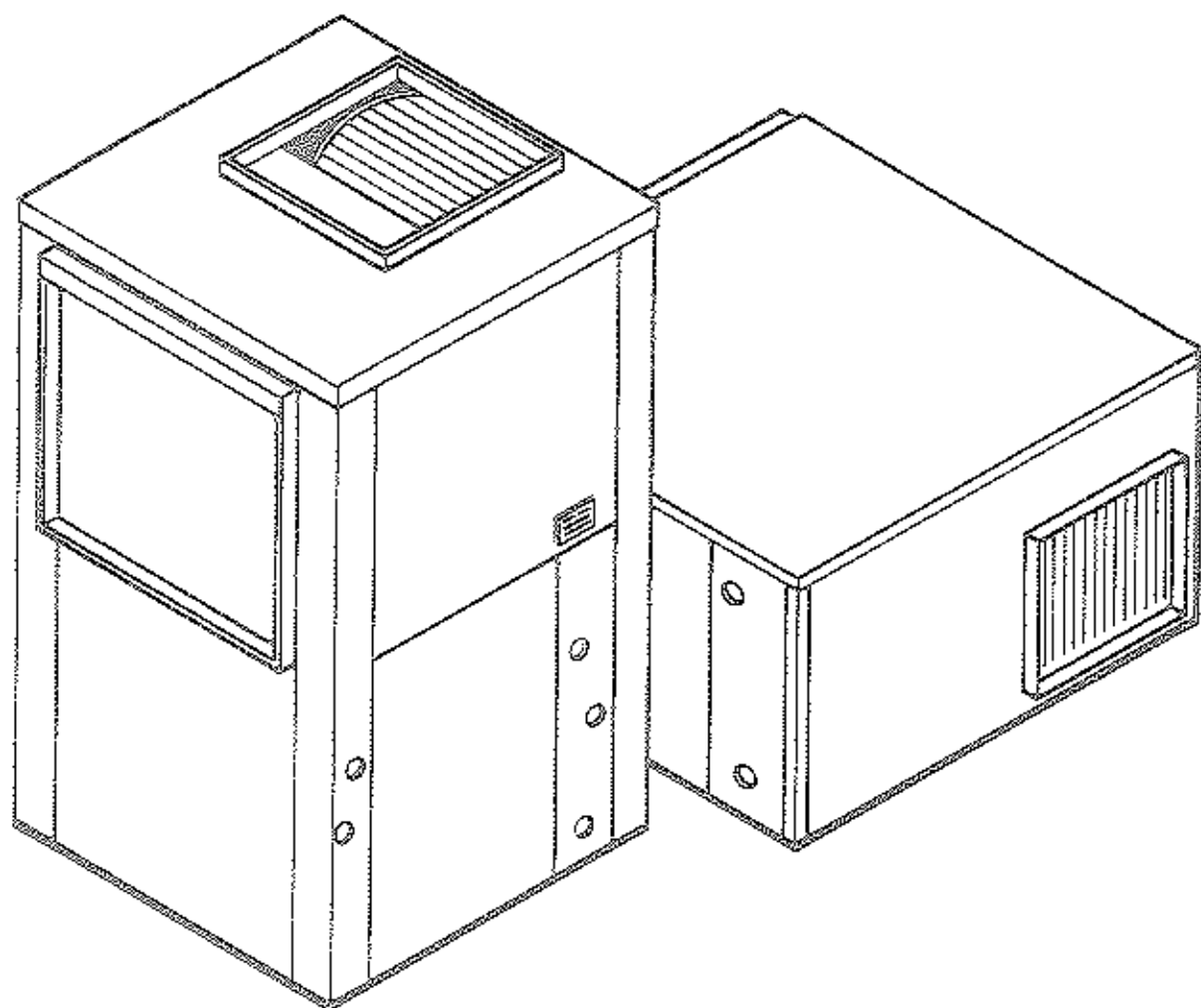


**Friedrich**<sup>®</sup>  
Contract Products

803 }  
804 } Series  
805 }

Geo-Thermal<sup>™</sup>  
Heat Pump



Service and Parts Manual

	PAGE
<b>MODEL NUMBER CODE</b>	
<b>SYSTEM SCHEMATIC</b> .....	1
<b>803 — 804 Series</b>	
<b>INTRODUCTION</b> .....	2
Inspection of Unit .....	2
Local Codes .....	2
Sizing the Unit .....	2
<b>INSTALLATION</b> .....	2
Mounting of Units .....	2
Duct Hookup .....	3
Existing Duct .....	3
Electrical .....	3
Low Voltage .....	3
Water Piping .....	4
Drain Piping .....	4
The Well .....	4
Discharged Water .....	5
<b>START-UP</b> .....	5
Water Flow Check .....	5
Manual Water Flow Valves .....	5
Direct Acting Pump .....	5
Electrical Operated Control Valves .....	6
Refrigerant Pressure Flow Control Valves .....	6
Supply Voltage Check .....	6
Air Flow Adjustment .....	6
Operating Pressures & Temperatures .....	7
Water Coil Maintenance .....	7
Charging of the Unit .....	7
<b>805 Series</b>	
<b>INTRODUCTION</b> .....	9
System Water Control .....	9
Placement of the Unit .....	9
Water Supply .....	9
Water Regulating Valve Adjustment .....	9
<b>HOT WATER GENERATOR</b> .....	10
Water Piping .....	10
Electrical Connections .....	11
Start-Up .....	11
<b>TROUBLESHOOTING</b> .....	12
<b>RESIDENTIAL DUCT SIZING CHART</b> .....	17
<b>COOLING &amp; HEATING CYCLE OPTIMUM PRESSURES &amp; SUPERHEAT</b> .....	18
<b>COOLING/HEATING CYCLE OPERATING CONDITIONS</b> .....	19
<b>WIRING DIAGRAMS</b> .....	20

# 803-048-GF

MODEL SERIES

- 803 - Standard Vertical
- 804 - Standard Horizontal
- 805 - Low Temperature Vertical

SUPPLY VOLTAGE

- G - 208-230/1/60
- H - 208-230/3/60

REVISION CODE

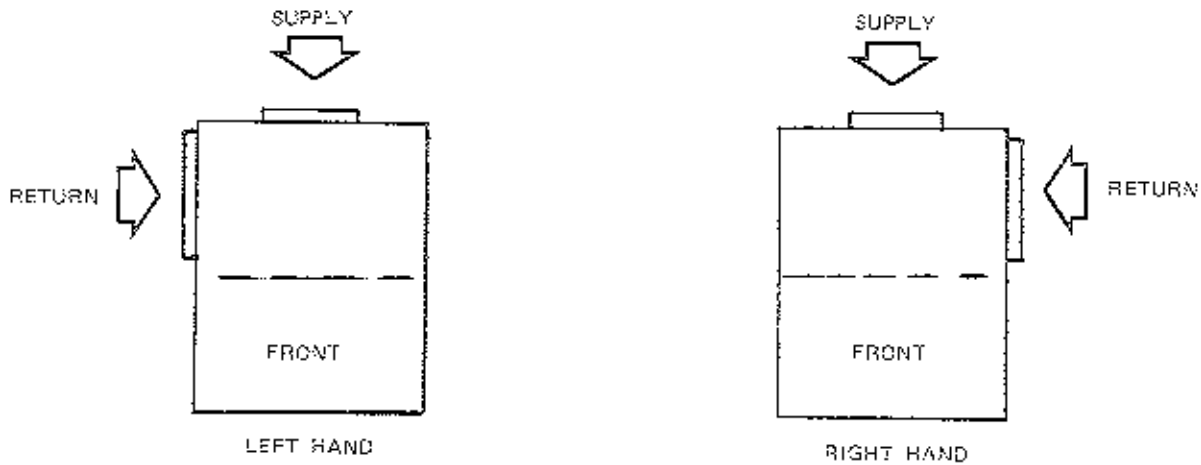
NOMINAL TONNAGE

- 18 - 1.5
- 24 - 2.0
- 30 - 2.5
- 36 - 3.0
- 42 - 3.5
- 48 - 4.0
- 60 - 5.0

OPTION CODE  
(All Cupro-Nickel)




- E - Left Hand Return
- F - Right Hand Return
- N - Left Hand + Hot Water Generator
- P - Right Hand + Hot Water Generator

RETURN DIAGRAM, VERTICAL MODEL

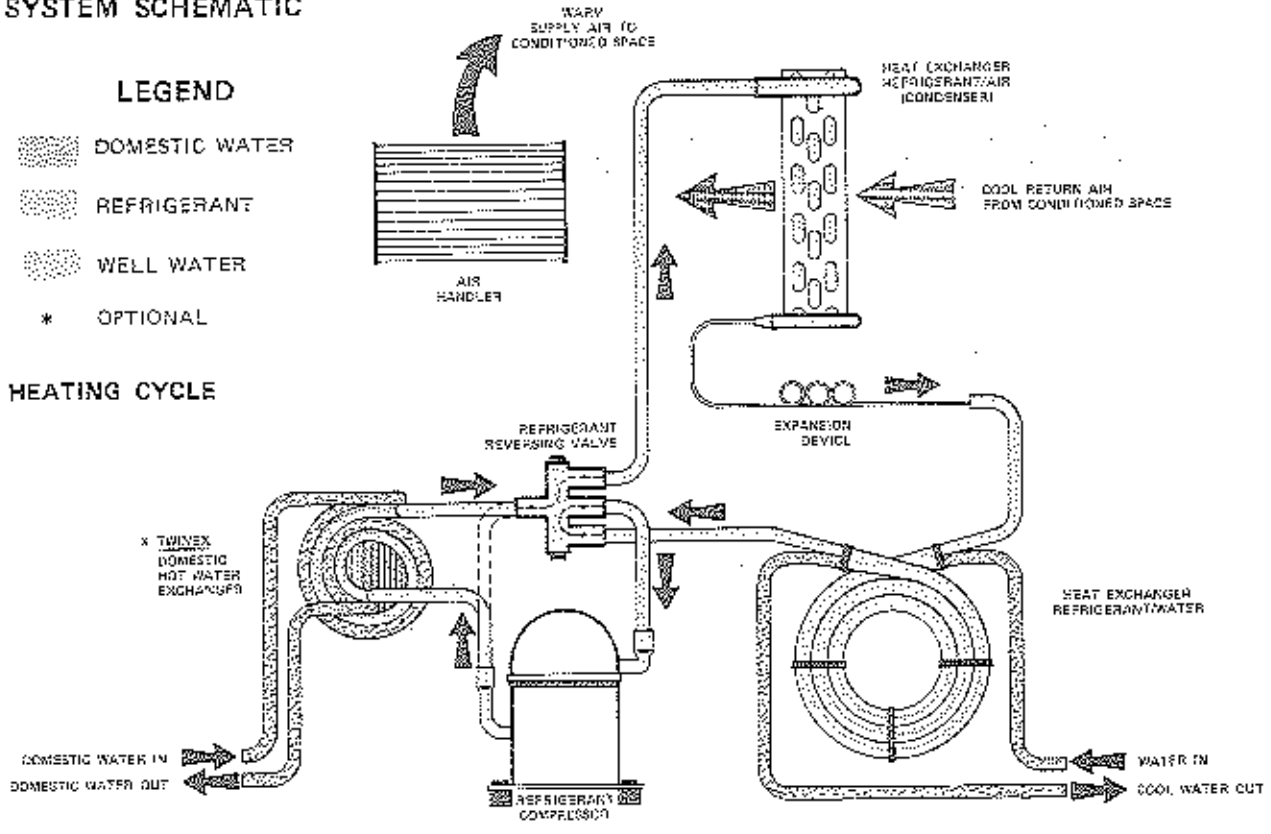


## SYSTEM SCHEMATIC

### LEGEND

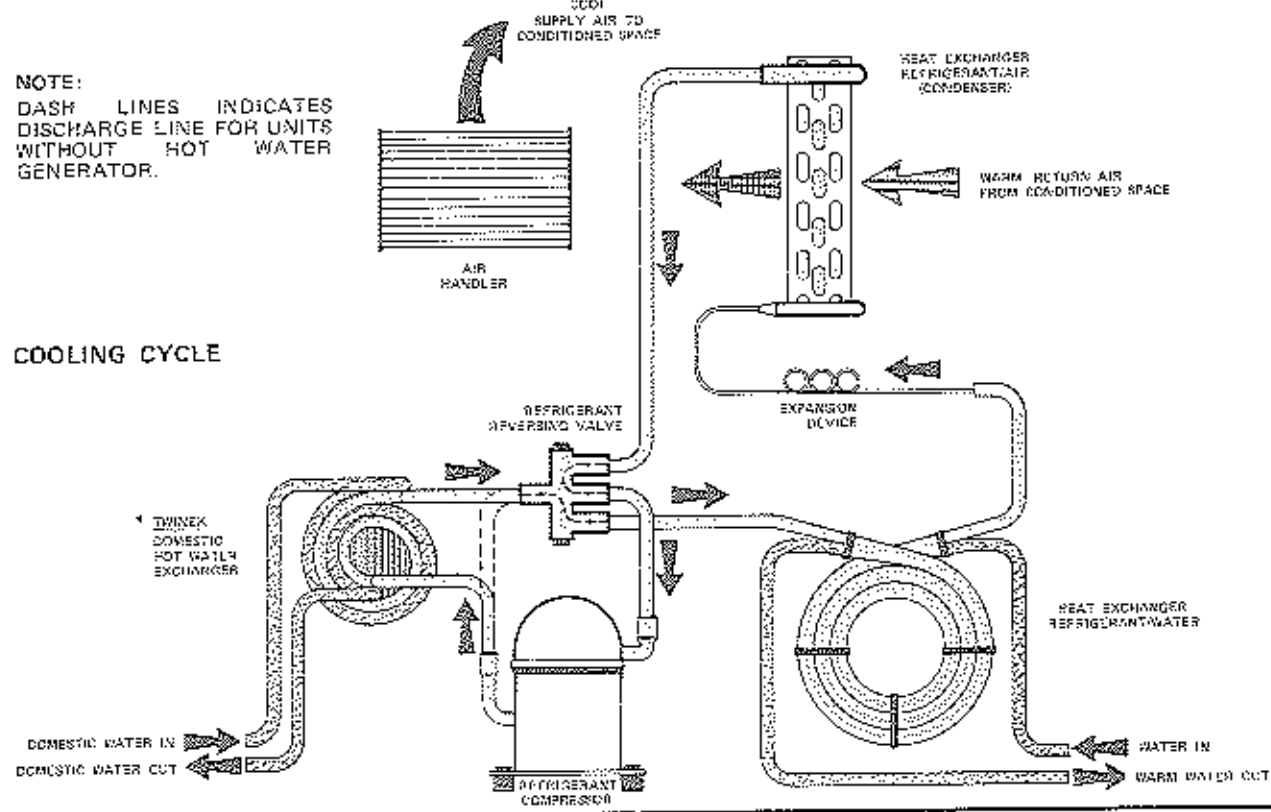
-  DOMESTIC WATER
-  REFRIGERANT
-  WELL WATER
- \* OPTIONAL

### HEATING CYCLE



NOTE:  
DASH LINES INDICATE DISCHARGE LINE FOR UNITS WITHOUT HOT WATER GENERATOR.

### COOLING CYCLE



## INTRODUCTION

The operation of the Geo-Thermal heat pump is basically the same as an air-to-air heat pump with the substitution of a water-to-refrigerant heat exchanger coil in place of an outdoor air coil. In the cooling cycle the water is used as a coolant, while in the heat mode the water is used as a heat source (see Page 1). The diagrams show the refrigerant cycle for both cooling and heating modes. The schematic also includes the hot water generator water loop which is available as an option on the 803 Series. It is necessary to understand the importance of the water supply for the efficient operation of the unit. Water temperature and water flow must be considered and controlled. The performance charts in this manual give the operating characteristics of each unit and should be considered before installing the unit.

## INSPECTION OF UNIT

After removing the unit from the carton, the panels should be immediately removed so that the unit can be inspected for any damage which might have occurred during shipment. Check for oil in the bottom of the unit, fan housing out of position, or punctured air coil.

## LOCAL CODES

All installations must be made in accordance with local electrical, heating, and air conditioning codes. National codes should be followed where local codes do not supersede. The local installer is responsible for knowing the local requirements, and for performing the installation accordingly.

## SIZING THE UNIT

The capacity of the unit to be installed should be sized according to the methods of ASHRAE. In northern areas the heating load of the house will determine the unit selected. In regions with mild winters, units should be selected to meet the cooling load. Hydronic cooling may be considered when water temperature is 55° or lower. Seldom should a unit be selected to meet 100% of the heating load if the cooling load is not within 1/2 ton. Additional strip heat is usually more economical for an average winter.

## INSTALLATION

Units are to be installed indoors in a protected space where the air temperature will remain above 55°F to avoid any problem when starting the unit. If the installation is in a

new house, or is a complete system including ductwork, the unit should be placed in accordance with good duct layout according to ASHRAE standards. If the unit is to replace an existing unit, it should be placed at the existing plenum or at the nearest possible location to prevent extended plenums and trunk lines. Any connecting ducting should be properly sized by following ASHRAE standards. Units are commonly installed in closets, utility rooms, and basements.

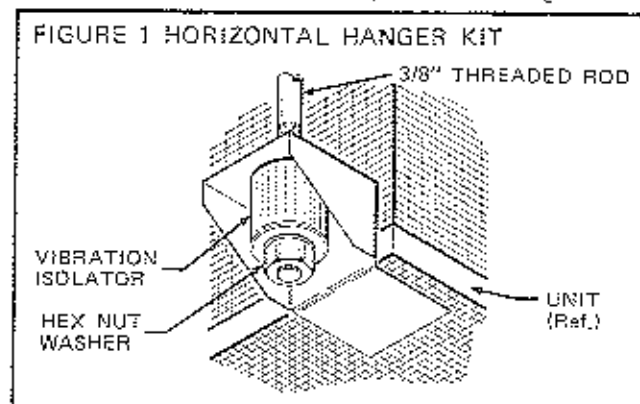
Crawl spaces will need to be protected in southern areas by preventing cold air from entering under the house. Crawl spaces are to be avoided in the north. In colder but mild winter regions it may be necessary to wrap the entire unit with blanket insulation and provide supplementary heat to the compressor compartment. Northern units installed in a garage should have a closet built surrounding the unit.

Attics are not acceptable outside the deep south.

## MOUNTING OF UNITS

Vertical units may be set on a concrete floor or a rigid platform. The platform must be of steel or wood and must support the entire bottom of the unit. If the platform is rigid, an isolator pad is not required. However, if one is used it should support the entire bottom of the unit. Duct liner or cork cut to the dimension of the unit serves as a good isolator.

Horizontal units when installed above a ceiling must be installed according to local codes. There should always be an auxiliary drain pan placed under the entire length of the unit. It is recommended that the unit be hung from supporting girders or joists by use of a horizontal hanger kit (see Figure 1) which is available as an accessory. Do not use hanger straps screwed into the unit as the unit is too heavy for this. Bar hanger rods should be screwed into isolator hangers to prevent transmission to the building framework if bar stock is used in place of the hanger kits.



## DUCT HOOKUP

Fiberglass duct may be fastened directly to the unit with heat sensitive tape. Do not use grey tape or ordinary adhesive aluminum tape. All connections should be tight fitting with no air spaces between duct and unit or duct to duct connections. Metal duct should be installed with a flexible duct collar between the plenum and the unit.

The unit is furnished with a filter rack at the return opening. If the installer desires filter-back return air grilles, the filter supplied with the unit should be removed and the return plenum fitted over the filter rack opening. Do not use both filter grilles and the unit filter!

When the return air is not ducted, local codes may limit installation to a single story residence.

## EXISTING DUCT

If the unit is installed with existing duct, a previous check should have been made to assure the duct has the capacity to handle the air needed according to the unit installed. Previous heating only systems usually do not have large enough duct to carry the heavier air of a cooling system, and/or heat pump system. Check according to an ASHRAE table, or refer to the Duct Sizing Chart on Page 17 in this manual. If ducting is too small, it must be removed and replaced with duct of the proper size.

Existing ductwork should be checked for the possibility of air leaks. Repairs should be made accordingly. Uninsulated ducts should be wrapped with a minimum of one inch duct wrap. Do not install the unit to uninsulated ductwork located in an unconditioned space, as the performance of the unit will be adversely affected.

## ELECTRICAL

All installations should be completed in accordance with the local electrical code. Units should be connected to supply boxes with copper wire only. Aluminum wire is to be avoided!

The power supply should be 60 hertz, single or three phase, sized for the current and voltage required as shown on the wiring diagram for each particular unit. The wiring diagram completely illustrates the internal wiring and power supply. The power supply should be armored cable or run through flexible conduit. It should be run from a separate disconnect which is installed within three feet of the unit. Conduit or armored cable should be positively grounded to the unit. Minimum ampacity for each unit is shown on the

unit rating plate. Supply voltage must be within +10 or -5% of rating.

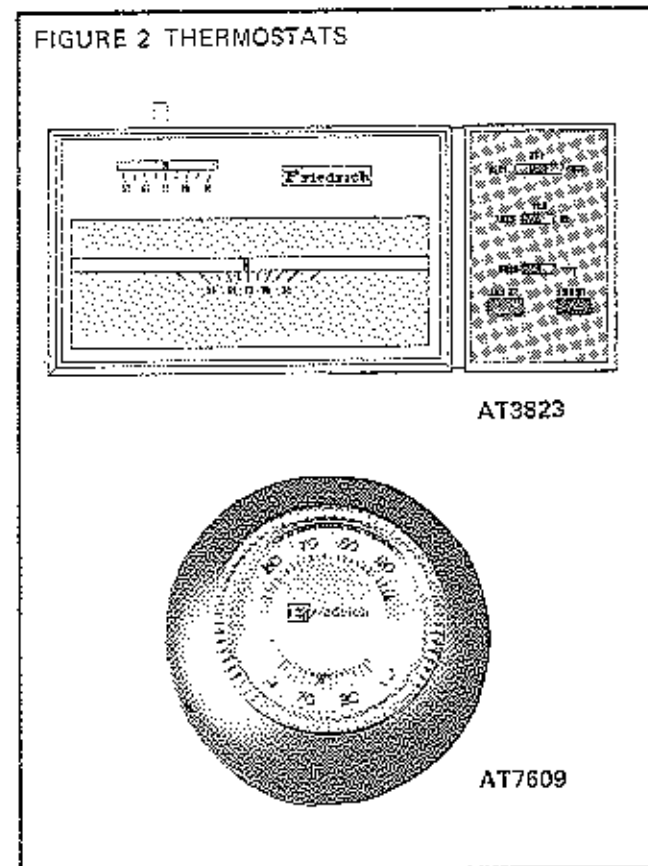
1. Run power supply cable to the opening on unit marked "power supply". Connect power conductors to the compressor contactor terminals.
2. Connect the grounding lead from the power supply to the equipment grounding lead (green) in the control box.
3. All 208/230 volt units are shipped with the transformer connected for 230 volts. If the supply voltage is 208 volts, connect the 208 volt lead (red) in place of the 230 volt lead (blue) as shown on the wiring diagram in this manual.

## LOW VOLTAGE

Use only thermostats and subbases listed for the unit (see Figure 2). Others will not function properly without rewiring. Use #18 AWG conductor cable for wiring between thermostat and the unit. Complete the thermostat wiring as shown on the wiring diagram in the control box.

Location of the thermostat should be in the main flow of air back to the unit or return air registers. It should not be placed on an outside wall, or in the kitchen area. Mounting should be approximately five feet from the floor.

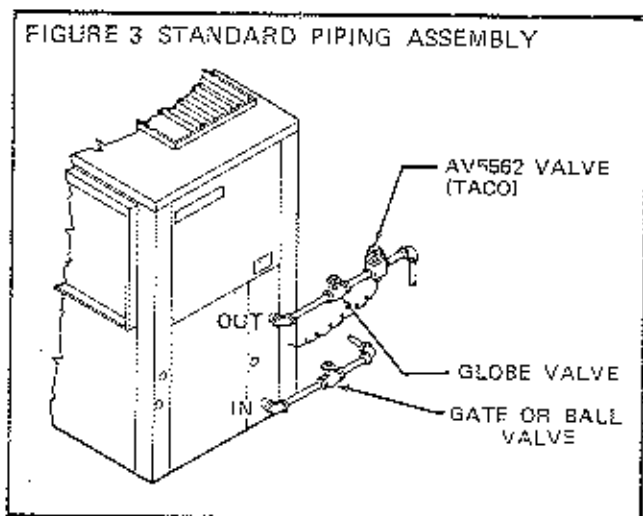
FIGURE 2 THERMOSTATS



## WATER PIPING

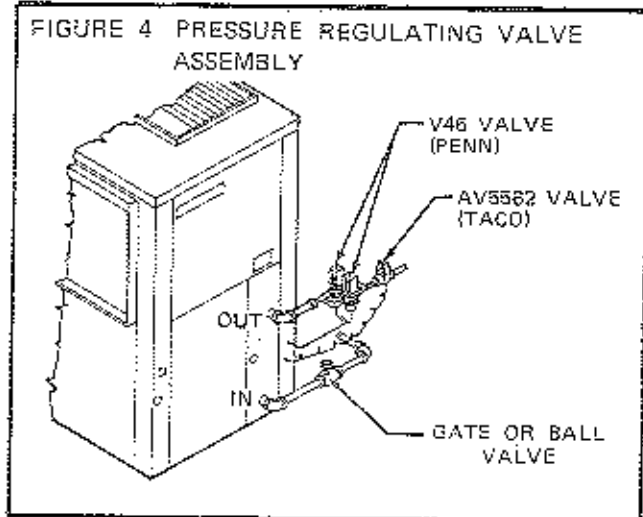
The recommended pipe is 3/4 or 1 inch PVC depending on the unit and length of lines. PVC is easy to work with, does not rust, and does not transmit sound as readily as metal pipe. Use a copper adapter between the unit and PVC pipe. The basic installation includes a gate valve in the supply line prior to the unit, with an on/off, flow control valve on the discharge line (see Figure 3). A slow opening motorized valve controlled by the low voltage is recommended to open and close the line as the unit is called into operation by the thermostat. Solenoid valves will work but tend to be noisy and may distort temperature swing during the cooling operation due to the extra load on the low voltage system.

FIGURE 3 STANDARD PIPING ASSEMBLY



Pressure regulated flow valves are recommended in areas with water temperatures below 65° for the 803/804 unit. They are of value any time the water supply will be of variable temperature of more than 10°F. Their function is to increase flow in the winter and reduce flow in the summer with lower temperature water. See page 9 for 805 unit statement.

FIGURE 4 PRESSURE REGULATING VALVE ASSEMBLY



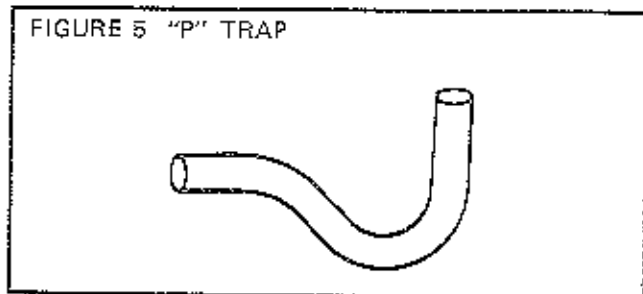
NOTE: Water "in" and "out" positions (see Figures 3 and 4) are for descriptive purposes only. Refer to unit engineering sheets for actual locations.

All exterior water piping must be buried below the frost line or well insulated to prevent altering the supply water temperature.

## DRAIN PIPING

Local codes should be followed. PVC is recommended, and should be of proper gauge to prevent sweating. Black plastic pipe may sweat from the chilled water being drained. A "P" trap should be placed at the unit (see Figure 5). A preformed trap is recommended. Your distributor should have them in stock.

FIGURE 5 "P" TRAP



## THE WELL

Since water is a crucial element to the operation of this unit, it is recommended that the services of a NWWA or equivalent certified well driller be obtained for supplying the water source. His expertise is valuable in assessing existing wells and equipment and making recommendations for new installations.

New wells need to be of sufficient depth to supply a constant supply of water to the unit. Advice of the certified well driller should be followed regarding the type of pump, size of pump, diameter of pipe, and location of the well itself. The well driller should be informed of the GPM needs of the unit. It is his responsibility to supply that amount on a constant basis. Do not be cut short by too shallow a well or a surface pump which does not have the capacity to efficiently pump the needed water when water tables drop due to heavy usage or dry spells.

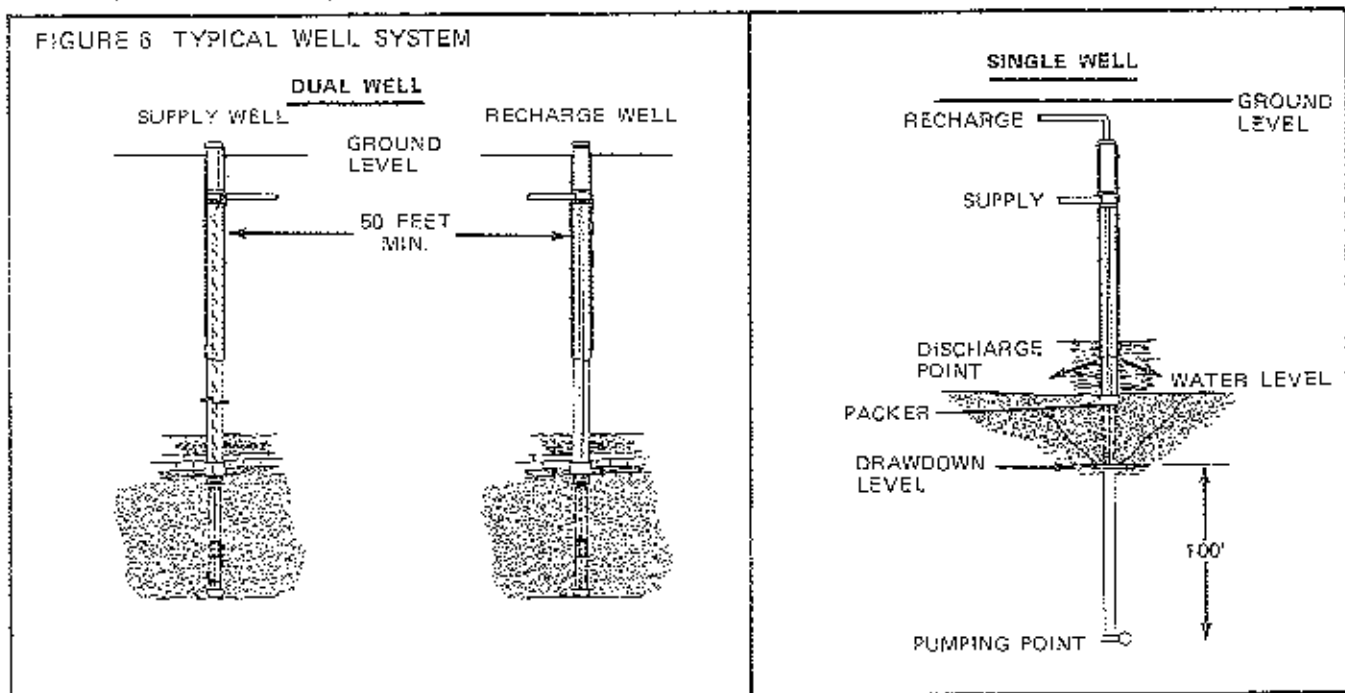
Existing wells may be used, but again it is best to have the advice of a competent well driller to know if the existing supply is adequate. In some cases it may be best to drill a new well separate from the domestic supply. The water does not need to be potable. It only needs to be clean and of sufficient supply and temperature. Well screens should be installed to prevent sand from eroding the system valves.

When tapping into an existing pressure line the tap should be made immediately after the pressure tank prior to down line taps. The tank should be sufficiently large enough to prevent constant cycling of the well pump. If not of sufficient size, a new tank must be installed, or it may be desirable to bypass the tank and cycle the pump with the unit. Remember, the electrical draw of the pump is an important consideration. These are decisions that need to be made for each installation based on existing equipment and water availability.

## DISCHARGED WATER

The discharge of water may be dictated by local requirements pertaining to codes, physical terrain, and temperature. In some areas it may be desirable to use the discharge water to sprinkle lawns in the summer. Sprinkler heads should be sized so as to allow for the proper flow (GPM) through the unit.

In most cases the desirable method of disposal will be the use of a recharge well where the water is replaced into the ground. Here local codes will usually dictate. Sufficient distance between the supply and discharge well should be provided to prevent any change in the temperature of the water supply. Wells should generally not be closer than 50 feet. The discharge should never be pumped back into the same well unless the water table is considerably higher than the pumping point (100 feet or more), and the supply of water is sizeable enough to prevent alteration of the water temperature at the well point (see Figure 6).



## START-UP

### WATER FLOW CHECK

It is good procedure to check for adequate water flow before running the compressor system. Check to assure that existing equipment is capable of supplying the water needs of the unit. This also provides for flushing of lines before operation of the unit.

### MANUAL WATER FLOW VALVES

After all lines have been run and tightly jointed, open all system flow control valves to full open position. Both low voltage and power supply should have been connected to the unit. The thermostat should remain in the system "Off" position.

### DIRECT ACTING PUMP

1. Operate pump and test system for water leaks. Repair at this time.
2. If system is watertight, set the flow balancing valve (globe valve) in the discharge line to the rated GPM for the heating mode. Refer to the individual specification sheet for the particular model. Measurement may be made either by a flowmeter or with a measurement container and checking against a 60 second watch. A flowmeter may be installed in the line, but is not necessary. Be certain at this point that the flow rate has stabilized and will remain constant.

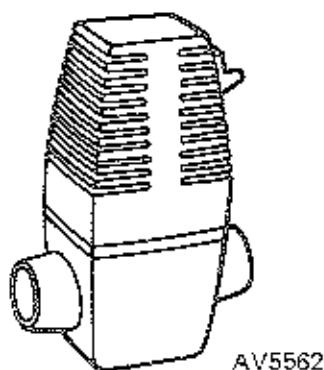


3. Disrupt power to the pump (switch off) and set the thermostat to the "Cool" position and "Auto" fan position. Move temperature setting below the present room temperature. Both fan and compressor should operate at this point.

## ELECTRICAL OPERATED CONTROL VALVES

Some systems will be installed with a motorized water valve through which the compressor is wired (see Figure 7). (The compressor starts after the flow has been established.) The pump is actuated by a pressure drop. The water test can be made by disconnecting the lead to the compressor contactor.

FIGURE 7 MOTORIZED WATER VALVE

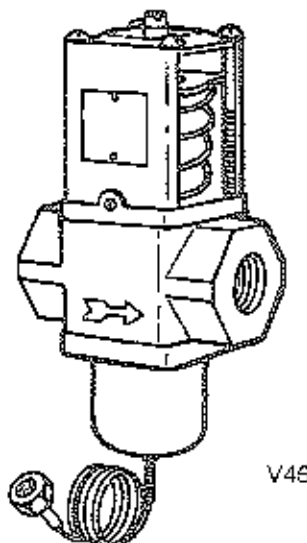


1. Bring on the pump by energizing the thermostat. Only the fan will operate. Set the flow rate and test for leaks at this time.
2. De-energize the thermostat and reconnect the compressor lead to the contactor. The unit is now ready to operate with the compressor running.

## REFRIGERANT PRESSURE FLOW CONTROL VALVES

Pressure flow control valves open when system refrigerant pressure rises above a set point. (See Figure 8). Flow may be established by setting opening point to its lowest setting if ambient is below set point. If ambient is too low to allow the valve to open, the system may be manually flushed by lifting the range spring follower with a screwdriver at two sides of the lower spring cap to open the valve. This will not effect valve adjustment. The dual valve arrangement should be connected to a single tap on the refrigerant line between the reversing valve and the heat exchanger. The water connection may be to either the supply or discharge side.

FIGURE 8 PRESSURE FLOW CONTROL VALVE



## SUPPLY VOLTAGE CHECK

The voltage at the power supply side of the contactor should be checked. It should be within +10 or -5% of the voltage indicated on the unit data plate.

## AIR FLOW ADJUSTMENT

Specification sheet for the 803/804/805 series units provide blower performance data. These units are built with a three-speed blower motor. The unit is shipped with the medium lead (blue) connected. To increase or decrease the air flow, connect either the high speed tap (black) or the low speed tap (red) in its place. Air flow is varied by motor speed, but is also a variable of the static pressure designed into the duct system.

1. Low Pressure Systems: In some short run duct systems static pressure may be so low as to necessitate the addition of additional pressure for the fan to operate against. This may be done by adding a baffle in the return or supply plenum, or by adding a restriction to one side of the fan housing.
2. High Pressure Systems: Some ducts may be extremely long or of very small capacity (old heating only systems). In this situation the motor should be set on high speed. However, this may cause a noise problem at the registers. In most cases of this type the supply and return plenum may need to be changed to a larger capacity. Branch ducts will probably be adequate as long as the trunk feeds adequate air to each branch.



## OPERATING PRESSURES & TEMPERATURES (See Page 18)

The Geo-Thermal heat pump is a factory charged unit. Ordinarily no adjustment of the charge will be necessary. AVOID the tendency of immediately thinking a unit is undercharged because pressures do not appear to be normal. The following variables should be considered before adjusting the charge:

1. Ambient Temperature: If the unit is installed in a non-heated space and ambient is below 55 degrees, it is necessary to insulate the unit to approximate the conditioned space and add some heat to the compressor compartment. A crankcase heater may be field installed.
2. Low Indoor Temperature: On start-up of an 803/804 unit in cold weather, indoor temperatures may be low enough to affect pressure readings, or even trip on low pressure cutoff. Allow the unit to run long enough to bring indoor temperatures up to normal. This will allow a pressure reading that is a true indication of performance. Starting a unit on the cooling cycle and switching to heating after a few minutes can usually be effective in starting in cold conditions. In some cases blocking the return at the unit is an alternative to immediately raise pressures. Gradually remove the block allowing the system to stabilize.
3. Water Flow Rate: Water flow rate has a direct effect on pressure readings and performance. Water flow may be either too high or too low depending on the mode of operation. Generally the heating GPM will be higher than the cooling GPM when water temperature is below 70 degrees. Refer to the specification sheet for the particular unit for the correct flow rate. Flow rate may be varied for increased performance. Proper performance will show a difference in inlet and outlet temperatures of 10-12 degrees on cooling and 5-6 degrees on the heating cycle. The pressure differential across the heat exchanger may be measured to find flow rate. Refer to pressure drop in performance data.
4. Air Flow Rate: Air delivery rate may be increased or decreased in relationship to the GPM to balance out the performance of the machine in accordance with the air delivery needs of the house. It is important that before leaving a start-up that the system has been balanced at the optimum operating level between heating and cooling. Normally the temperature difference between supply and return air will be 18-22 degrees on cooling and 35-40 degrees on heating.

*NOTE:* Some of the newer high efficiency compressors have different characteristics from past models. Some will normally operate with a "hot" dome, cool crankcase, while other brands may be just the opposite. Some of the past methods of "touch analysis" may be misleading with present series units.

## WATER COIL MAINTENANCE

All Geo-Thermal heat pumps are equipped with cupro-nickel heat exchangers. This considerably reduces any potential of scaling and corrosion. Some ground water is more colloidal than usual and some scaling may result. To minimize scaling, some precautions are recommended:

1. Keep Air Out of the Water: Water should be checked to insure that the well head is not allowing air to infiltrate the waterline. Lines should always be airtight! Check by filling a container with water and adding water below the surface. Air will appear as fine bubbles or grey turbulence.
  2. Keep System Charged at All Times: It is recommended that the shutoff valve be placed in the discharge line to prevent loss of pressure in between cycles.
  3. Constant Flow (Extreme Conditions): Scaling from severe water conditions may be abated by keeping some water flowing through the system at all times. This will keep particles in suspension and thereby reduce the chances for scaling. This is accomplished by means of a valve which does not close completely, but allows a small amount to flow.
- If a unit is installed in known high mineral content water areas, it is best to establish with the owner a coil maintenance schedule where the coil may be checked on a periodical basis. Cleaning may need to be done on a regular schedule to assure maximum efficiency and prevention of permanent coil damage. Use standard water coil cleaning methods.
4. Generally, the more water flowing through the coil the less chance for scaling. Low GPM produces higher temperatures in the coil. **Do not exceed GPM shown on the specification sheet for each unit!**

## CHARGING OF THE UNIT

When a loss of charge has resulted from a repair or replacement of a major part, proper methods of charging should be followed.

1. Pressure test with dry nitrogen. Repair any leaks with nitrogen in system.

2. Evacuate the system to 500 microns (29.9 inches of mercury).
3. Charge by using one of the following methods: (never attempt to measure charge by pressure alone)
  - A. Charging cylinder — charge to the quantity specified on the data plate.
  - B. Scale — charge by weighing actual ounces being added to the system.
  - C. Superheat — if neither charging cylinder nor scale is available, the recommended method is to follow the superheat charging steps shown below:
    - (1) Connect gauges to Schrader valves.
    - (2) Place a thermometer or thermocouple on the suction line between the reversing valve and the compressor.
    - (3) Read the temperature indicated and convert the suction pressure reading on the gauge to temperature.
    - (4) Subtract the converted pressure temperature from the thermocouple reading. The result is superheat.
    - (5) Refer to the superheat chart for the correct superheat reading as matched with the entering water temperature as shown on the pressure chart (page 18). Water flow should be within the range shown on chart with the stated temperature differential.

## INTRODUCTION

The 805 Series heat pump is a low temperature variation of the basic 803 Series machine. Physical dimensions of the equivalent model are identical except for the position of the water connections.

The 805 Series units use a thermal expansion valve to meter the refrigerant flow. This valve senses both the temperature and pressure of the refrigerant entering the suction of the compressor and automatically adjusts the flow of refrigerant for optimum operating conditions in both the heating and cooling modes. This valve is nonadjustable and cannot be serviced.

A flow switch is built into the water line which will cut off the power supply any time the water flow drops below two GPM. A time delay relay completes the circuit at start-up while the switch is in the open position. This relay will "break off" about 15 seconds after flow has been established. If flow is interrupted, the lockout circuit may be reestablished by resetting the thermostat. The system maintains loss of charge protection with a low pressure switch the same as the 803 Series.

## SYSTEM WATER CONTROL

805 units are not shipped with pressure regulating valves. It is not necessary that pressure regulating valves be installed in the water line to provide even refrigerant pressure. The expansion valve sufficiently controls suction pressure. However, they may be installed at the discretion of the contractor. For those who use the valves, a refrigerant tap is provided on the front of the unit between the water inlet and outlet. It is not necessary to drop the charge for installation of the valves.

When pressure regulating valves are used on any system, an additional water flow system valve (on-off) is recommended to prevent any water flow during the "off" cycle. (See Figure 7 on page 6). With dual reverse acting valves, one valve may be open during certain temperature conditions.

## PLACEMENT OF THE UNIT

Although the 805 is a low temperature machine, it is still necessary for the unit to be installed in a controlled temperature space, one which maintains 50-55° degrees. Areas which receive no heat are not satisfactory spaces for placement of the unit.

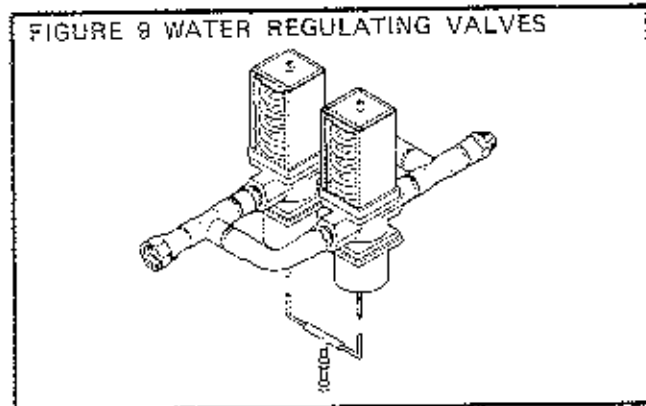
## WATER SUPPLY

The same considerations apply here as to the 803 Series. Three GPM per 12,000 BTU output should be available to obtain the optimal performance. However, for reduced flow rates refer to the performance sheet for the 805.

(Revised 6/81)

## WATER REGULATING VALVE ADJUSTMENT

With refrigerant gauges attached, operate the heat pump on the heating mode. Adjust the heating cycle water regulating valve (V46N) for an increase in suction pressure. Adjust the valve to the point where there is little or no increase in pressure reading by further opening. (See Figure 9 below). Any increase beyond this setting will be wasted water. The object is to gain a higher pressure reading for optimal heating capacity and this is gained by opening the valve for heating.



Now operate the unit on the cooling mode and adjust the cooling cycle valve (V46A) according to the following table.

### COOLING MODE

DISCHARGE PRESSURE FOR MODELS  
805 - 024, 030, 036, 042, 048, 060

	ENTERING WATER TEMPERATURE		
	45°F	55°F	65°F
Pressure PSIG	130 - 140	145 - 155	165 - 175

The following table is for suction pressures in the heating mode.

### HEATING MODE

SUCTION PRESSURE FOR MODELS  
805 - 024, 030, 036, 042, 048, 060

	ENTERING WATER TEMPERATURE		
	45°F	55°F	65°F
Pressure PSIG	49 - 55	56 - 63	68 - 75

The water system should be capable of delivering the maximum recommended flow rate as shown in the table below against a pressure drop of 35 PSIG.

MODEL	MAXIMUM FLOW RATES
805-024	8 gpm
805-030	10 gpm
805-036	11 gpm
805-042	13 gpm
805-048	14 gpm
805-060	18 gpm

## HOT WATER GENERATOR

The Hot Water Generator requires only simple piping and wiring to complete the hot water system.

**ALWAYS USE COPPER TUBING**

**IMPORTANT: FLUSH TANK**

### WATER PIPING

When the Hot Water Generator is being connected to an existing hot water tank, the tank must be thoroughly flushed to remove all sediment and deposits from the tank before connecting to the Generator. Failure to flush the tank may damage the pump and heat exchanger and cause inefficient operation or malfunction.

The piping should be connected from the Friedrich unit to the hot water heater (See Figure 10). Connect a line from the "hot water out" fitting of the unit to the "hot water supply" fitting of the water heater or to the auxiliary tap on the top of the unit. Install a bleed port in the line near the water heater for expelling air trapped in the line. Double check that the condenser "water in" and "water out" connections are not mixed or confused with the hot water connections.

Be careful not to disturb the effective operation of the pressure and temperature relief valve installed on the water tank.

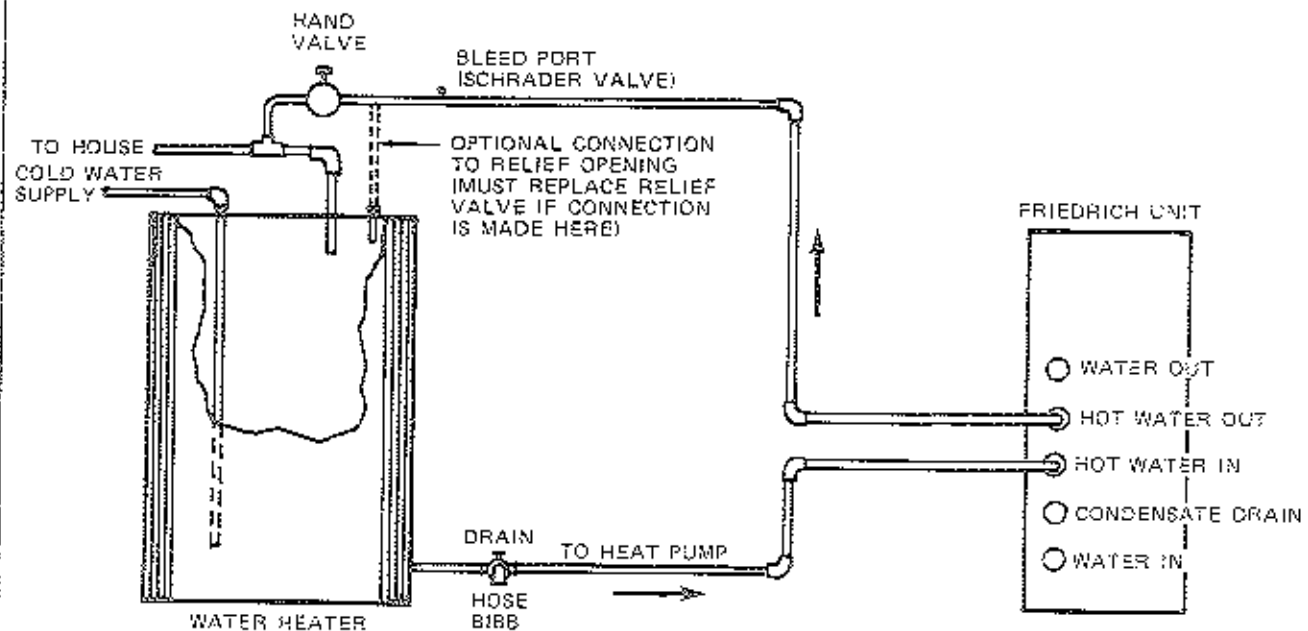
Piping sizes between the Friedrich unit and the hot water heater should be in accordance with the following table. Distances of greater than 24 feet are not recommended because the pump capacity would be exceeded.

Distance Between Hot Water Heater and Friedrich Unit	Minimum Recommended Water Line Size (nom)
0 - 5 Feet	1/4" (3/8" O.D.)
6 - 25 Feet	3/8" (1/2" O.D.)

It is recommended that the water piping be insulated with a minimum of 1/4" thick closed cell piping insulation such as "Armaflex" or "Rubatex". It is especially important to insulate the hot water out line to prevent losses to the ambient.

A valve in the water line is recommended for adjustment of the flow rate once the installation is complete, and to facilitate flushing of the heater.

FIGURE 10 WATER PIPING



## ELECTRICAL CONNECTIONS

If the voltage is 220 volts or above with the compressor running, no adjustment is required, however if the voltage is below 220 volts, disconnect the wire from the 230 volt tap and connect it to the 208 volt tap. (See Figure 11). A wiring diagram is located inside the cover of the unit control box.

The temperature controls are preset at the factory to provide water at 125–150°F. If higher temperatures are required, the return line thermostat may be adjusted with a screwdriver for higher temperatures. (See Figure 12).

Do not energize the Hot Water Generator until the water connections are made and the water has been turned on. Operation of the pump dry may be harmful and would invalidate the warranty.

## START-UP

Check that all connections and piping are completed. Start the air conditioner, open bleed port, and allow any air in line to be expelled. This may take 5–10 minutes. Water will not circulate with air in line. After approximately

15 minutes, check the leaving water temperature by measuring the leaving water line temperature with a reliable thermometer such as an electronic thermometer. Adjust the valve in the water line so that the leaving water temperature is 130–140°F with cold water entering from the tank bottom. Wait for approximately 5 minutes after adjusting the valve to allow the water temperature to stabilize.

If the leaving water temperature is over 165°F with the valve wide open, check to see that:

1. The entering water is cold (below 80 degrees); if not draw off enough hot water until cold water is entering.
2. The voltage connection is correct (see section on electrical connections).

If the temperature is still too high, it may be that the water lines are too long or too small in diameter and will have to be changed to insure proper operation.

FIGURE 11 VOLTAGE DROPPING RESISTOR

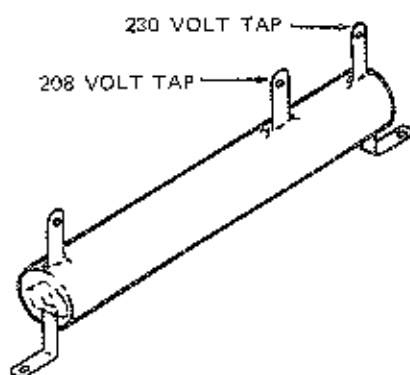
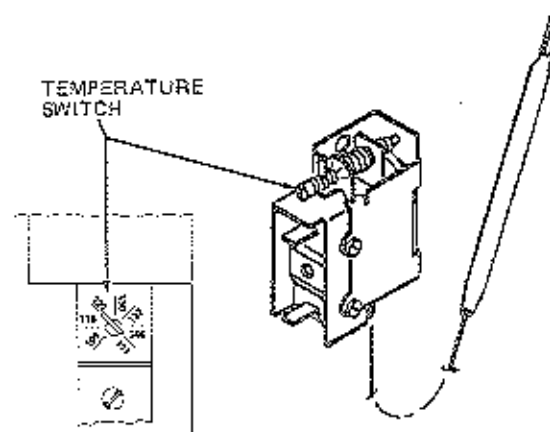


FIGURE 12 RETURN LINE THERMOSTAT



# Troubleshooting

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Entire unit does not run.	Blown fuse.	Replace fuse or reset circuit breaker. (Check for correct size fuse.)
	Broken or loose wires.	Replace or tighten the wires.
	Voltage supply low.	If voltage is below minimum voltage specified on data plate, contact local power company.
	Low voltage circuit.	Check 24 volt transformer for burnout or voltage less than 18 volts.
	Thermostat.	Set thermostat on "Cool" and lowest temperature setting, unit should run. Set thermostat on "Heat" and highest temperature setting, unit should run. Set fan to "On", fan should run. If unit does not run in all three cases, the thermostat could be wired incorrectly or be faulty. To ensure faulty or miswired thermostat, disconnect thermostat wires at the unit and jumper between "R", "Y", "G", and "O" terminals and unit should run. Replace thermostat with correct thermostat only. A substitute may not work properly.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit operates, not cooling properly.	Clogged air filter	Check filter. Clean or replace if found too dirty.
	Water flow through condenser restricted, stopped, or insufficient supply.	Check condenser flow, increase GPM.
	Defective compressor or refrigerant leak.	If compressor runs but the evaporator does not cool down, it would indicate either a defective compressor or loss of refrigerant charge.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit heats only.	Reversing valve does not shift, the valve is stuck.	The solenoid valve is de-energized due to miswiring at the unit or the thermostat - correct wiring. Replace valve if tight or frozen and will not move.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit will not operate on "Heating".	Clogged or dirty filter.	Check filter. Clean or replace if found too dirty.
	Thermostat improperly set.	Is it below room temperature? Check thermostat setting.
	Defective thermostat.	Check thermostat operation. Replace if found defective.
	Incorrect wiring.	Check for broken, loose, or incorrect wires.
	Blower motor defective.	Check blower motor in one of the other switch positions. If it does not operate, check for open overload. If motor is not overheated, replace it.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Insufficient cooling or heating.	Water.	Lack of sufficient pressure, temperature and/or quantity of water. Possible scaling in condenser, (refer to cleaning and descaling methods). Adjust flow according to specifications.
	Unit undersized.	Recalculate heat gains or losses for space to be conditioned. If excessive, rectify by adding insulation, shading, etc.
	Loss of conditioned air by leaks.	Check for leaks in ductwork or introduction of ambient air through doors and windows.
	Thermostat.	Improperly located thermostat (eg. near kitchen sensing inaccurately the comfort level in living areas).
	Airflow.	Lack of adequate airflow or improper distribution of air. Check the motor speed or duct sizing. Check the filter, it should be inspected every three months and changed if dirty. Remove or add resistance accordingly.
	Refrigerant charge.	Low on refrigerant charge causing inefficient operation. Adjust only after adjusting CFM and GPM.
	Blower runs backwards.	Reverse the two blower motor capacitor leads.
	Compressor.	Check for defective compressor. If discharge pressure is too low and suction pressure too high, compressor is not pumping properly. Replace compressor.
	Reversing valve.	Defective reversing valve creating bypass of refrigerant from discharge to suction side of compressor. When it is necessary to replace the reversing valve, wrap it with a wet cloth and direct the heat away. Excessive heat can damage the valve.
Operating pressure.	Incorrect operating pressure (see chart).	
Refrigerant system.	Check strainer and capillary tubes for possible restrictions to flow of refrigerant. The refrigerant system may be contaminated with moisture, non-condensibles and particles. Dehydrate, evacuate, and recharge the system.	

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Evaporator ices over.	Clogged air filter.	Check filter. Clean or replace if found too dirty.
	Motor set on wrong speed.	Connect to higher speed tap.
	Evaporator blower motor tripping off on overload.	Check for overheated evaporator blower motor and tripped overload. Replace motor if necessary.
	Unit operating at too low room temperature.	If room temperature drops below 55°F, the evaporator may ice over.
	Unit operates at too low water temperature.	When unit operates when water too cold it may ice over.



PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Blower motor runs but compressor does not.	Thermostat.	Check setting, calibration, and wiring.
	Wiring.	Check for loose or broken wires at compressor, capacitor, or contactor.
	High or low pressure controls.	The unit could be off on the high or low pressure cut out control. Reset the thermostat to "Off". After a few minutes turn to "Cool". If the compressor runs, unit was off on high or low pressure (see complaints for possible causes). If the unit still fails to run, check for faulty pressure switch by jumping the high and low pressure controls individually. Replace if defective.
	Defective lockout relay.	Stuck open, does not reset when power is turned off. Must be replaced.
	Defective capacitor.	Check capacitor, if defective remove, replace and rewire correctly.
	Voltage supply low.	If voltage is below minimum voltage specified on the data plate, contact local power company.
	Compressor overload open.	In all cases an "external" or "internal" temperature sensitive compressor overload is used. If the compressor dome is too hot to touch, the overload will not reset until the compressor cools down. If the compressor is cool and the overload does not reset, there may be a defective or open overload. If the overload is external, replace the overload, otherwise replace the compressor.
	Compressor motor grounded.	Internal winding grounded to the compressor shell. Replace the compressor. If compressor burnout, install filter drier at suction line.
	Compressor windings open.	Check continuity of the compressor windings with an ohmmeter. If the windings are open, replace the compressor.
Seized compressor.	Try an auxiliary capacitor in parallel with the run capacitor momentarily. If the compressor starts but the problem recurs on starting, install an auxiliary start kit. The hard-start kit is comprised of a recommended start relay and correctly sized capacitor. If the compressor still does not start, replace the compressor.	

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit short cycles.	Thermostat.	The differential is set too close in the thermostat. Readjust heat anticipator.
	Wiring and controls.	Loose wiring connections, or control contactor defective.
	Compressor overload.	Defective compressor overload, check and replace if necessary. If the compressor runs too hot, it may be due to a deficient refrigerant charge.
	Thermostat.	Improperly located thermostat (e.g. near kitchen, sensing inaccurately the comfort level in living areas).

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit off on high pressure cutout control.	Discharge pressure too high on "Cooling" Cycle.	Lack of, or inadequate, water flow. Entering water too warm. Scaled or plugged condenser.
	Discharge pressure too high on "Heating" Cycle.	Lack of, or inadequate, air flow. Entering air too hot. Blower inoperative, clogged filter or coil, restrictions in ductwork.
	Refrigerant charge.	The unit is overcharged with refrigerant. Bleed off some charge or evacuate and recharge with specified amount of R22, only after next check.
	Excessive CFM and insufficient water flow.	Check for correct CFM. Check water flow for correct GPM.
	Defective high pressure switch.	Stuck open, does not reset, or has defective calibration. A replacement switch is available that attaches to the service port. When it is necessary to replace either of the pressure switches or reversing valve, wrap them with a wet cloth and direct the heat away. Excessive heat can damage them.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Unit off on low pressure cutout control.	Suction pressure too low on "Cooling" Cycle.	Lack of, or inadequate, air flow. If belt drive, check belt. Entering air too cold. Blower inoperative, clogged filter or coil, restrictions in ductwork.
	Suction pressure too low on "Heating" Cycle.	Lack of, or inadequate, water flow. Entering water too cold. Scaled or plugged condenser.
	Suction pressure too low because of low ambient temperature.	When installed in an unconditioned space, (such as a garage) the unit may not start in cold weather, (approximately 50°F). In this case, it may be necessary to start the unit on cooling in cool weather for three to five minutes, then shut off and turn to heat, after one minute shut down. (It may be necessary to repeat this procedure several times, especially when a crankcase heater is not used.)
	Refrigerant charge.	Low refrigerant charge. Locate leaks, repair, evacuate, and recharge with specified amount of R22 only after checking CFM - GPM.
	Defective low pressure switch.	Stuck open, does not reset or has defective calibration. A replacement switch is available that attaches to the service port. When it is necessary to replace the pressure switch, wrap it with a wet cloth and direct the heat away. Excessive heat can damage the pressure switch.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Water drips from unit.	Unit not level or pitched correctly.	Level unit.
	Condensate drain line kinked or plugged.	Clean condensate drain.

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Water leak.	Plugged condensate drain or machine out of level.	Condensate drains pick up dirt or algae which can grow, causing the drain outlet to clog and condensate to overflow. Inspect and clean. Check level of the unit and adjust.
	Condensate trap not installed.	Install proper trap (see instructions).

PROBLEM	POSSIBLE CAUSE	CHECKS AND CORRECTIONS
Noisy operation.	Compressor.	Make sure the compressor is not in direct contact with the base or sides of the cabinet. The hold-down bolts used for shipping should be loosened so that the compressor is floating freely on its isolator mounts. Excessive noise will occur if the compressor has a broken valve or loose discharge tube. Replace the compressor.
	Blower and blower motor.	Blower wheel hitting the casing. Adjust for clearance and alignment. Bent blower, check and replace if damaged. Loose blower wheel on shaft, check and tighten. Defective bearings, check and replace.
	Contactors.	A "clattering" or "humming" noise in the contactor could be due to control voltage less than 18 volts. Check for low supply voltage, low transformer output or extra long runs of thermostat wires. If the contactor contacts are pitted or corroded or coil is defective, repair or replace.
	Rattles and vibrations.	Check for loose screws, panels, or internal components. Tighten and secure. Copper piping could be hitting the metal surfaces. Carefully readjust by bending slightly.
	Airborne noises and other sounds.	Undersized ductwork will cause high airflow velocities and noisy operation. Excessive water through the water-cooled heat exchanger will cause a rattling sound. Throttle back on the water flow ensuring adequate flow for good operation but eliminating the noise.
	Water.	Reduce water pressure to below 35 pounds if a Dole Water Valve is used.



## RESIDENTIAL DUCT SIZING CHART

Standards: 900 FPM Main Duct  
600 FPM Branch

Design duct size at .085 - .1 friction per 100 feet

ACCEPTABLE BRANCH DUCT SIZES			ACCEPTABLE MAIN OR TRUNK DUCT SIZES		
CFM	Round	Rectangular	Round	Rectangular	
50	4"	4 x 4		Metal duct in unconditioned space must have liner or be wrapped with blanket insulation of 1" thickness.  Fiberglass board must be jointed by fab and mastic or stapled with heat-applied aluminum tape. Grey-duct tape or plain-foil tape are not acceptable.	
75	5"	4 x 5, 4 x 6			
100	6"	4 x 8, 5 x 6			
125	6"	4 x 8, 5 x 6, 6 x 6			
150	7"	4 x 10, 5 x 8, 6 x 6			
175	7"	5 x 10, 6 x 8, 4 x 13, 7 x 7			
200	8"	5 x 10, 6 x 8, 4 x 14, 7 x 7			
225	8"	5 x 12, 7 x 8, 6 x 10			
250	9"	6 x 10, 8 x 8, 4 x 16			
275	9"	4 x 20, 8 x 8, 7 x 10, 5 x 15, 6 x 12			
300	10"	6 x 14, 8 x 10, 7 x 12	10"		4 x 20, 7 x 10, 6 x 12, 8 x 9
350	10"	5 x 20, 6 x 16, 9 x 10	10"		5 x 20, 6 x 16, 9 x 10, 8 x 12
400	12"	6 x 18, 10 x 10, 9 x 12	10"		10 x 10, 6 x 18, 8 x 12, 7 x 14
450	12"	6 x 20, 8 x 14, 9 x 12, 10 x 11	12"		6 x 20, 7 x 18, 8 x 16, 10 x 12
500			12"		8 x 18, 9 x 15, 10 x 14, 12 x 12
600			14"		10 x 18, 12 x 14, 8 x 24
800			16"	10 x 20, 12 x 18, 14 x 15	
1000			18"	10 x 25, 12 x 20, 14 x 18, 15 x 16	
1200			18"	10 x 30, 15 x 18, 14 x 20	
1400			20"	10 x 35, 15 x 20, 16 x 19, 12 x 30, 14 x 25	
1600			20"	10 x 40, 12 x 30, 15 x 25, 18 x 20	
1800					
2000					

Grilles and registers shall be sized according to manufacturer's performance data capable of handling the CFM of the duct at a throw based on room dimensions. Return air registers should be selected to provide for 450 FPM face velocity.

**COOLING & HEATING CYCLE OPTIMUM PRESSURES & SUPERHEAT**  
 (\*Flow Rate Corresponds to Approximately 10° TD on Cooling Cycle & 5 to 6° TD on Heating Cycle)

MODEL 803/804	SYSTEM PARAMETERS			COOLING CYCLE			HEATING CYCLE		
	SUPPLY WATER TEMP. °F	WATER FLOW RATE GPM*	AIR FLOW RATE CFM	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	SUPERHEAT °F	SUCTION PRESSURE PSIG	DISCHARGE PRESSURE PSIG	SUPERHEAT °F
024	60°	6.4	800	70	150	27	75	255	3
	65°	6.4	800	70	170	23	80	255	7
	70°	6.4	800	73	185	19	85	270	12
	75°	6.4	800	75	195	15	90	275	17
	80°	6.4	800	75	210	14	90	280	21
	85°	6.4	800	76	225	12	90	285	25
030	60°	8.0	1000	65	175	38	70	250	0
	65°	8.0	1000	70	180	32	75	260	2
	70°	8.0	1000	73	190	27	80	265	4
	75°	8.0	1000	75	195	21	85	275	6
	80°	8.0	1000	75	210	18	90	280	10
	85°	8.0	1000	80	220	11	90	285	14
036	60°	9.1	1250	69	170	33	70	245	14
	65°	9.1	1250	65	180	30	73	250	19
	70°	9.1	1250	67	190	27	76	250	22
	75°	9.1	1250	70	200	24	78	255	25
	80°	9.1	1250	73	205	20	80	260	28
	85°	9.1	1250	75	220	15	80	270	31
042	60°	11.3	1500	68	185	28	74	245	1
	65°	11.3	1500	70	190	25	78	250	4
	70°	11.3	1500	73	195	23	82	255	7
	75°	11.3	1500	75	200	21	84	260	10
	80°	11.3	1500	77	210	18	85	265	13
	85°	11.3	1500	80	225	14	86	270	16
048	60°	12.8	1700	73	190	26	66	215	2
	65°	12.8	1700	75	195	24	62	225	15
	70°	12.8	1700	76	200	22	65	230	23
	75°	12.8	1700	78	205	19	57	235	28
	80°	12.8	1700	80	215	16	70	235	32
	85°	12.8	1700	80	230	12	70	240	35
050	60°	16.6	2000	70	205	29	56	210	23
	65°	16.6	2000	75	210	27	58	210	31
	70°	16.6	2000	76	210	24	60	215	36
	75°	16.6	2000	78	215	21	60	215	40
	80°	16.6	2000	80	225	17	62	220	43
	85°	16.6	2000	80	235	13	65	230	45

NOTE: Based upon return air temperature — 80°DB/67°WB (Cooling Cycle)  
 70°DB (Heating Cycle)

### 805 COOLING/HEATING CYCLE OPERATING CONDITIONS

MODEL 805	UNIT CHARGE (OZ. R-22)	ENT. WAT. TEMP. °F	FLOW RATE (GPM)	COOLING		HEATING	
				HEAD PRESSURE (PSIG)	SUCTION PRESSURE (PSIG)	HEAD PRESSURE (PSIG)	SUCTION PRESSURE (PSIG)
024	40	45°	4.0	152	69	234	50
			6.0	140	68	236	52
			8.0	135	67	240	54
		55°	4.0	175	70	247	59
			6.0	163	68	253	62
			8.0	155	66	255	63
030	54	45°	5.0	145	70	218	49
			7.5	132	70	221	51
			10.0	126	70	221	52
		55°	5.0	165	71	236	58
			7.5	154	70	242	60
			10.0	146	70	243	62
036	56	45°	7.0	140	68	218	50
			9.0	134	68	216	51
			11.0	125	68	220	52
		55°	7.0	160	68	234	60
			9.0	152	68	236	61
			11.0	150	68	237	62
042	60	45°	7.0	145	68	208	46
			10.0	133	67	210	47
			13.0	126	67	212	48
		55°	7.0	166	69	216	54
			10.0	157	69	220	56
			13.0	150	69	223	56
060	75	45°	10.0	160	75	192	50
			14.0	150	74	195	51
			18.0	143	74	198	52
		55°	10.0	182	76	205	57
			14.0	169	75	208	59
			18.0	163	75	210	60

# ELECTRICAL DATA

1. THE BASIS FOR THE FOLLOWING DATA IS BASED ON UL REQUIREMENTS AND THE NATIONAL ELECTRIC CODE.
2. ALL UNITS ARE AVAILABLE WITH OPTIONAL AUTOMATIC CHANGE OVER THERMOSTAT.

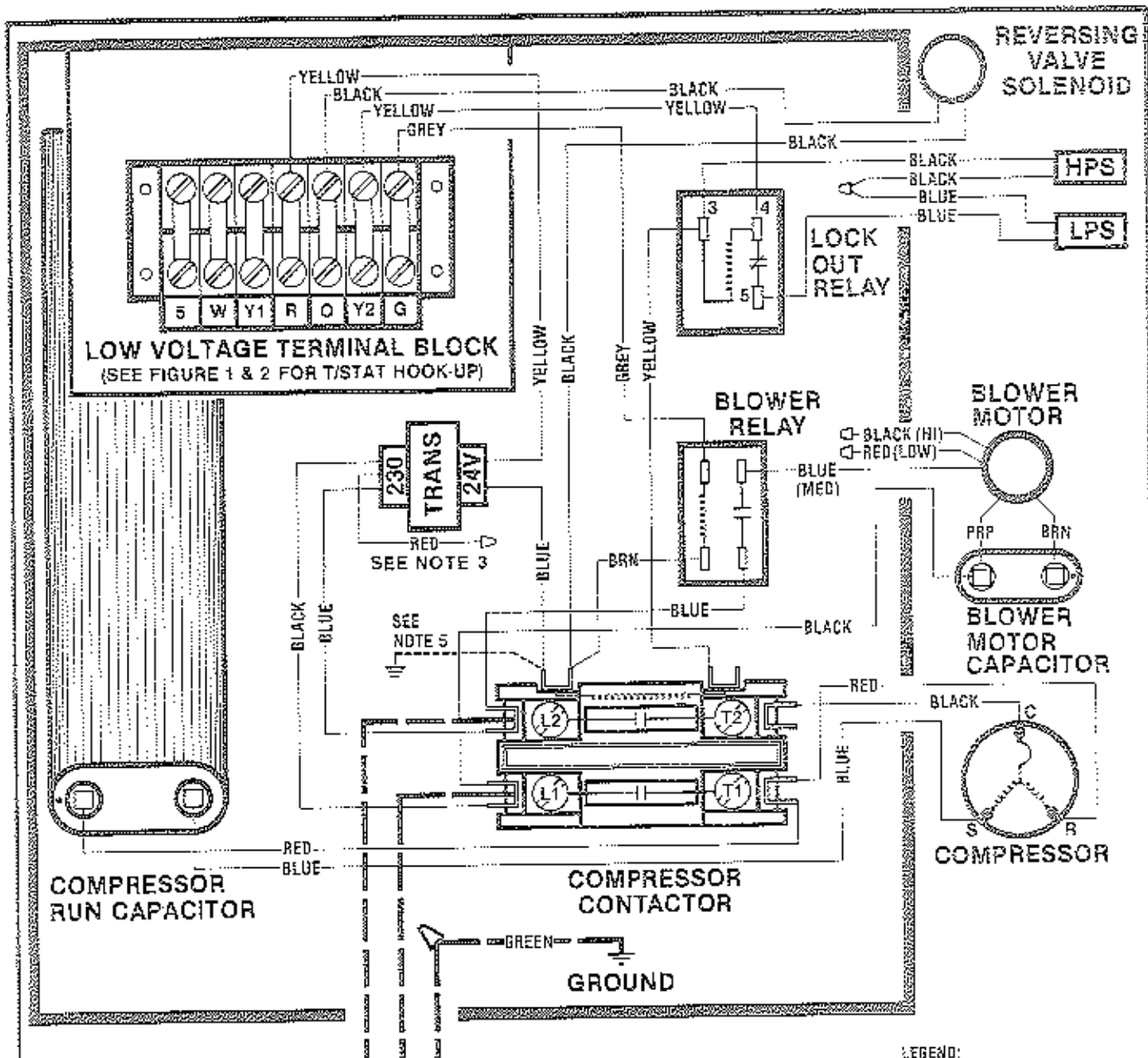
V&H MODEL NO.	VOLTAGE	PH.	MINIMUM CIRCUIT AMPACITY	MAX. FUSE SIZE	COMP. L.R.A.	COMP. R.L.A.	BLOWER F.L.A.	TOTAL F.L.A.	BLOWER WHEEL DIAMETER & LENGTH	BLOWER H.P.	REF. TO AIR HEAT. EXCH. FACE AREA F+2	COIL DEPTH	FINS PER INCH	V.B.H. OR DIRECT DRIVE MULT. SPEED
804-120	208/230 460	3 3	44.6 21.2	60 25	103 54	16.1 7.9	7.5 3.4	39.7 19.2	11 7/8 2- 10 7/8	2	8.33	4.33	13	V.B.
804-096	208/230 460	3 3	37.4 18.4	50 25	72 35	14.1 7.0	5.7 2.6	33.2 16.6	10 5/8 2- 10 7/8	1 1/2	8.33	3.25	14	V.B.
803/ 804 060	208/230 208/230 460	1 3 3	39.8 26.4 12.5	60 40 20	132 103 54	26.0 16.1 7.9	5.8 5.8 2.6	31.8 21.9 10.5	11 7/8  10 7/8	1	4.17	4.33	13	DDMS
803/ 804 048	208/230 208/230 460	1 3 3	30.0 23.0 11.0	45 35 15	104 72 35	19.8 14.1 7.0	5.4 5.4 2.2	25.2 19.5 9.2	10 5/8  10 7/8	3/4	4.17	3.25	14	DDMS
803/ 804 042	208/230 208/230 460	1 3 3	28.7 19.4 9.6	45 30 15	93 71 41	19.4 12.6 6.3	3.4 3.4 1.7	22.8 18.2 8.0	10  8	1/2	3.33	3.00	14	DDMS
803/ 804 036	208/230 265 208/230 460	1 1 3 3	23.0 21.6 16.7 8.3	35 35 25 15	75.8 70 65 32.5	15.8 13.5 10.4 5.3	3.2 3.2 3.2 1.8	19.0 16.7 13.6 7.1	9  7	1/2	3.33	2.25	14	DDMS
803/ 804 030	208/230 265	1 1	19.5 15.4	30 25	85.0 56.0	14.0 11.0	2.0 1.6	16.0 12.6	10  8	1/4	2.50	3.00	13	DDMS
803/ 804 024	208/230 265	1 1	16.4 13.1	25 20	54.0 47.0	11.8 9.3	1.6 1.5	13.4 10.8	9  7	1/4	2.50	2.25	13	DDMS
803/ 804 019	208/230 265	1 1	11.1 5.7	15 15	40.6 34.0	7.6 6.0	1.5 1.2	9.1 7.2	9  4	1/8	2.22	3.00	14	DDMS

**Friedrich**
**803/804 SERIES**
**GENERAL SPECIFICATIONS**

 - CERTIFICATIONS -  
5/80


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**FCM 803/804-2**

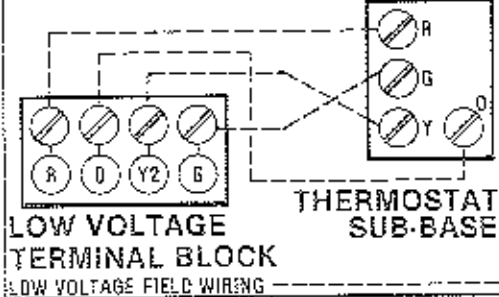


**POWER SUPPLY**  
208/230-1-60  
SEE NOTE 2

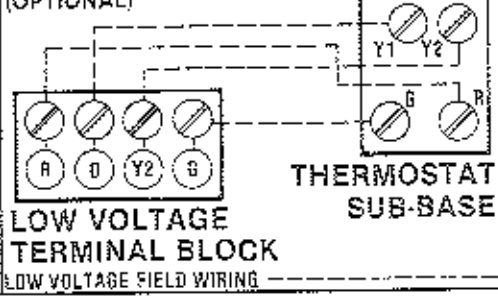
**LEGEND:**  
LPS—LOW PRESSURE SWITCH  
HPS—HIGH PRESSURE SWITCH  
NOTES

1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
2. LINE VOLTAGE FIELD WIRING
3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES
5. FOR USE ON CANADIAN UNITS ONLY.

**FIGURE 1 MANUAL CHANGE OVER**



**FIGURE 2 AUTO CHANGE OVER (OPTIONAL)**



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**803/804-015-G**

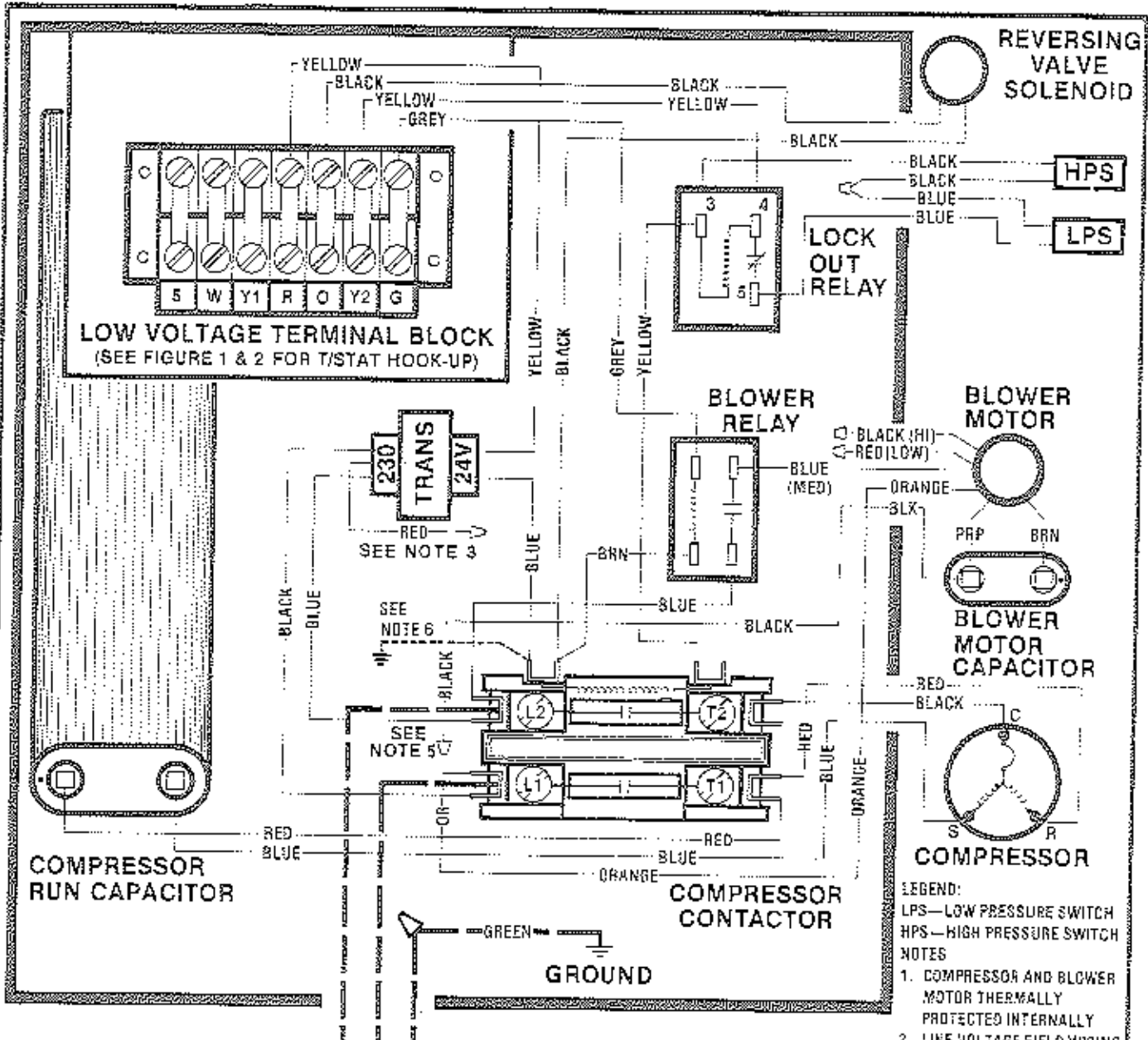
**WIRING DIAGRAM**  
208/230V/1PH/60HZ



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**FCM 803/804-015-G**

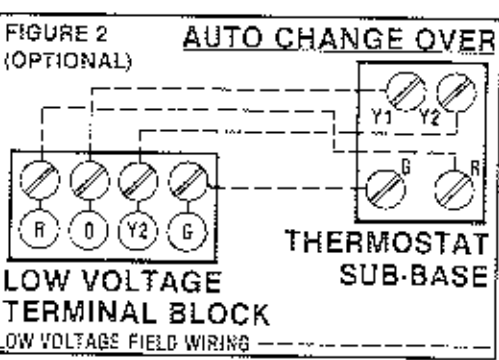
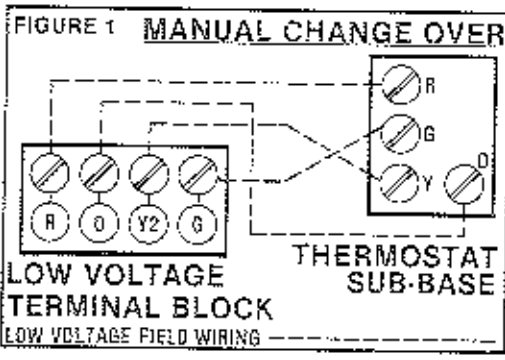




POWER SUPPLY  
208/230-1-60  
SEE NOTE 2

LEGEND:  
LPS—LOW PRESSURE SWITCH  
HPS—HIGH PRESSURE SWITCH  
NOTES

1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
2. LINE VOLTAGE FIELD WIRING
3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (CN COMP. CONTACTOR); AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES
5. BLOWER MOTOR CONNECTED FOR 230V SUPPLY. FOR 208V SUPPLY, DISCONNECT ORANGE LEAD AT "L1" CN COMP. CONTACTOR AND TAPE OPEN END; THEN ATTACH BLACK LEAD TO "L1".
6. FOR USE ON CANADIAN UNITS ONLY.



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803/804-019-G

WIRING DIAGRAM  
208/230V/1PH/60HZ

CERTIFICATIONS  
5/80



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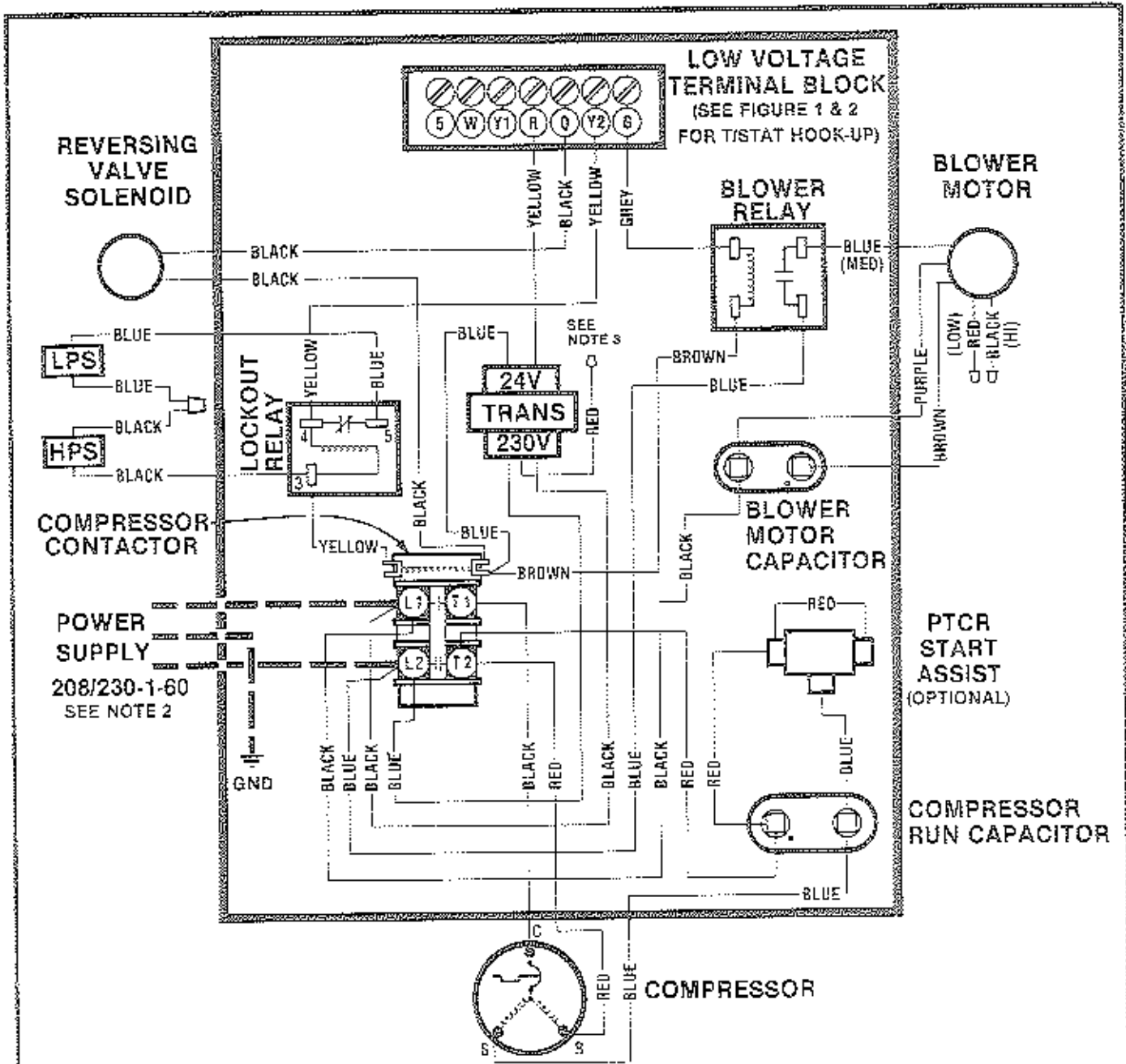


FIGURE 1 MANUAL CHANGE OVER

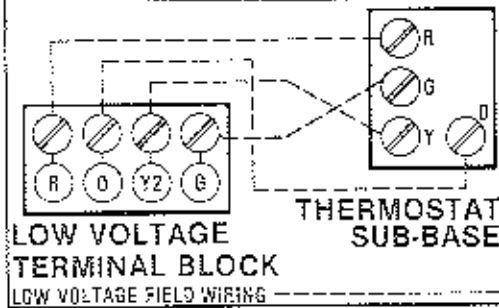
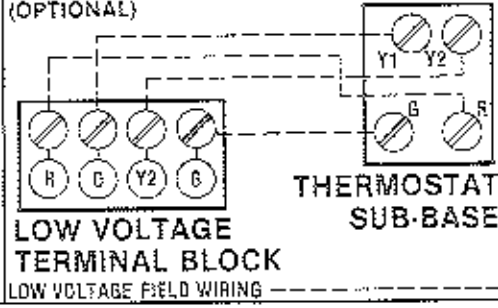


FIGURE 2 AUTO CHANGE OVER (OPTIONAL)



LEGEND:

- LPS — LOW PRESSURE SWITCH
- HPS — HIGH PRESSURE SWITCH

NOTES

1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
2. LINE VOLTAGE FIELD WIRING
3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

**Friedrich**

**803/804-024-G**

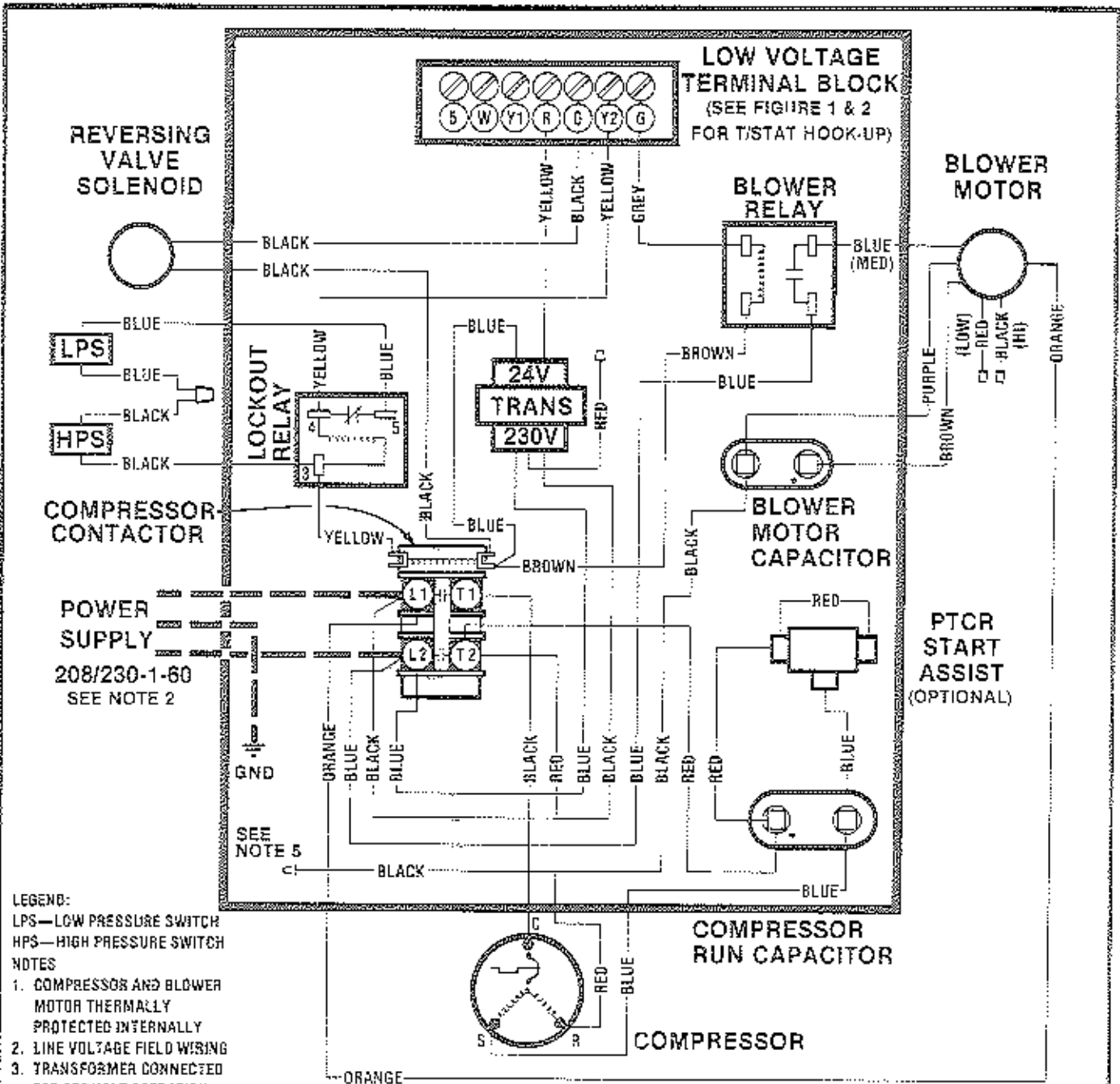
**WIRING DIAGRAM  
208/230V/1PH/60HZ**

CERTIFICATIONS  
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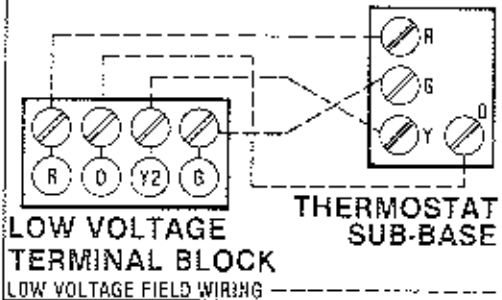


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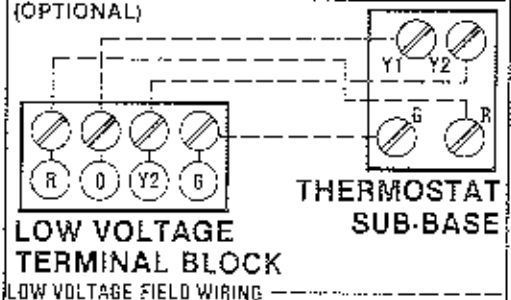
LPS—LOW PRESSURE SWITCH  
 HPS—HIGH PRESSURE SWITCH  
**NOTES**

1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
2. LINE VOLTAGE FIELD WIRING
3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMPR. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES
5. BLOWER MOTOR CONNECTED FOR 230V SUPPLY. FOR 208V SUPPLY, DISCONNECT ORANGE LEAD AT "L1" ON COMPR. CONTACTOR AND TAPE OPEN END; THEN ATTACH BLACK LEAD TO "L1".

**FIGURE 1 MANUAL CHANGE OVER**



**FIGURE 2 AUTO CHANGE OVER (OPTIONAL)**



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**803/804-030-G**

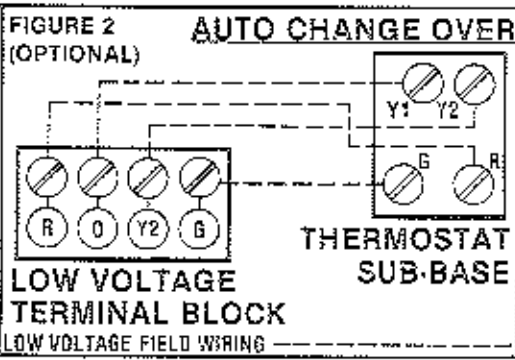
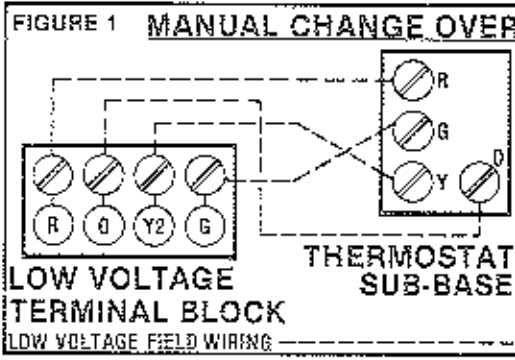
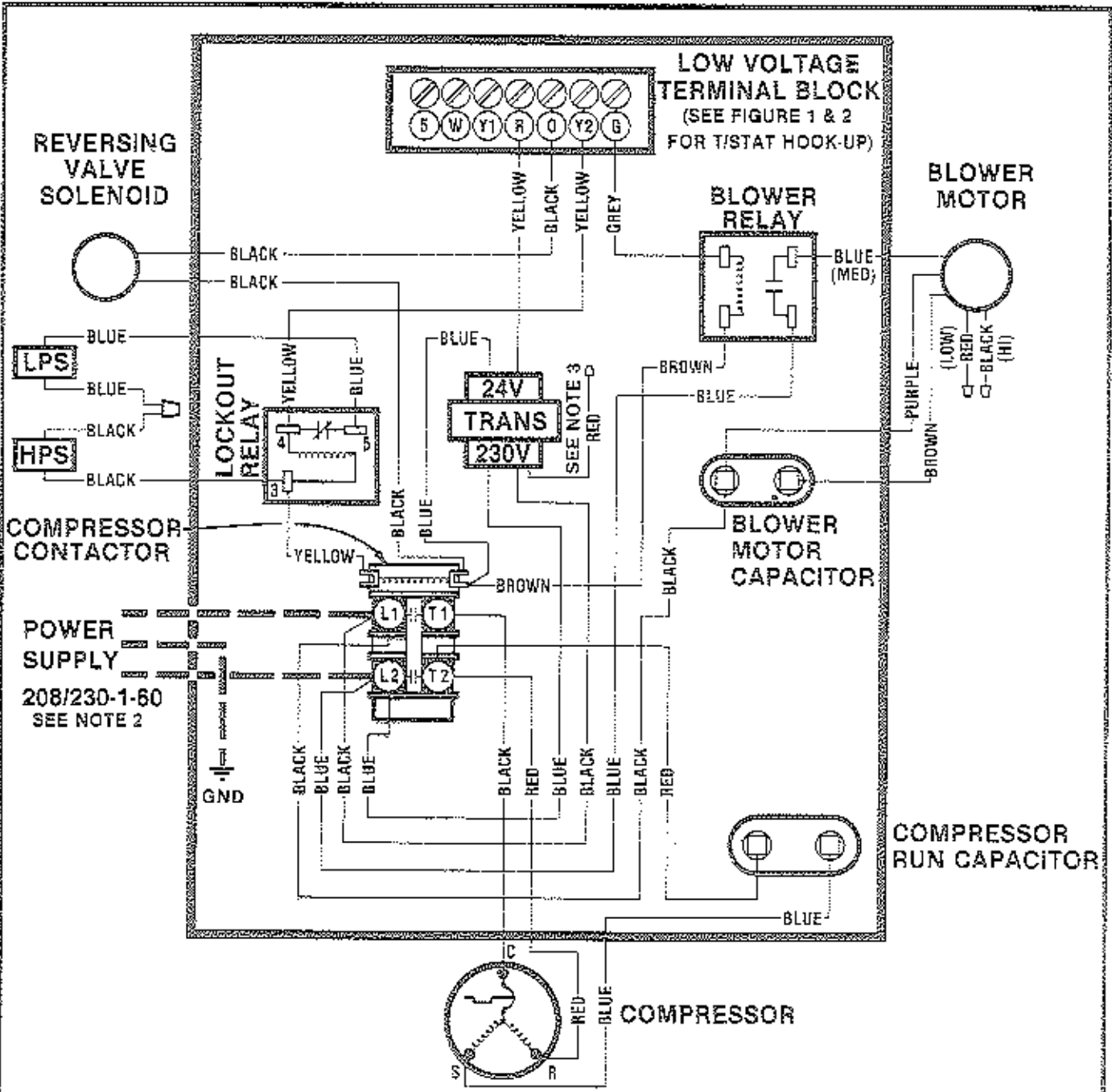
**WIRING DIAGRAM  
 208/230V/1PH/60HZ**



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- LEGEND:**  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH
- NOTES**
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END, THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

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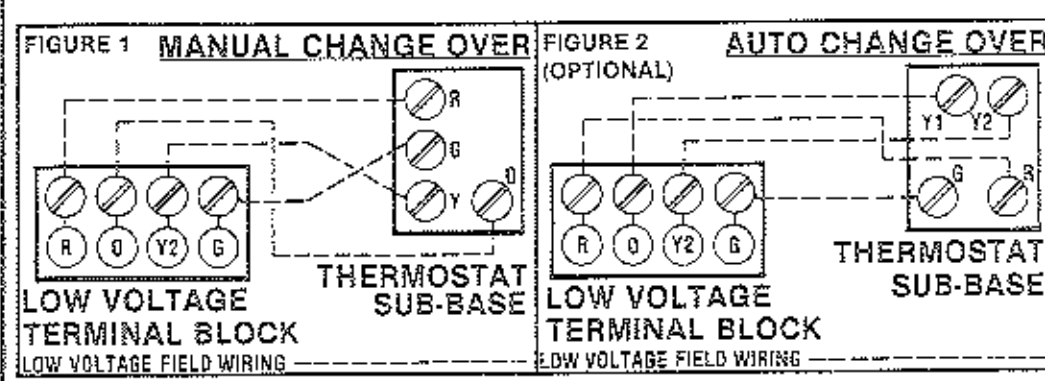
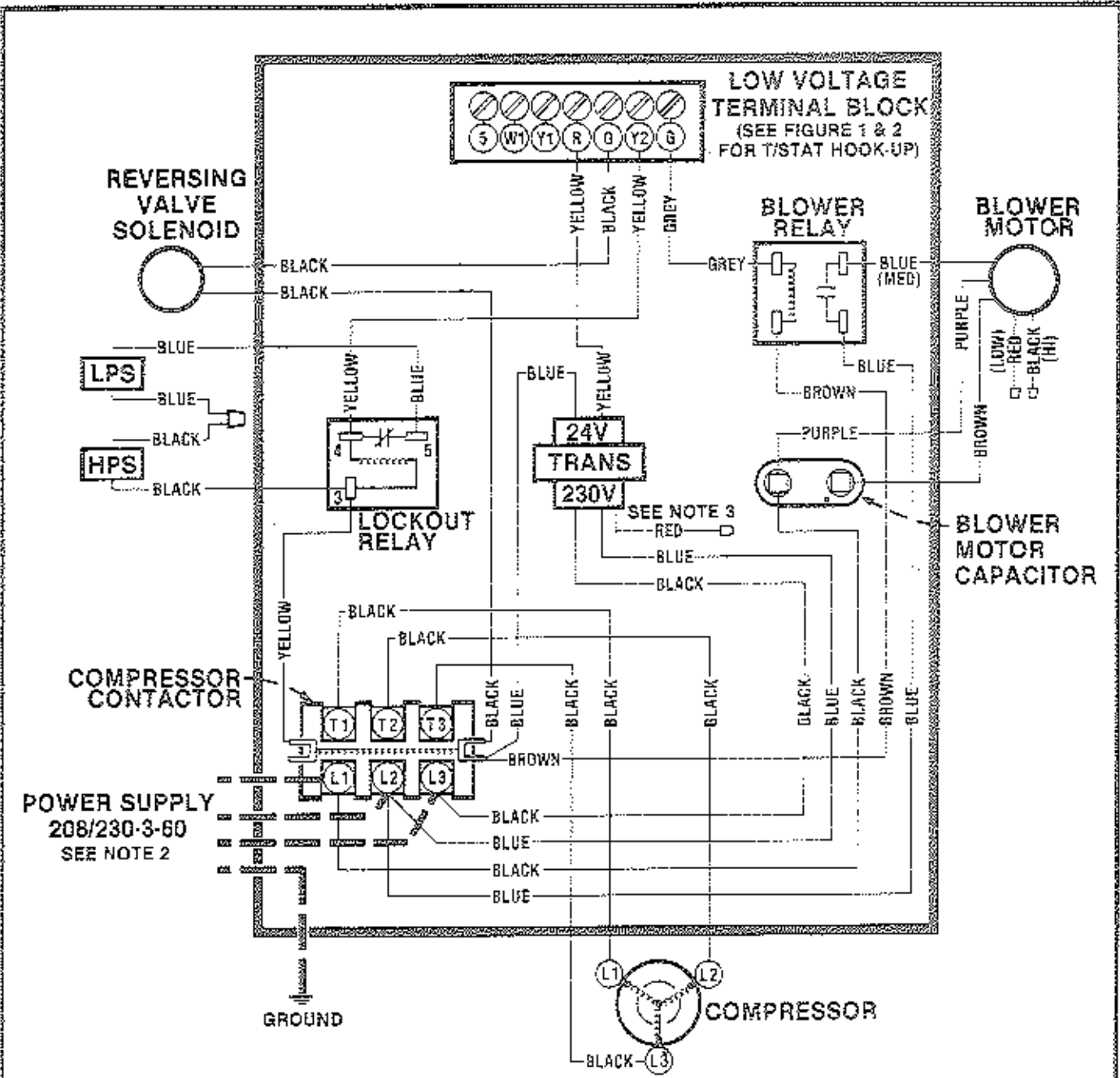
**803/804-036 & 042-G**

**WIRING DIAGRAM**  
208/230V/1PH/60HZ

— CERTIFICATIONS —

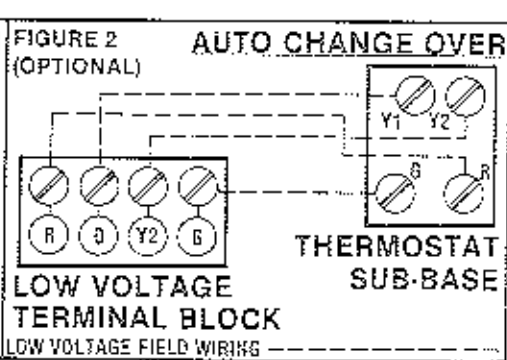
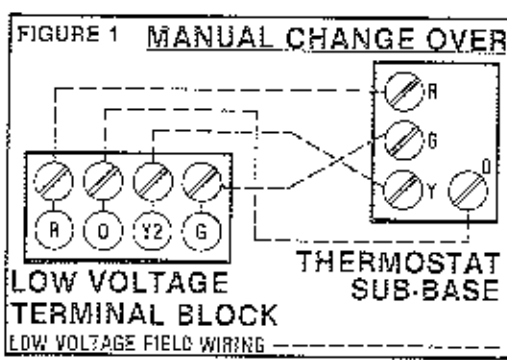
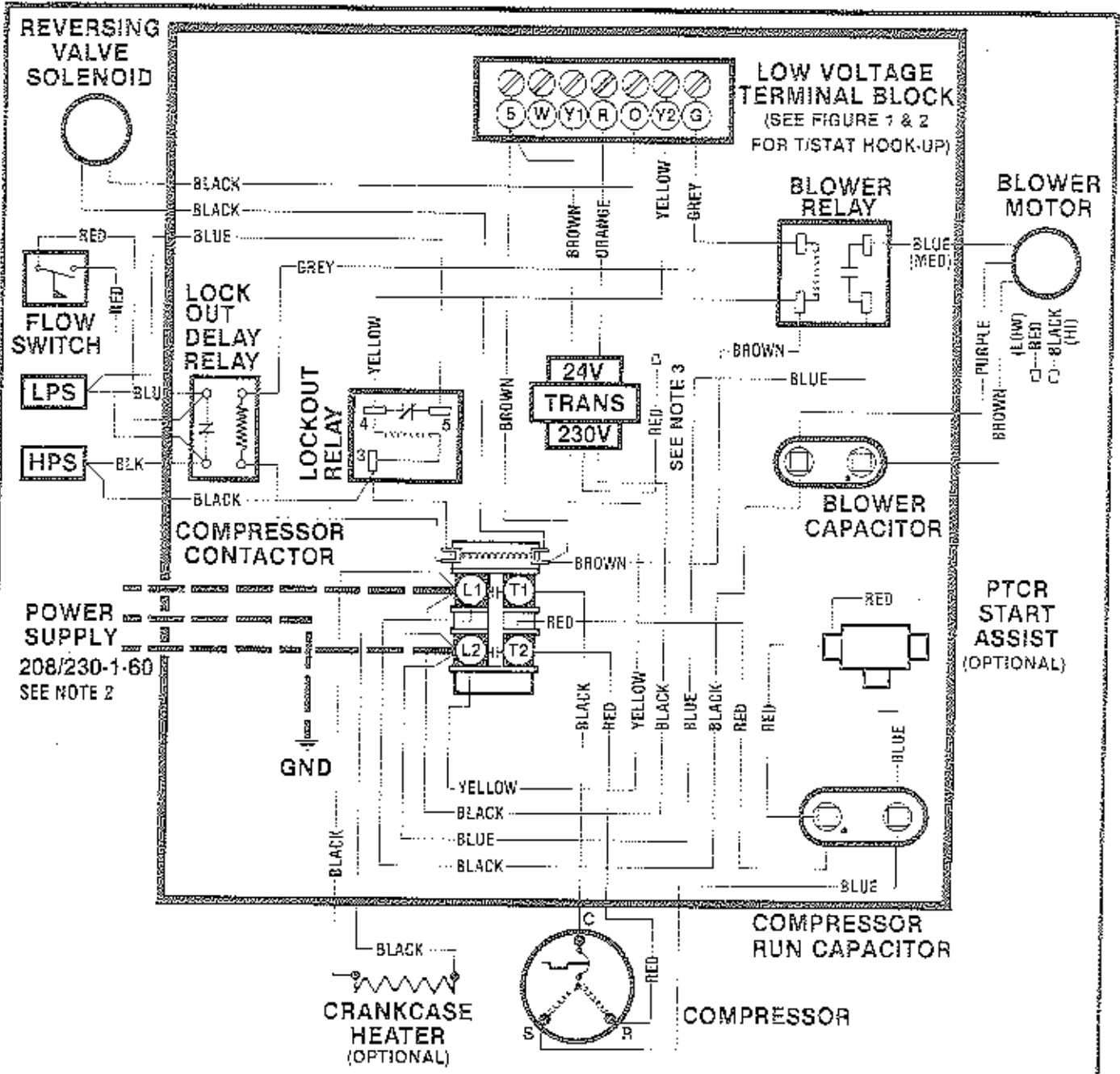
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LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

NOTES  
 1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY  
 2. LINE VOLTAGE FIELD WIRING  
 3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2  
 4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES



**LEGEND:**  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

- NOTES**
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION, FOR 208 VOLT OPERATION, DISCONNECT YELLOW LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END, THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

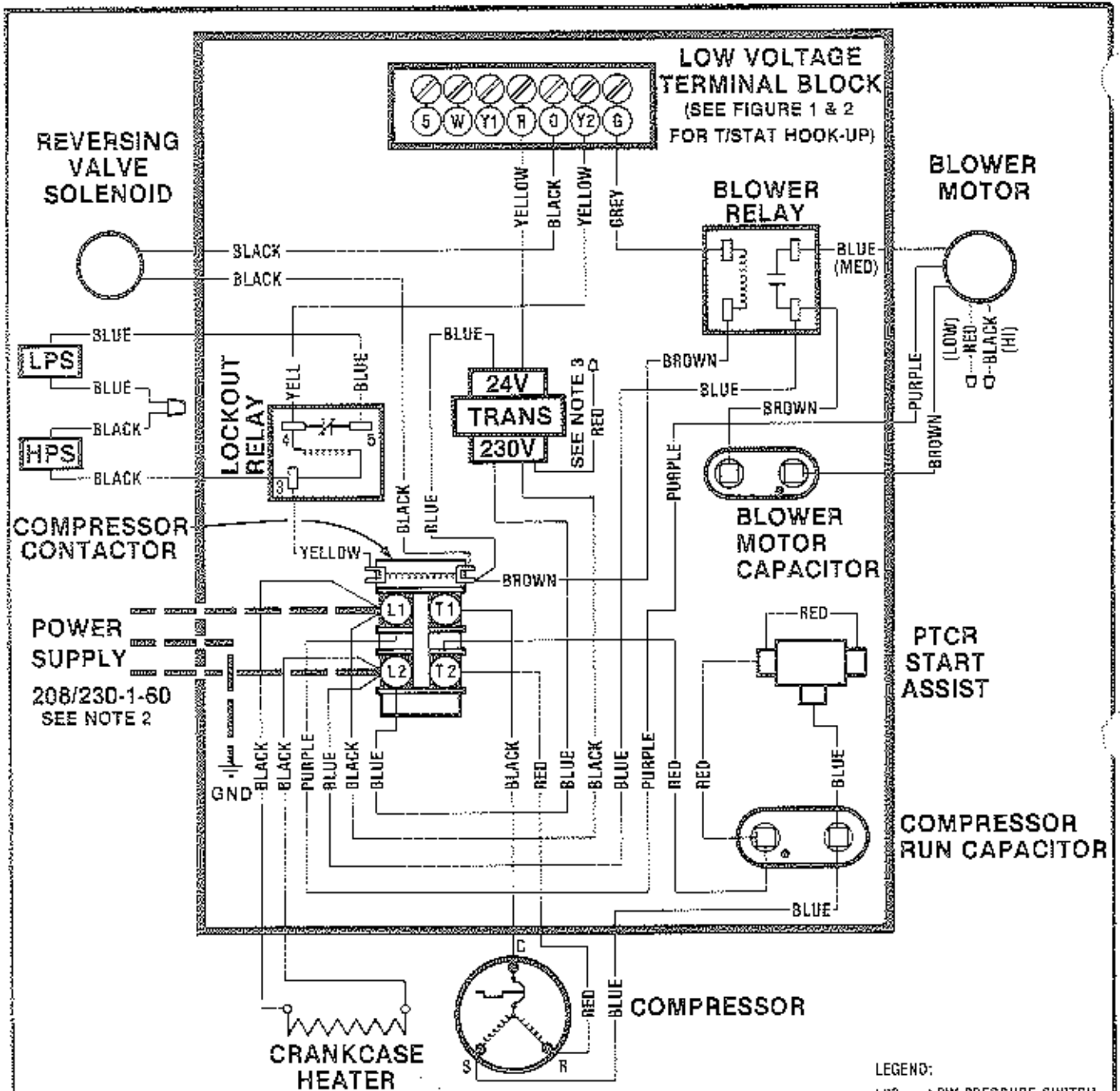
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**805-036 & 042-G**

**WIRING DIAGRAM  
 208/230V/1PH/60HZ**

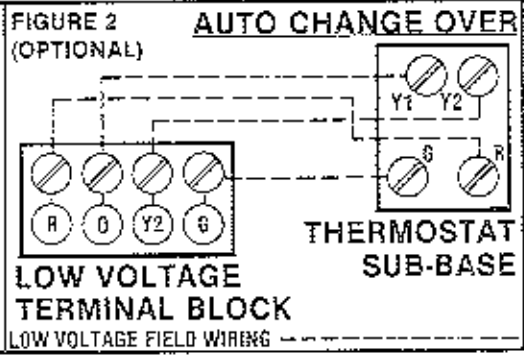
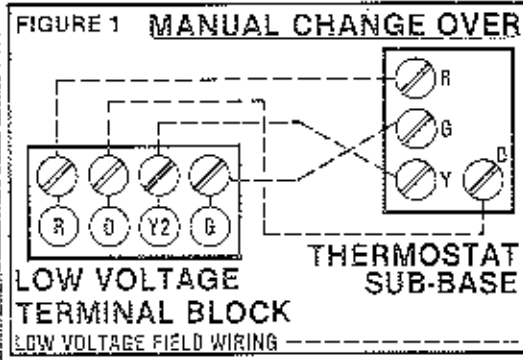
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LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

- NOTES
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 ON COMPR. CONTACTOR; AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES



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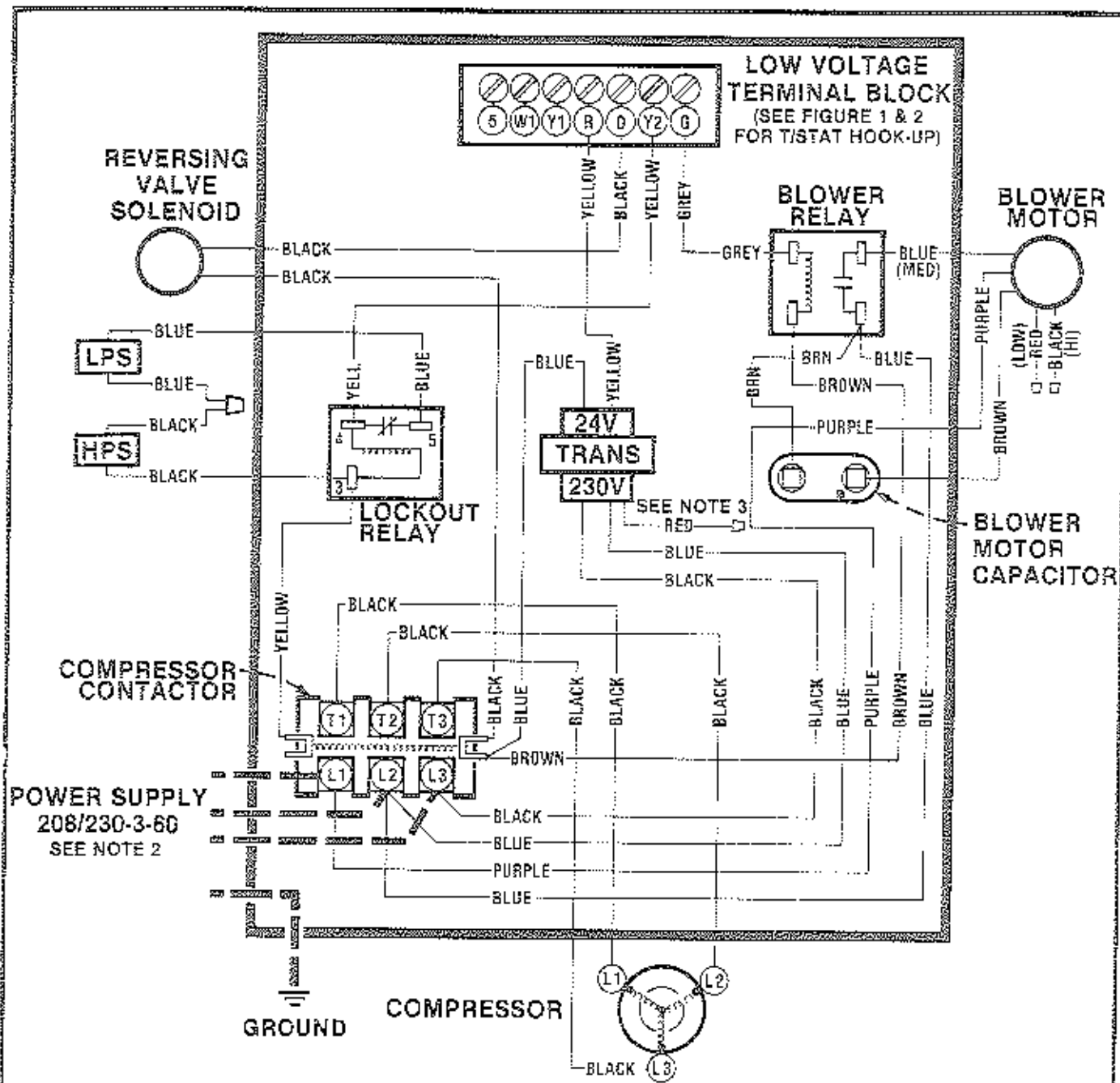
WIRING DIAGRAM  
 208/230V/1PH/60HZ

CERTIFICATIONS: UL, A, SF

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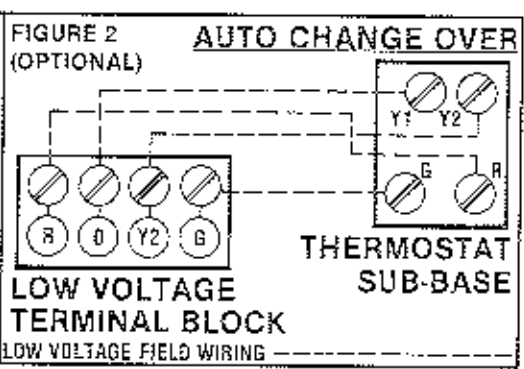
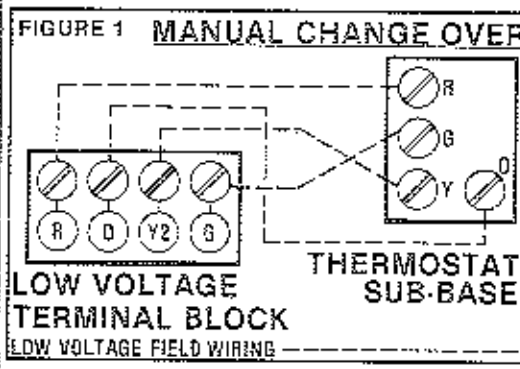
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LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

- NOTES
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTRACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES



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WIRING DIAGRAM  
 208/230V/3PH/60HZ



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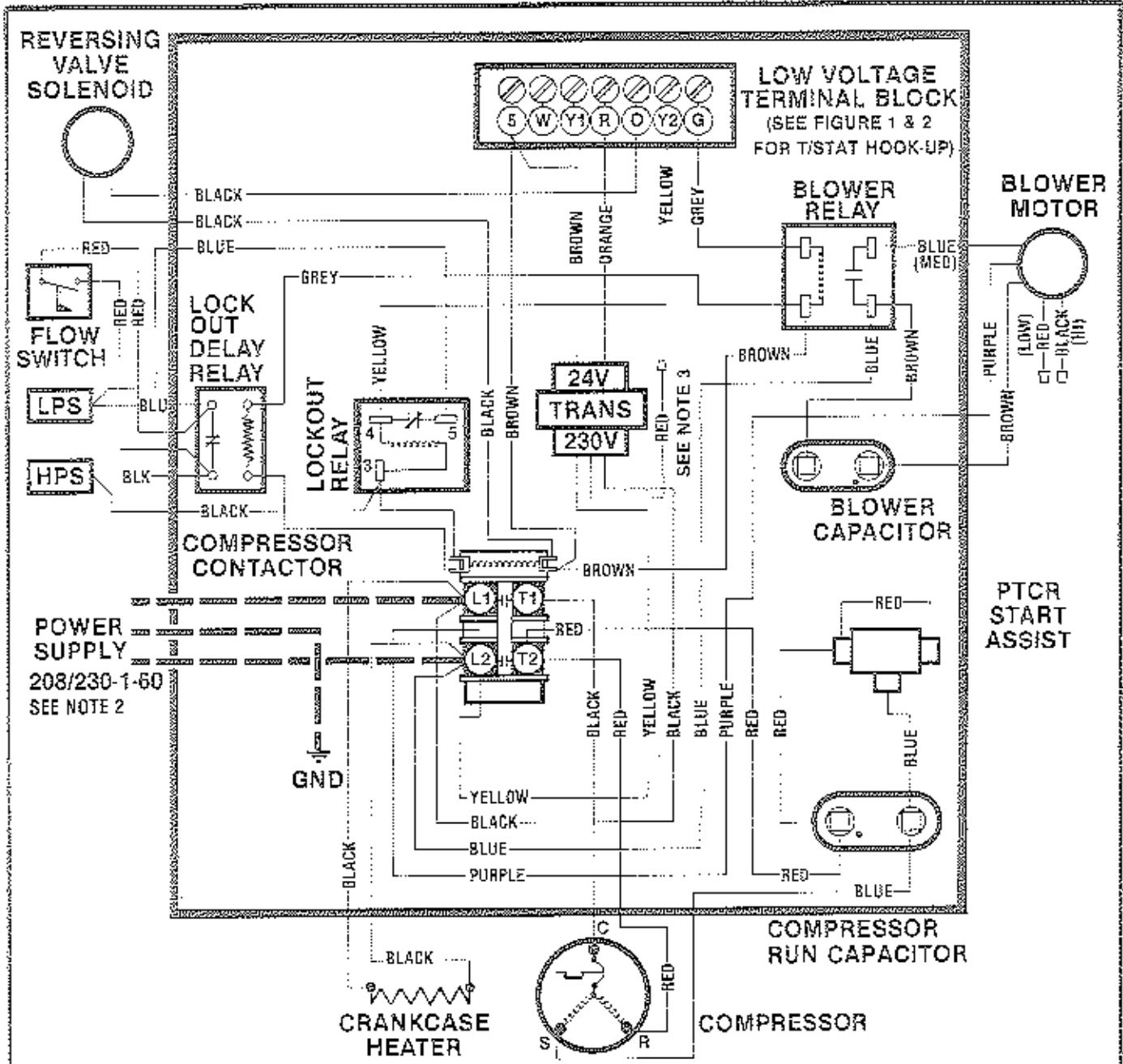


FIGURE 1 MANUAL CHANGE OVER

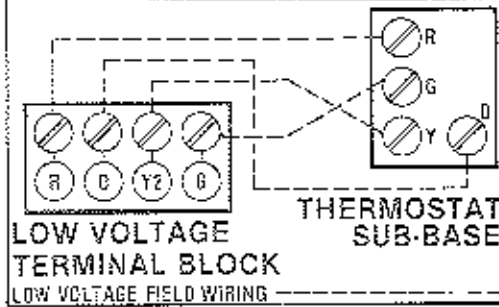
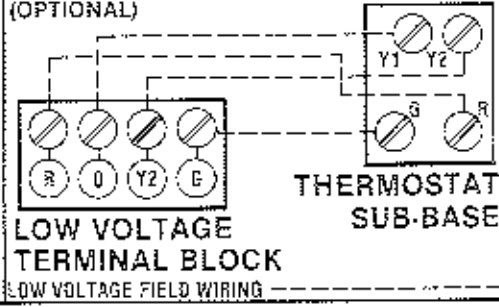


FIGURE 2 (OPTIONAL) AUTO CHANGE OVER



LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH  
 NOTES

1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTS INTERNALLY
2. LINE VOLTAGE FIELD WIRING
3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT YELLOW LEAD AT L2 (ON COMPR. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

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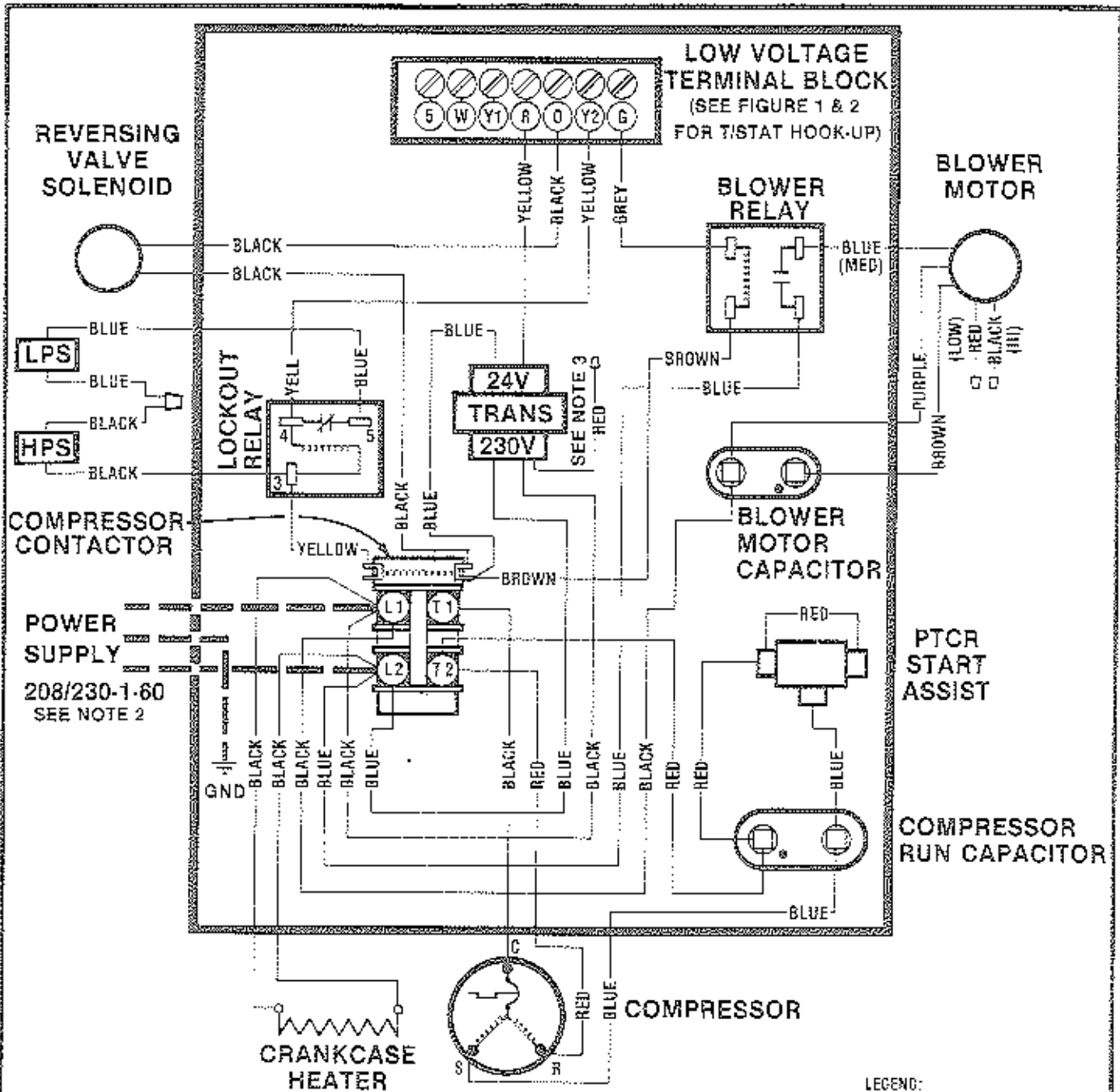
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**WIRING DIAGRAM  
 208/230V/1PH/60HZ**

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LEGEND:  
 LPS -- LOW PRESSURE SWITCH  
 HPS -- HIGH PRESSURE SWITCH

- NOTES
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMPR. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

FIGURE 1 MANUAL CHANGE OVER

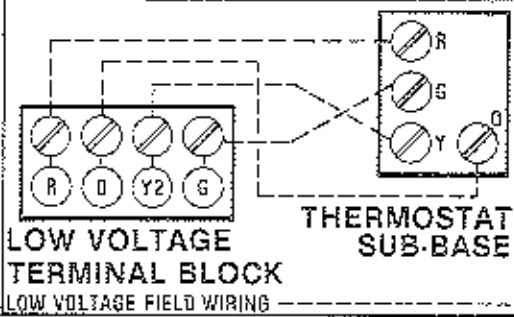
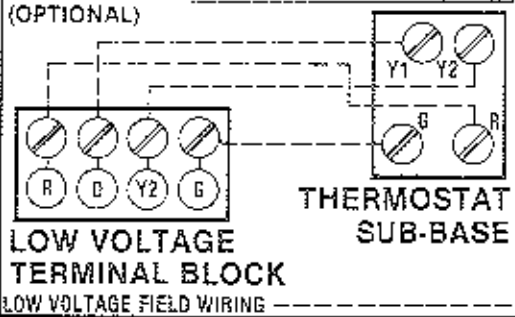


FIGURE 2 AUTO CHANGE OVER (OPTIONAL)



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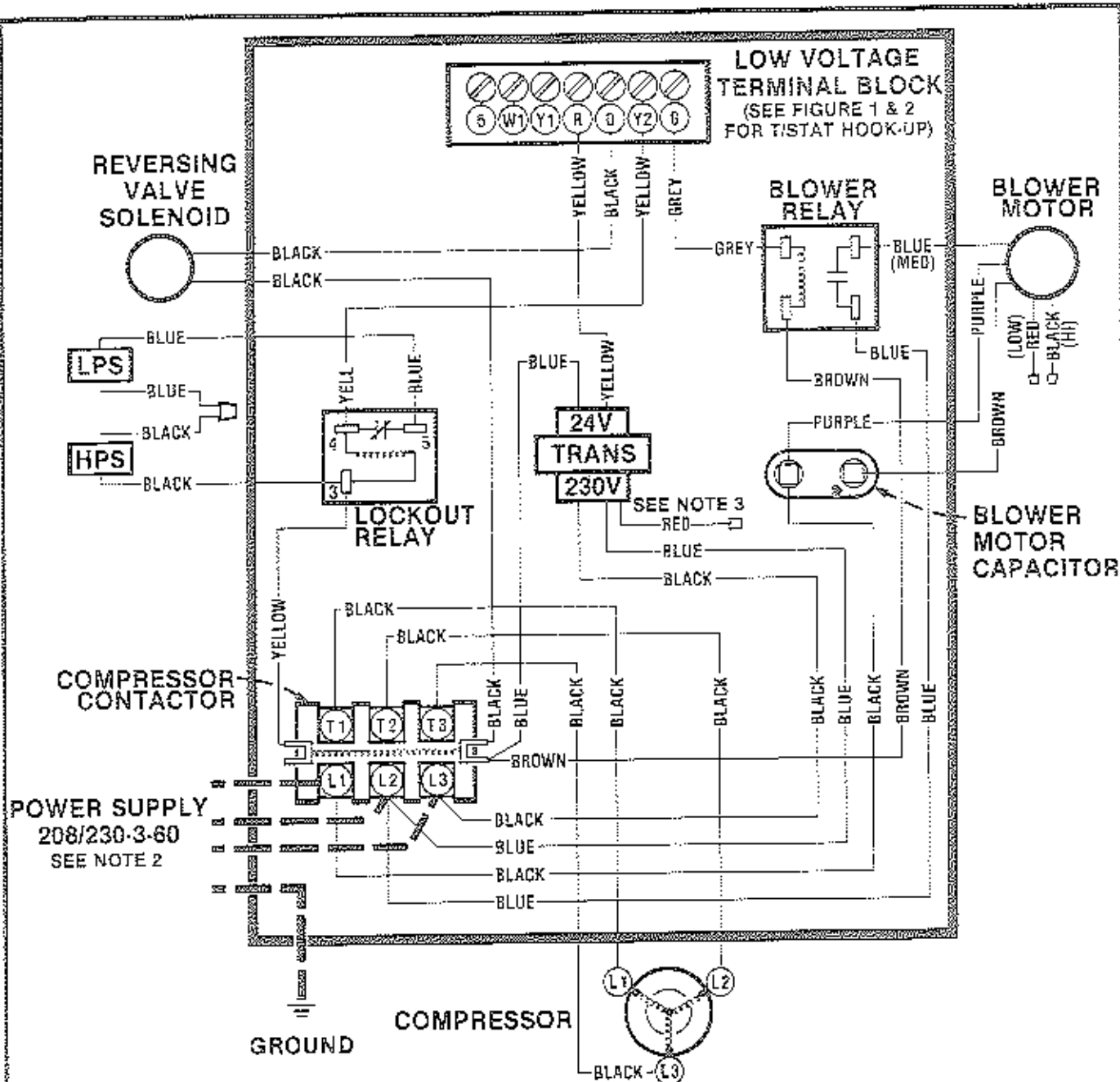
803/804 060-G

WIRING DIAGRAM  
 208/230V/1PH/60HZ



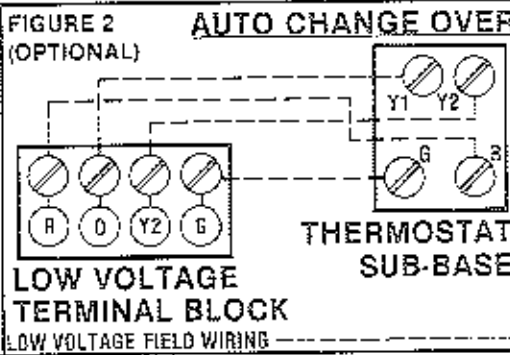
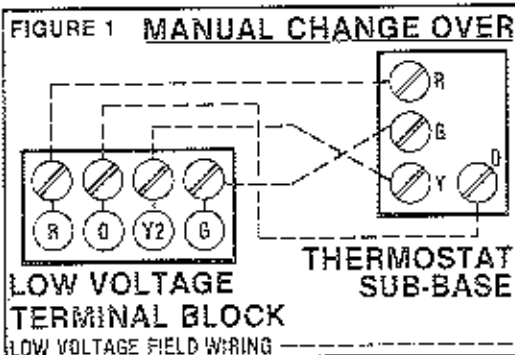
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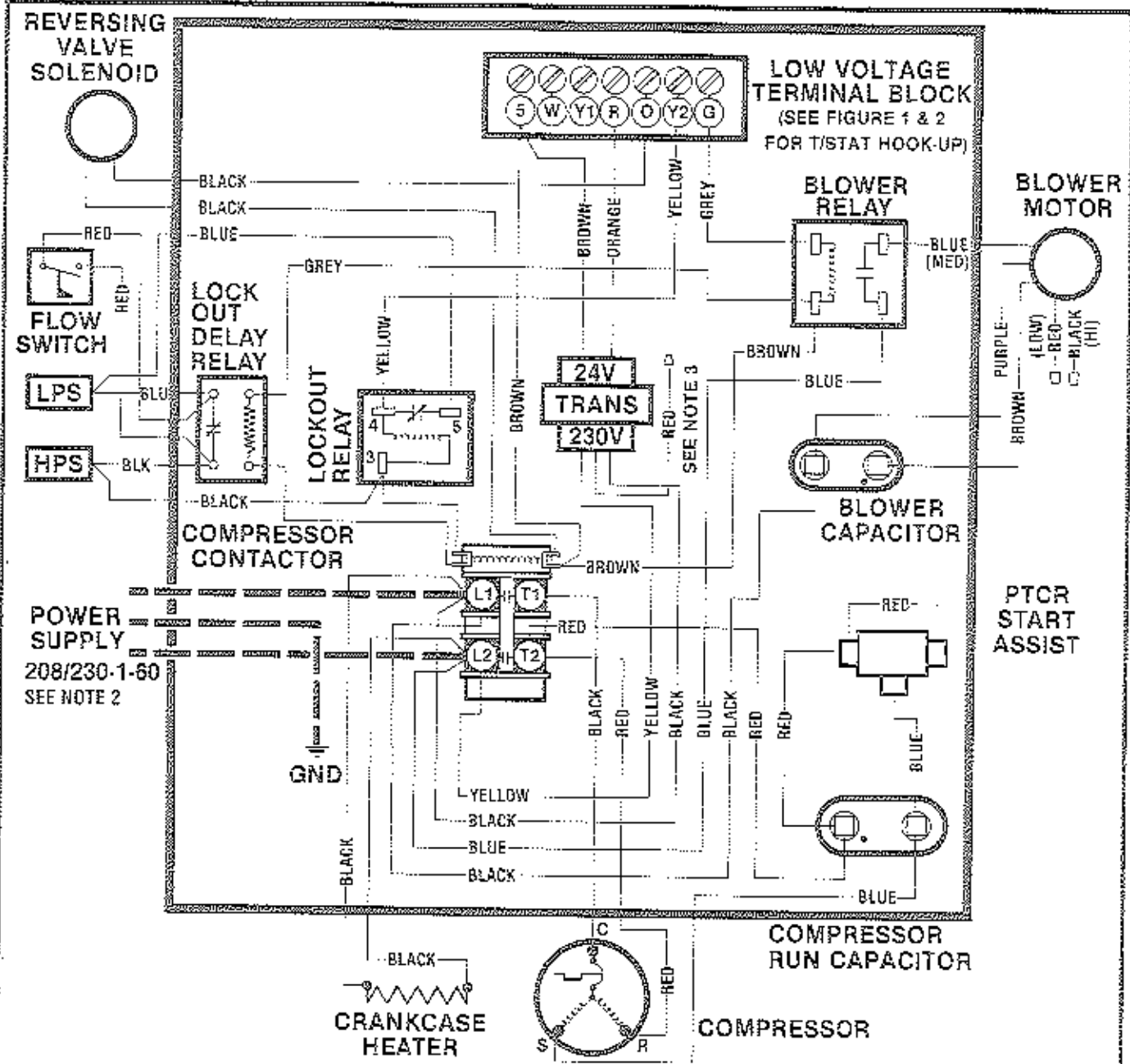


LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

- NOTES
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 238 VOLT OPERATION, DISCONNECT BLUE LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES

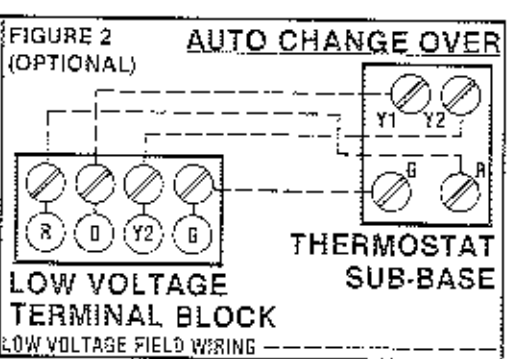
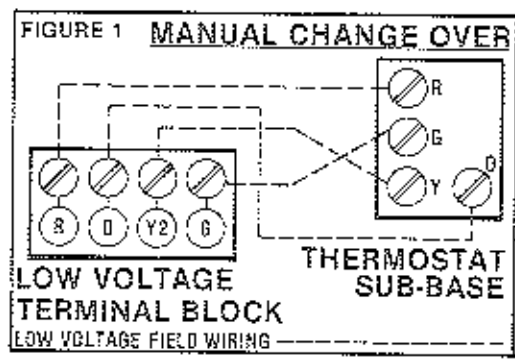


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LEGEND:  
 LPS — LOW PRESSURE SWITCH  
 HPS — HIGH PRESSURE SWITCH

- NOTES
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY
  2. LINE VOLTAGE FIELD WIRING
  3. TRANSFORMER CONNECTED FOR 230 VOLT OPERATION. FOR 208 VOLT OPERATION, DISCONNECT YELLOW LEAD AT L2 (ON COMP. CONTACTOR) AND TAPE OPEN END. THEN ATTACH RED LEAD TO L2
  4. ALL WIRING TO UNIT MUST COMPLY WITH N.E.C. AND LOCAL CODES



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**805-060-G**

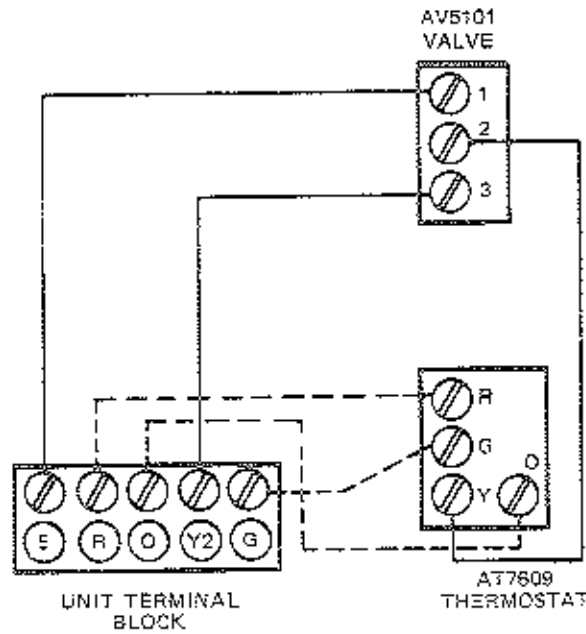
**WIRING DIAGRAM  
 208/230V/1PH/60HZ**

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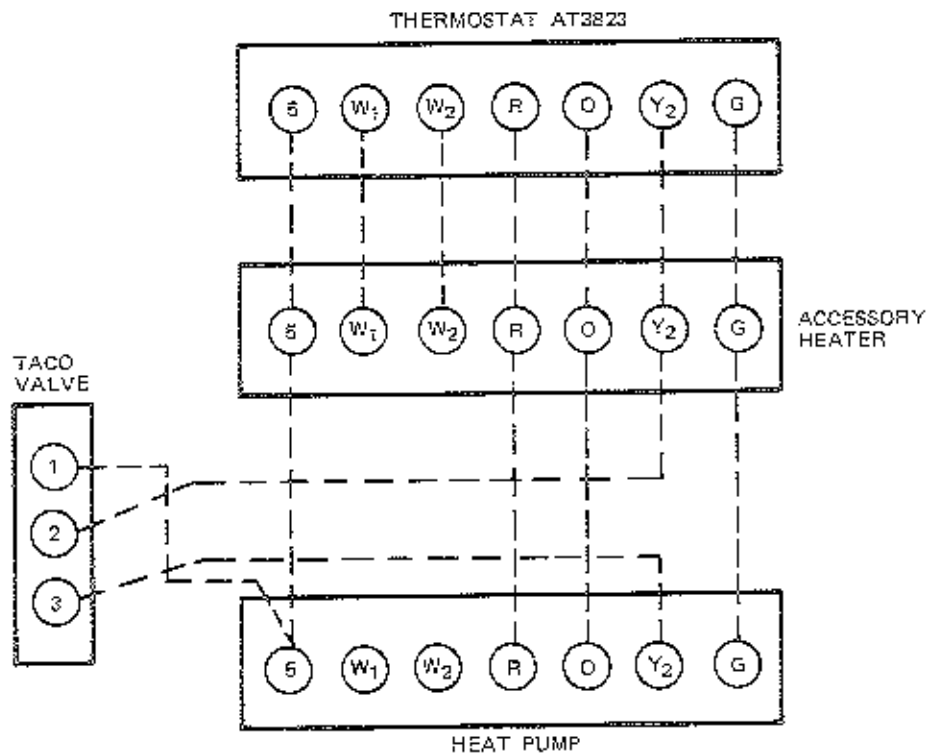
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**FCM 805-060-G**

TYPICAL WIRING DIAGRAM AV5101 VALVE WITH AT7609 THERMOSTAT (805 SERIES)



TYPICAL WIRING DIAGRAM AV5101 VALVE WITH AT3823 THERMOSTAT (805 SERIES)



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