GE APPLIANCES
a Haier *company*

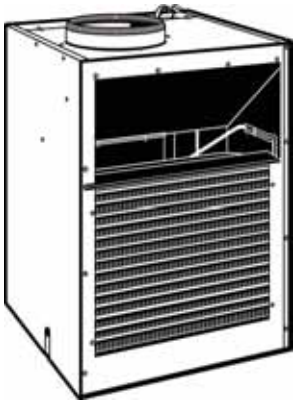
Technical Service Guide

June 2017

Vertical Zoneline

AZ90E09D_C
AZ90E12D_C
AZ90E18D_C

AZ91H09D_C
AZ91H12D_C
AZ91H18D_C
AZ91H09E_C
AZ91H12E_C
AZ91H18E_C
AZ91H18E_S



Rear View
9K, 12K,
18K Small
Chassis

18K
Large
Chassis

31-9269

Safety Information

IMPORTANT SAFETY NOTICE

The information in this service guide is intended for use by individuals possessing adequate backgrounds of electrical, electronic, and mechanical experience. Any attempt to repair a major appliance may result in personal injury and property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

WARNING

To avoid personal injury, disconnect power before servicing this product. If electrical power is required for diagnosis or test purposes, disconnect the power immediately after performing the necessary checks.

RECONNECT ALL GROUNDING DEVICES

If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.

Table of Contents

Safety Requirements

GE Factory Service Employees are required to use safety glasses with side shields, safety gloves and steel toe shoes for all repairs.

Steel Toed Work Boot

Electrically Rated Glove and Dyneema® Cut Resistant Glove Keeper

Dyneema®Cut Resistant Glove

Cut Resistant Sleeve(s)

Plano Type Safety Glasses

Brazing Glasses

Prescription Safety Glasses
Safety Glasses must be ANSI Z87.1-2003 compliant

⚠ WARNING

Prior to disassembly of the GE Vertical Zoneline to access components, GE Factory Service technicians are REQUIRED to follow the Lockout / Tagout (LOTO) 6 Step Process:

Step 1 Plan and Prepare	**Step 4** Apply LOTO device and lock
Step 2 Shut down the appliance	**Step 5** Control (discharge) stored energy
Step 3 Isolate the appliance	**Step 6** “Try It” verify that the appliance is locked out

Nomenclature

Model Number

A Z 9 1 H 1 2 D 2 C W 1

Zoneline®

Chassis Series
90: Cooling w/ Electric Resistance Heat
91: Cooling w/ Heat Pump and Electric Resistance Heat

E: Cooling w/ Electric Resistance Heat
H: Cooling w/ Heat Pump and Electric Resistance Heat

BTU/hr
09: 9,000
12: 12,000
18: 18,000

D: 230/208 V Single Phase
E: 265 V Single Phase

Heater Wattage
2: 2.5 kW
3: 3.45 kW
5: 5.0 kW

C: Corrosion
S: Small

K: GMCC Compressor
W: Rechi Compressor

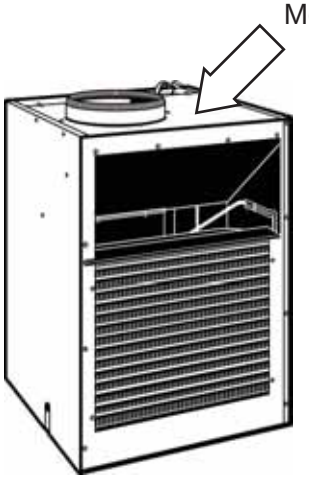
Engineering Revision

The nomenclature breaks down and explains what the letters and numbers mean in the model number.

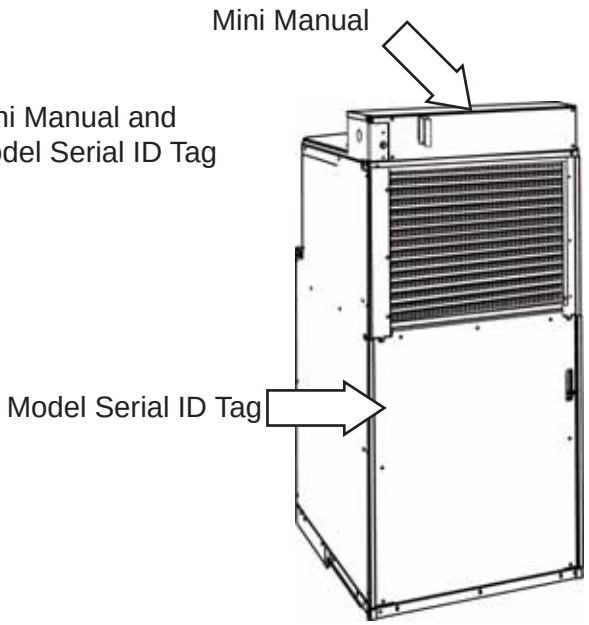
Serial Number
The first two characters of the serial number identify the month and year of manufacture. The letter designating the year repeats every 12 years.

Example: LA123456S = June, 2013

A – JAN	2024 – Z
D – FEB	2023 – V
F – MAR	2022 – T
G – APR	2021 – S
H – MAY	2020 – R
L – JUN	2019 – M
M – JUL	2018 – L
R – AUG	2017 – H
S – SEP	2016 – G
T – OCT	2015 – F
V – NOV	2014 – D
Z – DEC	2013 – A



Small Chassis
(rear view)



Large Chassis
(front view)

Introduction

This service guide is designed to be used in conjunction with the installation manuals provided with each GE Vertical Zoneline.

This service guide was written to assist the professional HVAC service technician to quickly and accurately diagnose and repair any malfunctions of this product.

This guide, therefore, will deal with all subjects in a general nature (i.e.: All text will pertain to all models).

Important: It will be necessary to accurately identify the GE Vertical Zoneline being serviced to be certain of a proper diagnosis and repair. (See the GE Vertical Zoneline **Nomenclature** section of this service guide).

Changes to Design

- No slide out chassis. Panels must be removed to service components.
- Small chassis uses a single – double shafted fan motor.
- All electronics are operated on 230 volt supply, 265 volt GE Vertical Zonelines have a “auto–transformer” to step down the voltage to 230 volts for all components except the resistive heaters.
- Large chassis models have 2 separate fan motors and capacitors.
- Small chassis models have a heater relay.
- Large chassis models have a compressor relay.
- Reversing valve default for heat pump models is COOLING (Coil energized for HEAT)”.

Features

- **Quiet Start/Stop Fan Delay**: The fan start and stop delays prevent abrupt changes in room acoustics due to the compressor energizing or stopping immediately. Upon call for cooling or heating, the fan will run for five seconds prior to energizing the compressor. Also, the fan off delay allows for "free cooling" by utilizing the already cool indoor coil to its maximum capacity by running for 30 seconds after the compressor shuts off.
- **Remote Thermostat Operation**: GE Vertical Zonelines are controlled by a wired remote thermostat.
- **Internal Diagnostic Program**: The GE Vertical Zoneline features a self-diagnostic program that can alert maintenance to component failures or operating problems. The internal diagnostic program saves time when diagnosing running problems.
- **Service Fault Code Storage**: The self-diagnosis program will also store fault codes in memory if certain conditions occur and correct themselves such as extreme high or low operating conditions or activation of the room freeze protection feature. Storing fault codes can help determine if the GE Vertical Zoneline faced obscure conditions or if an fault occurred and corrected itself.
- **Random Compressor Restart**: The random restart delay eliminates multiple GE Vertical Zonelines from starting at once following a power outage or initial power up. The compressor delay will range from 180 to 240 seconds.
- **Heat Pump GE Zonelines**: **Thermistor** - The new GE Vertical Zoneline uses a thermistor to accurately monitor the outdoor coil conditions to allow the heat pump to run whenever conditions are correct. Running the GE Vertical Zoneline in heat pump mode saves energy and reduces operating costs. The thermistor allows maximization of heat pump run time.
- **Instant Heat**: **Heat Pump Mode** - Heat pump models will automatically run the electric heater during compressor lock-out to quickly provide heat when initially energized, then return to heat pump mode. This ensures that the room is heated quickly without the usual delay associated with heat pump GE Vertical Zonelines.
- **Room Air Sampling Feature**: The room air sampling feature maintains a balanced temperature throughout the room by circulating the air for 90 seconds once every 9 minutes that the GE Vertical Zoneline is not running when it is set to cooling or heating mode. By circulating the air, the GE Vertical Zoneline can detect hot or cold areas in the room and operate the GE Vertical Zoneline to cool or warm the room as necessary. This function is only available when the fan mode is set to 'AUTO' during COOL or HEAT Mode.
- **Desk Control Ready**: All GE Vertical Zonelines have low voltage terminals ready to connect to a desk control energy management system. Controlling the GE Vertical Zonelines on/off operation from a remote location like a front desk can reduce energy usage and requires no additional accessories at the GE Vertical Zoneline.
- **Indoor Coil Frost Sensor**: The frost sensor protects the compressor from damage in the event that airflow is reduced or low outdoor temperatures cause the indoor coil to freeze. When the indoor coil reaches 30°F the compressor is disabled and the fan continues to operate based on demand. Once the coil temperature returns to 45°F, the compressor returns to operation.
- **Auxiliary Fan Ready**: The GE Vertical Zoneline features a 24 VAC terminal for connection to a relay that may be used to operate an auxiliary fan to transfer air to adjoining rooms. Auxiliary fans can provide air conditioning to odd shaped rooms.

*All features are similar to previous models.

Electronic Control Sequence Of Operation

NOTE: The GE Vertical Zoneline is operated by a wired remote wall thermostat which is connected to an electronic control board at the GE Vertical Zoneline.

Compressor and Reversing Valve Control

Active Mode	Compressor	Reversing Valve State*
Cooling	On	De-Energized
Heat - Heat Pump (Compressor heat)	On	Energized
Heat Pump Electric Heat	Off	Energized
Heat - Electric Heat / Cool Zoneline	Off	De-Energized
Fan only	Off	*

*The Reversing valve stays in the last state until a call for heat or cooling.

Cooling Mode

Once the ambient temperature rises past the cool demand set point of the thermostat, and if the compressor is not locked out, the cooling cycle begins. The fan is started 5 seconds prior to the compressor. Once the ambient temperature has been lowered to the cool set point, the cooling cycle starts to terminate by shutting off the compressor. After a 30 second delay, the fan is shut off.

Heating Mode Control Operation

There are two heating methods: Heat Pump and Electric Resistance Heat.
There are 2 types of GE Vertical Zonelines that provide heating:

- Heat Pump with Electric Heat
- Cool with Electric Heat

Heat Mode in Cool with Electric Heat Zonelines

When the thermostat is in the Heat Mode, if the indoor ambient temperature is below the heat set point and the compressor is not locked out, then the compressor turns on. If the ambient temperature rises above the thermostat's heat set point, the compressor turns off.

If the Compressor is Locked Out on the 3 Minute Time Delay and Electric Heat is Available

1. The control turns on the electric heat until the compressor is not locked out.
2. After lockout, the control turns off the electric heat, waits 5 seconds, then turns on the compressor. (The wired remote wall thermostat's time delay may override this feature).
3. If the outdoor coil temperature sensor drops to 30°F or less for 2 consecutive minutes, the GE Vertical Zoneline will switch to electric heat (if available). Thereafter, the GE Vertical Zoneline will switch back to Heat Pump heat until the outdoor coil temperatures sensor rises to 45°F or greater.

Compressor Lock Out Time

The lockout feature ensures that the compressor is de-energized for a period of time. The timer varies randomly from 180 to 240 seconds.

The compressor lockout is initiated every time the compressor is "off" due to:

1. Satisfying the thermostat temperature set point
2. Changing mode to fan only or heat
3. Turning the GE Vertical Zoneline off
4. Power is restored after failure
5. Line power is restored from a brown out condition

Cooling Fan Delay

This is only for the thermostat Fan Auto Mode only.

When the GE Vertical Zoneline cycles cooling ON - starts the fan 5 seconds EARLY.

When the GE Vertical Zoneline cycles cooling OFF - DELAYS the fan off for 30 seconds.

Heating Fan Delay

This is only for Fan Auto Mode (fan cycles with cool/heat operations) and not for continuous fan mode.

When the GE Vertical Zoneline cycles Heating ON - starts the fan 5 second EARLY.

When the GE Vertical Zoneline cycles Heating OFF - DELAYS the fan off for 15 seconds.

Continuous fan operation enables the fan to run continuously.

Fan Speed Change Delay

Relay activation is delayed by a minimum number of seconds. The default for this value is 2 seconds and is used to eliminate relay chatter.

Room Air Sampling Feature

The room air sampling feature maintains a balanced temperature throughout the room by circulating the air for 90 seconds once every 9 minutes that the GE Vertical Zoneline is not running when it is set to cooling or heating mode. By circulating that air, the GE Vertical Zoneline can detect a hot or cold area in the room and operate the GE Vertical Zoneline to cool or warm the room as necessary. This function is only available when the fan mode is set to 'AUTO' during COOL or HEAT mode.

Low Voltage Interface Connections

All GE Vertical Zonelines have a low voltage interface connector through which a Remote Wall Thermostat, Desk Control and Auxiliary Fan's Relay can be connected. The interface connector is located on the electronic control board.

Figure 1: Interface Connector Location

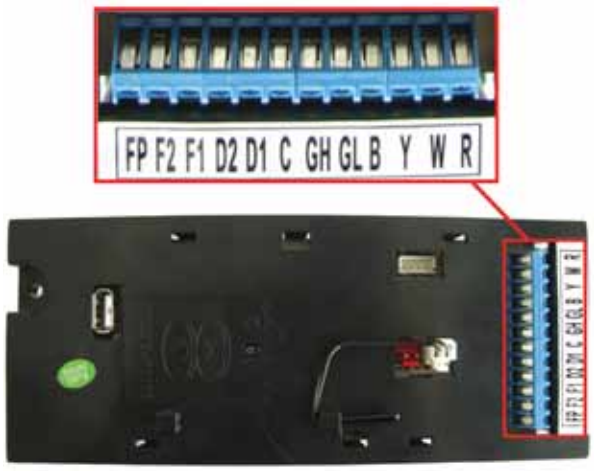


Table 1

Interface Connector Definitions	
FP	Factory use only (Ensure there is no jumper at FP and F2)
F2	Used with F1 to provide 24 VAC to external fan relay (Ensure there is no jumper at FP and F2)
F1	Used with F2 to provide 24 VAC to external fan relay.
D2	Used with D1 for desk control on or off operation
D1	Used with D2 for desk control on or off operation
C	Common Ground Terminal
GH	Call for high fan
GL	Call for low fan
B	Call for heat pump reversing valve
Y	Call for compressor
W	Call for heating
R	24 VAC power from Electronic Control to wall

Remote Wall Thermostat

All GE Vertical Zoneline are factory configured to be controlled by using a single stage heat/cool remote wired wall mounted thermostat.

Thermostat Selection

RAK164D2	Cooling with Electric Heat Digital Thermostat
RAK164P2	Cooling with Electric Heat Programmable Thermostat
RAK148D2	Heat Pump Digital Thermostat
RAK148P2	Heat Pump Programmable Thermostat

These thermostats are single stage heat/cool, with manual changeover. Other thermostats may be used as long as they are single stage heat/cool and are configured correctly for the Zoneline.

Thermostat Terminals Requirements:

- For cooling with electric heat GE Vertical Zonelines: C, R, G, Y, W.
- For heat pump GE Vertical Zonelines: C, R, G, Y, W, B.
- For two fan speeds, the thermostat must have 2 fan speed selection.

HEAT PUMP Zonelines

During Heat Mode:

The B terminal must be continuously energized. The W terminal must have 24 VAC output to call for heat. The control board decides on whether to turn on the Heat Pump Heat (compressor) or Electric Heat. The Y terminal should not have 24 VAC output during heat mode.

Connecting a Remote Wall Thermostat

Caution	
	**It is the installer's responsibility to ensure that all control wiring connections are made in accordance with the installation instructions.** **Improper connection of the thermostat control wiring and/or tampering with the GE Vertical Zonelines internal wiring can void the equipment warranty.** **Failure to follow these instructions can result in personal injury and damage to product or other property.**

Connect the thermostat using Figure 1 and Table 1 from the previous page (under **Low Voltage Interface Connections**) as a guide.

Ensure that there is no jumper wire at FP and F2, the follow the procedure below:

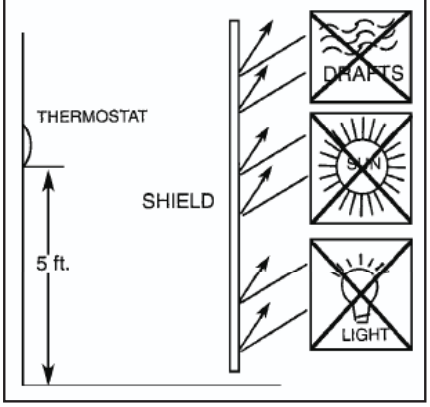
1. Disconnect power to the GE Vertical Zoneline.
2. Unscrew and remove the electrical control box's cover.
3. Locate the Interface Connector (24 VAC terminal strip (see Figure 1 from the previous page, under **Low Voltage Interface Connections**).
4. Make the wire connections according to the configuration needed for GE Vertical Zoneline. Use #18 gauge wire size.
5. Once each wire is matched and connected, the GE Vertical Zoneline is now ready to be controlled by the thermostat.
6. Reattach the electrical control box's cover.

Remote Wall Thermostat Location

The thermostat should not be mounted where it may be affected by drafts, discharge air from registers (hot or cold), or heat radiated from the sun appliances, windows, etc. The thermostat should be located about 5 ft. above the floor in an area of average temperature, with good air circulation.

Mercury bulb type thermostats MUST be level to control temperature accurately to the desired set-point. Electronic digital type thermostats should be level for aesthetics.

Thermostat Location



NOTE: An improperly operating or poorly located remote wall thermostat can be the source of perceived equipment problems. A careful check of the thermostat's location and wiring must be made then to ensure that it is not the source of the problems.

Desk Control

The GE Vertical Zonelines electronic control has built-in provisions for connection to an external switch to control power to the GE Vertical Zoneline. The switch can be a central desk control system or even a normally open door switch.

For desk control operation, connect one side of the switch to the D1 terminal and the other at the D2 terminal (see Figure 1 under **Low Voltage Interface Connections**). Whenever the switch closes, the GE Vertical Zoneline operation will stop.

Maximum Wire Length for Desk Control Switch

Wire Size	Maximum Length
#24	400 ft
#22	600 ft
#20	900 ft
#18	1500 ft
#16	2000 ft

Auxiliary Fan Control

The electronic control also has the ability to control a 24 VAC relay to activate an auxiliary, or transfer fan. The outputs are listed as F1 and F2 on the interface connector (using Figure 1 and Table 1 under **Low Voltage Interface Connections**).

To connect the relay, simply wire one side of the relay to F1 and the other side to F2. Anytime that the fan runs, the terminals will send a 24 VAC signal to the relay. The relay must be 24 VAC, 50 mA or less.

NOTE: The Desk Control, Auxiliary Fan relay and wires must be field supplied.

Service

Servicing / Chassis Quick Change Outs

The chassis is designed for quick disconnected and change out. For minor electrical service, the control box cover lifts straight up after the screws and disconnect head are removed. For major electrical, refrigeration and fan service the chassis may be removed from the utility closet.

To Remove the Chassis from the Closet:

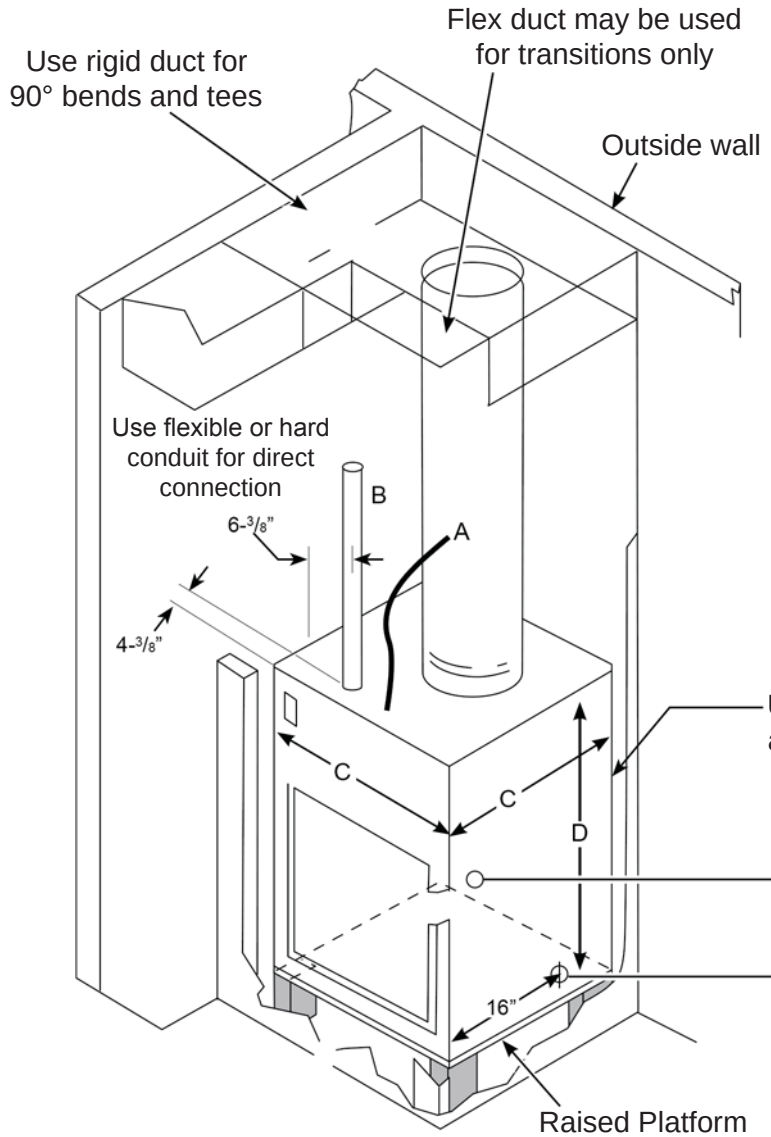
1. Disconnect the power coming into the Zoneline from the main breaker panel or the closet mounted disconnect.
2. Switch the wall thermostat off.
3. Pull the Power Disconnect located in the front of the chassis.
4. Disconnect the electrical connection.
5. Disconnect the duct work.
6. Disconnect the condensate drain on 9-18,000 BTU models (refer to the **Installation** section of this service guide).
7. Slide the chassis out of the wall plenum.
8. Lift the chassis out of the utility closet.

Installation

Utility Closet Connection Locations

IMPORTANT: Plan and locate plenum, electrical connection, drains and thermostat carefully to avoid interference. Hard-to-reach locations will make installation and service difficult!

Small Chassis



Reference Dimensions

- **A** Thermostat cable
- **B** Incoming Power Conduit
- **C** Unit width and depth: 23-1⁄8”
- **D** Unit height: 30-5/8” (32-3/4” with duct)
- **E** Condensate drains: 3/4” connector

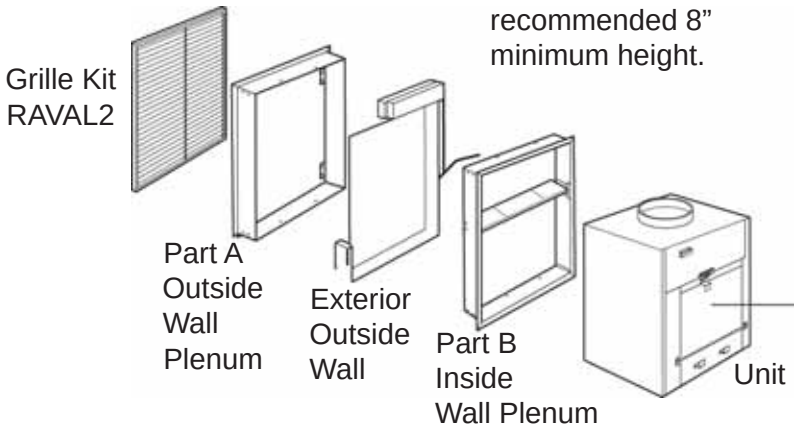
Choose one of THREE Primary Drain locations:

- 1 - Right Side
- 1 - Left Side
- 1 - Back (Plenum) Side
- Secondary drain water flows into plenum from the back of the unit.

Unit slides into wall plenum approximately 2”.

Primary Drains

- A drain connection is located on the back of the unit approximately 2” from the left side.
- A drain connection is located on the right and left side of the unit approximately 16” from the front of the unit.



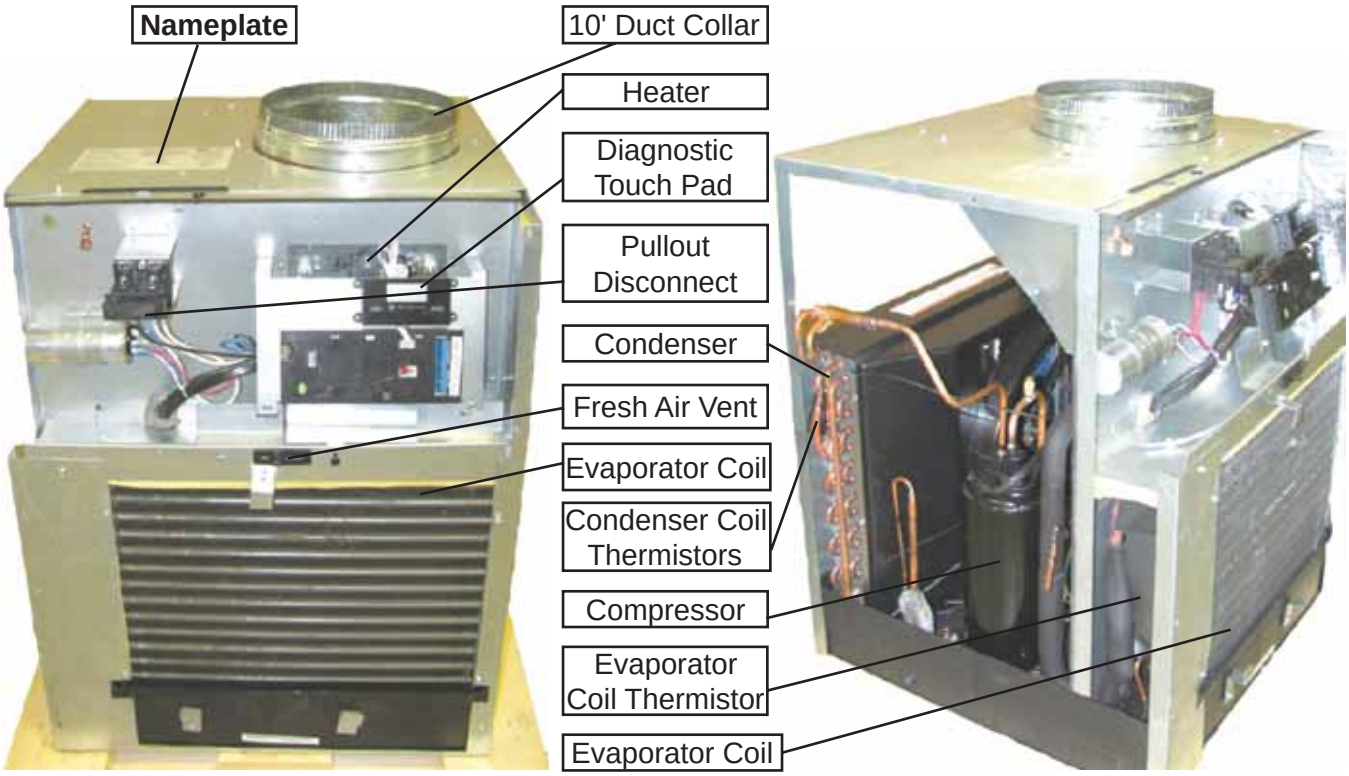
Small Chassis
(Unit Height 32")

Small Chassis

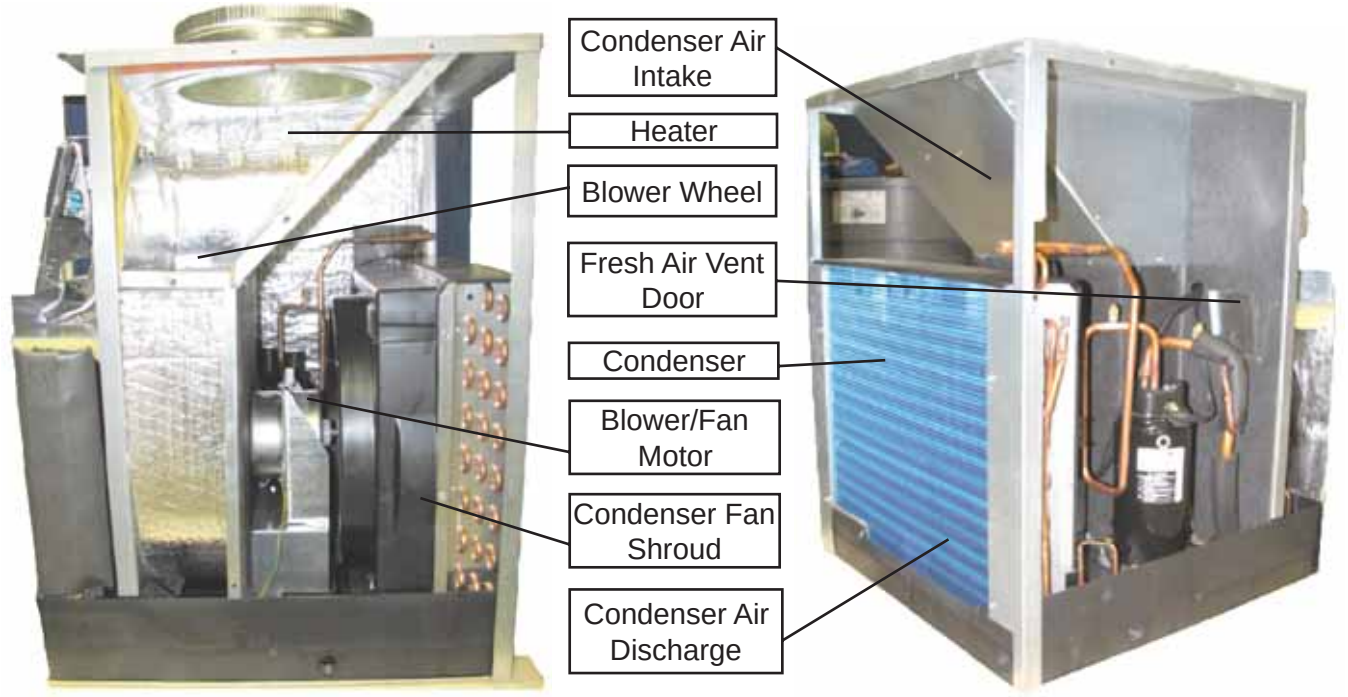
- **Power Input**: All models are hard wired to the AC power supply. A quick disconnect is provided to remove power from the GE Vertical Zoneline. **CAUTION**: Voltage is still applied to the input side of the disconnect! All other components do not have power with disconnect removed. Fuses are in line with supply on 265 volt models.
- **Control Boards**: A MAIN board contains the relays that operate the components. The MAIN board receives thermostat signals and responds to operate the loads as required. Also, a DISPLAY board is provided for displaying fault codes.
- **Heater Relay**: Used on 265 volt models which enables these models to use the full 265 volts to the heater assembly.
- **Capacitor**: All models use a dual capacitor, one section for the compressor and the other section for the fan motor. On small chassis, this capacitor is mounted in the control area.
- **Fan Motor**: A double shaft fan motor is used on the small chassis models. They are two speed motors and the blades are attached to the shaft with clamps.
- **Heater**: Model specific heaters are used. 2.5kW for 15 amp circuits, 3.4kW for 20 amp circuits and 5.0kW for 30 amp circuits.
- **Transformer (265 volt model)**: This “auto-transformer” is mounted below the power disconnect. The input to the transformer is fused and the output to the control board L2 is also fused.

  All components EXCEPT the heater assembly are operated on 230 volts, the transformer “steps-down” the 265 volts to 230 volts. Less components are required for stock.
- **Thermistors**: Heat pump models use an indoor coil sensor, outdoor coil sensor and ambient air sensor to determine proper operation. All three thermistors are the same resistance at room temperature. The outdoor coil sensor is not used on AZ90 models. The ambient air sensor is plugged directly into the main board and has short wires connected to it. No mounting bracket is provided for it.

Small Chassis Components Identifications

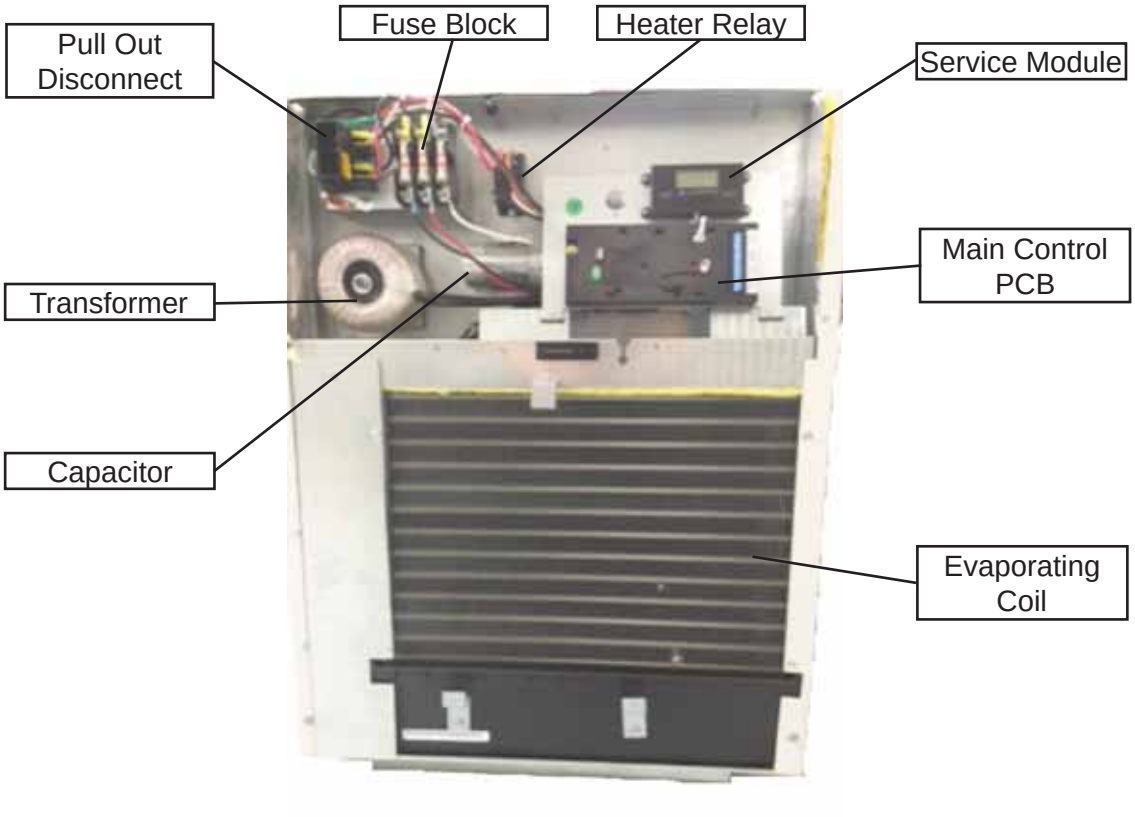


Front Side **Left and Front Sides**

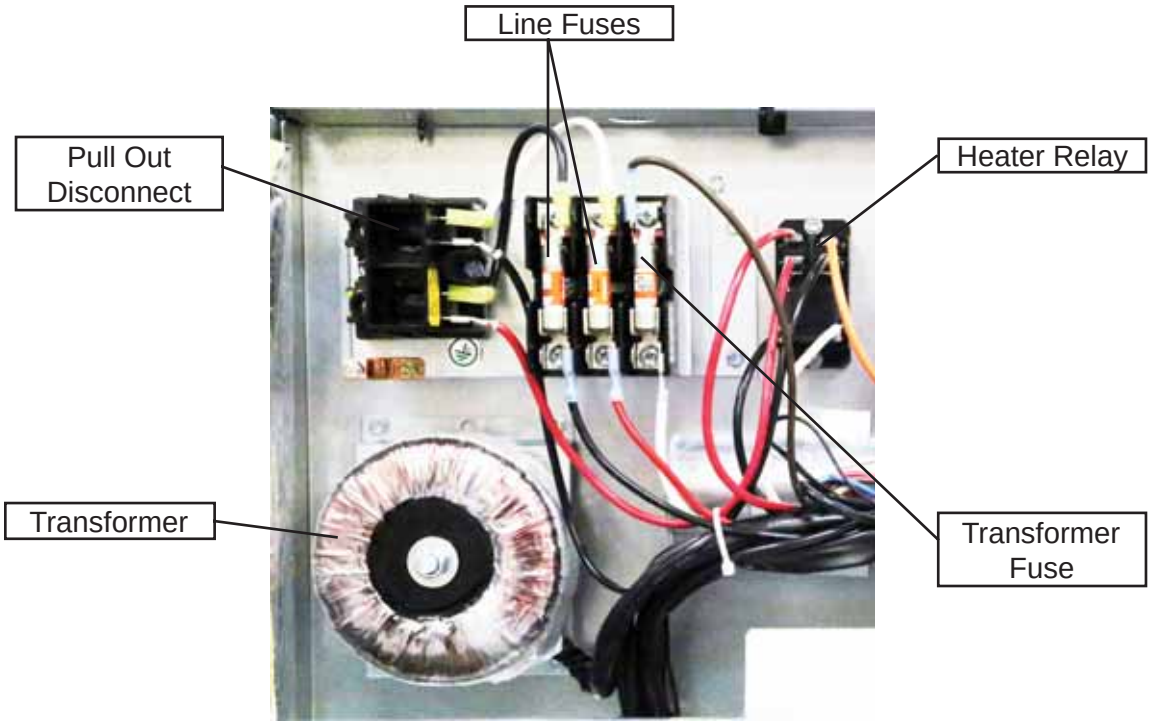


Right Side **Left and Back Sides**

Small Chassis Components Identifications (continued)



265 Model Front



265 Model Transformer Fuse

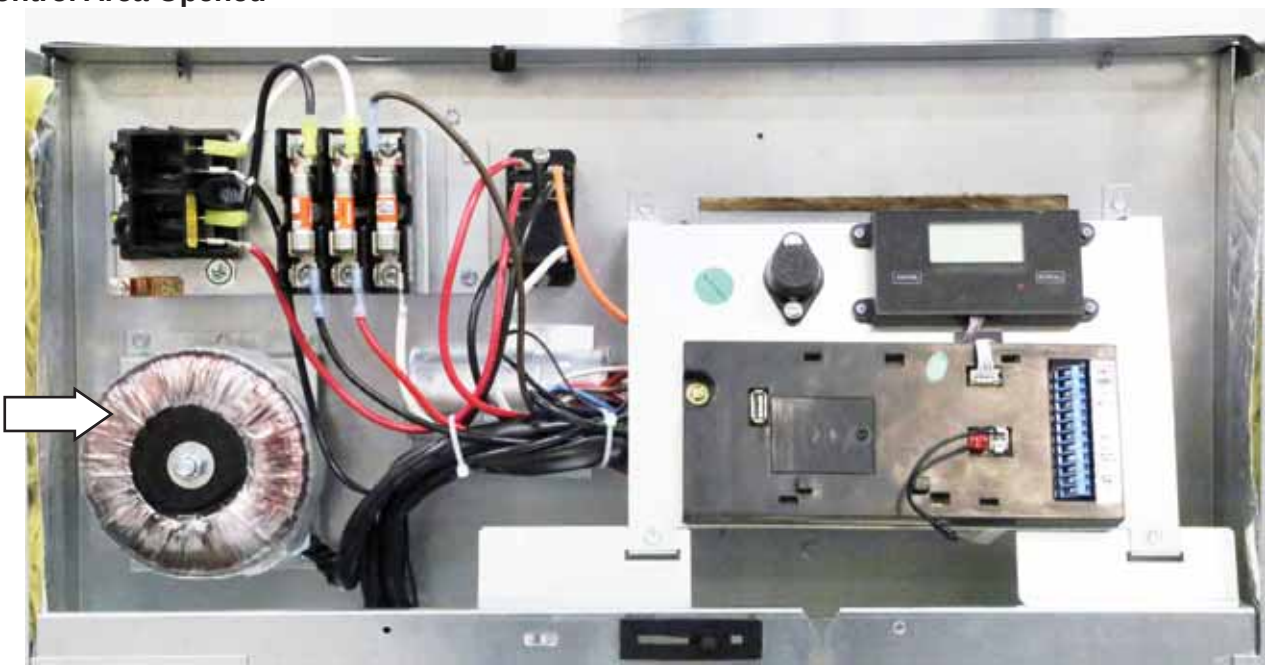
Small Chassis Component Access

Control Panel Access

Remove quick disconnect and nine 1/4 in. hex head screws, then slide the panel up and out of the GE Vertical Zoneline.

Control Area

Control Area Opened



Small Chassis Component Access (continued)

Transformer (265 Volt Models)

Transformer (265 Volt Models): Remove the control panel. One 1/2 in. nut secures the transformer to the control area bracket.

Motor Winding Resistance			
Model	Measurement	Winding Resistance (Ω)	
		Indoor Motor	Outdoor Motor
AZ90E09, AZ90E12, AZ90E18, AZ91H09, AZ91H12, AZ91H18E*S	WHITE TO BROWN	48 ± 10%	NA
	WHITE TO BLUE	35 ± 10%	
	WHITE TO BLACK	30 ± 10%	
AZ91H18D*C, AZ91H18E*C	WHITE TO BROWN	272 ± 10%	77 ± 10%
	WHITE TO BLUE	177 ± 10%	NA
	WHITE TO BLACK	151 ± 10%	37 ± 10%

Heater

Remove the control panel, and disconnect the two wires from the heater assembly. Remove the two 1/4 in. hex head screws from the heater. Disconnect the duct from the top of the GE Vertical Zoneline and pull the heater assembly up through the duct opening. If the duct cannot be removed, the right side panel will have to be removed for heater removal.

Heater

Heater Resistance		
Model	Heater	Resistance (Ω)
AZ90E09D, AZ90E12D, AZ90E18D, AZ91H09D, AZ91H12D	2.5 kW	18.61 ± 5%
	3.4 kW	13.68 ± 5%
	5.0 kW	9.31 ± 5%
AZ91H09E, AZ91H12E, AZ91H18E*S	2.5 kW	24.86 ± 5%
	3.4 kW	18.17 ± 5%
	5.0 kW	12.35 ± 5%
AZ91H18D*C	2.5 kW	18.61 ± 5%
	3.4 kW	13.86 ± 5%
	5.0 kW	9.31 ± 5%
AZ91H18E*C	2.5 kW	24.71 ± 5%
	3.4 kW	18.17 ± 5%
	5.0 kW	12.35 ± 5%

Small Chassis Component Access (continued)

Heater Top

Heater Side

Side panel removed to access heater if duct cannot be removed.

Large Chassis

- **Power Input**: All models are hard wired to the AC power supply. A quick disconnect is provided to remove power from the GE Vertical Zoneline. **CAUTION**: Voltage is still applied to the input side of the disconnect! All other components do not have power with disconnect removed. Fuses are in line with supply on 265 volt models.
- **Control Boards**: A MAIN board contains the relays that operate the components. The MAIN board receives thermostat signals and responds to operate the loads as required. Also, a DISPLAY board is provided for displaying fault codes.
- **Heater Relay**: Used on 265 volt models which enables these models to use the full 265 volts to the heater assembly.
- **Capacitor**: All models use two capacitors, one for the compressor and the other for the fan motors. On large chassis GE Vertical Zonelines, the capacitors are mounted on the blower housing behind the right side panel.
- **Fan Motor**: A separate blower fan motor is used on the large chassis models for inside air movement, and an outdoor fan motor for air intake and exhaust to the outside.
- **Heater**: Model specific heaters are used. 2.5kW for 15 amp circuits, 3.4kW for 20 amp circuits and 5.0kW for 30 amp circuits.
- **Transformer (265 volt model)**: This “auto-transformer” is mounted in the control housing. The input to the transformer is fused and the output to the control board L2 is also fused.

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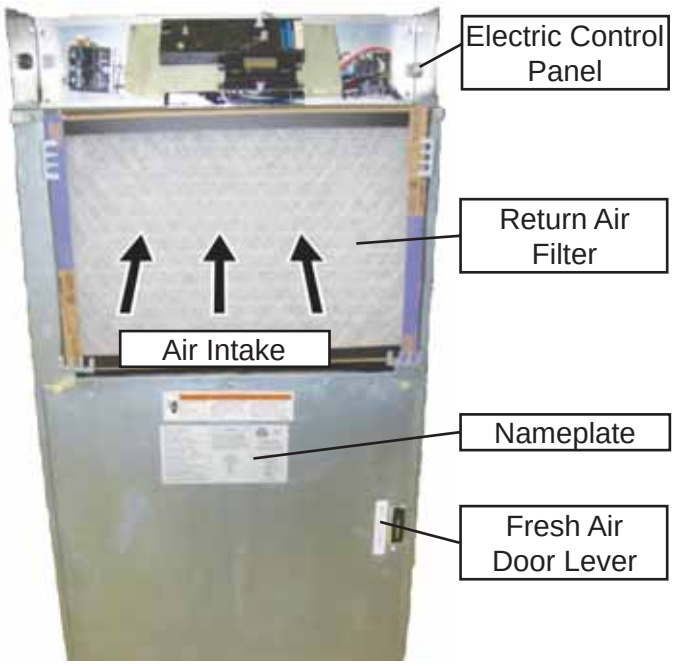
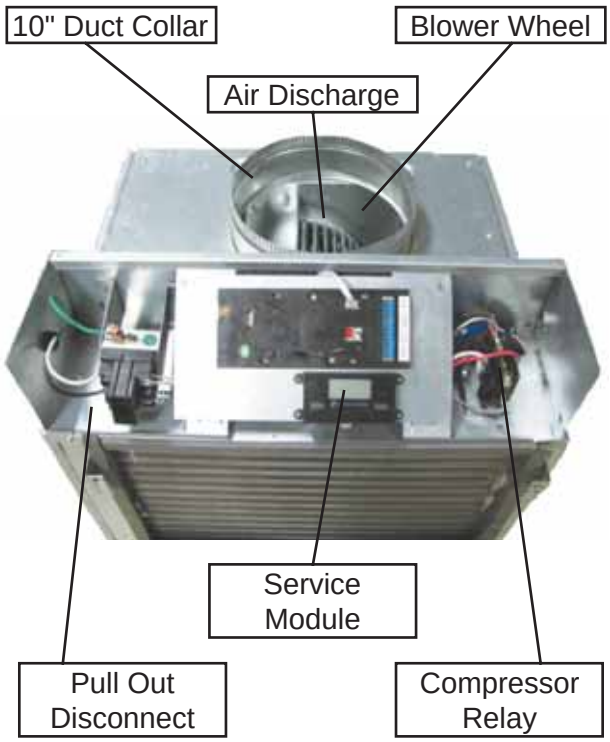
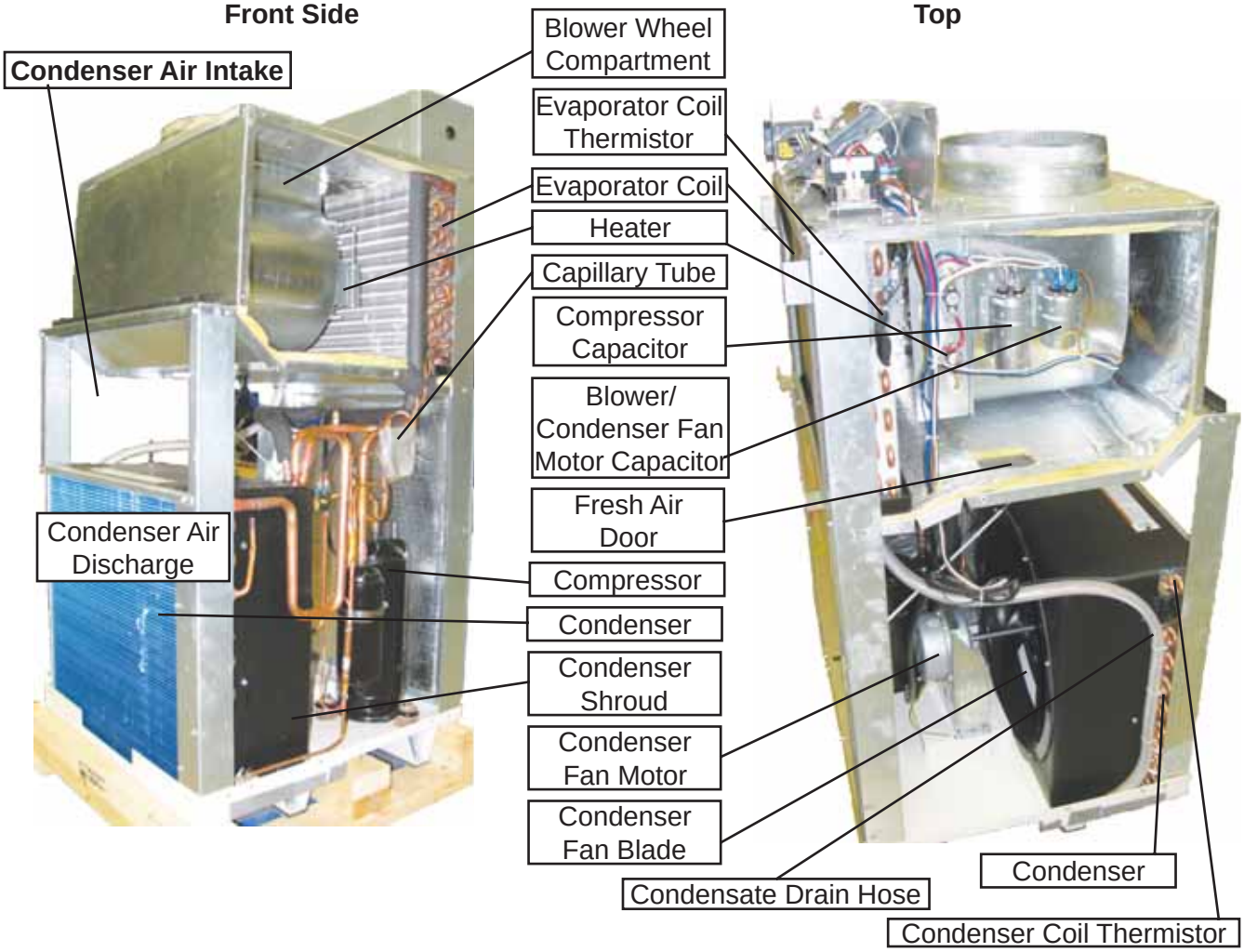
Large Chassis Components Identifications



Front Side



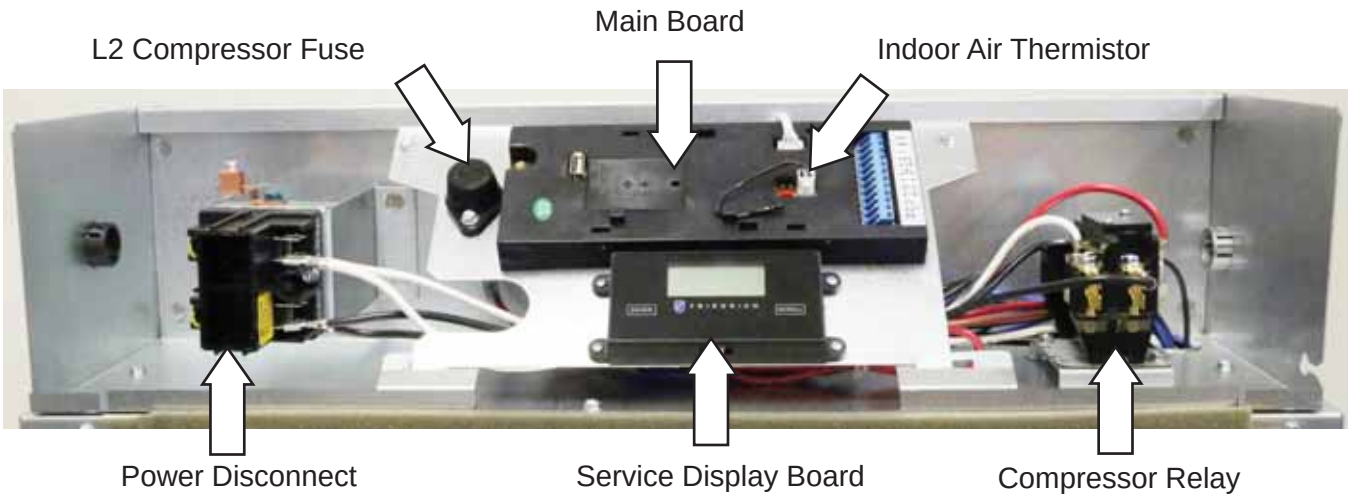
Top



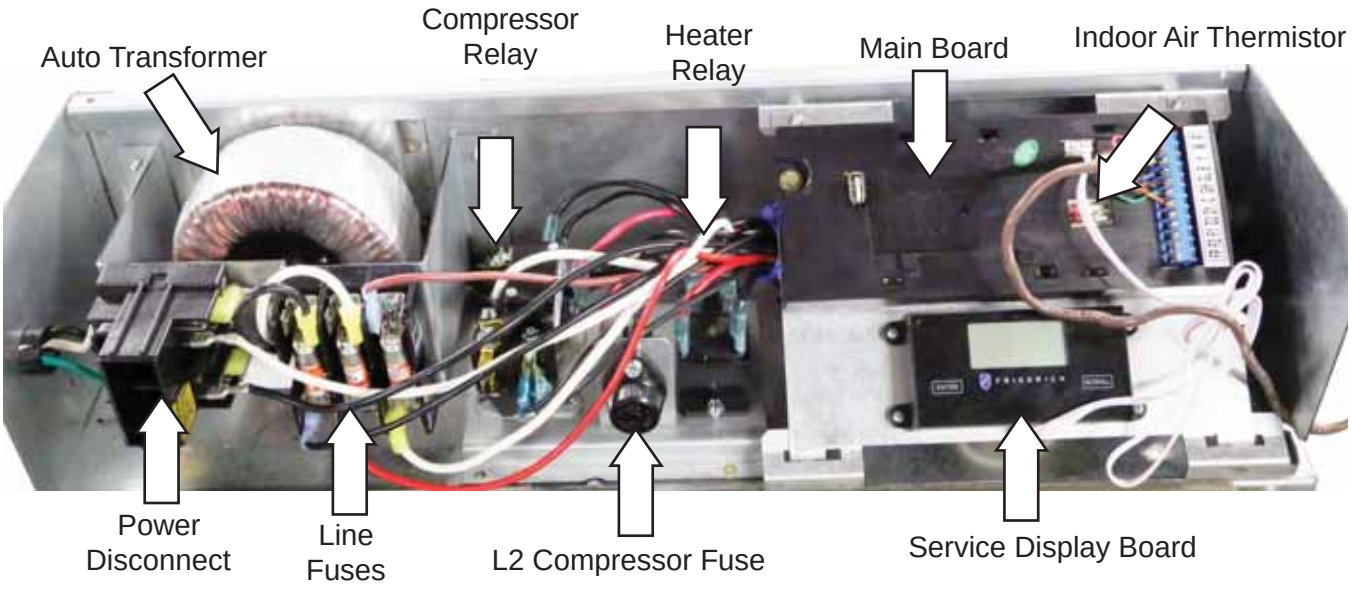
Left and Back Sides **Right Side**

Large Chassis Control Panel

230 Volt Control Area



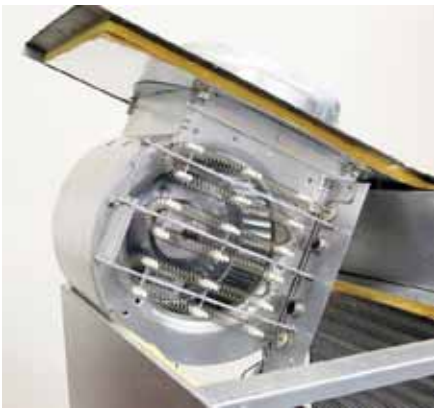
265 Volt Control Area

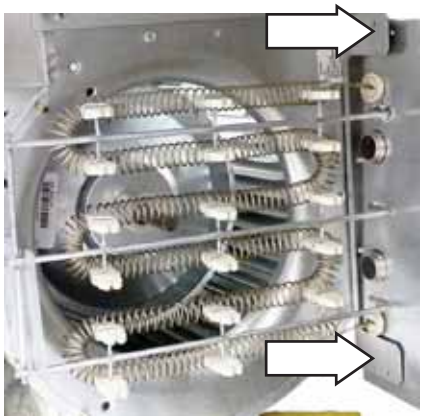


Large Chassis Component Access

Heater and Bracket Indoor Blower Assembly

The output duct and the top panel must be removed to access the heater assembly. Two screws secure the bracket with the thermal cut-outs on it. A rear brace has two screws and must be rotated to remove.





Bracket screws

Brace

Heater Resistance		
Model	Heater	Resistance (Ω)
AZ90E09D, AZ90E12D, AZ90E18D, AZ91H09D, AZ91H12D	2.5 kW	18.61 ± 5%
	3.4 kW	13.68 ± 5%
	5.0 kW	9.31 ± 5%
AZ91H09E, AZ91H12E, AZ91H18E*S	2.5 kW	24.86 ± 5%
	3.4 kW	18.17 ± 5%
	5.0 kW	12.35 ± 5%
AZ91H18D*C	2.5 kW	18.61 ± 5%
	3.4 kW	13.86 ± 5%
	5.0 kW	9.31 ± 5%
AZ91H18E*C	2.5 kW	24.71 ± 5%
	3.4 kW	18.17 ± 5%
	5.0 kW	12.35 ± 5%

Large Chassis Component Access (continued)

Indoor Motor and Blower Assembly

The blower wheel is attached to the motor shaft with a 5/16 in. square head bolt. The motor is secured to the blower housing with three 3/8 in. screws.

The blower wheel can be removed by separating the housing from the mount.

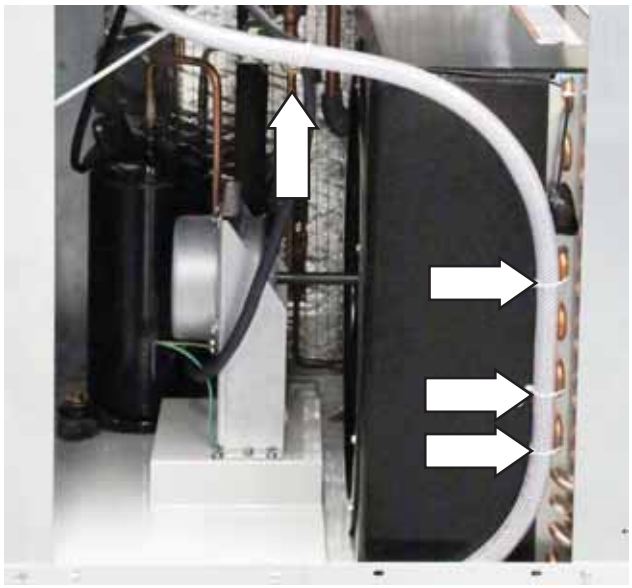
Outdoor Motor and Blade Assembly

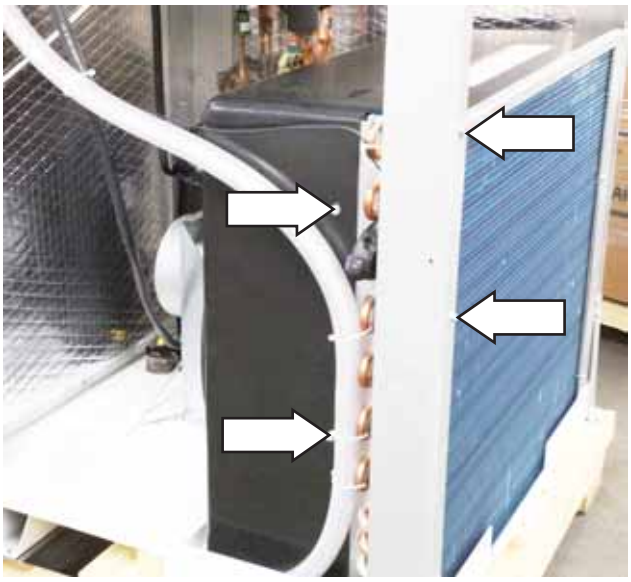
The motor bracket is secured to the base with four 5/16 in. screws.
The outdoor fan blade is attached to the motor shaft with a 5/32 in. Allen screw.

Large Chassis Component Access (continued)

Outdoor Shroud Assembly

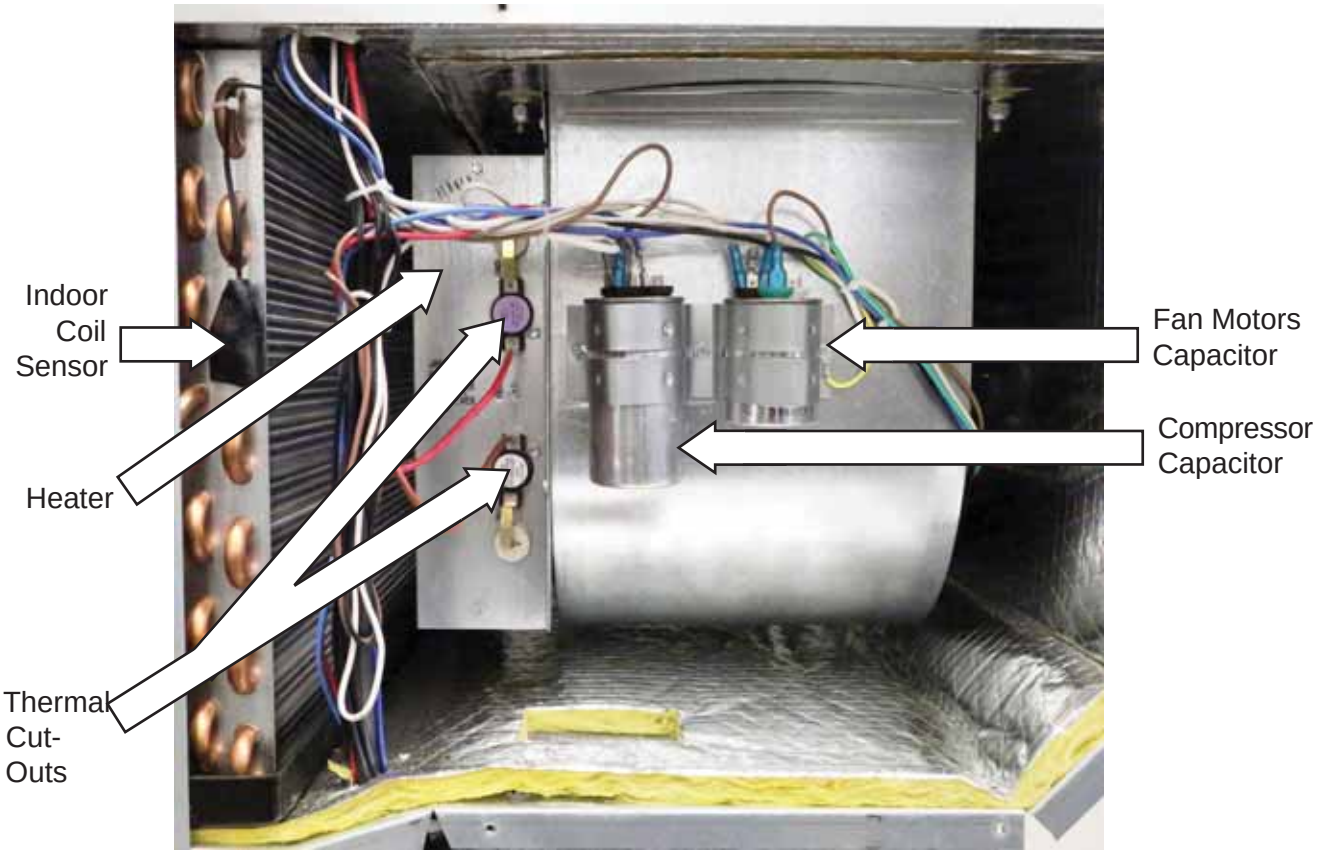
For easier access to the outdoor fan shroud. Cut the wire ties on the condensate drain tube to access the shroud screws. Remove the braces and bracket screws. Ensure that new wire ties are installed on the drain tube.





Right Side Components

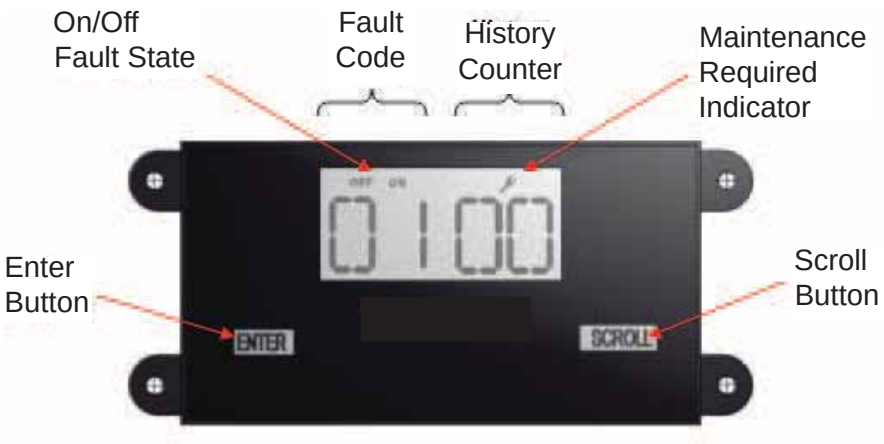
With the right side panel removed, the heater TCO's, capacitors and indoor coil sensor are accessible.



Fault Codes and Alarm Status

Service Module

The display shown below has four digits. The left two digits indicate the fault code # (1 to 24). The ON/OFF icons above these two digits indicate the current state of the fault code. The right two digits show the history count (up to 99) of the associated fault code. The display contains a maintenance icon (wrench) that will illuminate to indicate when the GE Vertical Zoneline needs service. This wrench indicates an fault code # is on (active). To find out which one, check all fault codes.



Check Fault Codes

1. Press the Enter key to activate the display
2. Each press of the scroll key display the next fault code.

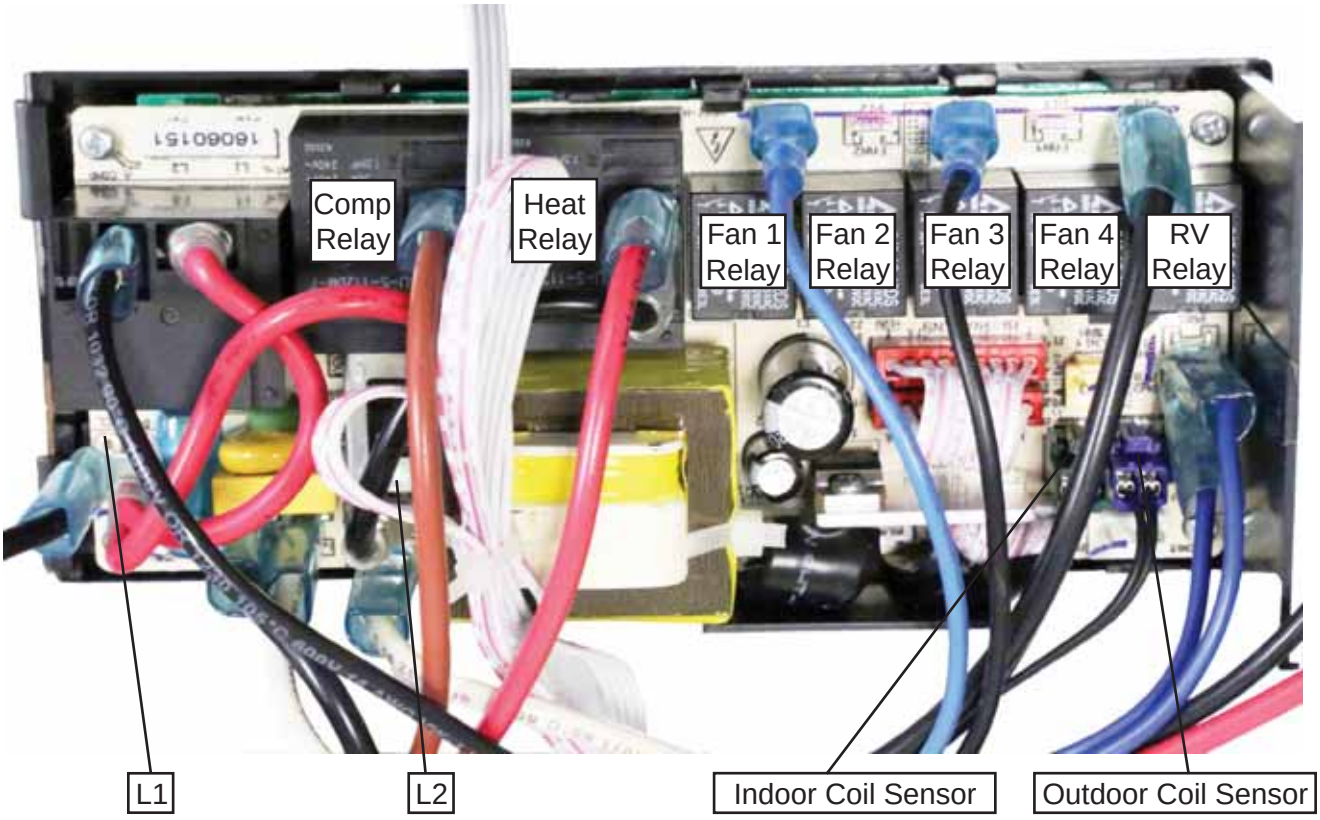
Clear History Counters

1. Press and hold the Enter key and the Scroll Key for 6 seconds.

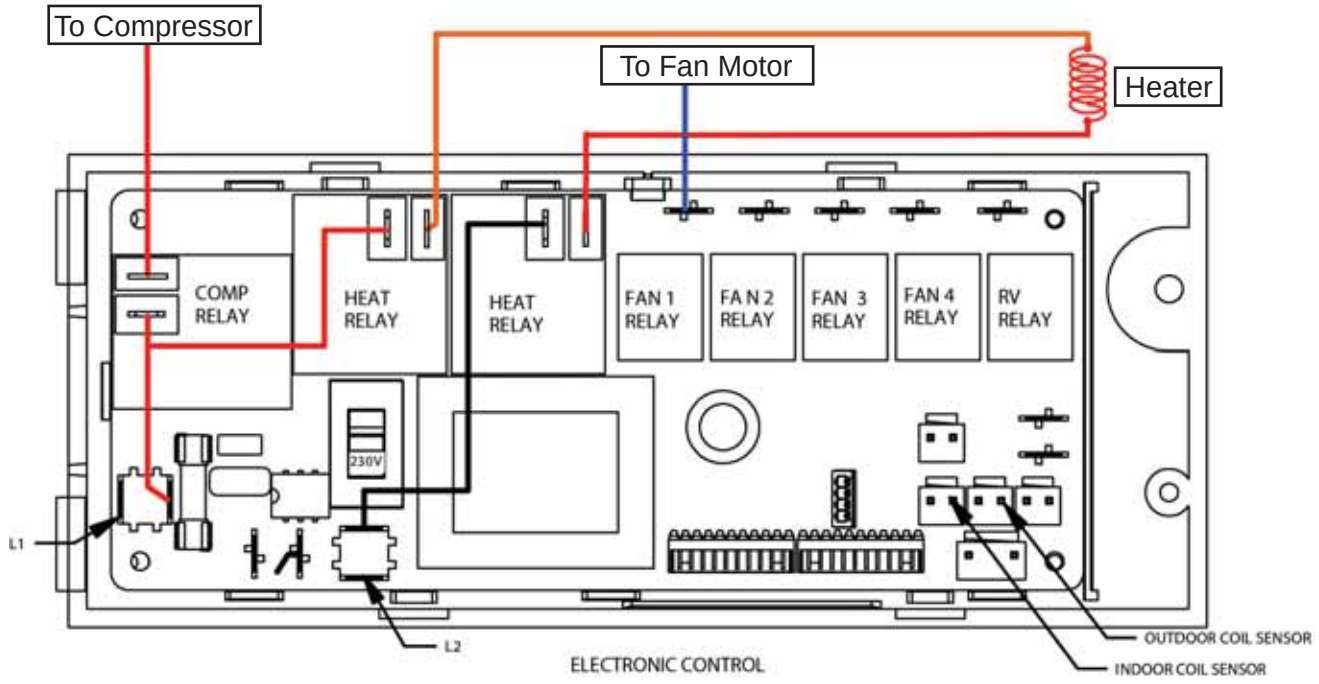
The chart on the following page lists the possible fault codes and their description:

Fault Code	Problem	Action
1	Front panel button stuck for more than 20 seconds	Continue to monitor for "OPEN" (Unstuck) switch. Do not process switch input.
2	Input voltage out of specification (187 - 253)	GE Vertical Zoneline stops, open all relays until voltage is back within specs then resume operation.
3	Indoor temperature sensor is open or shorted	GE Vertical Zoneline defaults to 75°F in COOLING or 68°F in HEATING and will continue to operator if setting is below 75°F in cool mode or if above 68°F in heat mode.
4	Indoor coil temperature sensor is open or shorted	The GE Vertical Zonelines control board defaults to 40°F. It will override the sensor and the GE Vertical Zoneline will continue to operate.
5	Outdoor coil temperature sensor is open or shorted	The GE Vertical Zoneline defaults to 20°F, overriding the sensor. The GE Vertical Zoneline will continue to operate. Using electric heat if available for HEATING. If not available, it will use HEAT PUMP if the outdoor temperature allows.
6	Outdoor coil > (greater than) 175°F	The GE Vertical Zoneline will shut down for 5 minutes. Resume operation for 3 minutes. If test fails 3 times, the GE Vertical Zoneline operation is locked out. To reset, turn power off and on.
7	Indoor coil < (less than) 30°F for 2 consecutive minutes	The compressor will turn off and the High Fan speed will run. When coil temperature reaches 45°F, the GE Vertical Zoneline will resume operation after lockout time.
8	Zoneline Cycles > (greater than) 9 times per hour	The GE Vertical Zoneline will continue to operate and be monitored.
9	Zoneline Cycles < (less than) 3 times per hour	The GE Vertical Zoneline will continue to operate and be monitored.
10	Not applicable	Not applicable
11	Wallstat problem or connection issue	The GE Vertical Zoneline will not operate.
12	Not applicable	Not applicable
13	Not applicable	Not applicable
14	Not applicable	Not applicable
15	Heat pump fault	If indoor coil temperature is less than ambient temperature for 3 minutes, the GE Vertical Zoneline will use electric heat to satisfy the heating demand. Causes could be a bad reversing valve, or the heat load is too high.
16	Temperature beyond operating limits	Occurs if the indoor ambient temperature range falls below 0°F or greater than 130°F. The fault code will remain on until the temperature reaches the operating range and then the GE Vertical Zoneline will return to normal operation.
17	Equipment doesn't meet minimum configuration	The compressor must be enabled and have at least 2 fan speeds.
18	Not applicable	Not applicable
19	Not applicable	Not applicable
20	Not applicable	Not applicable
21	Not applicable	Not applicable
22	(Not a fault code) Outdoor Coil temperature < 30°F for 2 consecutive minutes	GE Vertical Zoneline will use electric heat to satisfy heating demands until the temperature equals or exceeds 45°F. Applicable for Heat Pump models only.
23	Not applicable	Not applicable
24	Not applicable	Not applicable

Electronic Control Boards Components Identification

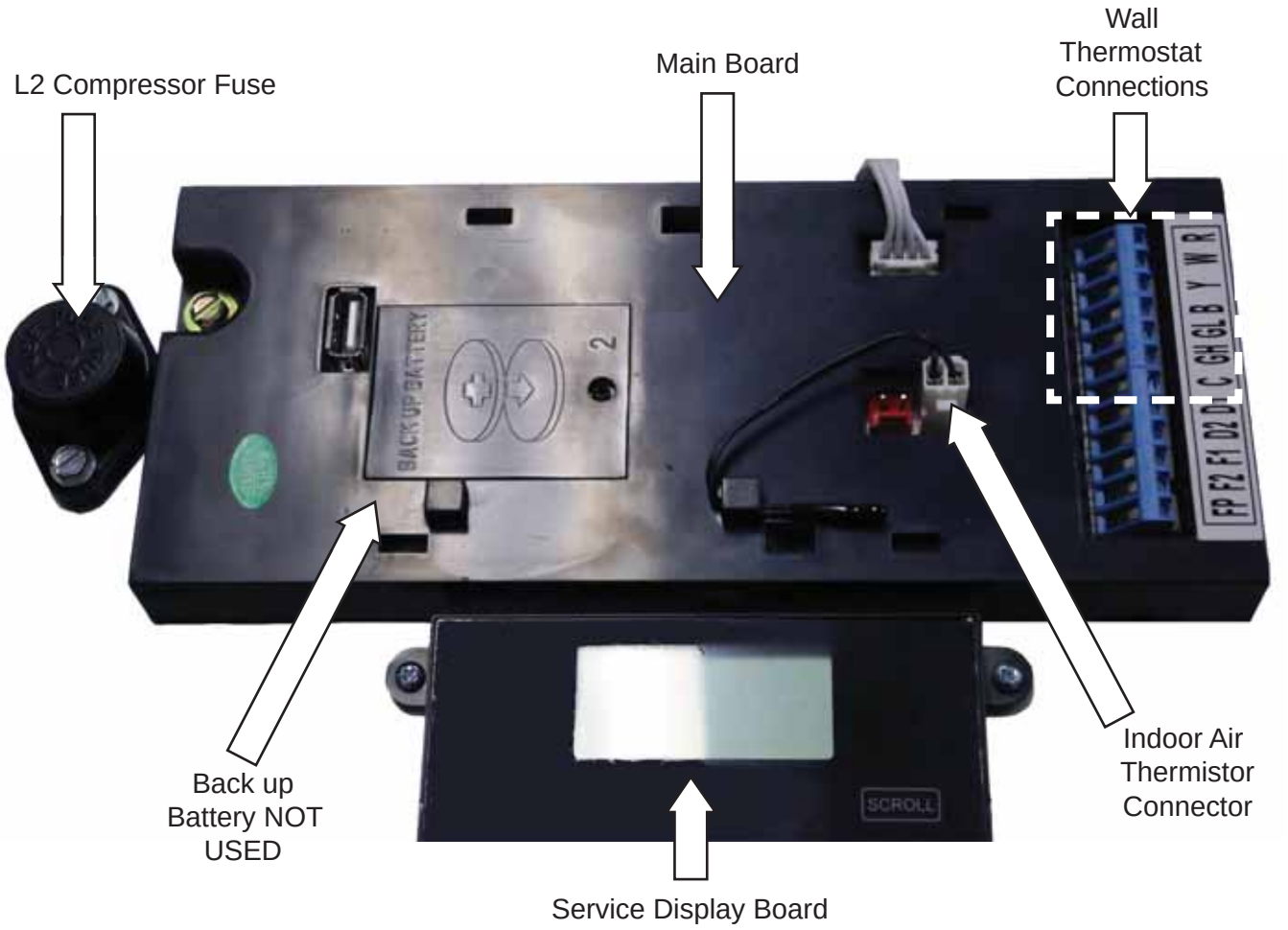


Electronic Control



Electronic Control Boards Components Identification

Main Board Front



Components Testing

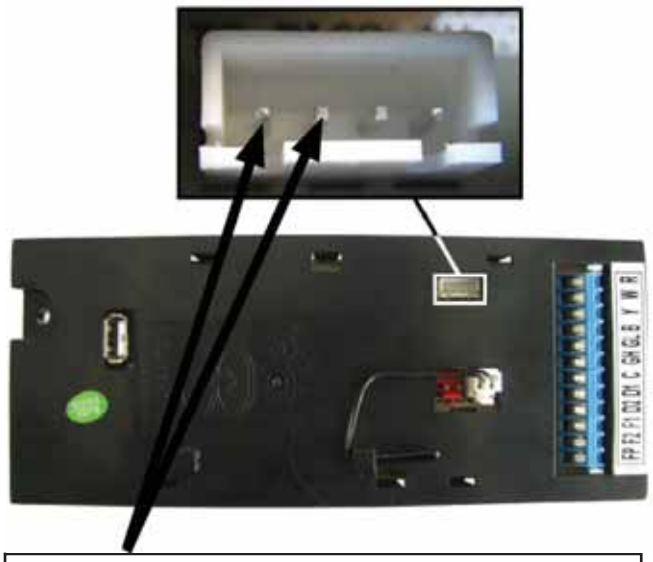
Testing the Diagnostic Service Module

If the Diagnostic Service Module does not turn on:

1. Make sure there is 208/230 VAC to the GE Vertical Zoneline and that it is turned on.
2. Disconnect the diagnostic service module's wire harness on the control board.
3. Using a volt meter, check the first two pins to the left of the female connector (see picture below). There should be up to 5 VDC.
4. If there is no voltage, replace the electronic control board.
5. If there is voltage, check the wire harness and connections at the electronic control board and the diagnostic service module.
6. If the connections and the wire harness are good, replace the diagnostic service module.

Diagnostic Service Module

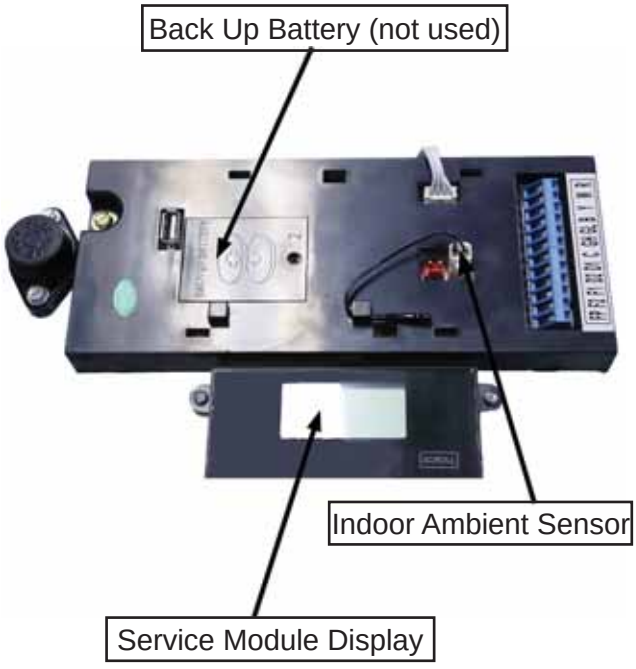
Service Module Connector



Test here up to 5 VDC.

If no voltage, replace board.

If there is 5 VDC, check the connections and cable. If OK, replace service module.



Components Testing (Continued)

Blower/Fan Motor

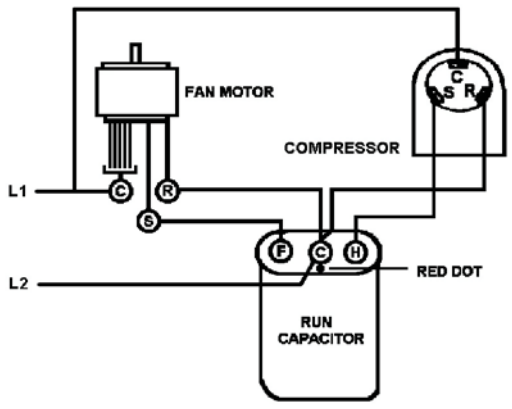
A single phase permanent split capacitor motor is used to drive the evaporator blower and condenser fan. A self-resetting overload is located inside the motor to protect against high temperature and high amperage conditions.

Blower/Fan Motor Test

1. Visually inspect the motor's wiring, housing, etc., and determine that the capacitor is serviceable.
2. Make sure the motor has cooled down.
3. Disconnect the fan motor wires from the control board.
4. Test for continuity between the windings also, test to ground.
5. If any winding is open or grounded replace the motor.

Motor Winding Resistance			
Model	Measurement	Winding Resistance (Ω)	
		Indoor Motor	Outdoor Motor
AZ90E09, AZ90E12, AZ90E18, AZ91H09, AZ91H12, AZ91H18E*S	WHITE TO BROWN	48 ± 10%	NA
	WHITE TO BLUE	35 ± 10%	
	WHITE TO BLACK	30 ± 10%	
AZ91H18D*C, AZ91H18E*C	WHITE TO BROWN	272 ± 10%	77 ± 10%
	WHITE TO BLUE	177 ± 10%	NA
	WHITE TO BLACK	151 ± 10%	37 ± 10%

Dual Rated Run Capacitor Hook-Up



Capacitor

The best way to verify a capacitor fault is to substitute a known good capacitor into the circuit.

Components Testing (Continued)

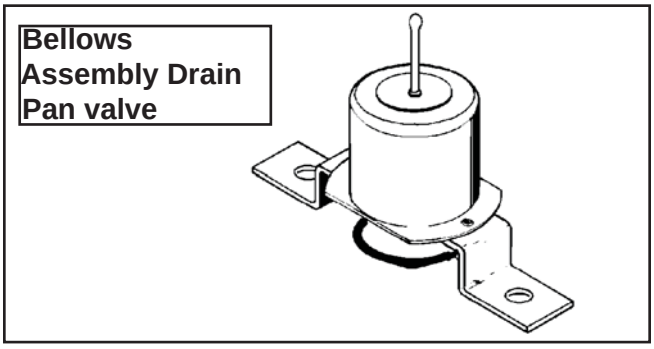
Drain Pan Valve

During the cooling mode of the operation, condensate which collects in the drain pan is picked up by the condenser fan blade and sprayed onto the condenser coil. This assists in cooling the refrigerant plus evaporating the water.

During the heating mode of operation, it is necessary that water be removed to prevent it from freezing during cold outside temperatures. This could cause the condenser fan blade to freeze in the accumulated water and prevent it from turning.

To provide a means of draining this water, a bellows type drain valve is installed over a drain opening in the base pan.

This valve is temperature sensitive and will open when the outside temperature reaches 40°F. the valve will close gradually as the temperature rises above 40°F to fully close at 60°F.



If outdoor temperature is at 40°F and drain valve does not open, replace it. (Ensure it is not restricted by debris).

Fresh Air Door

The Fresh Air Door is an "intake" system. The fresh air door opens via a slide on the front of the chassis located just above the indoor coil. Move the slide left to open and right to close the fresh air door. The system is capable of up to 60 CFM of fresh air @ ~ .3" H2O internal static pressure.

Refrigeration Sequence of Operation

A good understanding of the basic operation of the refrigeration system is essential for the service technician. Without this understanding, accurate troubleshooting of refrigeration system problems will be more difficult and time consuming, if not (in some cases) entirely impossible. The refrigeration system uses four basic principles (laws) in its operation:

1. "Heat always flows from a warmer body to a cooler body."
2. "Heat must be added to or removed from a substance before a change in state can occur."
3. "Flow is always from a higher pressure area to a lower pressure area."
4. "The temperature at which a liquid or gas changes state is dependent upon the pressure."

The refrigeration cycle begins at the compressor. Starting the compressor creates a low pressure in the suction line which draws refrigerant gas (vapor) into the compressor. The compressor then "compresses" this refrigerant, raising its pressure and its (heat intensity) temperature.

The refrigerant leaves the compressor through the discharge line as a hot high pressure gas (vapor). The refrigerant enters the condenser coil where it gives up some of its heat. The condenser fan moving air across the coil's finned surface facilitates the transfer of heat from the refrigerant to the relatively cooler outdoor air.

When a sufficient quantity of heat has been removed from the refrigerant gas (vapor), the refrigerant will "condense" (i.e.: change to a liquid). Once the refrigerant has been condensed (changed) to a liquid it is cooled even further by the air that continues to flow across the condenser coil.

The GE Vertical Zoneline design determines at exactly what point (in the condenser) the change of state (i.e.: gas to a liquid) takes place. In all cases, however, the refrigerant must be totally condensed (changed) to a liquid before leaving the condenser coil.

The refrigerant leaves the condenser coil through the liquid line as a warm high pressure liquid. It next will pass through the refrigerant drier (if so equipped). It is the function of the drier to trap any moisture present in the system, contaminants, and large particulate matter.

The liquid refrigerant next enters the metering device. The metering device is a capillary tube. The purpose of the metering device is to "meter" (i.e.: control or measure) the quantity of refrigerant entering the evaporator coil.

In the case of the capillary tube, this is accomplished (by design) through size (and length) of device, and the pressure difference present across the device.

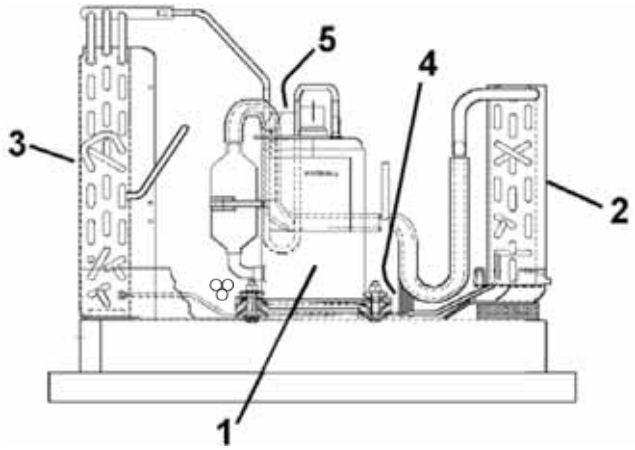
Since the evaporator coil is under a lower pressure (due to the suction created by the compressor) than the liquid line, the liquid refrigerant leaves the metering device entering the evaporator coil. As it enters the evaporator coil, the larger area and lower pressure allows the refrigerant to expand and lower pressure allows the refrigerant to expand and lower its temperature (heat intensity). This expansion is often referred to as "boiling". Since the GE Vertical Zonelines blower is moving indoor air across the finned surface of the evaporator coil, the expanding refrigerant absorbs some of that heat. This results in a lowering of the indoor air temperature, hence the "cooling" effect.

The expansion and absorbing of heat cause the liquid refrigerant to evaporate (i.e.: change to a gas). Once the refrigerant has been evaporated (changed to a gas), it is heated even further by the air that continues to flow across the evaporator coil.

Refrigeration Sequence of Operation (Continued)

The particular system design determines at exactly what point (in the evaporator) the change of state (i.e.: liquid to a gas) takes place. In all cases, however, the refrigerant must be totally evaporated (changed) to a gas before leaving the evaporator coil.

The low pressure (suction) created by the compressor causes the refrigerant to leave the evaporator through the suction line as a cool low pressure vapor. The refrigerant then returns to the compressor, where the cycle is repeated.



Refrigeration Assembly

1. Compressor
2. Evaporator Coil Assembly
3. Condenser Coil Assembly
4. Capillary Tube
5. Compressor Overload

Sealed Refrigeration System Repairs

IMPORTANT: ANY SEALED SYSTEM REPAIRS TO COOL-ONLY MODELS REQUIRE THE INSTALLATION OF A LIQUID LINE DRIER. ALSO, ANY SEALED SYSTEM REPAIRS TO HEAT PUMP MODELS REQUIRE THE INSTALLATION OF A SUCTION LINE DRIER.

EQUIPMENT MUST BE CAPABLE OF:

1. Recovering refrigerant to EPA required levels.
2. Evacuation from both the high side and low side of the system simultaneously.
3. Introducing refrigerant charge into high side of the system.
4. Accurately weighing the refrigerant charge actually introduced into the system.

Regrigerant Charging

Proper refrigerant charge is essential to proper GE Vertical Zoneline operations. Operating a GE Vertical Zoneline with an improper refrigerant charge will result in reduced performance (capacity) and/or efficiency. Accordingly, the use of proper charging methods during servicing will insure that the GE Vertical Zoneline is functioning as designed and that its compressor will not be damaged.

Too much refrigerant (overcharge) in the system is just as bad (if not worse) than not enough refrigerant (undercharge). They both can be the source of certain compressor failures if they remain uncorrected for any period of time. Quite often, other problems (such as low air flow across evaporator, etc.) are misdiagnosed as refrigerant charge problems. The refrigerant circuit diagnosis chart will assist in properly diagnosing these systems.

On overcharged GE Vertical Zoneline will at times return liquid refrigerant (slugging) back to the suction side of the compressor eventually causing a mechanical failure within the compressor. This mechanical failure can manifest itself as valve failure, bearing failure, and/or other mechanical failure. The specific type of failure will be influenced by the amount of liquid being returned, and the length of time the slugging continues.

Not enough refrigerant (undercharge) on the other hand, will cause the temperature of the suction gas to increase to the point where it does not provide sufficient cooling for the compressor motor. When this occurs, the motor winding temperature will increase causing the motor to overheat and possibly cycle open the compressor overload protector. Continued overheating of the motor windings and/or cycling of the overload will eventually lead to compressor motor or overload failure.

Method of Charging / Repairs

The acceptable method for charging the RAC system is the **Weighed in Charge Method**. The weighed in charge method is applicable to all GE Vertical Zonelines. It is the preferred method to use, as it is the most accurate.

The weighed in method should always be used whenever a charge is removed from a GE Vertical Zoneline such as for a leak repair, compressor replacement, or when there is no refrigerant charge left in the GE Vertical Zoneline. To change by this method, requires the following steps:

1. Install a piercing valve to remove refrigerant from the sealed system. (The piercing valve must be removed from the system before recharging.)
2. Recover refrigerant in accordance with EPA regulations.
3. Install a process tube to the sealed system.
4. Make necessary repairs to the system.
5. Evacuate the system.
6. Weigh in refrigerant with the property quantity of R-410A refrigerant.
7. Start the GE Vertical Zoneline, and verify performance.

Undercharged Refrigerant Systems

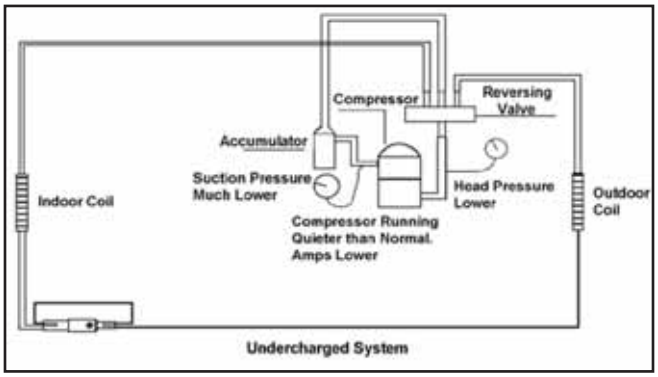
An undercharged system will result in poor performance (low pressures, etc.) in both the heating and cooling cycle.

Whenever servicing a GE Vertical Zoneline with an undercharge of refrigerant, always suspect a leak. The leak must be repaired before charging the GE Vertical Zoneline.

To check for an undercharged system, turn the GE Vertical Zoneline on, and allow the compressor to run long enough to establish working pressures in the system (15 to 20 minutes).

During the cooling cycle, listen carefully at the exit of the metering device into the evaporator. An intermittent hissing and gurgling sound indicates a low refrigerant charge. Intermittent frosting and thawing of the evaporator is another indication of a low charge, however, frosting and thawing can also be caused by insufficient air over the evaporator.

A check of the amperage drawn by the compressor motor should show a lower reading. (Check the GE Vertical Zoneline Specification in the Mini Manual).

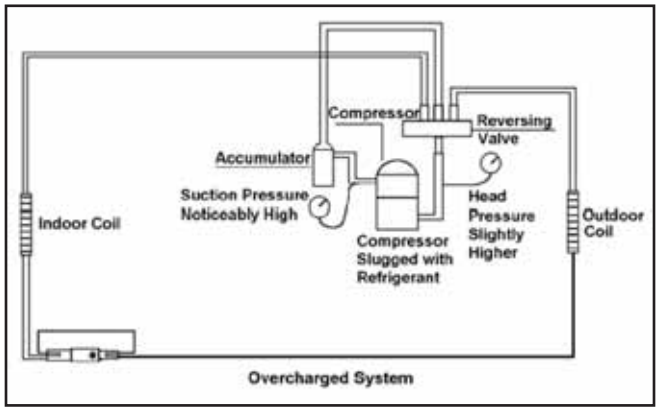


Overcharged Refrigerant Systems

Compressor amps will be near normal or higher. Non-condensables can also cause these symptoms. To confirm, remove some of the charge; if conditions improve, system may be overcharged. If conditions don't improve, then non-condensables are indicated.

Whenever an overcharged system is indicated, always make sure that the problem is not caused by air flow problems. Improper air flow over the evaporator coil may indicate some of the same symptoms as an over charged system. An overcharge can cause the compressor to fail, since it would be "slugged" with liquid refrigerant.

The charge for any system is critical. When the compressor is noisy, suspect an overcharge. Ensure the air quantity over the evaporator coil is correct. Icing of the evaporator will not be encountered because the refrigerant will boil later if at all.



Restricted Regrigerant System

Troubleshooting a restricted refrigerant system can be difficult. The following procedures are the more common problems and solutions to these problems. There are two types of refrigerant restrictions; partial restrictions and complete restrictions.

- A partial restriction allows some of the refrigerant to circulate through the system.
- With a complete restriction there is no circulation of refrigerant in the system.
- Restricted refrigerant systems display the same symptoms as a "low-charge condition".

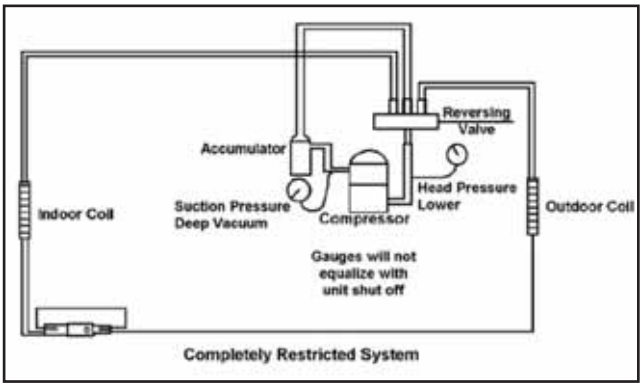
A quick check for either condition begins at the evaporator. With a partial restriction, there may be gurgling sounds at the metering device entrance to the evaporator. The evaporator in a partial restriction could be partially frosted of have an ice ball close to the entrance of the metering device. Frost may continue on the suction line back to the compressor.

Often a partial restriction of any type can be found by feel, as there is a temperature difference from one side of the restriction to the other.

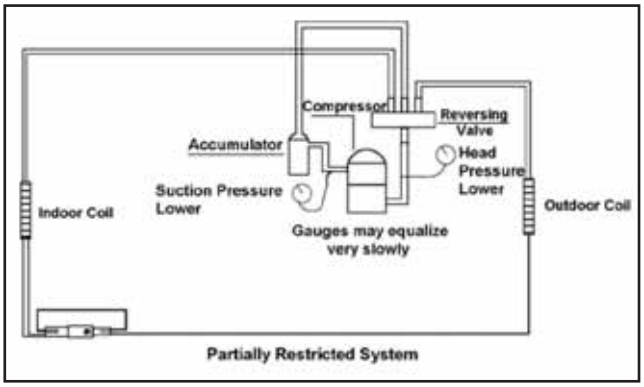
With a complete restriction, there will be no sound at the metering device entrance. An amperage check of the compressor with a partial restriction may show normal current when compared to the GE Vertical Zoneline Specification in the Mini Manual.

With a complete restriction, the current drawn may be considerable less than normal, as the compressor is running in a deep vacuum (no load). Much of the area of the condenser will be relatively cool since most of all of the liquid refrigerant will be stored there.

The following conditions are based primarily on a system in the cooling mode.



Completely Restricted System



Partially Restricted System

Hermetic Components Check

Metering Device

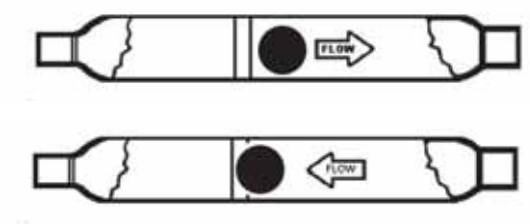
Capillary Tube Systems

All GE Vertical Zonelines are equipped with capillary tube metering devices.

Check Valve

A unique two-way check valve is used on the reverse cycle heat pumps. It is pressure operated and used to direct the flow of refrigerant through a single filter drier and to the proper capillary tube during either the heating or cooling cycle.

One-way Check Valve
(Heat Pump Mode(s)



NOTE: The slide (check) inside the valve is made of Teflon. Should it become necessary to replace the check valve, place a wet cloth around the valve to prevent overheating during the brazing operation.

Check Valve Operation

In the cooling mode of operation, high pressure liquid enters for the check valve forcing the slide to close the opposite port (liquid line) to the indoor coil. Refer to refrigerant flow chart. This directs the refrigerant through the filter drier and cooling capillary tube to the indoor coil.

In the heating mode of operation, high pressure refrigerant enters the check valve from the opposite, closing the port (liquid line) to the outdoor coil. The flow path of the refrigerant is then through the filter drier and heating capillary to the outdoor coil.

Failure of the slide in the check valve to seat properly in either mode of operation will cause flooding of the cooling coil. This is due to the refrigerant bypassing the heating or cooling capillary tube and entering the liquid line.

Cooling Mode

In the cooling mode of operation, liquid refrigerant from the condenser (liquid line) enters the cooling check valve forcing the heating check valve shut. The liquid refrigerant is directed into the liquid dryer after which the refrigerant is metered through cooling capillary tubes to evaporator. (**NOTE**: Liquid refrigerant will also be directed through the heating capillary tubes in a continuous loop during the cooling mode).

Heating Mode

In the heating mode of operation, liquid refrigerant from the indoor coil enters the heating check valve forcing the cooling check valve shut. The liquid refrigerant is directed into the liquid dryer after which the refrigerant is metered through the heating capillary tubes to outdoor coils. (**NOTE**: Liquid refrigerant will also be directed through the cooling capillary tubes in a continuous loop during the heating mode).

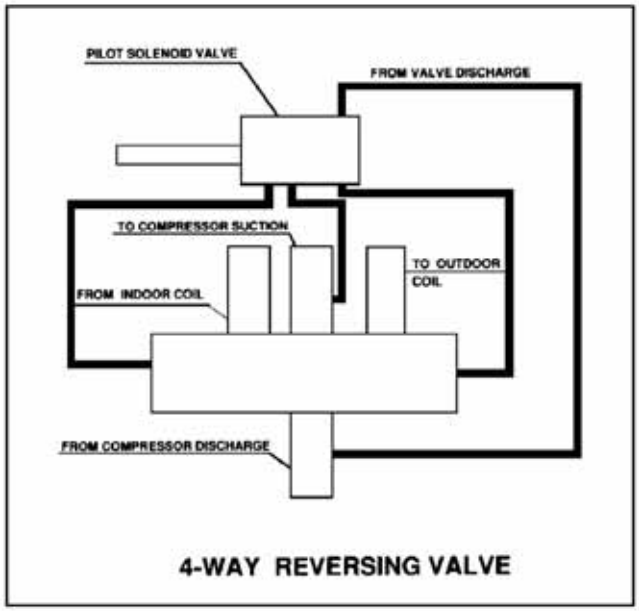
Reversing Valve Description/Operation

The Reversing Valve controls the direction of refrigerant flow to the indoor and outdoor coils. It consists of a pressure-operated, main valve and a pilot valve actuated by a solenoid plunger. The solenoid is energized during the heating cycle only. The reversing valves used in the PTAC system in a 2-position, 4-way valve.

The single tube on one side of the main valve body is the high-pressure inlet to the valve from the compressor. The center tube on the opposite side is connected to the low pressure (suction) side of the system. The other two are connected to the indoor and outdoor coils. Small capillary tubes connect each end of the main valve cylinder to the "A" and "B" ports of the pilot valve. A third capillary is a common return line from the ports to the suction tube on the main valve body. Four-way reversing valves also have a capillary tube from the compressor discharge tube to the pilot valve.

The piston assembly in the main valve can only be shifted by the pressure differential between the high and low sides of the system. The pilot section of the valve opens and closes ports for the small capillary tubes to the main valve to cause it to shift.

NOTE: System operating pressures must be near normal before the valve can shift.



4-WAY REVERSING VALVE

Testing The Coil

The solenoid coil is an electromagnetic type coil mounted on the reversing valve and is energized during the operation of the compressor in the heating cycle.

1. Turn off high voltage electrical power to GE Vertical Zoneline.
2. Unplug line voltage lead from reversing valve coil.
3. Check for electrical continuity through the coil. If there is no continuity, replace the coil.
4. Check from each lead of coil to the copper liquid line as it leaves the GE Vertical Zoneline or the ground lug. There should be no continuity between either of the coil leads and ground; if there is, coil is grounded and must be replaced.
5. If coil tests OK, reconnect the electrical leads.
6. Make sure coil has been assembled correctly.

NOTE: Do not start the GE Vertical Zoneline with solenoid coil removed from valve, or do not remove the coil after the GE Vertical Zoneline is in operation. This will cause the coil to burn out.

Checking The Reversing Valve

NOTE: There must be normal operation pressures before the reversing valve can shift.

Check the operation of the valve by starting the system and switching the operation from "Cooling" to "Heating" and then back to "Cooling". Do not hammer on the valve.

Occasionally, the reversing valve may stick in the heating or cooling position or in the mid-position.

When sluggish or stuck in the mid-position, part of the discharge gas from the compressor is directed back to the suction side, resulting in excessively high suction pressure.

Should the valve fail to shift from cooling to heating, block the air flow through the outdoor coil and allow the discharge pressure to build the system. Then switch the system from heating to cooling.

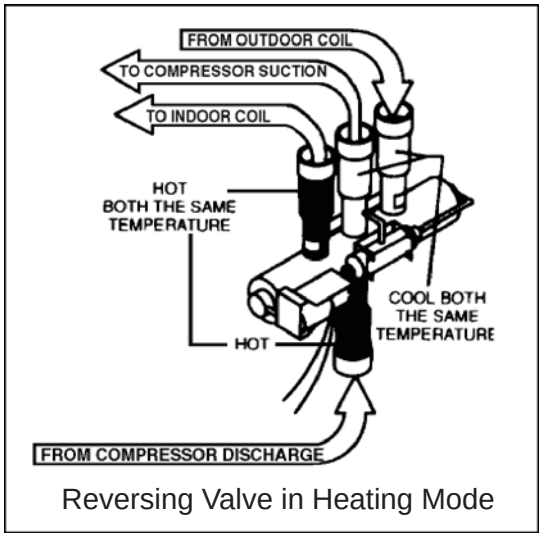
If the valve is stuck in the heating position, block the air flow through the indoor coil and allow discharge pressure to build in the system. Then switch the system from heating to cooling.

Should the valve fail to shift in either position after increasing the discharge pressure, replace the valve.

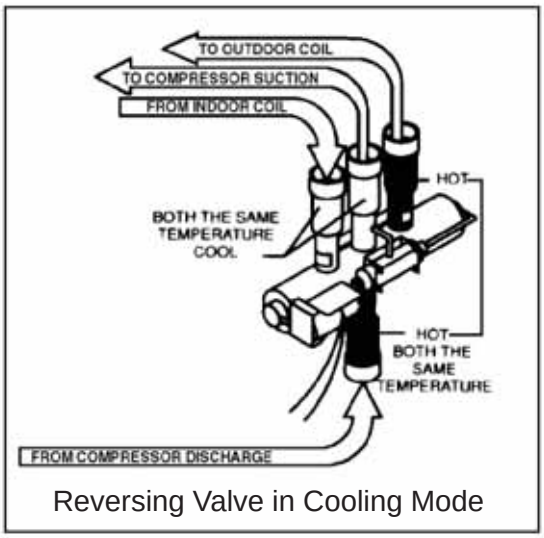
Dented or damaged valve body or capillary tubes can prevent the main slide in the valve body from shifting.

If it is determined this is the problem, replace the reversing valve.

After all of the previous inspections and checks have been made and determined correct, then perform the "Touch Test" on the reversing valve.



Reversing Valve in Heating Mode



Reversing Valve in Cooling Mode

Tough Test In Heating/Cooling Cycle

The only definite indications that the slide is in the mid-positions is if all three tubes on the suction side of the valve are hot after a few minutes of running time.

Procedure For Changing Reversing Valve

Notice
FIRE HAZARD The use of a torch requires extreme care and proper judgment. Follow all safety recommended precautions and protect surrounding areas with fire proof materials. Have a fire extinguisher readily available. Failure to follow this notice could result in moderate to serious property damage.

1. Install process tubes. Recover refrigerant from the sealed system. PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.
2. Remove the solenoid coil from the reversing valve. If the coil is to be reused, protect from heat while changing valve.
3. Unbraze all lines from the reversing valve.
4. Clean all excess braze from all tubing so that they will slip into the fittings on the new valve.
5. Remove the solenoid coil from the new valve.
6. Protect the new valve body from heat while brazing with plastic heat sink (Thermo Trap) or wrap valve body with wet rag.
7. Fit all lines into the new valve, and braze the lines into new valve.
8. Once the sealed system is leak free, install a solenoid coil on the new valve and charge the sealed system by weighing in the proper amount and type of refrigerant as shown on the rating plate. Crimp the process tubes and solder the ends shut. Do not leave Schrader or piercing valves in the sealed system.

NOTE: When brazing a reversing valve into the system, it is of extreme importance that the temperature of the valve does not exceed 250°F at any time.

Wrap the reversing valve with a large rag saturated with water. "Re-wet" the rag and thoroughly cool the valve after each brazing operation of the four joints involved.

The wet rag around the reversing valve will eliminate conduction of heat to the valve body when brazing the line connection.

Overloads

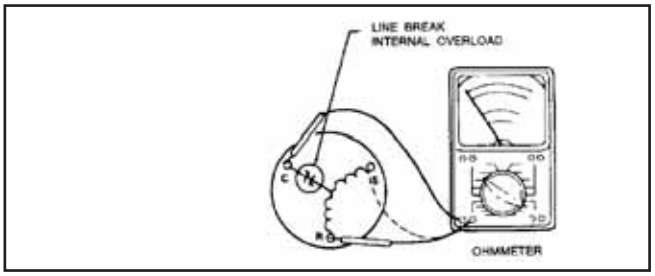
The compressor is equipped with an external or internal overload which senses both motor amperage and winding temperature. High motor temperature or amperage heats the overload causing it to open, breaking the common circuit within the compressor.

Heat generated within the compressor shell, usually due to recycling of the motor, is slow to dissipate. It may take anywhere from a few minutes to several hours for the overload to reset.

Checking the Overload

External Overload 9, 12, 18 K Btus

With the power off, remove the leads from compressor terminals. If the compressor is hot, allow the overload to cool before starting check. Using an ohmmeter, test continuity across the terminals of the external overload. If there is not continuity; this indicates that the overload is open and must be replaced.

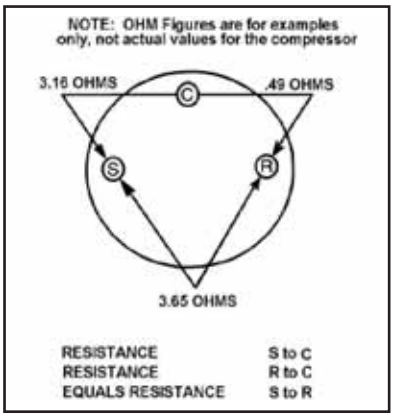


Compressor Resistance Test

Remove the leads from the compressor terminals and set to the ohmmeter on the lowest scale.

Touch the leads of the ohmmeter from terminals common to start ("C" to "S"). Next, touch the leads of the ohmmeter from terminals common to run ("C" to "R").

In a compressor motor, the highest value will be from the start to the run connections ("S" to "R"). The next highest resistance is from the start to the common connections ("S" to "C"). The lowest resistance is from the run to common. ("C" to "R"). Before replacing a compressor, check to be sure it is defective.



Ground Test

Use an ohmmeter set on its highest scale. Touch one lead to the compressor body (clean point of contact as a good connection is a must) and the other probe in turn to each compressor terminal. If a reading is obtained, the compressor is grounded and must be replaced.

Complete evaluation of the system must be made whenever it is suspected that the compressor is defective. If the compressor has been operating for some time, a careful examination must be made to determine why the compressor failed.

Many compressor failures are caused by the following conditions:

- Improper air flow over the evaporator
- Overcharged refrigerant system causing liquid to be returned to the compressor
- Restricted refrigerant system
- Lack of lubrication
- Liquid refrigerant returning to compressor causing oil to be washed out of bearings
- Non-condensables such as air and moisture in the system. Moisture is extremely destructive to a refrigerator system

Compressor Replacement

Recommended Procedure for Compressor Replacement

1. Be certain to perform all necessary electrical and refrigeration tests to be sure the compressor is actually defective before replacing.
2. Recover all refrigerant from the system through the process tubes. **PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.** Do not use gauge manifold for this purpose if there has been a burnout. This will contaminate the manifold and hoses. Use a Schrader valve adapter and copper tubing for burnout failures.
3. After all refrigerant has been recovered, disconnect suction and discharge lines from the compressor and remove the compressor. Be certain to have both suction and discharge process tubes open to atmosphere.
4. Install the replacement compressor.
5. Evacuate the system with a good vacuum pump capable of a final vacuum of 200 microns or less. The system should be evacuated through both liquid line and suction line gauge ports. While the GE Vertical Zoneline is being evacuated, seal all openings on the defective compressor.
6. Recharge the system with the correct amount of refrigerant. The proper refrigerant charge will be found on the GE Vertical Zoneline rating plate. The use of an accurate measuring device, such as a charging cylinder, electronic scales or similar device is necessary.

NOTE: **NEVER**, under any circumstances, liquid charge a rotary compressor through the LOW side. Doing so would cause permanent damage to the new compressor.

Routine Maintenance

To ensure proper GE Vertical Zoneline operation and life expectancy, the following maintenance procedures should be performed on a regular basis.

1. **Air Filter**

   To ensure proper GE Vertical Zoneline operation, the air filters should be replaced at least monthly, and more frequently if conditions warrant.

2. **Coils & Chassis**

   NOTE: Do not use a caustic coil cleaning agent on coils or base pain. Use a bio-degradable cleaning agent and degreaser. The use of harsh cleaning materials may lead to deterioration of the aluminum fins or the coil end plates.

   The indoor coil and outdoor coils and base pan should be inspected periodically (annually or semi-annually) and cleaned of all debris (lint, dirt, leaves, paper, etc.) as necessary. Under extreme conditions, more frequent cleaning may be required. Clean the coils and base pan with a soft brush and compressed air or vacuum. A pressure washer may also be used, however, be careful not to bend the aluminum fin back. Use a sweeping up and down motion in the direction of the vertical aluminum fin pack when pressure cleaning coils.

   NOTE: It is extremely important to ensure that none of the electrical and/or electronic parts of the GE Vertical Zoneline get wet. Be sure to cover all electrical components to protect them from water or spray.

3. **Fresh Air Vent**

   Ensure the fresh air vent door and lever are operating properly.

4. **Fan Motor & Compressor**

   The fan motor and compressor are permanently lubricated, and require no additional lubrication.

5. **Drain System**

   Inspect the drain system (annually or semi-annually) and clean as required. Under extreme conditions, more frequent cleaning may be necessary. Clean these areas with an antibacterial and antifungal cleaner. Rinse both items thoroughly with water and ensure that the drain outlets are operating properly.

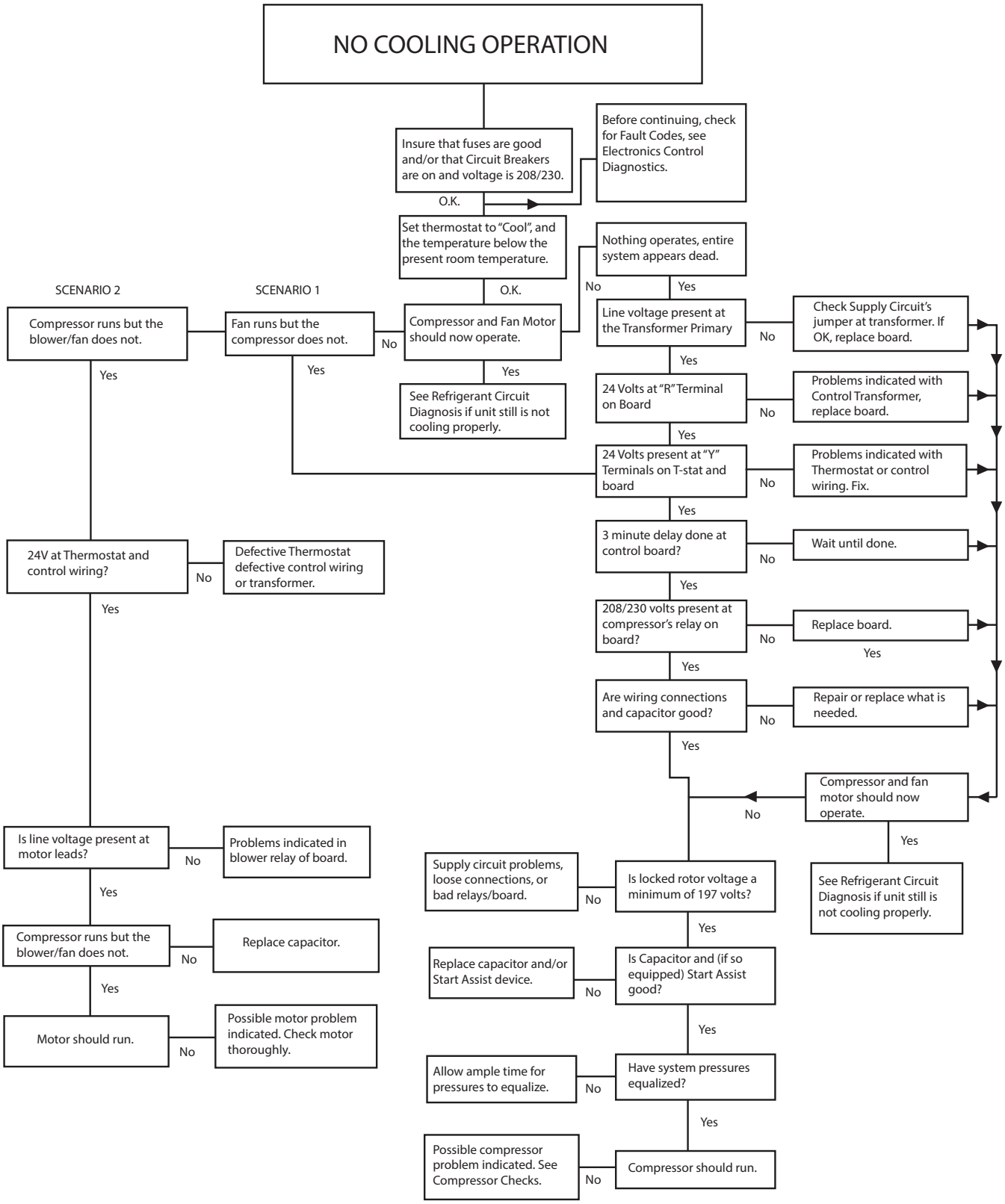
Thermistors' Resistance Values

(This Table Applies to All Thermistors)

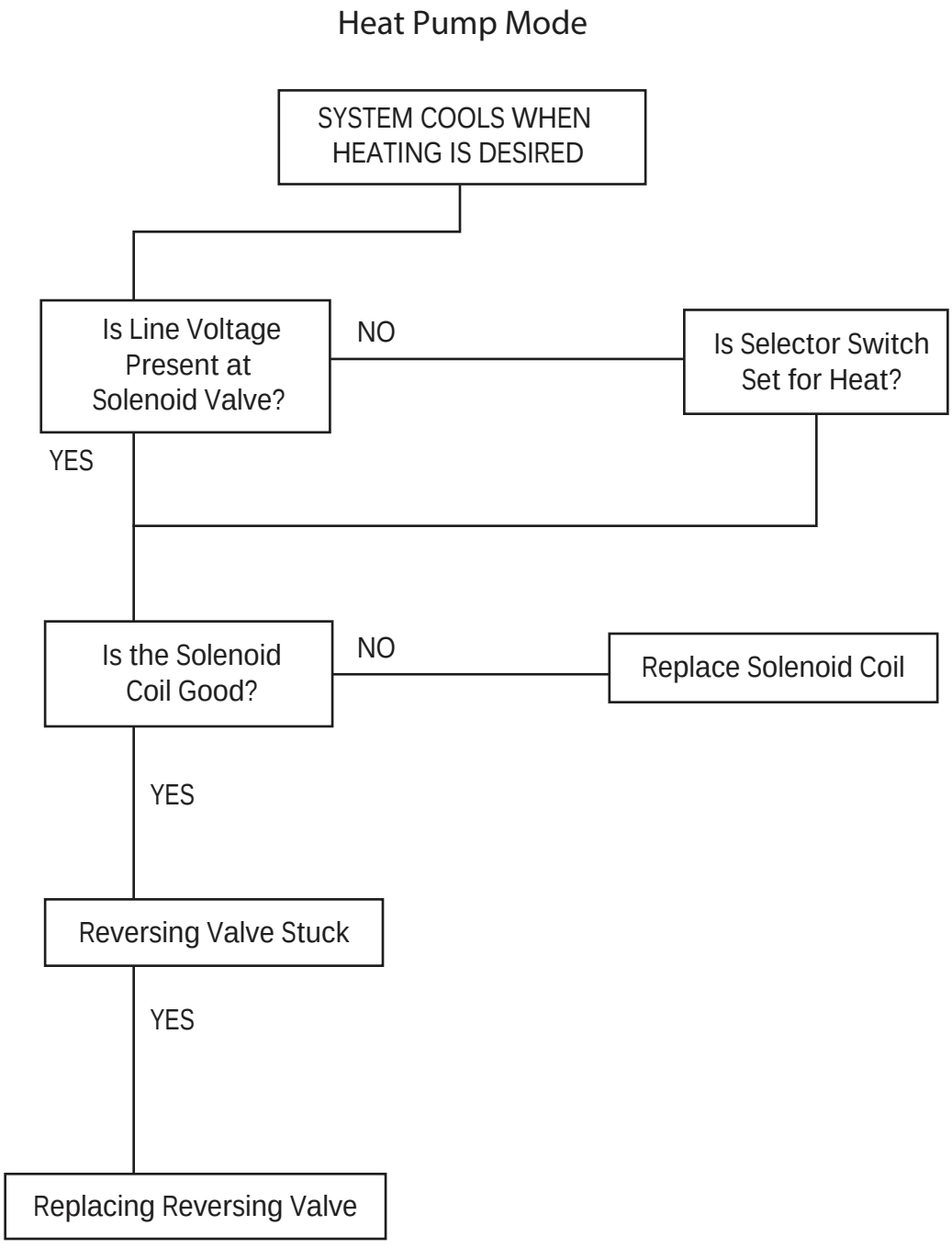
Temperature °F	Resistance (k Ohms)	Tolerance %
0	98	5
10	70	5
20	51	4
30	37	4
32	35	4
50	20	3
60	16	3
70	12	2
75	10	2
80	9	2
90	7	2
95	6	2
100	5.5	2

Electrical Troubleshooting Chart

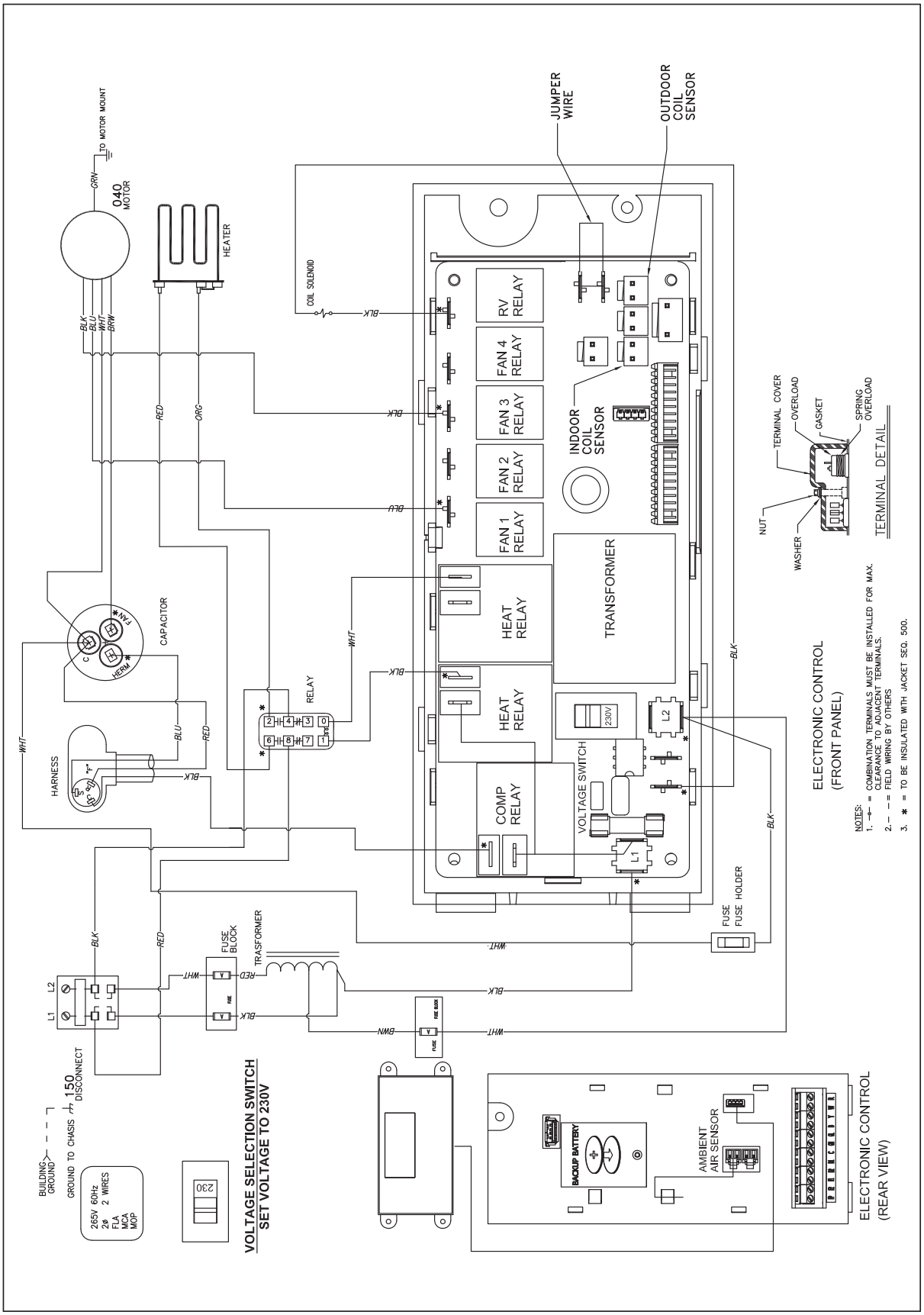
Cooling 9K BTU, 12K BTU, & 18K BTU



Electrical Troubleshooting Chart Heat Pump



Schematic


TO MOTOR MOUNT
GRN
040 MOTOR
HEATER
BLK
BLU
WHT
BRN
COIL SOLENOID
JUMPER WIRE
OUTDOOR COIL SENSOR
RV RELAY
FAN 4 RELAY
FAN 3 RELAY
FAN 2 RELAY
FAN 1 RELAY
INDOOR COIL SENSOR
HEAT RELAY
HEAT RELAY
TRANSFORMER
COMP RELAY
VOLTAGE SWITCH
230V
L1
L2
CAPACITOR
FAN
HERM
C
RELAY
HARNESS
RED
ORG
BLU
WHT
BLK
TERMINAL COVER
OVERLOAD
GASKET
SPRING, OVERLOAD
NUT
WASHER
TERMINAL DETAIL
ELECTRONIC CONTROL (FRONT PANEL)
NOTES:
1. -⊕- = COMBINATION TERMINALS MUST BE INSTALLED FOR MAX. CLEARANCE TO ADJACENT TERMINALS.
2. – – = FIELD WIRING BY OTHERS
3. * = TO BE INSULATED WITH JACKET SEQ. 500.
FUSE
FUSE HOLDER
FUSE BLOCK
TRASFORMER
BUILDING GROUND
GROUND TO CHASSIS
150 DISCONNECT
265V 60Hz 2⌀ 2 WIRES
FLA
MCA
MOP
230
VOLTAGE SELECTION SWITCH
SET VOLTAGE TO 230V
BACKUP BATTERY
AMBIENT AIR SENSOR
ELECTRONIC CONTROL (REAR VIEW)

Accessories

Model	Description
RAVAL2	Aluminum Outdoor Grill
RAVWPT8	Telescoping Wall Plenum " 5 1/2" - 8"
RAVWPT14	Telescoping Wall Plenum : 8" - 14"
RAVTRANS	Transition piece btw new VTAC & Sharp VTAC
RAVRG1	Access Panel with Return Air Grille
RAVRG2	Return Air Grille
RAVRMS	Wall mounted Room Air Sensor
RAVDP18	Drain Pan kit for 18K AZ91
RAVRG3	Return Air Grill/ Access Panel for 18K AZ91

GE Vertical Zoneline Warranty

All warranty service provided by our Factory Service Centers or an authorized Customer Care® technician. To schedule service, on-line, visit us at GEAppliances.com, or call 844-GE4-PTAC (or 844-434-7822). For service in Canada, contact Gordon Williams Corp. at 1.888.209.0999. Please have serial number and model number available when calling for service.

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

For The Period Of:	***GE Appliances Will Replace:***
One Year *From the date of the original purchase*	**Any part** of the air conditioner which fails due to a defect in materials or workmanship. During this **limited one-year warranty**, GE will provide, **free of charge**, all labor and related service cost to replace the defective part.
Five Years *From the date of the original purchase*	**Sealed Refrigerating System, if any part of the sealed refrigerating system** (the compressor, condenser, evaporator and all connecting tubing including the make up air system) should fail due to a defect in materials or workmanship. During this **limited five-year warranty**, GE will provide, **free of charge**, all labor and related service cost to replace the defective part.
Second through Fifth Year *From the date of the original purchase*	For the **second through the fifth year** from the date of original purchase, GE will replace **certain parts** that fail due to a defect in materials or workmanship. Parts covered are fan motors, switches, thermostats, electric resistance heater, electric resistance heater protectors, compressor overload, solenoids, circuit boards, auxiliary controls, thermistors, frost controls, ICR pump, capacitors, varistors and indoor blower bearing. During this **four-year limited additional warranty**, you will be responsible for any labor or on-site service costs.

What GE Will Not Cover (for customers in the United States):

- **Service trips to your home to teach you how to use the product.**
- **Improper installation, delivery or maintenance.**

  If you have an installation problem, or if the air conditioner is of improper cooling capacity for the intended use, contact your dealer or installer. You are responsible for providing adequate electrical connecting facilities.
- **In commercial locations, labor necessary to move the unit to a location where it is accessible for service by an individual technician.**
- **Failure or damage resulting from corrosion due to installation in an environment containing corrosive chemicals.**
- **Replacement of fuses or resetting of circuit breakers.**
- **Failure of the product resulting from modifications to the product or due to unreasonable use, including failure to provide reasonable and necessary maintenance.**
- **Failure or damage resulting from corrosion due to installation in a coastal environment, except for models treated with special factory-applied anti-corrosion protection as designated in the model number.**
- **Damage to product caused by improper power supply voltage, accident, fire, floods or acts of God.**
- **Incidental or consequential damage to personal property caused by possible defects with this air conditioner.**
- **Damage caused after delivery.**
- **Product not accessible to provide required service.**

EXCLUSION OF IMPLIED WARRANTIES – Your sole and exclusive remedy is product repair as provided in this Limited Warranty. Any implied warranties, including the implied warranties of merchantability or fitness for a particular purpose, are limited to one year or the shortest period allowed by law.

This warranty is extended to the original purchaser and any succeeding owner for products purchased for use within the USA and Canada. If the product is located in an area where service by a GE Authorized Servicer is not available, you may be responsible for a trip charge or you may be required to bring the product to an Authorized GE Service location for service. In Alaska, the warranty excludes the cost of shipping or service calls to your site.

Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or province to province. To know what your legal rights are, consult your local, state or provincial consumer affairs office or your state's Attorney General.

Warrantor: GE Appliances

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