



# HEAT PUMP INSTALLATION INSTRUCTIONS

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## HEAT PUMP SAFETY

### Your safety and the safety of others are very important.

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



This is the safety alert symbol.

This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol and either the word “DANGER” or “WARNING.”

These words mean:

**⚠ DANGER**

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

**⚠ WARNING**

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

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

## INSTALLATION REQUIREMENTS

These instructions are intended as a general guide only for use by qualified persons and do not supersede any national or local codes in any way. The installation must comply with all state and local codes as well as the National Electrical Code

- The heat pump is designed and approved for outdoor use only.
- The heat pump must be installed with no ductwork in the airstream. The outdoor fan is not designed to operate against any additional static pressure.

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## Tools and Parts

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

### Tools Needed

- Torch
- ¼" nut driver
- ⅝" nut driver
- Adjustable wrench
- Gauge set for R-410A refrigerant
- Service wrench with hex-head extension
- Torque wrench

### Parts Needed

Check local codes and HVAC supplier. Check existing electrical supply, and read "Electrical Requirements," "Location Requirements," "System Requirements" and "Connect Refrigerant Lines."

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## System Requirements

Heat pump system matches are derived from actual laboratory testing of matched systems. It is recommended that only matching equipment be used to ensure proper operation and efficient performance.

- The designed system matches are listed in the heat pump unit specification sheets and on the heat pump refrigerant charging instructions located on the back of the service access panel.
- Refrigerant charging instructions include a list of matching indoor equipment with the proper thermal expansion valve size and amount of refrigerant charge required.
- This heat pump has been factory charged with a quantity of refrigerant (R-410A) sufficient for a matched indoor coil and a maximum 15 ft of refrigerant line.
- In order to maintain the 16 SEER rating, this heat pump must be matched with an indoor section containing a variable speed blower.
- Refer to the refrigerant charge label located on the inside of the heat pump access panel for the correct thermal expansion valve size required.
- This product has been designed and manufactured to meet ENERGY STAR® criteria for energy efficiency when matched with appropriate coil components. However, proper refrigerant charge and proper airflow are critical to achieve rated capacity and efficiency. Installation of this product should follow the manufacturer's refrigerant charging and airflow instructions. Failure to confirm proper charge and airflow may reduce energy efficiency and shorten equipment life.
- A filter drier approved for use with R-410A refrigerant is installed in the heat pump.
- If this condensing unit is equipped with a crankcase heater, it should be energized 24 hours before the condensing unit is started to prevent compressor damage as a result of slugging.
- Use only polyol ester oils if oil must be added to the system. Mineral oil is not compatible with refrigerant.

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## Indoor System Thermal Expansion Valve

- W4GH6 units are designed for use with thermal expansion valve systems only. The thermal expansion valve must be ordered separately from the manufacturer.

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### Thermal Expansion Valve Kits

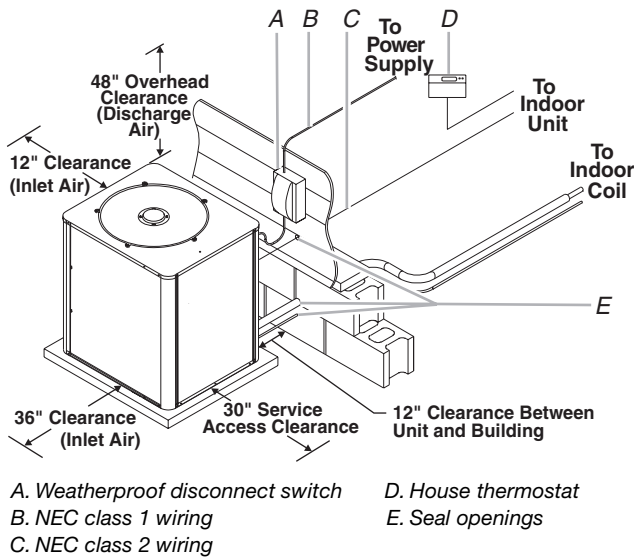
Model	Part Number
W4GH624	H4TXV01
W4GH636	H4TXV02
W4GH648, 60	H4TXV03

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## Location Requirements

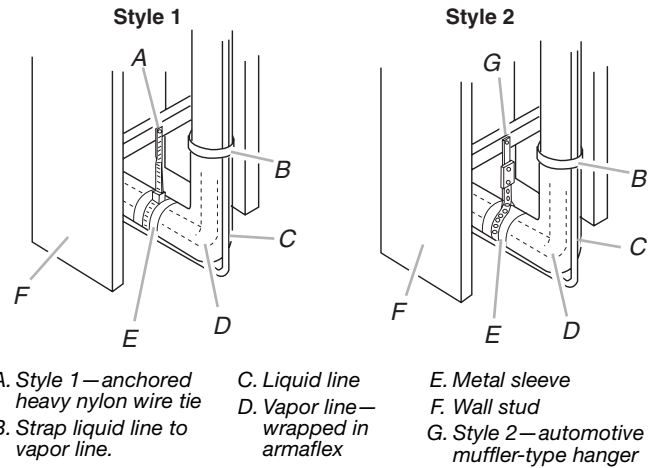
- This heat pump is designed to be located outdoors with sufficient clearance for free entrance to the inlet and discharge air openings. The location must also allow for adequate service access. See "Minimum Clearances."
- Where possible, select a location for the heat pump which is shaded from the direct rays of the sun most of the time. North or east locations are usually most desirable. Position the heat pump to avoid direct contact with water, snow or ice from a roofline overhead.
- The heat pump must be installed on a solid, level mounting pad that will not settle or shift. Isolate the pad from the building structure to avoid possible transmission of sound or vibration from the heat pump into the conditioned space.
- The heat pump foundation should be raised to a minimum of 3" above finish grade. In areas which have prolonged periods of temperatures below freezing, and/or snowfall, the heat pump should be elevated above the average snow line. If heat pump is to be installed on a flat roof, it should be on a platform or other support which will raise the inlet air opening 12" minimum above the surface of the flat roof.
- Care should be taken to ensure free drainage of condensate from defrost cycles. This will prevent ice accumulation. The heat pump should be located away from walkways to prevent possible icing from defrost condensate.
- Avoid placing the heat pump near areas such as sleeping quarters or study rooms. Normal operating sound levels may be objectionable if the heat pump is placed near certain rooms. A shift in sound type does occur during the defrost mode. The defrost mode generally lasts no longer than 10 minutes.

## Minimum Clearances



## Transition from Horizontal to Vertical

This shows how to make a transition from horizontal to vertical.



## Installing Vertical Runs (new construction shown)

This shows how to install line sets on vertical runs.

**NOTE:** Similar installation practices should be used if line set is to be installed on exterior of outside wall.

**IMPORTANT:** Refrigerant lines must not contact structure.

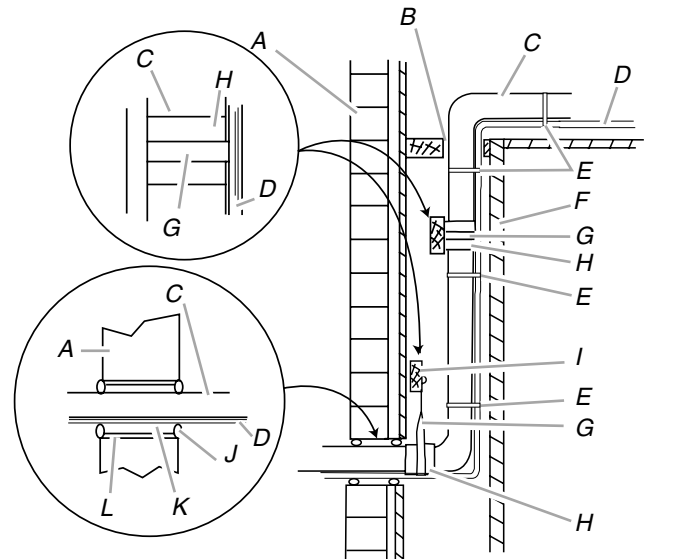
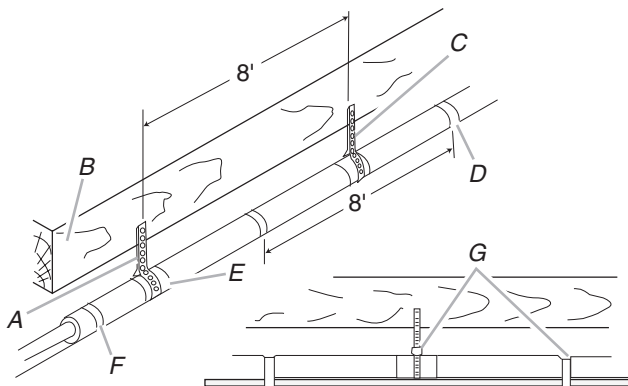
## Line Set Isolation

The following illustrations demonstrate procedures which ensure proper refrigerant line set isolation.

### Installing Horizontal Runs

This shows how to install line sets on horizontal runs.

**NOTE:** To hang line set from joist or rafter, use either metal strapping material or anchored heavy nylon wire ties.



## Electrical Requirements

### **⚠ WARNING**



#### Electrical Shock Hazard

Electrically ground condensing unit or heat pump.

Connect ground wire to ground lug.

Use copper wire for supply connection.

Correct wire gauge is shown in the chart below.

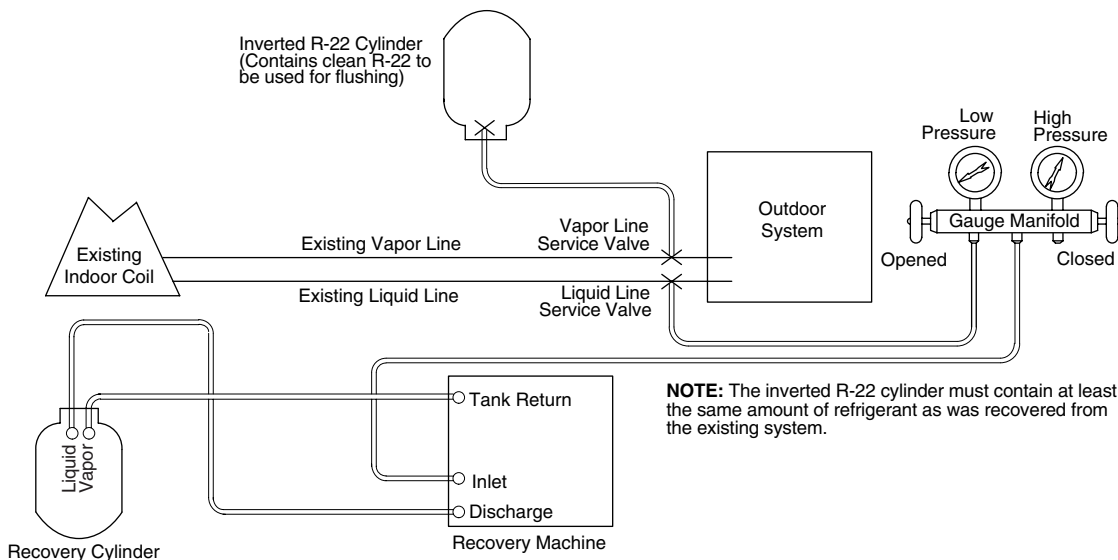
Failure to follow these instructions can result in death or electrical shock.

Rating Plate Ampacity	AWG
Less than 15	14
16 - 20	12
21 - 30	10
31 - 50	8

**NOTE:** All outdoor wiring must be suitable for outdoor use. Use copper conductors only.

- All field wiring must be done in accordance with National Electrical Code requirements, applicable requirements of UL, or local codes, where applicable.
- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the rating plate for the maximum over-current protection, minimum circuit ampacity, and operating voltage. See the wiring diagrams in "Make Electrical Connections."

## Flushing Connections



**NOTE:** The inverted R-22 cylinder must contain at least the same amount of refrigerant as was recovered from the existing system.

## Inspect Shipment

### **⚠ WARNING**

#### Excessive Weight Hazard

Use two or more people to move and install condensing unit or heat pump.

Failure to do so can result in back or other injury.

This heat pump is shipped in one package, completely assembled and wired. The thermostat is shipped in a separate carton when ordered.

1. Check the heat pump rating plate to confirm specifications are as ordered.
2. Upon receipt of equipment, carefully inspect it for possible shipping damage. Take special care to examine the heat pump inside the carton if the carton is damaged.

If damage is found, it should be noted on the carrier's freight bill. Damage claims should be filed with the carrier immediately. Claims of shortages should be filed with the seller within 5 days.

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

## Flush Refrigerant Lines

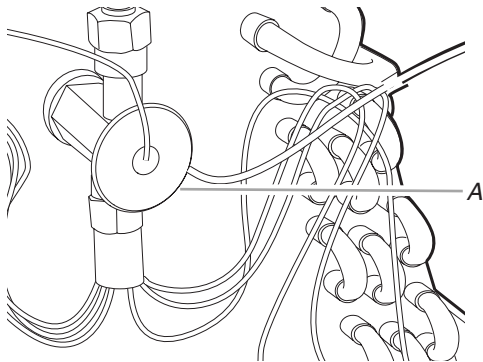
Refrigerant lines must be flushed by a licensed, EPA certified refrigerant technician in accordance with established procedures.

### NOTES:

- R-410A outdoor systems are not recommended for use with indoor systems that have used R-22 as the refrigerant. However, if this unit is being matched with an approved line set or indoor coil which was previously charged with R-22 refrigerant, or if it is being matched with a coil which was manufactured before January of 1999, the R-22 coil and line set must be flushed prior to installation.
- Check the refrigerant lines for size and length. See "Connect Refrigerant Lines."

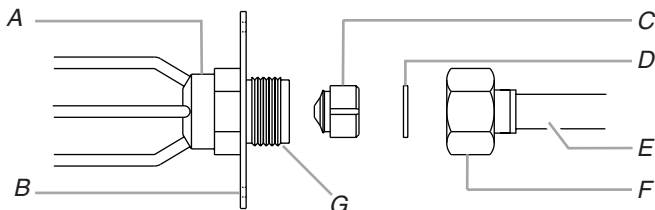
1. Disconnect power.
2. Remove the refrigerant from the existing system per the manufacturer's instructions provided with the recovery system being used. Connect the R-22 gauge set is connected to both sides of the refrigerant system (as shown), and verify that the entire system is void of refrigerant in accordance with the manufacturer's instructions provided with the recovery system being used.
3. Disconnect the liquid and vapor lines from the existing outdoor unit.
4. Remove the existing outdoor unit.
5. Set the new R-410A outdoor unit and connect the refrigerant lines. See "Connect Refrigerant Lines" steps 1 through 5. Do not evacuate the lines.
6. Remove the existing R-22 refrigerant flow control orifice or thermal expansion valve on the indoor coil, and use a field provided fitting to reconnect the lines.

### Thermal Expansion Valve



A. Thermal expansion valve

### Orifice



A. Distributor fitting

B. Mounting flange

C. Piston orifice

D. Ring seal (supplied)

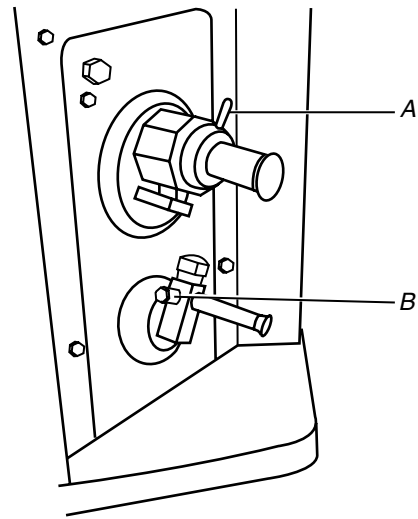
E. Orifice extension stub

F. 0.812" brass hex nut

G. Brass hex fitting

7. Remove the caps from the suction and liquid pressure taps.

8. Remove the valve cores.



A. Suction pressure tap

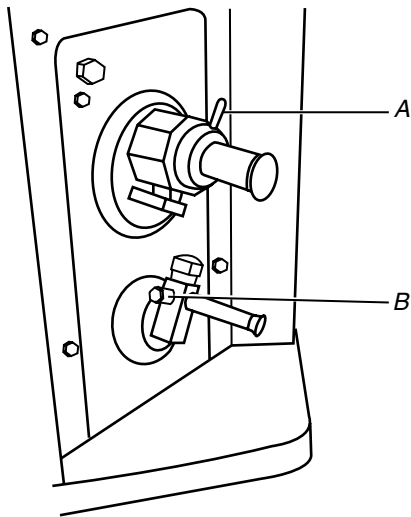
B. Liquid pressure tap

9. Connect an R-22 cylinder with clean refrigerant to the suction pressure tap.
10. Connect the R-22 gauge set to the liquid line service valve and connect a recovery machine with an empty recovery tank to the gauge set.
11. Set the recovery machine for liquid recovery and start the recovery machine in accordance with the manufacturer's instructions provided with the recovery system being used.
12. Open the gauge set valves to allow the recovery machine to run until a vacuum level less than 0" Hg (gauge pressure) is established in the existing system line set and indoor coil.
13. Invert the cylinder of clean R-22 and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve.
14. After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery to allow the recovery machine to run until a vacuum level less than 0" Hg (gauge pressure) is established in the existing system line set and indoor coil in accordance with the manufacturer's instructions provided with the recovery system being used.

**NOTE:** A single system flush should remove all of the mineral oil from the existing refrigerant lines and indoor coil. A second flushing may be done (using clean refrigerant) if insufficient amounts of mineral oil were removed during the first flush. A second flushing may be required to ensure that the maximum amount of oil is removed.

15. Close the valves on the inverted R-22 cylinder and gauge set.
16. Remove the recovery machine, gauges, R-22 cylinder and the field provided fitting installed in Step 6.

17. Install the valve cores.



A. Suction pressure tap  
B. Liquid pressure tap

18. Install the R-410A thermal expansion valve specified for this system in the indoor coil.

**NOTE:** R-410A systems use only thermal expansion valves.

19. Pressurize the lines and indoor coil with a pressure not to exceed 20 psig.

20. Leak test the lines with a pressure not to exceed 20 psig.

21. Open the suction and liquid service valves fully.

22. Insulate the suction line with refrigerant line insulation material of ¼" or more wall thickness.

23. Pack insulating material around refrigerant lines where they penetrate the structure to protect the lines and to minimize vibration transmission.

## Connect Refrigerant Lines

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

### IMPORTANT:

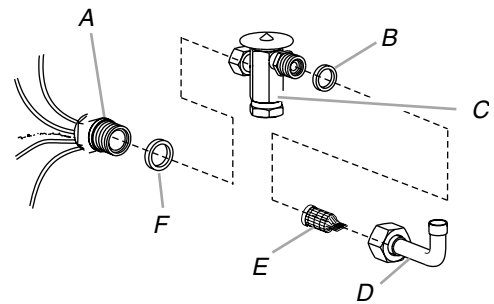
- Connecting refrigerant lines must be clean, dehydrated, refrigerant-grade copper lines. Heat pumps should be installed only with specified line sizes for approved system combinations with elevation differences up to 15 ft and total length of up to 50 ft. See the Suction Line Sizes and Liquid Line Sizes charts later in this section.
- Avoid sharp bends or possible kinking in the refrigerant lines during installation as this may cause a reduction in performance.
- Use care with the refrigerant lines during the installation process. Sharp bends or possible kinking in the lines will cause a reduction in performance.
- To avoid contamination of the refrigerant system, do not remove the caps from the lines or system connection points until connections are ready to be completed.

### Install Thermal Expansion Valve

W4GH6 heat pumps are designed for use with thermal expansion valve systems only. An R-410A system will not operate properly with an R-22 thermal expansion valve.

Thermal expansion valves equipped with Chatleff-type fittings are available from the manufacturer. See Thermal Expansion Valve Kits chart in "System Requirements."

### Thermal Expansion Valve Installation

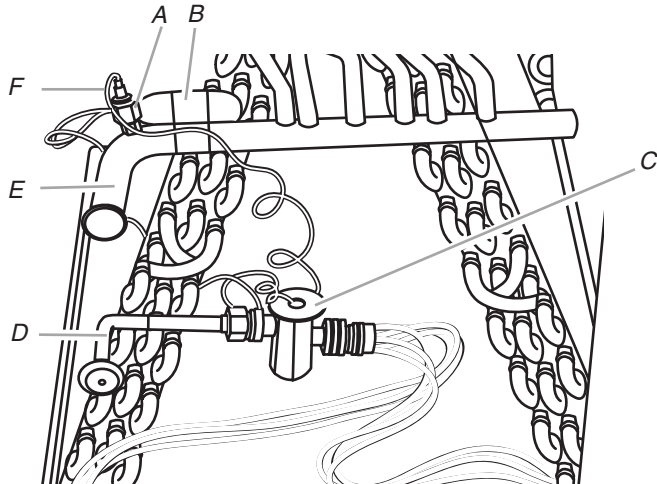


A. Distributor  
B. Teflon® seal  
C. Thermal expansion valve  
D. Liquid line stub  
E. Strainer  
F. Teflon® seal

### To install the thermal expansion valve:

1. Separate the distributor assembly.
2. If a piston orifice is installed, remove the piston orifice and old Teflon® seal and discard.
3. Insert nozzle end of the thermal expansion valve along with a new Teflon® seal into the distributor.
4. Tighten to 20 to 30 ft lbs. Use backup wrench on all wrench flats.  
**NOTE:** Overtightening may crush the Teflon® seal and cause a leak.
5. Attach liquid line portion of distributor assembly along with new Teflon® seal to the inlet of the thermal expansion valve.

6. Tighten to 20 to 30 ft lbs. Use backup wrench on all wrench flats.  
**NOTE:** Overtightening may crush the Teflon® seal and cause a leak.
7. Connect the external equalizer line to the equalizer port on the suction line.
8. Tighten to 8 ft lbs.
9. Attach the superheat sensing bulb to the suction header with the strap provided with the thermal expansion valve.



A. Equalizer port  
B. Superheat sensing bulb  
C. Thermal expansion valve  
D. Liquid line  
E. Suction line  
F. Equalizer line

**NOTE:** If installing a thermal expansion valve on an indoor coil that previously used a fixed orifice, be sure to remove the existing fixed orifice. Failure to remove a fixed orifice when installing a thermal expansion valve to the indoor coil may result in improper operation and damage to the system.

### Connect Liquid and Suction Lines

1. Route the suction and liquid lines from the fittings on the indoor coil to the fittings on the heat pump. Run the lines in as direct a path as possible, avoiding unnecessary turns and bends.
2. For product efficiency, be sure that the suction line is insulated over the entire exposed length and that both suction and liquid lines are not in direct contact with floors, walls, ductwork, floor joists, or other piping.
3. Remove valve cores.
4. Wrap the service valves with a wet rag.
5. Connect the suction and liquid lines, using a brazing compound. Braze with an alloy of silver or copper and phosphorus with a melting point above 1,100°F.

**NOTE:** Do not use soft solder.

6. Make sure indoor coil has been put in place according to the Installation Instructions and is connected to the refrigerant lines.
7. Replace valve cores.
8. Pressurize the lines and indoor coil with a pressure not to exceed 20 psig.
9. Leak test the lines with a pressure not to exceed 20 psig.
10. Evacuate the indoor coil and lines to a minimum of 500 microns to remove contamination and moisture, then disconnect the vacuum pump.
11. Open the suction and liquid service valves fully.
12. Insulate the suction line with refrigerant line insulation material of ¼" or more wall thickness.
13. Pack insulating material around refrigerant lines where they penetrate the structure to protect the lines and to minimize vibration transmission.

### Refrigerant Charge

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

#### IMPORTANT:

- Refrigerant charge adjustment will be required for line set lengths greater than 15 ft and for evaporator coils not matched to the systems.
- The heat pump is factory charged with the proper refrigerant charge amount for a matching evaporator and 15 ft of refrigerant line. Refer to the heat pump rating plate for the exact amount of this factory charge.
- Adjustment of the refrigerant charge will be necessary based on the system combination and line length. To adjust the refrigerant size for increased line lengths, add the following amount of refrigerant.  
**For line set lengths greater than 15 ft,** add refrigerant by weighing in 0.60 oz per ft of ¾" O.D. liquid line.
- If necessary, adjust the refrigerant charge for compatibility with the evaporator coil.
- In heat pump systems, horizontal suction lines should be slightly sloped toward the heat pump. Piping must avoid dips or low spots, which can collect oil.

### Check Charge Using Normal Operating Pressures

Use Normal Operating Pressures chart to perform maintenance checks.

#### NOTES:

- The Normal Operating Pressures chart is not a procedure for charging the system.
- Minor variations in these pressures may be due to differences in installations.
- Significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

## Normal Operating Pressures

**NOTE:** Values provided in chart are typical pressures. Indoor unit matchup, indoor air quality and indoor load will cause pressures to vary.

Temperature of the Air Entering the Outdoor Coil	Model							
	-24		-36		-48		-60	
	Liquid	Suction	Liquid	Suction	Liquid	Suction	Liquid	Suction
<b>Cooling – 1st Stage (Low Capacity)</b>								
65°F	232	146	225	144	235	144	225	138
75°F	264	148	261	147	268	145	264	141
85°F	307	149	302	149	310	147	305	142
95°F	353	151	349	151	356	148	352	146
105°F	403	153	397	153	407	150	405	148
115°F	460	155	461	157	466	152	459	150
<b>Cooling – 2nd Stage (High Capacity)</b>								
65°F	240	143	239	139	244	140	241	134
75°F	279	145	278	141	283	141	280	136
85°F	322	147	322	143	326	144	324	137
95°F	371	149	367	146	374	147	373	138
105°F	423	151	426	148	427	148	425	142
115°F	485	154	489	151	491	151	486	146
<b>Heating – 1st Stage (Low Capacity)</b>								
40°F	337	93	328	98	369	75	351	63
50°F	322	117	333	118	366	114	335	92
<b>Heating – 2nd Stage (High Capacity)</b>								
20°	279	62	296	62	311	58	308	59
30°F	288	76	309	75	334	72	323	70
40°F	302	93	322	92	354	89	318	69
50°F	306	112	336	113	381	108	329	82



### Suction Line Sizes

Installations exceeding 100 ft are not recommended.


Btu/h	Line Set Size (in. OD)		
24,000	3/4	3/4	3/4
36,000	7/8	7/8	7/8
48,000	7/8	7/8	7/8
60,000	1 1/8	1 1/8	1 1/8
Line Set Length	Less than 25 ft	25 ft	Over 25 ft and up to 50 ft

### Liquid Line Sizes


Installations exceeding 100 ft are not recommended.

Btu/h	Line Set Size (in. OD)		
24,000	3/8	3/8	3/8
36,000	3/8	3/8	3/8
48,000	3/8	3/8	3/8
60,000	3/8	3/8	3/8
Line Set Length	Less than 25 ft	25 ft	Over 25 ft and up to 50 ft

## Make Electrical Connections



### WARNING



**Electrical Shock Hazard**


Electrically ground condensing unit or heat pump.  
 Connect ground wire to ground lug.  
 Use copper wire for supply connection.  
 Correct wire gauge is shown in the chart below.  
 Failure to follow these instructions can result in death or electrical shock.

Rating Plate Ampacity	AWG
Less than 15	14
16 - 20	12
21 - 30	10
31 - 50	8


- Install an adequately-sized branch circuit disconnect, according to the NEC, within sight of and readily accessible from heat pump.
- The cable or conduit and fittings connected from the disconnect to the heat pump shall be rated for outdoor use.

### Single Phase Electrical Connections

Refer to “Wiring Diagram—Single Phase 208/230 Volt.”



### WARNING



**Electrical Shock Hazard**

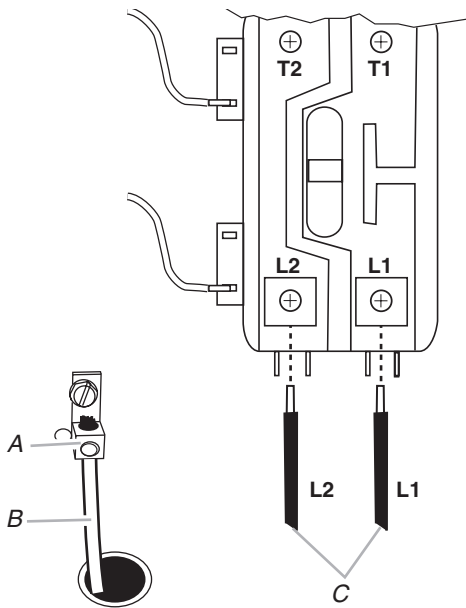
Disconnect power before servicing.  
 Replace all parts and panels before operating.  
 Failure to do so can result in death or electrical shock.

1. Disconnect power.
2. Remove control box cover.
3. Connect the field supply wires L1 and L2 to contactor terminals L1 and L2.

### IMPORTANT:

- Electrical wiring, disconnect means and over-current protection are to be supplied by the installer. Refer to the rating plate for the maximum over-current protection, minimum circuit ampacity, and operating voltage. See wiring diagrams later in this section.

4. Connect ground wire to ground lug.

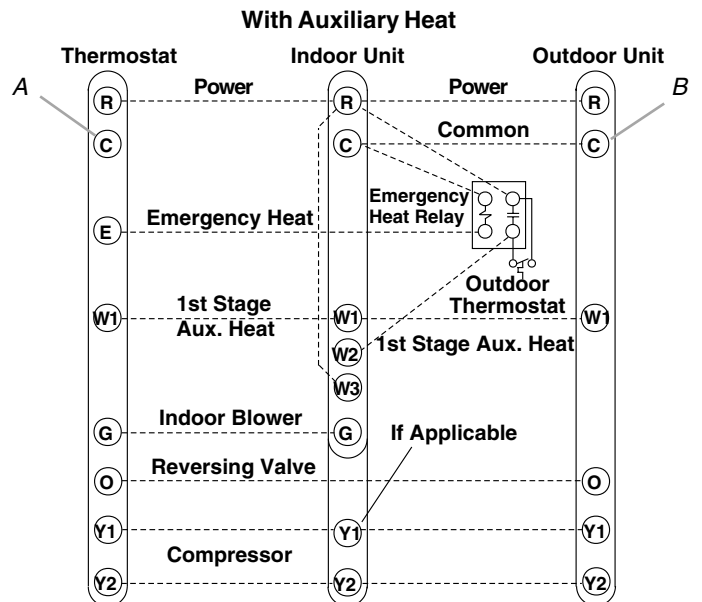
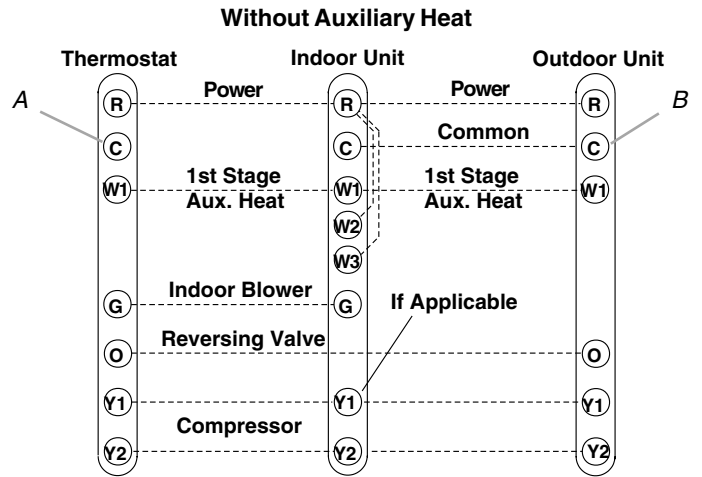


A. Ground lug  
 B. Field supply ground wire  
 C. 208/230 volt field supply wires

5. Connect low voltage circuit.

**Typical Wiring Connection (low voltage circuit)**

**NOTE:** Some connections may not apply. Refer to specific thermostat and indoor unit.

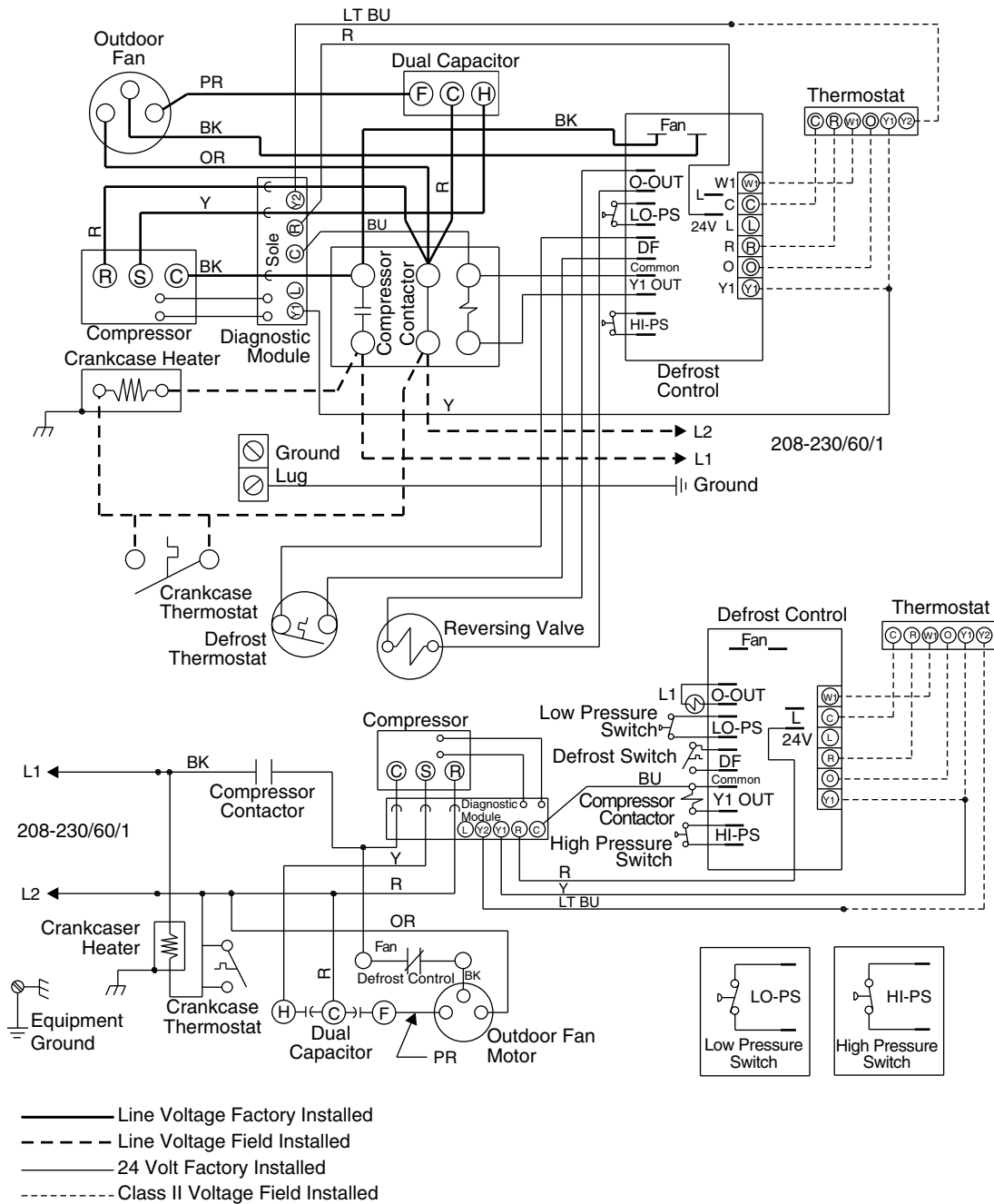


A. Do not connect C (common) connection between indoor unit and thermostat except when required by the indoor thermostat. Refer to the thermostat installation instructions.  
 B. C (common) connection between indoor unit and outdoor unit required for proper operation.

6. Replace control box cover.

7. Reconnect power.

# Outdoor Unit Typical Wiring Diagram



## Complete Installation

1. Operate the heat pump for a period of at least 15 minutes to allow for pressures and temperatures to stabilize.
2. If heat pump does not appear to be functioning correctly, have heat pump checked by a person certified by the EPA to handle refrigerant.

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# SEQUENCE OF OPERATION

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## Cooling Cycle

Upon cooling demand, the thermostat closes circuit R to O and Y. Closing R to O and Y energizes the reversing valve for cooling operation and closes the heat pump contactor, starting the compressor and outdoor fan. The thermostat automatically closes R to G circuit, which also brings on the indoor fan at the same time. Upon satisfying cooling demand, the thermostat will open the above circuits and open the main contactor, stopping the compressor and outdoor fan. If the indoor unit is equipped with a delay timer, the blower will continue to operate for 60 to 90 seconds, which improves system efficiency.

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## Heating Cycle

Upon heating demand, the thermostat closes circuit R to Y, which closes the heat pump contactor, starting the compressor and outdoor fan. The reversing valve is not energized in the heating mode. The thermostat again automatically brings on the indoor fan at the same time. Upon satisfying heating demand, the thermostat opens the above circuits and stops heat pump operation.

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## Defrost Cycle

If the outdoor ambient conditions are such that frost forms on the outdoor coil, the defrost control monitors a defrost cycle. It then runs the defrost cycle as ambient temperatures require.

The defrost control is time/temperature initiated and temperature terminated with a maximum defrost time (time-out) of 10 minutes. The time between defrost cycles is preset at 60-minute intervals at the factory, but can be field adjusted between 30, 60, or 90 minutes. To adjust the time period between defrost cycles, see "Adjust Time Between Defrost Cycles."

The defrost control will initiate a defrost cycle when the selected time period has elapsed and the defrost sensor sees a temperature below freezing. At the start of a defrost cycle, the defrost control will energize the reversing valve solenoid, shifting the reversing valve and de-energizing the outdoor fan. The defrost relay will also close, energizing temporary heat for increased comfort during defrost (if the indoor unit is so equipped). The heat pump will remain in defrost until the defrost sensor has determined that the frost has been removed from the coil or a 10-minute period has elapsed, whichever comes first.

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### Defrost Thermostat

The defrost thermostat is located on the liquid line between the check/expansion valve and the distributor. When defrost thermostat senses 42°F or cooler, the thermostat contacts close and send a signal to the defrost control board to start the defrost timing. It also terminates defrost when the liquid line warms up to 70°F.

## Defrost Control

The defrost control board includes the combined functions of the time/temperature defrost control, defrost relay, diagnostic LEDs and terminal strip for field wiring connections. See "Defrost Control Board" in the "Adjust Defrost System" section.

The control provides automatic switching from normal heating operation to defrost mode and back. During compressor cycle (call for defrost), the control accumulates compressor run times at 30, 60 or 90 minute field-adjustable intervals. If the defrost thermostat is closed when the selected compressor run time interval ends, the defrost relay is energized and defrost begins.

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## Defrost Control Timing Pins

Each timing pin selection provides a different accumulated compressor run time period during one thermostat run cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted to 30 (T1), 60 (T2) or 90 (T3) minutes. See "Defrost Control Board" in the "Adjust Defrost System" section. The defrost timing jumper is factory-installed to provide a 60-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval. The maximum defrost period is 14 minutes and cannot be adjusted.

A test option is provided for troubleshooting. The test mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered. If the jumper is in the test position at power-up, the control will ignore the test pins. When the jumper is placed across the Test pins for 2 seconds, the control will enter the defrost mode. If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost thermostat opens or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

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## Compressor Delay

The defrost board has a field-selectable function to reduce occasional sounds that may occur while the heat pump is cycling in and out of the defrost mode. The compressor will be cycled off for 30 seconds while going in and out of the defrost mode when the compressor delay jumper is removed.

**NOTE:** The 30-second "off" cycle is not functional when jumpering the TEST pins.

## Time Delay

The time delay is 5 minutes long. The delay helps to protect the compressor from short cycling in case the power to the heat pump is interrupted or a pressure switch opens. The delay is bypassed by placing the timer select jumper across the TEST pins for 0.5 seconds.

## Pressure Switch Circuit

The defrost control includes LO-PS terminals to connect an optional low pressure (loss of charge pressure) switch. A high pressure switch (optional) can be connected to the HI PS terminals. See "Defrost Control Board" in the "Adjust Defrost System" section.

During a single demand cycle, the defrost control will lock out the heat pump after the fifth time that the circuit is interrupted by any pressure switch wired to the control board. In addition, the diagnostic LEDs will indicate a locked-out pressure switch after the fifth occurrence of an open pressure switch. See Defrost Control Board Diagnostic LEDs chart later in this section. The heat pump will remain locked out until power to the board is interrupted, then re-established, or until the jumper is applied to the TEST pins for 0.5 seconds.

**NOTE:** The defrost control board ignores input from the low pressure switch terminals during:

- TEST mode
- Defrost cycle
- 90-second start-up period
- First 90 seconds after the reversing valve switches heat/cool modes

**NOTE:** If the TEST pins are jumpered and the 5-minute delay is being bypassed, the LO PS terminal signal is not ignored during the 90-second start-up period.

## Defrost Control Board Diagnostic LEDs

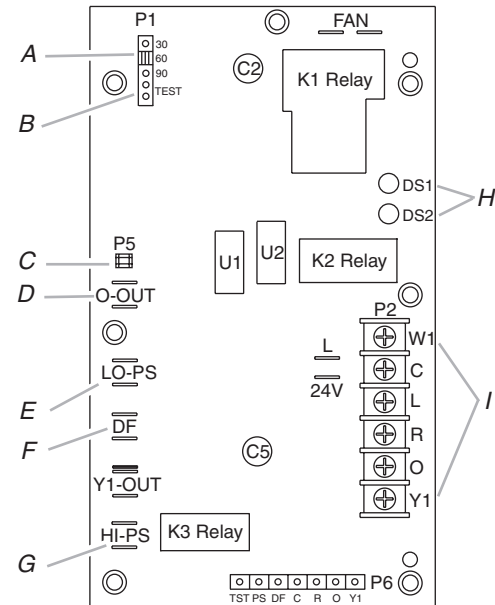
Mode	Green LED (DS2)	Red LED (DS1)
No Power to Board	Off	Off
Normal Operation/Power to Board	Simultaneous Slow Flash	
Short Cycle Lockout	Alternating Slow Flash	
Low Pressure Switch Fault	Off	Slow Flash
Low Pressure Switch Lockout	Off	On
High Pressure Switch Fault	Slow Flash	Off
High Pressure Switch Lockout	On	Off

## Adjust Defrost System

### Defrost Control Board

Optional high pressure switch connections

**NOTE:** To add the pressure switch, remove the factory-installed jumper.



A. Defrost time setting pins

B. Test pins

C. Compressor valve

D. Reversing valve

E. Low pressure switch (optional)

F. Defrost thermostat

G. High pressure switch (optional)

H. Diagnostic LEDs

I. Low voltage terminal strip connections

### Adjust Time Between Defrost Cycles

## WARNING



### Electrical Shock Hazard

**Disconnect power before servicing.**

**Replace all parts and panels before operating.**

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

1. Disconnect power.

2. Remove the heater compartment access panel.
3. Adjust the time period between defrost cycles by placing the defrost time plug in the proper position. See “Defrost Control Board.”
  - For 30-minute intervals between defrost cycles, connect the Defrost Time Setting Plug to the pins corresponding to 30.
  - For 60-minute intervals between defrost cycles, connect the Defrost Time Setting Plug to the pins corresponding to 60 (this setting is the factory preset setting).
  - For 90-minute intervals between defrost cycles, connect the Defrost Time Setting Plug to the pins corresponding to 90.
4. Replace the heater compartment access panel.
5. Reconnect power.

## Troubleshoot the Defrost System

### ⚠ WARNING



#### Electrical Shock Hazard

**Disconnect power before servicing.**

**Replace all parts and panels before operating.**

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

The defrost control is equipped with a set of pins (labeled TEST on control circuit board) to aid in troubleshooting the defrost system. Connecting the test pins speeds up the defrost cycle time by a factor of 256.

1. Disconnect power.
2. Remove control box cover.

3. Connect the test pins on the defrost control using a test jumper wire.
 

**NOTE:** If the outdoor temperature is above 32°F, connect the defrost sensor terminals using a test jumper wire. See “Defrost Control Board” in the “Adjust Defrost System” section.

4. Replace control box cover.
5. Reconnect power.
6. Start system in heating operation.
7. Time the defrost test cycle as determined by the chart. After the corresponding defrost cycle time from the chart below has elapsed, the reversing valve should shift to defrost mode and the outdoor fan should stop. After 2 seconds of defrost operation, the reversing valve should shift back to heating operation and the outdoor fan should start.

**NOTE:** If this procedure is not observed, check the reversing valve solenoid for correct operation by measuring temperatures and pressures under heating and cooling modes. If the reversing valve solenoid operates correctly then replace the defrost control board. See “Sequence of Operation.”

Defrost Control Setting	Defrost Test Cycle Time
T1 - 30 minutes	7 seconds
T2 - 60 minutes	14 seconds
T3 - 90 minutes	21 seconds


8. If an adjustment is required, see “Adjust Time Between Defrost Cycles” in the “Adjust Defrost System” section.
9. Disconnect power.
10. Remove control box cover.
11. Remove jumper from test pins and jumper from defrost sensor terminals, if used.
12. Replace control box cover.
13. Reconnect power.

# TROUBLESHOOTING

## Heat Pump Fails to Operate Properly

Review “Sequence of Operation” and visually inspect the heat pump before troubleshooting:

**! WARNING**



**Electrical Shock Hazard**

**Disconnect power before servicing.**

**Replace all parts and panels before operating.**

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

## System Diagnostic Module

W4GH6 heat pumps contain a diagnostic module for troubleshooting heat pump system failures. By monitoring and analyzing data from the compressor and thermostat demand, the module can accurately detect the cause of electrical and system related failure without any sensors. If a system problem occurs, a flashing LED indicator communicates the failure code.

## LED Description

Power LED (Green) indicates voltage is present at the power connection of the module.

Alert LED (Yellow) communicates an abnormal system condition through a unique flash code. The Alert LED will flash a number of times consecutively, pause, and then repeat the process. The number of consecutive flashes correlates to a particular abnormal condition.

Trip LED (Red) indicates there is a demand signal from the thermostat but no current to the compressor is detected by the module. The Trip LED typically indicates the compressor protector is open or may indicate missing supply power to the compressor.

## Diagnostic LEDs Interpretation

When an abnormal system condition occurs, the diagnostic module displays the appropriate Alert and/or Trip LED. The yellow Alert LED will flash a number of times consecutively, pause, and then repeat the process. To identify a flash code number, count the number of consecutive flashes. Refer to the Flash Codes chart for information on the flash codes.

Every time the module powers up, the last Alert LED flash code that occurred prior to shutdown is displayed for 60 seconds. The module will continue to display the previous flash code until the condition returns to normal or 24 VAC is removed from the module. Trip and Alert LED's flashing at the same time means control circuit voltage is too low for operation.

## Flash Codes

LED Status	Fault Description	Troubleshooting Information
Power (Green)	Module has power.	<ul style="list-style-type: none"> <li>■ Supply voltage is present at module terminals.</li> </ul>
Trip (Red)	Thermostat demand signal Y1 is present, but the compressor is not running.	<ul style="list-style-type: none"> <li>■ Compressor protector is open.</li> <li>■ Outdoor unit power disconnect is open.</li> <li>■ Compressor circuit breaker or fuse(s) is open.</li> <li>■ Broken wire or connector is not making contact.</li> <li>■ Low pressure switch is open, if present in system.</li> <li>■ Compressor contactor has failed to open.</li> </ul>
Alert (Yellow) Flash Code 1	<p>Long Run Time: Compressor is running extremely long run cycles.</p> <p><b>NOTE:</b> Not applicable on heat pump models.</p>	
Alert (Yellow) Flash Code 2	System Pressure Trip: Discharge or suction pressure out of limits or compressor is overloaded.	<ul style="list-style-type: none"> <li>■ High head pressure.</li> <li>■ Condenser coil has poor air circulation (dirty, blocked, damaged).</li> <li>■ Condenser fan is not running.</li> <li>■ Return air duct has substantial leakage.</li> <li>■ If low pressure switch is present in the system, go to Flash Code 1 information.</li> </ul>

## Flash Codes

LED Status	Fault Description	Troubleshooting Information
Alert (Yellow) Flash Code 3	Short Cycling: Compressor is running only briefly.	<ul style="list-style-type: none"> <li>■ Thermostat demand signal is intermittent.</li> <li>■ Time delay relay or control board is defective.</li> <li>■ If high pressure switch is present, go to Flash Code 2 information.</li> <li>■ If low pressure switch is present, go to Flash Code 1 information.</li> </ul>
Alert (Yellow) Flash Code 4	Locked Rotor	<ul style="list-style-type: none"> <li>■ Run capacitor has failed.</li> <li>■ Low line voltage (contact utility if voltage at disconnect is low).</li> <li>■ Excessive liquid refrigerant in the compressor.</li> <li>■ Compressor bearings are seized.</li> </ul>
Alert (Yellow) Flash Code 5	Open circuit	<ul style="list-style-type: none"> <li>■ Outdoor unit power disconnect is open.</li> <li>■ Compressor circuit breaker or fuse(s) is open.</li> <li>■ Compressor contactor has failed to open.</li> <li>■ High pressure switch is open and requires manual reset.</li> <li>■ Open circuit in the compressor supply wiring or connections.</li> <li>■ Unusually long compressor protector reset time due to the extreme ambient temperature.</li> <li>■ Compressor windings are damaged.</li> </ul>
Alert (Yellow) Flash Code 6	Open Start Circuit: Current only in run circuit.	<ul style="list-style-type: none"> <li>■ Run capacitor has failed.</li> <li>■ Open circuit in the compressor start wiring or connections.</li> <li>■ Compressor start winding is damaged.</li> </ul>
Alert (Yellow) Flash Code 7 <b>NOTE:</b> This code will flash within 5 minutes of power interruption until the 5 minute short cycle timer has elapsed. Allow at least 5 minutes of run time before confirming this code.	Open Run Circuit: Current only in start circuit	<ul style="list-style-type: none"> <li>■ Open circuit in the compressor run wiring or connections.</li> <li>■ Compressor run winding is damaged.</li> </ul>
Alert (Yellow) Flash Code 8	Welded Contactor: Compressor always runs.	<ul style="list-style-type: none"> <li>■ Compressor contactor has failed to close.</li> <li>■ Thermostat demand signal not connected to the module.</li> </ul>
Alert (Yellow) Flash Code 9	Low Voltage: Control circuit less than 17 VAC	<ul style="list-style-type: none"> <li>■ Control circuit transformer is overloaded.</li> <li>■ Low line voltage (contact utility if voltage at disconnect is low).</li> </ul>

### 24 VAC Power Wiring

The diagnostic module requires a constant nominal 24 VAC power supply. The wiring to the module's R and C terminals must be directly from the indoor unit or thermostat. The module cannot be powered by R and C terminals on the defrost board without experiencing nuisance alerts.

### Thermostat Demand Wiring

The diagnostic module requires a thermostat demand signal to operate properly. The thermostat demand signal input, labeled Y on the module, should always be connected to the compressor contactor coil so that when the coil is energized, the demand signal input is 24 VAC. When the coil is not energized, the demand signal input should be less than 0.5 VAC.



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## Incorrectly Wired Module Codes

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Depending on the system configuration, some Alert flash codes may not be active. The presence of safety switches affects how the system alerts are displayed by the module.

Incorrectly wiring the diagnostic module will cause false LED codes. The Incorrectly Wired Module Troubleshooting chart describes LED operation when the module is incorrectly wired and what troubleshooting action is required to correct the problem.

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## Incorrectly Wired Module Troubleshooting

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Incorrectly Wired Module Indication	Recommended Troubleshooting Action
Green LED is not on, module does not power up.	Determine if both R and C module terminals are connected. See “24 VAC Power Wiring” section for R and C wiring.
Green LED intermittent, module powers up only when the compressor runs.	Determine if R and Y terminals are wired in reverse. See “24 VAC Power Wiring” earlier in this section for R and C wiring.
Trip LED is on but the system and the compressor check OK.	Verify that the Y terminal is connected to the 24 VAC at the contactor coil.
Trip LED and Alert LED are flashing together.	Verify that the R and C terminals are connected. See “24 VAC Power Wiring” earlier in this section for R and C wiring.
Alert Flash Code 3 (Compressor Short Cycling) is displayed incorrectly.	Verify that the Y terminal is connect to the 24 VAC at the contactor coil.
Alert Flash Codes 5, 6 or 7 (Open Circuit, Open Start Circuit or Open Run Circuit) are displayed incorrectly.	Check that the compressor run and start wires are through the module’s current sensing holes. Verify that the Y terminal is connected to the 24 VAC at the contactor coil.
Alert Flash Code 6 (Open Start Circuit) is displayed for Code 7 (Open Run Circuit) or vice versa.	Check that the compressor run and start wires are routed through the correct module sensing holes.
Alert Flash Code 8 (Welded Contactor) is displayed incorrectly.	Determine if the module’s Y terminal is connected. Verify that the Y terminal is connected to the 24 VAC at the contactor coil.

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## SYSTEM MAINTENANCE

- Leaves and other large obstructions should be removed from the heat pump surfaces without damaging the fin surface of the coil.
- Routinely clean or change the indoor air filter. Should the indoor coil become dirty, thus restricting airflow, call a qualified service person to clean the coil surface.
- An annual inspection by a qualified person should be performed to ensure continued quality performance.

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## ASSISTANCE OR SERVICE

If you need further assistance, you can write to the below address with any questions or concerns:

Whirlpool® Home Cooling and Heating  
14610 Breakers Drive  
Jacksonville, FL 32258

Please include a daytime phone number in your correspondence.

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### Accessories

To order accessories contact your Whirlpool® Home Cooling and Heating dealer.

## Limited Warranty

September 2002

*This warranty gives you specific legal rights and you may have other rights which vary from state/province to state/province. This warranty applies to U.S. and Canada only.*

**Warrantor: Allied Air Enterprises Inc., 355 Millennium Dr., Orangeburg, SC 29115**

Products are available under the following brand names: Whirlpool, Whirlpool Gold

**IF SOMETHING GOES WRONG, CONTACT THE WHIRLPOOL HOME COOLING & HEATING DEALER FROM WHOM YOU PURCHASED YOUR EQUIPMENT. IN MOST CASES, YOUR DEALER WILL BE ABLE TO CORRECT THE PROBLEM, BUT IF HE/SHE IS NOT ABLE TO DO SO, YOU SHOULD CONTACT TRADEWINDS DISTRIBUTING DIRECTLY IN WRITING AT THE FOLLOWING ADDRESS:**

**Whirlpool® Home Cooling and Heating  
14610 Breakers Drive  
Jacksonville, FL 32258**

### General Warranty

Subject to the limitations stated in this warranty, we warrant the covered equipment for residential use, when installed, operated and maintained according to the manufacturer's instructions, to be free of defects in workmanship or materials for a period of 5 years (1 year for commercial use) from the time of initial installation. We will replace any defective component without cost or expense to you except for the costs of diagnosis, delivery and labor for removing, servicing and/or replacing the parts or unit.

**WH1 series heat pumps carry a 5-year compressor warranty. WH2 and WGH series heat pumps carry a 10-year compressor warranty.**

### Warranty Begins

The warranty period begins when the installation is complete and the product is ready to operate. You must be able to verify this date whenever a warranty claim is made. Original bill of sale, installer's invoice or other similar document will suffice. If the beginning date cannot be verified, we will consider warranty coverage to begin 6 months after the date the product was shipped from our factory.

### Limitations on Implied Warranties

**Implied warranties of merchantability or, to the extent applicable, fitness for a particular purpose are excluded to the extent legally permissible and are in any event limited to 5 years, or the shortest period allowed by law. Some states/provinces do not allow limitations or exclusions on how long an implied warranty of merchantability or fitness lasts, so the above limitations or exclusions may not apply to you.**

### Only Warranty

**This written Limited Warranty is the only warranty made by the warrantor; this warranty is in lieu of and excludes all other warranties by the warrantor, express or implied. The warrantor does not authorize any person to provide on it's behalf any other warranty or to assume for it any further obligation in connection with the warranted product.**

### What is NOT Covered by Any Warranty

1. Cabinets or cabinet pieces.
2. Normal maintenance items such as filters, fan belts, fuses or other consumable items.
3. Damage caused by misuse, failure to maintain properly, accidents or acts of God.
4. External wiring, piping, venting or attachment of accessory products not integral to our product, including without limitation, humidifier, air cleaner, vent damper, thermostat or other mechanical devices not manufactured by the warrantor.
5. Products that have been operated in a corrosive atmosphere or otherwise in contact with corrosive materials where a concentration of acids, halogenated hydrocarbons or other corrosive elements such as urine, salt, etc. cause deterioration to metal surfaces or integral components. NOTE: Operation in a corrosive atmosphere is considered misuse and voids this warranty.
6. Products that have NOT been installed, used and maintained in accordance with our published installation instructions, applicable local, state/provincial or national codes, and/or ACCA published standards.
7. Products that have NOT been installed by competent, qualified installers.
8. Products that have been moved from their original place of installation.

### Warranty on Replacement Components

Any replacement product or component furnished by us will assume the remaining (unused) portion of the Limited Warranty.

### Consequential Damages

The warrantor shall not be responsible for any accidental consequential damages caused by any defect in the product. Some states/provinces do not allow the exclusion or limitations of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This product must be installed, used and cared for in accordance with the instruction manual. You are responsible for required periodic maintenance or service, such as changing or cleaning of air filters and lubrication or cleaning of components. **Failure to properly install, operate or maintain your unit voids this warranty.**

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

Write down the following information about your Split System Heat Pump—Outdoor Section to better help you obtain assistance or service if you ever need it.

**Dealer name** \_\_\_\_\_

**Address** \_\_\_\_\_

**Phone number** \_\_\_\_\_

**Model number** \_\_\_\_\_

**Serial number** \_\_\_\_\_

**Installation date** \_\_\_\_\_

