replace all panels.
 7. Reconnect power.

PSC Motor Blower Performance Chart

Air Handler Model	Blower Speed	CFM @ ESP. -in. w.c.				
		0.10	0.20	0.30	0.40	0.50
18	Low* (Red)	722	702	656	609	517
	Med (Blue)	994	926	838	707	626
	High (Black)	1036	958	873	779	663
24	Low (Red)	722	702	656	609	517
	Med* (Blue)	994	926	838	707	626
	High (Black)	1036	958	873	779	663
30	Low (Red)	929	916	890	842	737
	Med* (Blue)	1029	1043	1014	948	842
	High (Black)	1290	1271	1213	1153	1043
36	Low* (Red)	1135	1120	1112	1079	995
	Med (Blue)	1354	1345	1317	1260	1090
	High (Black)	1494	1469	1417	1336	1250
42	Low (Red)	1202	1192	1160	1116	998
	Med* (Blue)	1404	1413	1386	1303	1192
	High (Black)	1540	1530	1507	1386	1254
48	Low (Red)	1593	1582	1526	1444	1318
	Med* (Blue)	1759	1709	1636	1538	1395
	High (Black)	1886	1820	1742	1606	1446
60	Low (Red)	1782	1755	1672	1554	1393
	Med* (Blue)	2066	1960	1860	1714	1476
	High (Black)	2109	2067	1949	1770	1586

All data given while air handler is operating with a wet DX coil and air filter installed.
 Speeds marked in **bold with an asterisk*** are the factory settings for both heating and cooling.
 Cooling speeds should not be reduced below factory settings.
 Different speeds can be set for heating mode.

Variable Speed Motor - Blower Performance Chart

CFM @ ESP. - in. W.C.

				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	
24	Y1	Tap A		540	550	550	550	560	560	570	560	
		Tap B		470	490	490	500	500	500	490	490	
		Tap C		420	420	410	430	430	430	430	410	
		Tap D		270	270	300	280	270	250	240	240	
	Y1/Y2	Tap A		770	790	790	790	800	800	800	810	800
		Tap B		670	700	700	710	710	710	710	700	700
		Tap C		600	600	590	610	610	610	610	610	590
		Tap D		390	390	420	400	380	360	340	340	
	G	Tap A		390	400	400	400	400	400	400	410	400
		Tap B		340	350	350	360	360	360	360	350	350
		Tap C		300	300	300	310	310	310	310	310	300
		Tap D		200	200	210	200	190	180	170	170	
36	Y1	Tap A		820	830	850	850	870	870	870	870	
		Tap B		700	700	700	690	700	710	710	700	
		Tap C		570	560	560	560	550	550	540	520	
		Tap D		440	420	390	390	370	360	360	340	
	Y1/Y2	Tap A		1170	1180	1210	1210	1240	1240	1240	1240	1240
		Tap B		1000	1000	1000	990	1000	1010	1010	1000	
		Tap C		810	800	800	800	790	780	770	740	
		Tap D		630	600	560	550	530	520	510	480	
	G	Tap A		590	590	610	610	620	620	620	620	
		Tap B		500	500	500	500	500	510	510	500	
		Tap C		410	400	400	400	400	390	390	370	
		Tap D		320	300	280	280	270	260	260	240	
42	Y1	Tap A		920	970	970	970	980	990	990	1000	
		Tap B		830	830	840	850	850	850	850	850	
		Tap C		690	700	700	700	710	710	720	710	
		Tap D		570	570	570	580	580	590	570	550	
	Y1/Y2	Tap A		1320	1380	1380	1390	1400	1410	1410	1430	
		Tap B		1180	1180	1200	1210	1220	1220	1220	1220	
		Tap C		990	1000	1000	1000	1020	1020	1030	1020	
		Tap D		810	810	810	830	830	840	820	790	
	G	Tap A		660	690	690	700	700	710	710	720	
		Tap B		590	590	600	610	610	610	610	610	
		Tap C		500	500	500	500	510	510	520	510	
		Tap D		410	410	410	420	420	420	410	400	
48	Y1	Tap A		1120	1120	1130	1140	1130	1130	1130	1140	
		Tap B		960	970	970	980	990	990	990	1000	
		Tap C		830	830	830	830	840	850	850	830	
		Tap D		690	700	710	710	710	710	710	690	
	Y1/Y2	Tap A		1600	1600	1610	1630	1620	1620	1620	1620	1630
		Tap B		1370	1380	1390	1400	1420	1420	1410	1430	
		Tap C		1190	1190	1190	1190	1200	1210	1210	1190	
		Tap D		990	1000	1020	1010	1010	1020	1010	990	
	G	Tap A		800	800	810	820	810	810	810	810	820
		Tap B		690	690	700	700	710	710	710	720	
		Tap C		600	600	600	600	600	610	610	600	
		Tap D		500	500	510	510	510	510	510	500	
60	Y1	Tap A		1250	1270	1270	1300	1290	1290	1290	1280	
		Tap B		1120	1120	1130	1130	1140	1130	1130	1130	
		Tap C		990	990	990	980	980	970	960	970	
		Tap D		840	850	850	850	840	850	830	820	
	Y1/Y2	Tap A		1780	1810	1820	1850	1840	1840	1840	1830	
		Tap B		1600	1600	1610	1610	1630	1620	1610	1610	
		Tap C		1410	1420	1410	1400	1400	1390	1380	1380	
		Tap D		1200	1220	1220	1210	1200	1210	1190	1170	
	G	Tap A		890	910	910	930	920	920	920	920	
		Tap B		800	800	810	810	820	810	810	810	
		Tap C		710	710	710	700	700	700	690	690	
		Tap D		600	610	610	610	600	610	600	590	

NOTES:

- All above data given while air handler is operating with dry coil.
- Humidistat will reduce cooling airflow by 10% in high humidity.
- Adjust tap (+) will increase airflow by 10%, while (-) will decrease by 12%.
- Adjust tap test will cause motor to run at 70% of full airflow. **Use this for troubleshooting only.**
- At the start of a call for cooling/heating, there is a short run at 82% of airflow for 7.5 minutes.
- At the end of a call for cooling/heating, there is a blower delay of 1 minute.

SEQUENCE OF OPERATION

Cooling (cooling only or heat pump)

When the thermostat calls for cooling, the circuit between R and G is completed, and the blower relay is energized. The Normally Open contacts close, causing the indoor blower motor to operate. The circuit between R and Y is also completed; this circuit closes the contactor in the outdoor fan motor. Circuit R and O energizes the reversing valve, switching it to the cooling position. (The reversing valve remains energized as long as selector switch is on the COOL position.)

Heating (electric heat only)

When the thermostat calls for heat, the circuit between R and W is completed, and the heater sequencer is energized. A time delay follows before the heating elements and the indoor blower motor comes on. Units with a second heat sequencer can be connected with the first sequencer to W on the thermostat subbase or connected to a second stage on the subbase.

Heating (heat pump)

When the thermostat calls for heat, the circuits between R and Y and R and G are completed. Circuit R-Y energizes the contactor starting the outdoor fan motor and the compressor. Circuit R and G energizes the blower relay starting the indoor blower motor. If the room temperature should continue to fall, the circuit between R and W1 is completed by the second stage heat room thermostat. Circuit R-W1 energizes a heat sequencer. The completed circuit will energize supplemental electric heat (if applicable). Units with a second heater sequencer can be connected with the first sequencer to W1 on the thermostat or connected to a second heating stage W2 on the thermostat subbase.

Emergency Heat (heating heat pump)

If selector switch on thermostat is set to the emergency heat position, the heat pump will be locked out of the heating circuit, and all heating will be electric heat (if applicable). A jumper should be placed between W2 and E on the thermostat subbase so that the electric heat control will transfer to the first stage heat on the thermostat. This will allow the indoor blower to cycle on and off with the electric heat when the fan switch is in the AUTO position.

Variable Speed Features

The BCS2 air handler is equipped with a variable speed motor and will deliver a constant airflow within a wide range of external static pressures. The variable speed blower offers the following comfort features:

Soft Start

When called into operation, the variable speed motor will slowly ramp up to normal operating speed. This eliminates the noise and discomfort that results caused by the initial blast of air encountered with standard electric furnaces. It can take up to 7.5 minutes to reach normal operating speed.

Continuous Blower Operation

The comfort level of the living space can be enhanced when using this feature by allowing continuous circulation of air in between calls for cooling or heating. The circulation of air occurs at 50% of the normal airflow rate (350 CFM minimum).

Reduced Airflow Operation

For situations where humidity control is a problem, the variable speed motor can be enabled to operate at a 10% reduction in the normal airflow rate. This can be achieved by connecting to a standard humidity control that is normally closed and opens on humidity rise.

AIR HANDLER MAINTENANCE

At the beginning of each heating season the unit should be serviced by a qualified installer or servicing agency.

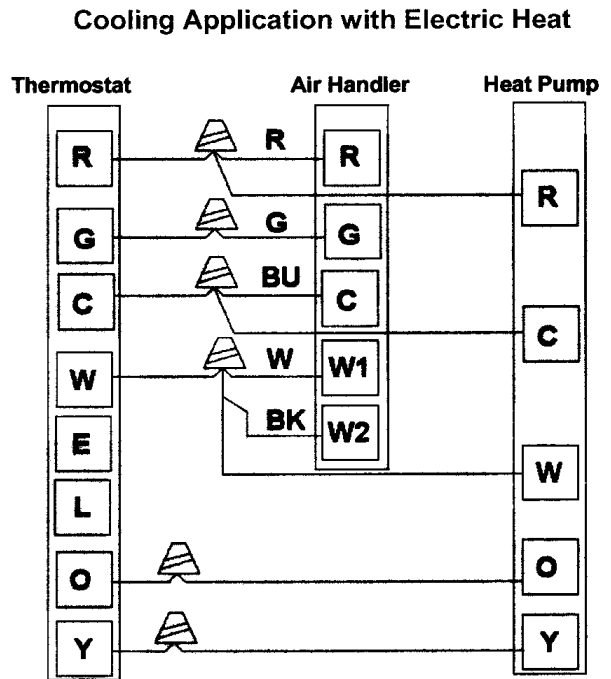
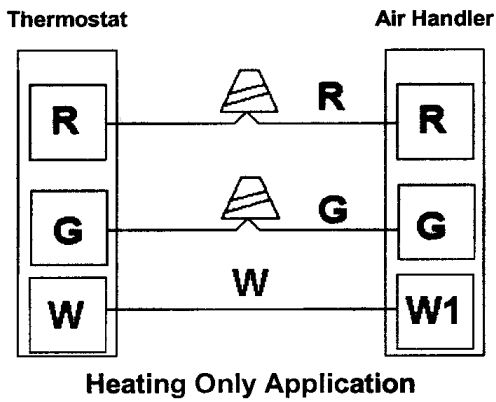
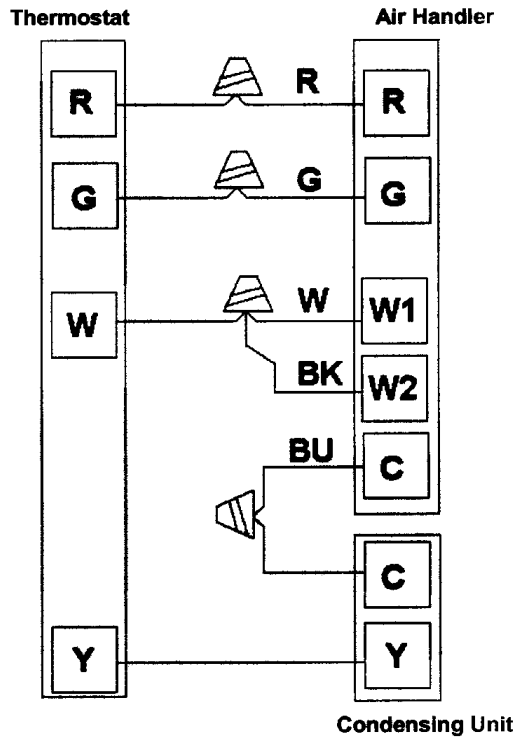
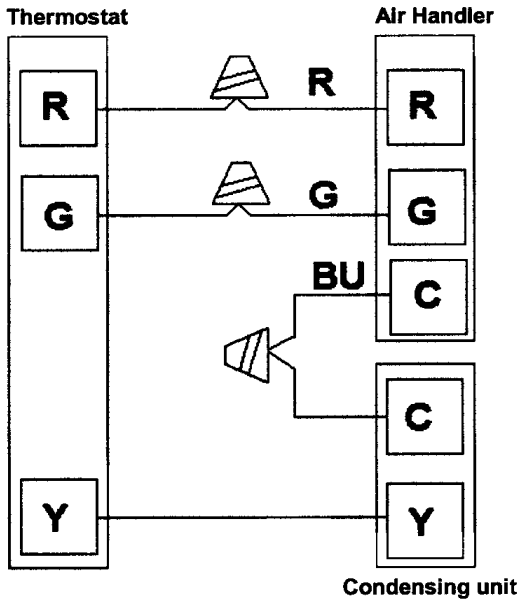
IMPORTANT: Do not operate system without a filter. A filter is required to protect the coil, blower, and internal parts from excessive dirt and dust. See "Installation Configurations" for the location of the filter in the unit cabinet and the service panel giving access to unit filter. The filter is placed in the air return duct by the installer.

- Inspect air filters at least once a month and replace or clean as required. Dirty filters are the most common cause of inadequate heating or cooling performance.
- Replace disposable filters. Cleanable filters can be cleaned by soaking in mild detergent and rinsing with cold water.
- Do not replace a cleanable (high velocity) filter with a disposable (low velocity) filter unless return air system is properly sized for it.
- If water should start coming from secondary drain line, a problem exists which should be investigated and corrected. Contact a qualified person.

ASSISTANCE OR SERVICE

If you need further assistance, you may contact your local dealer or any licensed contractor/serviceman in your area.

Low Voltage Connections (PSC Motor)

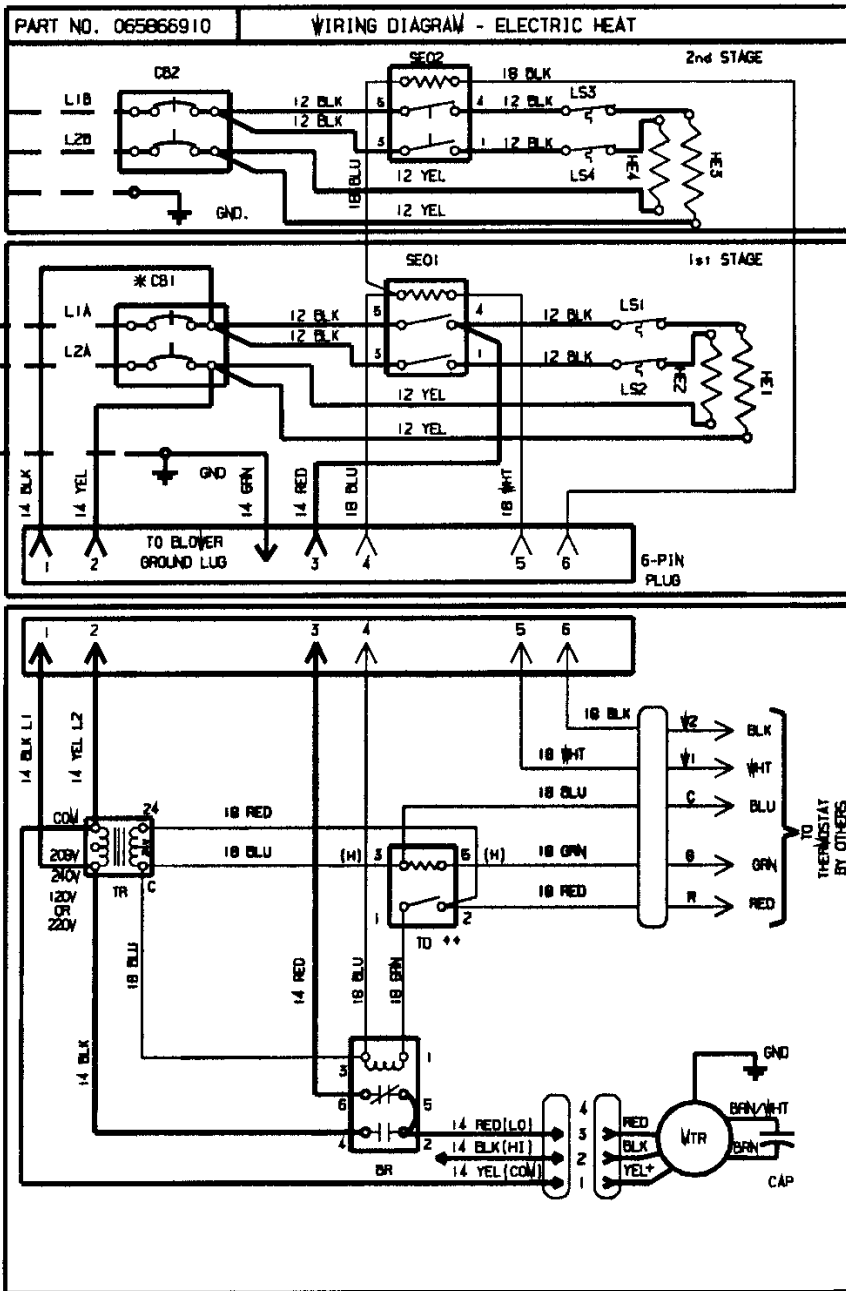


*Connect common (C) wire only if required. See
Thermostat Installation Instructions.

Heat Pump Application with Electric Heat

PSC MOTOR WIRING DIAGRAM

Electric Heat & Blower



HEATERS USED

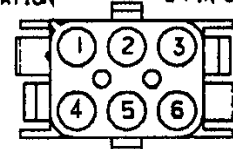
- 5 KW = HE1
- 7.5 & 10 KW = HE1 & HE2
- 15 KW = HE1, HE2 & HE3
- 20 KW = HE1, HE2, HE3 & HE4

- * TB = TERMINAL BLOCK (OPT.)
- * CB = CIRCUIT BREAKER (OPT.)
- SEO = SEQUENCER
- GND = GROUND LUG
- LS = LIMIT SWITCH
- HE = HEATER ELEMENT

- POWER (FACTORY WIRE) ———
- POWER (FIELD WIRE) ———
- CONTROL (FACTORY WIRE) ———
- CONTROL (FIELD WIRE) ———

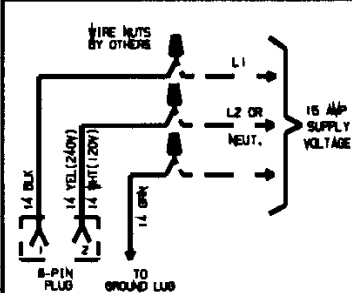
CONTROL CIRCUIT WIRING TO BE 24 VOLT, N.E.C. CLASS 2

PLUG PIN LOCATION AMP 350781-1
6-PIN CAP

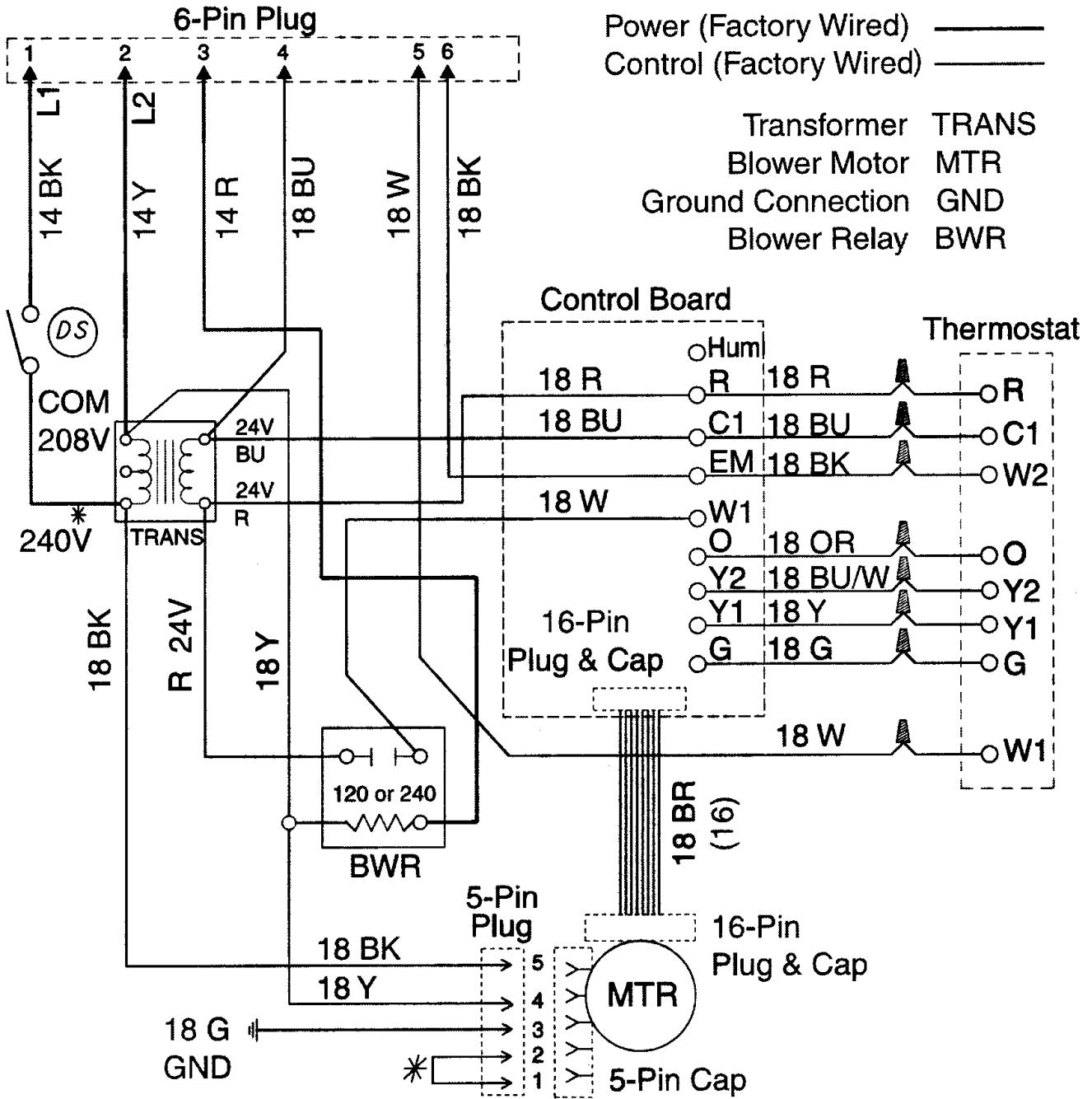


- ♦♦ TD = TIME DELAY (OPT.)
- TR = TRANSFORMER
- BR = BLOWER RELAY
- WTR = BLOWER MOTOR
- CAP = MOTOR CAPACITOR
- GND = GROUND CONNECTION

WIRING DIAGRAM: NO HEAT



VARIABLE SPEED MOTOR Wiring Diagram



*120 V When Applicable

OUTDOOR EQUIPMENT LIMITED WARRANTY

(Not applicable outside the U.S.A. and Canada.)

GENERAL FIVE YEAR PART WARRANTY - This equipment will perform at installation according to its specifications when installed, operated, repaired and serviced in strict accordance with the installation and maintenance instructions and using authorized service parts. This warranty applies only to equipment installed within the United States and Canada.

If within five (5) years from the date of original installation any covered parts fail because of a manufacturing defect, the manufacturer will provide a replacement part. You are responsible for all other costs of warranty service. The manufacturer assumes no responsibility for any costs associated with the replacement of this part. The costs of refrigerant, refrigerant reclaiming, driers, filters, belts or freight charges along with miscellaneous material charges are not covered. Such cost may be covered by a separate warranty provided by the installing dealer or contractor. Replacement of failed parts by the manufacturer will be provided through a qualified servicing dealer or contractor. The manufacturer must receive written documentation of annual preventative maintenance, for this warranty to be valid. This should include a record of normal maintenance as outlined in the installation and servicing instructions or the owners manual including all cleaning, lubrication and standard replacement.

Use of this product other than in a single-family residential application will limit the warranty to one (1) year for covered parts.

Covered parts include all parts of this unit except for the following Excluded Components, which are not covered by this warranty: cabinets, cabinet pieces, wiring and wiring harnesses.

This warranty will begin on the date of original installation whether or not the actual use begins on that date. If the date of original installation cannot be verified, the warranty will be deemed to begin six (6) months after the date of manufacture.

Warranty Procedure - When warranty parts are required, you should contact a qualified local contractor or dealer, and be prepared to provide the following information: complete model and serial number and date of installation, and an accurate description of the problem.

Limitation of Warranties - The manufacturer makes no express warranties other than the warranties set forth above. All implied warranties, including the implied warranties of merchantability and fitness for a particular purpose are excluded to the extent legally permissible, or are limited to a period of one (1) year. Should such exclusion or limitation of warranty be unenforceable, such implied warranties are in any event limited to the duration of the express warranty, set forth above. Liability for incidental, punitive and/or consequential damages is excluded. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitations of incidental, punitive or consequential damages, so the limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

Conditions of Warranty - The furnishing of replacement parts under the terms of this warranty will apply to the original warranty period (including any extended warranty period) and will not serve to extend such period. This warranty is voided if the equipment is removed from the original installation site.

This warranty does not apply to damage or defect resulting from:

1. Accident, or negligent or unreasonable use or operation of the equipment, including operation beyond rated capacity and operation of electrical components at voltages other than the rate specified in the nameplate.
2. Modification, changes or alterations of the equipment, except as directed by the manufacturer.
3. Operation with system components, which do not match combinations listed in the Air Conditioning and Refrigeration Institute (ARI) Director of Certified Unitary Equipment or operation of this system with refrigerants other than as specified in the installation instructions.
4. Damage as a result of flood, winds, fires, lightning, or exposure to corrosive elements or a corrosive environment (such as salt, chlorine, fluorine, or other damaging chemicals).

This warranty gives you specific rights, and you may also have other rights that vary from state to state.

Keep this book and your sales slip together for future reference. You must provide proof of purchase or installation date for in-warranty service.

Write down the following information about your unit to better help you obtain assistance or service if you ever need it. You will need to know the complete model and serial number. You can find this information on the unit rating plate.

Dealer Name: _____

Address: _____

Phone Number: _____

Indoor Model Number: _____ **Serial Number:** _____

Indoor Model Number: _____ **Serial Number:** _____

Installation Date: _____