

## Outdoor Heat Pump

# User's Information/Installation Instructions

## 10 SEER High Efficiency Split System

These units have been designed and tested for capacity and efficiency in accordance with A.R.I. Standards. Split System Heat Pump units are designed for use with a wide variety of fossil fuel furnaces, electric furnaces, air handlers, and evaporator coil combinations.

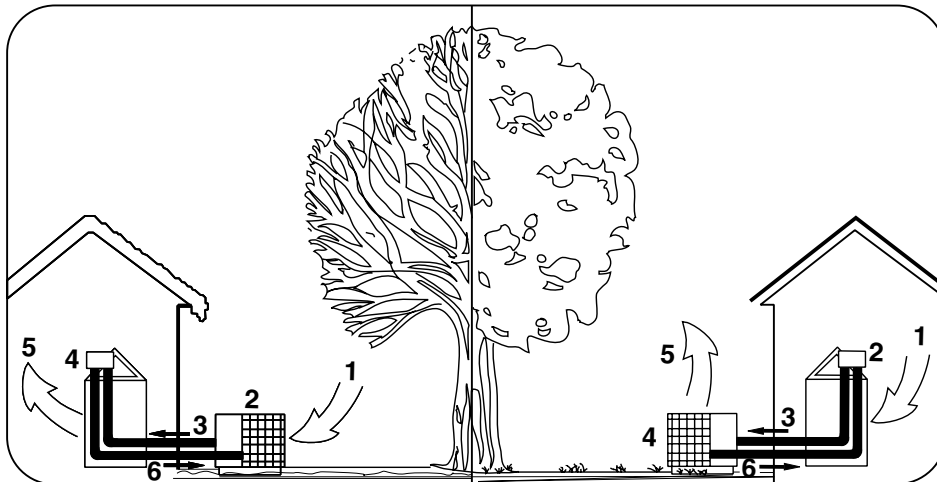
These instructions are primarily intended to assist qualified individuals experienced in the proper installation of heating and/or air conditioning appliances. Some local codes require licensed installation/service personnel for this type of equipment. Read all instructions carefully before starting the installation.

## USER'S INFORMATION

### IMPORTANT

Read this owner information to become familiar with the capabilities and use of your appliance. Keep this with literature on other appliances where you have easy access to it in the future. If a problem occurs, check the instructions and follow recommendations given. If these suggestions don't eliminate your problem, call your servicing contractor.

### Heat Pump Principle of Operation



#### WINTER HEATING

1. Outdoor air enters heat pump.
2. Cold, heat-transfer section (outdoor coil) extracts heat from outdoor air as refrigerant evaporates from a liquid to a gas.
3. Refrigerant, compressed to a hot gas by heat pump, carries the heat to the hot heat-transfer section (indoor coil).
4. Hot, heat-transfer section (indoor coil) releases the heat to indoor air as refrigerant condenses from a gas to a liquid.
5. Air handler circulates the heat throughout the home.
6. Refrigerant returns to outdoor coil and evaporates once again to absorb more heat.

#### SUMMER COOLING

1. Indoor air enters the air handler section.
2. Cold, heat-transfer section (indoor coil) extracts heat from indoor air as refrigerant evaporates from a liquid to a cold gas.
3. Refrigerant, drawn to heat pump and compressed to a hot gas by heat pump, carries the heat outdoors.
4. Hot, heat-transfer section (outdoor coil) releases the heat as refrigerant condenses from a gas to a liquid.
5. Heat pump (outdoor fan) discharges the heat to outside air.
6. Refrigerant returns to indoor coil and evaporates once again to absorb more heat.



## OPERATING INSTRUCTIONS

### TO OPERATE YOUR HEAT PUMP FOR COOLING —

1. Set the thermostat system switch to COOL and the thermostat fan switch to AUTO. (See Figure 1)
2. Set the thermostat temperature to the desired temperature level by pressing the WARMER or COOLER button. Please refer to the separate detailed thermostat user's manual for complete instructions regarding thermostat programming. The outdoor unit and indoor blower will both cycle on and off to maintain the indoor temperature at the desired cooling level.

**NOTE:** If the thermostat temperature level is re-adjusted, or the thermostat system switch is repositioned, the outdoor unit may not start immediately. The outdoor unit contains a protective timer circuit which holds the unit off for approximately five minutes following a previous operation, or the interruption of the main electrical power.

### TO OPERATE YOUR HEAT PUMP FOR HEATING —

1. Set the thermostat system switch to HEAT and the thermostat fan switch to AUTO. (See Figure 1)

2. Set the thermostat temperature to the desired temperature level by pressing the WARMER or COOLER button. Please refer to the separate detailed thermostat user's manual for complete instructions regarding thermostat programming. The outdoor unit and indoor blower will both cycle on and off to maintain the indoor temperature at the desired heating level.

**NOTE:** If the thermostat temperature level is re-adjusted, or the thermostat system switch is repositioned, the outdoor unit may not start immediately. The outdoor unit contains a protective timer circuit which holds the unit off for approximately five minutes following a previous operation, or the interruption of the main electrical power.

#### Emergency Heat:

The thermostat includes a system switch position termed EM. HT. This is a back-up heating mode to be used only if there is a suspected problem with the outdoor unit. With the system switch set to EM. HT. the outdoor unit will be locked off, and supplemental heat (typically electric resistance heating) will be used as a source of heat. Sustained use of electric resistance heat in place of the heat pump will result in an increase in electric utility costs.

#### Defrost:

During cold weather heating operation, the outdoor unit will develop a coating of

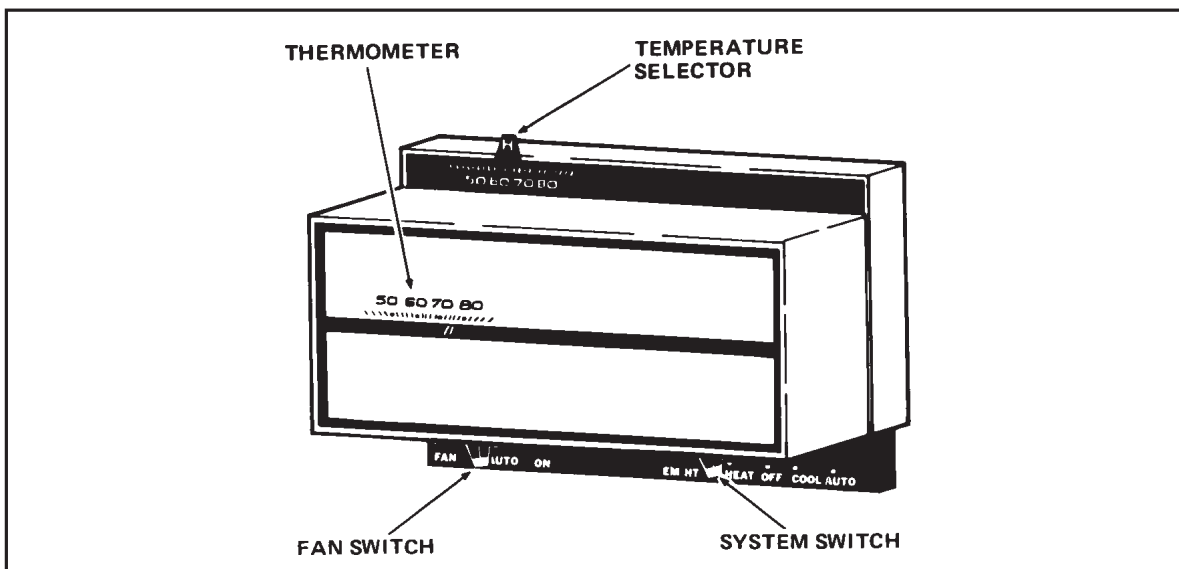


Figure 1. Typical Thermostat

snow and ice on the heat transfer coil. This is normal, and the unit will periodically defrost itself. During the defrost cycle, the outdoor fan will stop, and the compressor will continue to run and heat the outdoor coil, causing the snow and ice to melt. After the snow and ice have melted, some steam may rise from the outdoor unit as the warm coil causes some melted frost to evaporate.

## TO OPERATE YOUR HEAT PUMP FOR AUTOMATIC COOLING AND HEATING

1. Set the thermostat system switch to AUTO and the thermostat fan switch to AUTO. (See Figure 1)

Note: Thermostats will vary. Some models will not include the AUTO mode, and others will have the AUTO in place of the HEAT and COOL, and some will include all three.

2. Set the thermostat temperature to the desired heating and cooling temperature level(s). The outdoor unit and the indoor blower will then cycle on and off in either the heating or cooling mode of operation as required to automatically maintain the indoor temperature within the desired limits.

## TO SHUT OFF YOUR HEAT PUMP —

Set the thermostat system switch to OFF and the thermostat fan switch to AUTO. (See Figure 1) The system will not operate, regardless of the thermostat temperature selector(s) setting.

## TO OPERATE THE INDOOR BLOWER CONTINUOUSLY —

Set the thermostat fan switch to ON (See Figure 1). The indoor blower will start immediately, and will run continually until the fan switch is reset to AUTO.

The continuous indoor blower operation can be obtained with the thermostat system switch set in any position, including OFF.

The continuous indoor blower operation is typically used to circulate the indoor air to equalize

a temperature unbalance due to a sun load, cooking, or fireplace operation.

## TO MAINTAIN YOUR HEAT PUMP —

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**CAUTION:**

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**Be certain the electrical power to the outdoor unit and the furnace/air handler is disconnected before doing the following recommended maintenance.**

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### 1. Regularly:

- a. Clean or replace the indoor air filter at the start of each heating and cooling season, and when an accumulation of dust and dirt is visible on the air filter. Inspect the filter monthly.
- b. Remove any leaves and grass clippings from the coil in the outdoor unit, being careful not to damage the aluminum fins.
- c. Check for any obstruction such as twigs, sticks, etc.

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**CAUTION:**

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**Do not over-oil, or oil motors not factory-equipped with oil tubes. The compressor is hermetically “sealed” and does not require lubrication.**

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### 2. Before Calling a Service Technician, Be Certain:

- a. The unit thermostat is properly set — see “To Operate Your Heat Pump for Cooling” and “To Operate Your Heat Pump for Heating.”
- b. The unit disconnect fuses are in good condition, and the electrical power to the unit is turned on.

### Read Your Warranty

Please read the separate warranty document completely. It contains valuable information about your system.

## GENERAL INFORMATION

Read the following instructions completely before performing the installation.

**Outdoor Unit Section** — Each outdoor unit is shipped with a refrigerant charge adequate to operate the outdoor section with an indoor matching coil or air handler. Units with braze connections include the proper amount of refrigerant for an additional 15 ft. of refrigerant lines the same size as the valve fittings.

**NOTE:** DO NOT USE ANY PORTION OF THE CHARGE FOR PURGING OR LEAK TESTING.

Matching coils and air handlers may be shipped with a small holding charge to pressurize them to keep out contaminants. To release the pressure, read the indoor section installation instructions carefully.

**Liquid and Suction Lines** — Fully annealed, refrigerant grade copper tubing should be used when installing the system. Refrigerant suction line tubing should be fully insulated.

**Field Connections for Electrical Power Supply** — All wiring must comply with current provisions of the “National Electrical Code” (ANSI C1.) and with applicable local codes having jurisdiction. The minimum size of electrical conductors and circuit protection must be in compliance with information listed on the outdoor unit data label.

## SAFETY CONSIDERATIONS

**Pressures within the System** — Split system heat pump equipment contains liquid and gaseous refrigerant under pressure. Installation and servicing of this equipment should be accomplished by qualified, trained personnel thoroughly familiar with this type of equipment. Under no circumstances should the Homeowner attempt to install and/or service the equipment.

**Labels, Tags, Precautions** — When working with this equipment, follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.

**Brazing Operations** — Installation of equipment may require brazing operations. Safety codes must be complied with. Safety equipment (e.g.; safety glasses, work gloves, fire extinguisher, etc.) must be used when performing brazing operations.



## WARNING:

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**Ensure all electrical power to the unit is off prior to installing or servicing the equipment. Failure to do so may cause personal injury or death.**

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## SITE PREPARATION

**Unpacking Equipment** — Remove the cardboard carton and User's Manual from the equipment. Take care to not damage tubing connections when removing from the carton.

**Inspect for Damage** — Inspect the equipment for damage prior to installing the equipment at the job site. Ensure coil fins are straight and, if necessary, comb fins to remove flattened and bent fins.

**Preferred Location of the Outdoor Unit at the Job Site** — Conduct a survey of the job site to determine the optimum location for mounting the outdoor unit. Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided. The outdoor unit should be installed no closer than 18 inches from the outside walls of the facility and in an area free from overhead obstructions to ensure unrestricted airflow through the outdoor unit.

**Facility Prerequisites** — Electrical power supplied must be adequate for proper operation of the equipment. The system must be wired and provided with circuit protection in accordance with local building codes and the National Electrical Code.

## INSTALLING THE OUTDOOR UNIT

**Slab Mount** — The site selected for a slab mount installation requires a stable foundation and one not subject to erosion. The slab should be level and anchored (if necessary) prior to placing the equipment on the slab.

**Cantilever Mount** — The cantilever mount should be designed with adequate safety factor to support the weight of the equipment, and for loads subjected to the mount during operation. Installed equipment should be adequately secured to the cantilever mount and levelled prior to operation of the equipment.

**Roof Mount** — The method of mounting should be designed so as not to overload roof structures nor transmit noise to the interior of the structure. Refrigerant and electrical line should be routed through suitably waterproofed openings to prevent water leaking into the structure.

## INSTALLING THE INDOOR UNIT

The indoor section should be installed before proceeding with routing of refrigerant piping. Consult the Installation Instructions of the indoor unit (i.e.: air handler, furnace, etc.) for details regarding installation.

## CONNECTING REFRIGERANT TUBING BETWEEN THE INDOOR AND OUTDOOR UNIT

**General** — Once outdoor and indoor unit placement has been determined, route refrigerant tubing between the equipment in accordance with sound installation practices. Refrigerant tubing should be routed in a manner that minimizes the length of tubing and the number of bends in the tubing. Refrigerant tubing should be supported in a manner that the tubing will not vibrate or abrade during system operation. Tubing should be kept clean of foreign debris during installation and installation of a liquid line filter drier is recommended if cleanliness or adequacy of system evacuation is unknown or compromised. Every effort should be made by the installer to ensure that the field installed, refrigerant containing components of the system have been installed in accordance with these instructions and sound installation practices so as to insure reliable system operation and longevity.

The maximum recommended interconnecting refrigerant line length is 75 feet, and the vertical elevation difference between the indoor and outdoor sections should not exceed 20 feet. Consult long line application guide for installations in excess of these limits.

**Optional Equipment** — Optional equipment (e.g.: filter/driers, liquid line solenoid valves, etc.) should be installed in strict accordance with the manufacturer's installation instructions.

For refrigerant line sets that incorporate single shot couplings only:

1. Remove protective caps from the unit and the refrigerant line couplings.
2. Carefully wipe all coupling threads and seals with a clean cloth to remove any dust or foreign material which could contaminate the refrigerant system.
3. Using refrigerant oil, lightly lubricate the diaphragm, seal and threads on the male unit coupling.

4. Connect couplings as follows:

**Note:** Start with indoor section first.

- a. HOLD REFRIGERANT LINE IN STRAIGHT POSITION TO UNIT COUPLING AND THREAD COUPLING HALVES TOGETHER BY HAND TO INSURE PROPER CONNECTION. Hold body of the line coupling hex with wrench, while slowly tightening the union nut until a definite resistance (bottoming out) is felt.
- b. Mark the position of union nut (match lines on the line coupling and the unit bulk head), and then tighten the coupling an additional 1/4 turn to insure leak-proof connection. (See Table of Torque Values for recommended torque values if a torque wrench is used.)

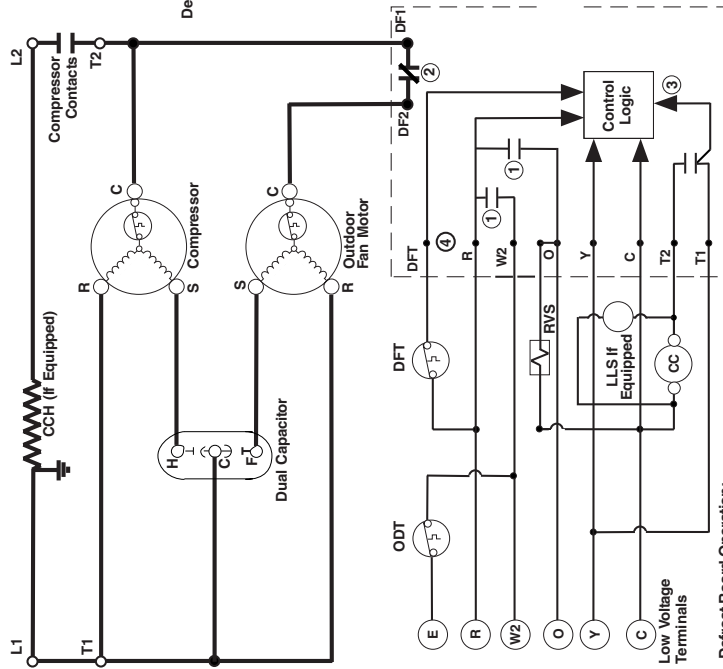
**TABLE OF TORQUE VALUES**

Coupling Size	Torque
3/8" (10 mm) Liquid Line Coupling	10 - 12 ft. lbs. (Metric: 14-16 N-m)
3/4" (19 mm) or 7/8" (22 mm) Vapor Line Coupling	34 - 45 ft. lbs. (Metric: 47-61 N-m)
Service Valve Cap	5 - 6 ft. lbs. (Metric: 7 - 8 N-m)

## Split System Heat Pump (Outdoor Section)

### NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105 C.
5. For ampacities and overcurrent protection, see unit rating plate.
6. Connect to 24 vac/40va/class 2 circuit. See furnace/air handler instructions for control circuit and optional relay/transformer kits.



### Defrost Board Operation:

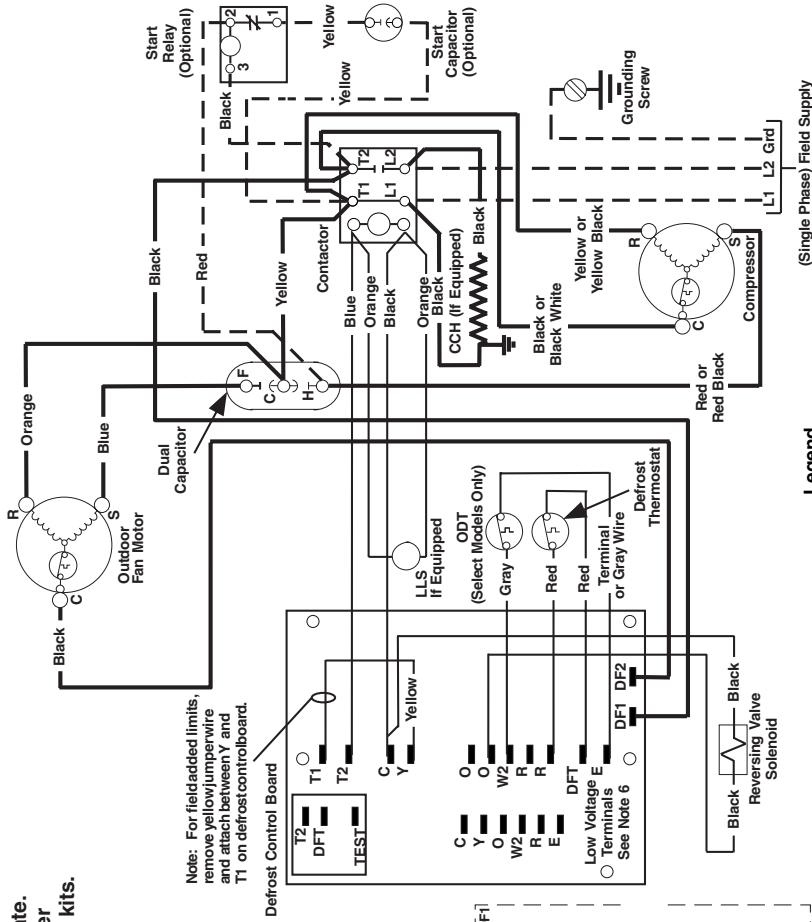
- 1 Closing during defrost. Rating: 1 Amp. Max.
- 2 Opens during defrost. Rating: 2 HP at 230 Vac Max.
- 3 Closed when "y" is on, Open when "y" is off. Provides "off" delay time of 5 min. when "y" opens.
- 4 With DFT closed and "y" closed, compressor run time is accumulated. Opening of DFT during defrost or interval period resets the interval to 0.

### Defrost Control Board

- CC - Contactor Coil
- CCH - Crankcase Heater (If Equipped)
- DFT - Defrost Thermostat
- LLS - Liquid Line Solenoid (If Equipped)
- RVS - Reversing Valve Solenoid
- ODT - Outdoor Thermostat (Select Models Only)

## Single Phase

1. Couper le courant avant de faire le retretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.



### Legend

- Field Wiring (dashed line)
- Factory Wiring (solid line)
- Low Voltage (thin solid line)
- High Voltage (thick solid line)

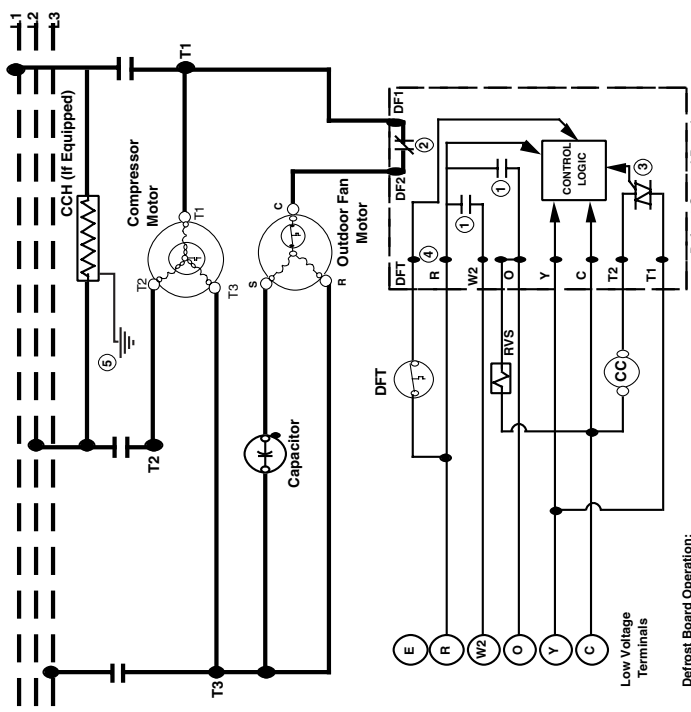
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Figure 2. Single Phase Wiring Diagram

## Split System Heat Pump (Outdoor Section)

### NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105 deg. C
5. For supply wire ampacities and overcurrent protection, see unit data label.
6. Connect to 24 vac/40va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional Relay/Transformer Kits.

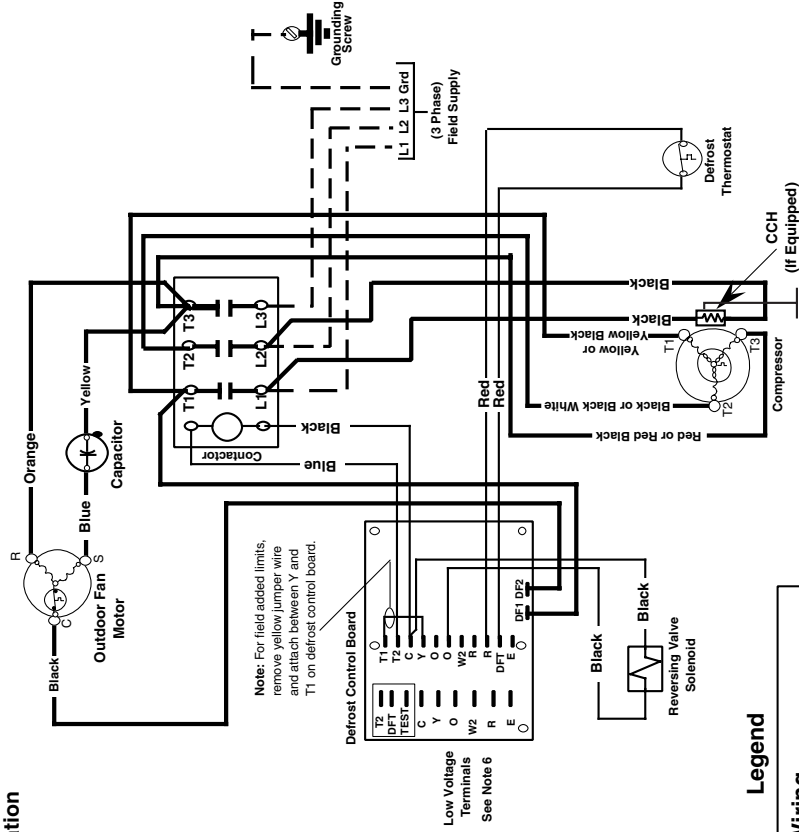


### Defrost Board Operation:

- 1 Closes during defrost. Rating: 1 Amp. Max.
- 2 Opens during defrost. Rating: 2 HP. at 230 Vac Max.
- 3 Closed when "Y" is on. Open when "Y" is off. Provides "off" delay time of 5 min. when "Y" opens.
- 4 With DFT closed and "Y" closed, compressor run time is accumulated. Opening of DFT during defrost or interval period resets the interval to 0.
- 5 Ground on location provided inside compressor terminal box.

## Three Phase

1. Couper le courant avant de faire l'entretien.
2. Employez uniquement des conducteurs en cuivre
3. Ne convient pas aux installations de plus de 150 volt a la terre.



Note: For field added limits, remove yellow jumper wire and attach between Y and T1 on defrost control board.

### Legend

Field Wiring	---
Factory Wiring	—
Low Voltage	—
High Voltage	—

DFT - Defrost Thermostat  
 RVS - Reversing Valve Solenoid  
 CC - Contactor Coil  
 CCH - Crankcase Heater (If Equipped)  
 ODT - Outdoor Thermostat (Select Models Only)

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Figure 3. Three Phase Wiring Diagram



## ELECTRICAL CONNECTIONS

### **WARNING:**

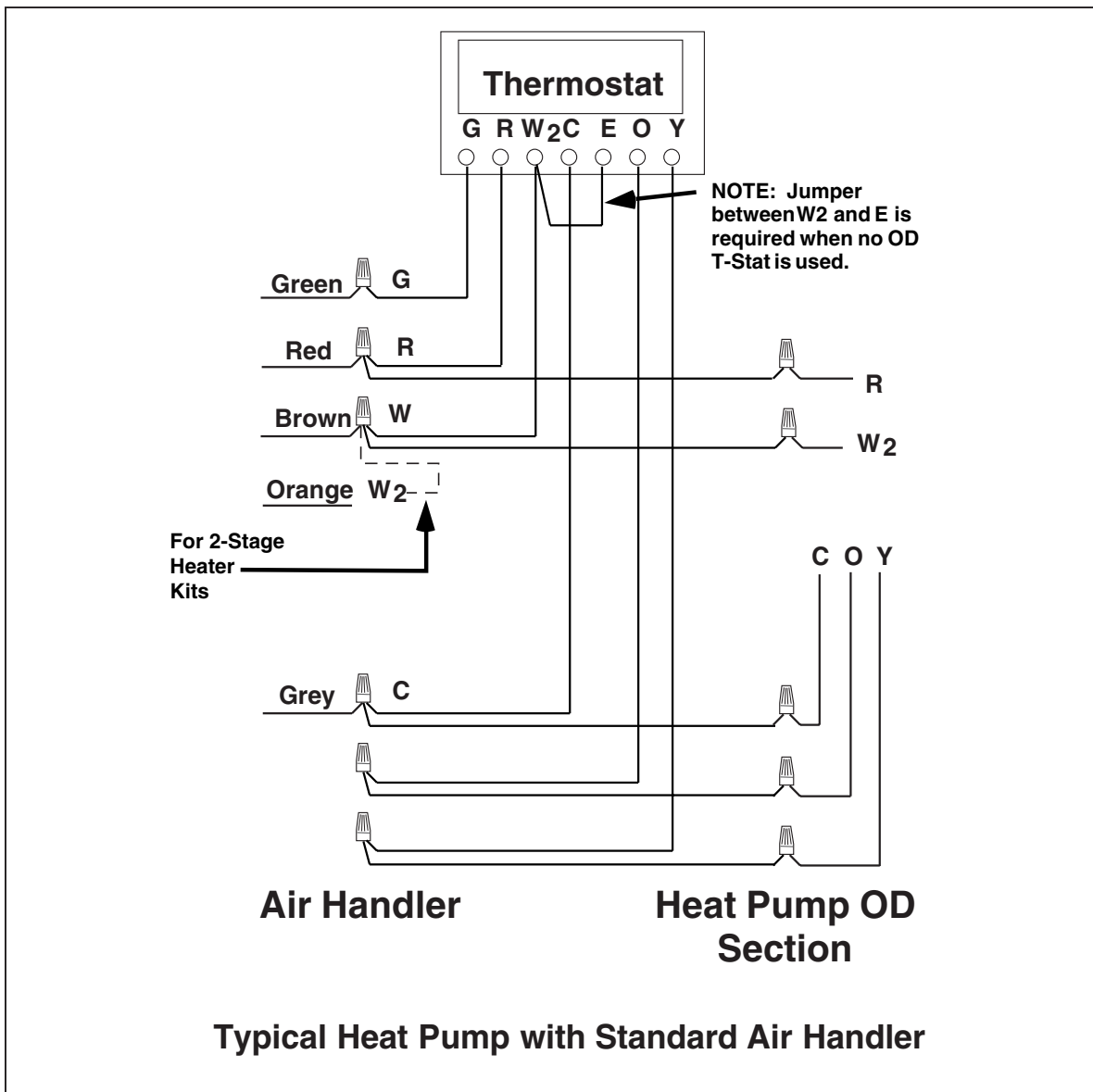
Turn off all electrical power at the main circuit box before wiring electrical power to the outdoor unit. Failure to comply may cause severe personnel injury or death.

**Wiring Diagram/Schematic** — A wiring diagram/schematic is located on the inside cover of the electrical box of the outdoor unit and on the opposite page of these instructions. The installer should become familiar with the wiring diagram/schematic before making any electrical connections to the outdoor unit. (See Figure 3).

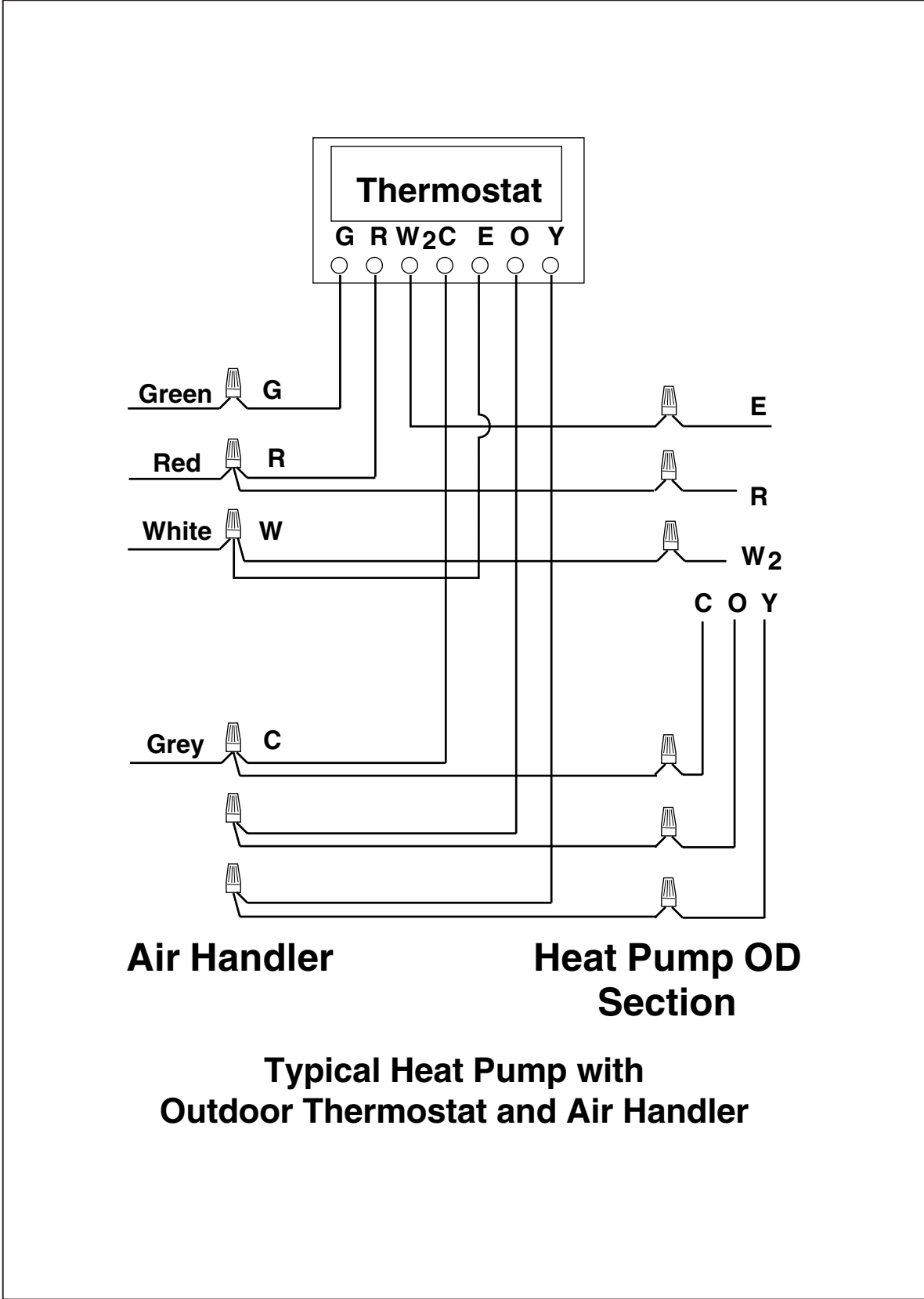
**Outdoor Unit Connections** — The outdoor unit requires both power and control circuit electrical connections. Refer to the unit wiring diagram/schematic for identification and location of outdoor unit field wiring interfaces.

**Control Circuit Wiring** — The outdoor unit is designed to operate from a 24 VAC Class II control circuit. Control circuit wiring must comply with the current provisions of the “National Electrical Code” (ANSI C1.) and with applicable local codes having jurisdiction.

Thermostat connections should be made in accordance with the instructions supplied with the thermostat, and with the instructions supplied with the indoor equipment. A typical residential installation with a heat pump thermostat and air handler are shown below.



A typical installation with a heat pump thermostat, air handler, and heat pump with an outdoor thermostat.



**Electrical Power Wiring** — Electrical power wiring must comply with the current provisions of the “National Electrical Code” (ANSI C1.) and with applicable local codes having jurisdiction. Use of rain tight conduit is recommended. Electrical conductors shall have minimum circuit ampacity in compliance with the outdoor unit rating label. The facility shall employ electrical circuit protection at a current rating no greater than that indicated on the outdoor unit rating label. Refer to the unit wiring diagram for connection details.

**Minimum Circuit Ampacity** — Electrical wiring to the equipment must be compatible and in

COPPER WIRE SIZE — AWG (1% Voltage Drop)				
Supply Wire Length-Feet				Supply Circuit
200	150	100	50	Ampacity
6	8	10	14	15
4	6	8	12	20
4	6	8	10	25
4	4	6	10	30
3	4	6	8	35
3	4	6	8	40
2	3	4	6	45
2	3	4	6	50

Wire Size based on N.E.C. for 60° type copper conductors.

compliance with the minimum circuit ampacity listed on the outdoor unit data label.

**Maximum Fuse/Circuit Breaker Size** — Circuit protection for the outdoor unit must be compatible with the maximum fuse/circuit breaker size listed on the outdoor unit data label.

**Disconnect Switch** — An electrically compatible disconnect switch must be within line of sight of the outdoor unit. This switch shall be capable of electrically de-energizing the outdoor unit.

**Optional Equipment** — Optional equipment requiring connection to the power or control circuits must be wired in strict accordance with current provisions of the “National Electrical Code” (ANSI C1.), with applicable local codes having jurisdiction, and the installation instructions provided with the equipment. Optional Equipment (e.g.: liquid line solenoid

valves, hard start kits, low suction pressure cutout switch kit, high pressure cutout switch kit, refrigerant compressor crankcase heater, etc.) should be installed in strict accordance with the manufacturer’s installation instructions.

## STARTUP AND CHECKOUT

### **WARNING:**

**Ensure electrical power to the unit is off prior to performing the following steps. Failure to do so may cause personal injury or death.**

**Air Filters** — Ensure air filters are clean and in place prior to operating the equipment.

**Thermostat** — Set the room thermostat function switch to OFF, fan switch to AUTO, and adjust the temperature setpoint to its highest setting.

Prior to applying electrical power to the outdoor unit, ensure that the unit has been properly and securely grounded, and that power supply

connections have been made at both the facility power interface and outdoor unit.

**Outdoor Unit** — Ensure the outdoor coil and top of the unit are free from obstructions and debris, and all equipment access/control panels are in place.

Using extreme caution, apply power to the unit and inspect the wiring for evidence of open, shorted, and/or improperly wired circuits.

### **Functional Checkout:**

### **CAUTION:**

**If equipped with a compressor crankcase heater, wait 24 hours prior to performing a function checkout to allow for heating of the compressor crankcase. Failure to comply may result in damage and could cause premature failure of the system.**

**Indoor Blower** — Set the thermostat function switch to COOLING and the fan switch to ON. Verify that the indoor blower is operating and that airflow is not restricted. Set the fan switch back to AUTO.

**Cooling** — Gradually lower the thermostat temperature setpoint below the actual room temperature and observe that the outdoor unit and indoor blower energize. Feel the air being circulated by the indoor blower and verify that it is cooler than ambient temperature. Listen for any unusual noises. If present, locate and determine the source of the noise and correct as necessary.

**Short Cycle Protection** — With the system operating in COOLING mode, note the setpoint temperature setting of the thermostat, and gradually raise the setpoint temperature until the outdoor unit and indoor blower de-energize. Immediately lower the setpoint temperature of the thermostat to its original setting and verify that the indoor blower is energized and that the outdoor unit remains de-energized. Verify that, after approximately 5 minutes, the outdoor unit energizes and that the temperature of the air supplied to the facility is cooler than ambient temperature.

**Heating** — Lower the thermostat setpoint temperature to the lowest obtainable setting and set the thermostat function switch to HEATING. The indoor blower and outdoor unit should stop running. After a minimum of five minutes, increase the setpoint temperature of the thermostat to the maximum setting. Verify that the outdoor unit and indoor blower have energized. Feel the air being circulated by the indoor blower and verify that it is warmer than ambient temperature. Listen for any unusual noises. If present, locate and determine the source of the noise and correct as necessary.

#### **OUTDOOR THERMOSTAT (if supplied)**

The outdoor thermostat prevents the electrical auxiliary heat (if used) from operating when the outdoor temperature is above 40°F.

**Defrost Cycle Timer** — The defrost cycle timer controls the time interval of the hot gas defrost after the defrost sensor closes. It is located in the lower left corner of the defrost control board.

Three interval settings are available: 30 minutes, 60 minutes, and 90 minutes. Time setting selection is dependent on the climate where the unit is being installed.

Example 1. Dry climate of Southern Arizona. A 90 minute setting is recommended.

Example 2. Moist climate of Seattle, Washington. A 30 minute setting is recommended.

To set the cycle timer, place the timing pin on the defrost control board to the desired time interval post.

**Note:** All units are shipped from the factory with the default time setting of 30 minutes. Maximum heating performance can be achieved by setting the time to 90 minutes.

#### **Defrost Test Procedure**

1. Terminals “R”-“C” must have 18-30v present between them in order for time delay and defrost sequences to be initiated.
2. With compressor running in heat mode, first jump the “T2”-“DFT” test pins. This will indicate to board that defrost T-stat is closed. Defrost T-stat closes at 32°, opens at 68°.
3. Next jump the “Test” pin to “C” on terminal strip. This will initiate defrost test in 5, 10 or 15 seconds (This is determined by 30, 60 or 90 minutes defrost pin settings). Factory setting will be 30 minutes.
4. When the reversing valve shifts to the defrost mode, quickly remove jumper from “Test”-“C”. If the jumper is not removed within a 5 second period, the defrost test will terminate. Unit will continue to stay in defrost mode Until :
  - A) Board recognizes that defrost sensor has reached 68° and opened or
  - B) “T2”-“DFT” jumper is removed or
  - C) 10 minutes have elapsed (board override)

If the above steps will not initiate a defrost, replace the defrost board.

### Anti Short Cycle Timer Test

The 5 minute time delay feature can be bypassed or shortened to 1 second by jumping the “Test” to “C” terminal.

**Note:** If jumper is left on the “Test” to “common” pins permanently, the defrost cycle will become inoperable.

**Optional Equipment** — A functional checkout should be performed in accordance with the checkout procedures supplied with the equipment.

**NOTE:** The following Refrigerant Charging Charts are applicable to listed assemblies of equipment and at listed airflows for the indoor coil. Assemblies of indoor coils and outdoor units not listed are not recommended.

### Adjustment of Refrigerant Charge:

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 **CAUTION:**

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Split system heat pump equipment contains liquid and gaseous refrigerant under pressure. Adjustment of refrigerant charge should only be attempted by qualified, trained personnel thoroughly familiar with the equipment. Under no circumstances should the homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

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### 10 SEER SPLIT SYSTEM HEAT PUMP ORIFICE USAGE

10 SEER SPLIT SYSTEM HEAT PUMP ORIFICE			
Model	Restrictor Bore Size (in.)		System Charge R-22 (oz.)
	Indoor	Outdoor	
1 Ton (KB)	.040	.035	69
1-1/2 Ton (KA)	.053	.041	69
1-1/2 Ton (KB)	.050	.044	69
2 Ton	.060	.049	70
2-1/2 Ton	.067	.055	79
3 Ton	.071	.059	95
3-1/2 Ton	.077	.063	103
4 Ton	.082	.065	134
5 Ton	.093	.071	198

## REFRIGERANT CHARGING CHARTS FOR COOLING MODE OF OPERATION

\* Note: All pressures are listed in psig. and all temperatures in degrees F.



- Shaded Boxes indicate flooded conditions



- Rated Design Values. Suction Pressure will be lower than design value if indoor air flow, entering dry bulb, or entering wet bulb temperatures are lower than design.

- Discharge temperatures greater than charted values indicate a refrigerant undercharge.

S.P. = Suction Pressure  
L.P. = Liquid Pressure  
D.T. = Discharge Temperature

1 Ton (KB)	OUTDOOR TEMPERATURE (°F)																
	70			75		80		85		90		95		100		105	
	S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
70	153	143															
72	155	148	168	146													
74	157	153	170	151	183	150											
76	156	193	171	156	184	154	198	153									
78	156	220	172	168	186	159	199	158	212	157							
80			173	177	187	166	201	162	214	161	227	160					
82					188	172	202	167	215	165	229	164	242	164			
84							203	171	217	169	230	169	243	168	257	168	
86							204	176	218	173	231	172	245	172	258	171	
88									219	176	233	175	246	175	259	175	
90											234	178	247	177	261	178	
92													249	180	262	180	
94															264	183	
96																	

1 1/2 Ton (KA)	OUTDOOR TEMPERATURE (°F)																
	70			75		80		85		90		95		100		105	
	S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
71	165	145															
73	168	148	180	149													
75	171	150	183	151	196	153											
77	174	153	186	154	199	155	211	156									
79	177	157	189	157	201	158	214	159	226	160							
81			193	161	205	161	217	162	229	164	241	164					
83					208	165	220	165	232	167	244	168	257	168			
85							223	168	235	169	247	171	260	172	272	173	
87							226	171	238	172	250	173	262	175	275	176	
89									242	174	254	175	266	177	278	179	
91											257	178	269	179	281	180	
93													272	181	284	182	
95															288	184	
97																	

## REFRIGERANT CHARGING CHARTS FOR COOLING MODE OF OPERATION (Cont.)

1 1/2 Ton (KB)		OUTDOOR TEMPERATURE (°F)															
		70		75		80		85		90		95		100		105	
S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	
73	172	132															
75	174	137	188	138													
77	175	142	189	143	203	144											
79	176	163	191	148	205	149	219	150									
81	176	190	192	156	207	153	221	154	235	156							
83			193	166	208	159	222	159	236	160	251	162					
85					209	165	223	164	238	165	252	166	266	168			
87							225	168	239	168	253	170	268	172	282	174	
89							226	173	240	172	255	173	269	176	283	178	
91									242	176	256	176	270	178	285	181	
93											257	180	272	181	286	184	
95													273	184	287	186	
97															289	189	
99																	

2 Ton		OUTDOOR TEMPERATURE (°F)															
		70		75		80		85		90		95		100		105	
S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	
68	171	158															
70	173	161	186	160													
72	176	163	189	163	202	163											
74	179	166	192	166	205	166	218	166									
76	182	170	195	169	208	169	221	169	234	169							
78			198	172	211	172	224	172	236	172	249	171					
80					214	175	227	175	239	175	252	175	265	174			
82							230	178	243	177	255	178	268	178	281	177	
84							233	180	246	180	258	180	271	181	284	181	
86									249	183	262	182	274	183	287	184	
88											265	185	278	185	290	185	
90													281	187	293	187	
92															297	188	
94																	

2 1/2 Ton		OUTDOOR TEMPERATURE (°F)															
		70		75		80		85		90		95		100		105	
S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	
68	161	149															
70	164	152	182	154													
72	167	155	185	157	203	159											
74	170	158	188	160	206	162	224	165									
76	173	161	191	163	209	165	227	168	245	170							
78			194	167	212	168	230	171	248	173	266	175					
80					215	171	233	174	251	176	269	178	287	180			
82							236	176	254	179	272	182	290	184	308	186	
84							240	179	257	181	275	184	293	187	311	189	
86									261	184	278	186	296	189	314	192	
88											282	188	299	191	317	194	
90													303	193	320	196	
92															324	197	
94																	

## REFRIGERANT CHARGING CHARTS FOR COOLING MODE OF OPERATION (Cont.)

3 Ton	OUTDOOR TEMPERATURE (°F)																
	70		75		80		85		90		95		100		105		
	S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
64	173	175															
66	176	178	189	176													
68	179	180	192	179	204	177											
70	182	184	195	181	207	180	220	178									
72	186	188	198	185	210	182	223	181	236	178							
74			201	188	214	186	226	184	239	182	251	179					
76					217	189	229	186	242	185	254	183	267	180			
78							233	189	245	187	257	186	270	184	283	181	
80							236	192	248	190	261	188	273	187	286	185	
82									252	192	264	190	276	189	289	188	
84											267	193	280	191	292	190	
86													283	193	295	192	
88															298	193	
90																	

3 1/2 Ton	OUTDOOR TEMPERATURE (°F)																
	70		75		80		85		90		95		100		105		
	S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
63	168	147															
65	171	150	185	151													
67	174	152	188	154	202	156											
69	176	154	191	157	205	159	219	161									
71	180	158	193	159	208	162	222	164	236	165							
73			197	163	211	165	225	167	239	169	253	170					
75					214	168	228	170	242	172	256	174	270	175			
77							231	173	245	174	259	177	273	179	287	180	
79							234	175	248	177	262	179	276	182	290	184	
81									252	180	265	181	279	183	293	187	
83											269	184	282	185	296	187	
85													286	187	300	189	
87															303	191	
89																	

4 Ton	OUTDOOR TEMPERATURE (°F)																
	70		75		80		85		90		95		100		105		
	S.P.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
63	160	151															
65	163	154	178	154													
67	166	157	180	157	195	158											
69	168	158	183	160	198	161	212	161									
71	172	162	186	162	201	164	215	164	229	165							
73			189	166	203	167	218	167	232	168	246	169					
75					207	170	221	170	235	171	249	172	264	173			
77							224	173	238	174	252	175	267	176	281	176	
79							227	176	241	177	255	177	269	179	284	180	
81									245	179	259	180	273	180	287	183	
83											262	182	276	182	290	183	
85													279	184	294	185	
87															297	187	
89																	



## REFRIGERANT CHARGING CHARTS FOR COOLING MODE OF OPERATION (Cont.)

5 Ton	OUTDOOR TEMPERATURE (°F)																	
	70			75			80		85		90		95		100		105	
	S.P.	L.P.	D.T.	L.P.	D.T.		L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.	L.P.	D.T.
61	166	156																
63	169	159	184	161														
65	172	161	187	164	201	166												
67	174	162	189	167	204	169	219	171										
69	177	166	192	169	207	172	222	175	236	177								
71			195	172	210	175	225	178	239	180	254	183						
73					213	178	227	181	242	183	257	186	272	188				
75							231	183	245	186	260	189	275	191	289	194		
77							234	186	249	189	263	191	278	195	292	197		
79									252	191	266	193	281	196	295	201		
81											270	196	284	198	299	200		
83												288	200	302	202			
85														305	204			
87																		

## REFRIGERANT CHARGING CHARTS FOR HEATING MODE OF OPERATION

1 TON (KB)																				
OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
15	109	80	24	126	93	33	143	106	42	159	119	52	164	135	62	181	152	72	198	170
16	116	78	25	132	91	34	147	104	43	163	117	53	171	132	63	188	148	73	205	164
17	123	76	26	138	89	35	152	102	44	167	115	54	178	129	64	195	143	74	212	158
18	130	74	27	144	87	36	157	100	45	170	113	55	185	126	65	202	139	75	219	151
19	137	72	28	150	85	37	162	98	46	174	111	56	192	123	66	209	134	76	226	145
20	144	70	29	155	83	38	167	96	47	178	109	57	199	120	67	216	130	77	233	139
21	151	68	30	161	81	39	171	94	48	181	107	58	206	118	68	223	125	78	240	133

1-1/2 TON (KA)																				
OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
15	108	115	23	127	120	31	146	126	39	166	132	48	176	147	58	199	171	68	223	196
16	115	113	24	133	118	32	151	124	40	169	130	49	183	144	59	206	167	69	230	190
17	122	111	25	139	116	33	156	122	41	173	128	50	190	141	60	213	162	70	237	184
18	129	109	26	145	114	34	161	120	42	177	126	51	197	139	61	220	158	71	244	177
19	136	107	27	151	112	35	165	118	43	180	124	52	204	136	62	227	153	72	251	171
20	143	105	28	157	110	36	170	116	44	184	122	53	211	133	63	234	149	73	258	165
21	150	103	29	162	108	37	175	114	45	188	120	54	218	130	64	241	144	74	265	159

## REFRIGERANT CHARGING CHARTS FOR HEATING MODE OF OPERATION (Cont.)

1-1/2 TON (KB)			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
12	115	88	21	129	102	29	144	116	38	158	130	47	159	145	55	170	162	64	181	179
13	122	86	22	135	100	30	149	114	39	162	128	48	166	143	56	177	158	65	188	173
14	129	84	23	141	98	31	153	112	40	166	126	49	173	140	57	184	153	66	195	167
15	136	82	24	147	96	32	158	110	41	169	124	50	180	137	58	191	149	67	202	161
16	143	80	25	153	94	33	163	108	42	173	122	51	187	134	59	198	144	68	209	155
17	150	78	26	159	92	34	168	106	43	177	120	52	194	131	60	205	140	69	216	148
18	157	76	27	164	90	35	172	104	44	180	118	53	201	128	61	212	135	70	223	142

2 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
13	108	123	21	127	128	29	147	133	37	167	137	46	174	151	54	193	174	63	211	196
14	115	121	22	133	126	30	152	131	38	171	135	47	181	148	55	200	169	64	218	190
15	122	119	23	139	124	31	157	129	39	174	133	48	188	145	56	207	165	65	225	184
16	129	117	24	145	122	32	162	127	40	178	131	49	195	143	57	214	160	66	232	178
17	136	115	25	151	120	33	166	125	41	182	129	50	202	140	58	221	156	67	239	171
18	143	113	26	157	118	34	171	123	42	185	127	51	209	137	59	228	151	68	246	165
19	150	111	27	163	116	35	176	121	43	189	125	52	216	134	60	235	147	69	253	159

2-1/2 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
13	108	123	21	127	128	30	146	133	38	165	139	47	171	153	55	186	177	63	201	201
14	115	121	22	133	126	31	151	131	39	169	137	48	178	151	56	193	173	64	208	195
15	122	119	23	139	124	32	156	129	40	173	135	49	185	148	57	200	168	65	215	188
16	129	117	24	145	122	33	160	127	41	176	133	50	192	145	58	207	164	66	222	182
17	136	115	25	150	120	34	165	125	42	180	131	51	199	142	59	214	159	67	229	176
18	143	113	26	156	118	35	170	123	43	184	129	52	206	139	60	221	155	68	236	170
19	150	111	27	162	116	36	175	121	44	187	127	53	213	136	61	228	150	69	243	164

3 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
13	114	133	20	131	137	27	148	140	34	166	144	43	175	156	55	200	178	67	226	200
14	121	131	21	137	135	28	153	138	35	169	142	44	182	153	56	207	173	68	233	193
15	128	129	22	143	133	29	158	136	36	173	140	45	189	151	57	214	169	69	240	187
16	135	127	23	149	131	30	163	134	37	177	138	46	196	148	58	221	164	70	247	181
17	142	125	24	155	129	31	167	132	38	180	136	47	203	145	59	228	160	71	254	175
18	149	123	25	161	127	32	172	130	39	184	134	48	210	142	60	235	155	72	261	169
19	156	121	26	166	125	33	177	128	40	188	132	49	217	139	61	242	151	73	268	163

## REFRIGERANT CHARGING CHARTS FOR HEATING MODE OF OPERATION (Cont.)

3-1/2 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
9	119	138	16	136	139	23	152	140	30	169	140	38	176	156	49	196	186	59	216	217
10	126	136	17	141	137	24	157	138	31	173	138	39	183	153	50	203	182	60	223	210
11	133	134	18	147	135	25	162	136	32	177	136	40	190	150	51	210	177	61	230	204
12	140	132	19	153	133	26	167	134	33	180	134	41	197	148	52	217	173	62	237	198
13	147	130	20	159	131	27	172	132	34	184	132	42	204	145	53	224	168	63	244	192
14	154	128	21	165	129	28	176	130	35	188	130	43	211	142	54	231	164	64	251	186
15	161	126	22	171	127	29	181	128	36	191	128	44	218	139	55	238	159	65	258	180

4 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
15	125	128	19	137	130	23	150	131	28	162	133	38	175	143	54	213	161	70	251	179
16	132	126	20	143	128	24	154	129	29	166	131	39	182	140	55	220	157	71	258	173
17	139	124	21	149	126	25	159	127	30	169	129	40	189	137	56	227	152	72	265	167
18	146	122	22	155	124	26	164	125	31	173	127	41	196	134	57	234	148	73	272	161
19	153	120	23	161	122	27	169	123	32	177	125	42	203	131	58	241	143	74	279	155
20	160	118	24	166	120	28	173	121	33	180	123	43	210	129	59	248	139	75	286	148
21	167	116	25	172	118	29	178	119	34	184	121	44	217	126	60	255	134	76	293	142

5 TON			OUTDOOR TEMPERATURE (DEG. F)																	
0			10			20			30			40			50			60		
S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.	S.P.	L.P.	D.T.
8	116	134	16	140	139	25	163	144	33	187	149	41	199	159	50	222	175	59	246	191
9	123	132	17	146	137	26	168	142	34	190	147	42	206	156	51	229	170	60	253	185
10	130	130	18	151	135	27	173	140	35	194	145	43	213	153	52	236	166	61	260	179
11	137	128	19	157	133	28	178	138	36	198	143	44	220	151	53	243	162	62	267	173
12	144	126	20	163	131	29	182	136	37	201	141	45	227	148	54	250	157	63	274	166
13	151	124	21	169	129	30	187	134	38	205	139	46	234	145	55	257	153	64	281	160
14	158	122	22	175	127	31	192	132	39	209	137	47	241	142	56	264	148	65	288	154

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LEAVE THESE  
INSTALLATION  
INSTRUCTIONS WITH  
THE HOMEOWNER.**



**708105C**

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