IMPORTANT SAFETY NOTICE

This information is intended for use by individuals possessing adequate background 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.

DISCONNECT POWER BEFORE SERVICING

IMPORTANT- RECONNECT ALL GROUNDING DEVICES

All parts of this appliance capable of conducting electrical current are grounded. 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 condition and properly fastened.

⚠ CAUTION

Double wall heat exchanger, suitable for potable water connection.

SPECIFICATIONS

Capacity	50 US gal
Tank Max Working Pressure	150 PSI
Water Temperature Set Point Range	100F - 140F
Electrical	240/208VAC 60 Hz 1-PH
Circuit Breaker	30 Amp
Upper Element Wattage	4500/3380
Lower Element Wattage	4500/3380

REFRIGERATION SYSTEM

Compressor	600 W
Refrigerant Charge (R134a)	27.34 oz
Compressor LRA	19.6A
Compressor RLA	4.5A
High Pressure (at 70 ambient)	331 PSIA
Low Pressure (at 70 ambient)	107 PSIA

SERVICE MODE

The Service Mode can be accessed by pressing and holding the UP Arrow and Enter buttons simultaneously for 5 seconds. You will first hear a single beep when pressing the buttons, then a two-tone sound indicating the action was successful. A moment later, you will see the first display of the thermistor T2 alternating with its temperature displayed in the units selected (degrees F or C). The Service Mode will time out after 15 minutes of button inactivity.

Three functions are available in Service Mode: View Thermistors, Heating Component Status and Control, and View Faults and Counters. You may switch from one function to another by pressing the Mode button. Service Mode starts with the View Thermistors function with the Heat Pump (Only) Mode LED (top) lit. Pressing the Mode button will switch to the Heating Components Status and Control function with the Hybrid LED (2nd from top) lit. Pressing the Mode button again will switch to the View faults and Counters function will be 3rd LED from the top lit. Pressing the Mode button again will return to the top LED and the Thermistors function.
An explanation of the three functions follows:

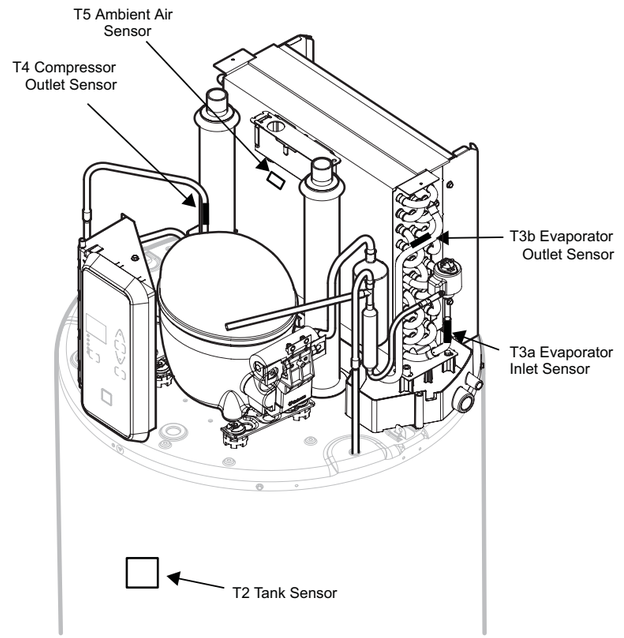
View Thermistor - Each of the 5 thermistors can be monitored for the temperature they sense. The thermistor designation appears on the display and alternates with the temperature in degrees of the units selected - Fahrenheit or Celsius. Pressing the Down Arrow button switches the display to the next thermistor in the list. The following table shows the thermistors' designations and their function in the unit.

Designation	Function
T2	Tank (Water) Temperature
T3a	Evaporator Inlet Temperature
T3b	Evaporator Outlet Temperature
T4	Compressor Discharge Temperature
T5	Ambient Air Temperature

Heating Component Status and Control - This function displays the status (on/off) for each of the heating components - Lower Element, Upper Element and Compressor - and allows you to turn it on or off. The first component is the Lower electric element (LE). On status is signified by a 1 and off is 0. Pressing the Down Arrow button switches to the Upper Element (UE). Pressing Down Arrow once more switches to the Compressor (Co). only one component can be on at one time. The electric elements will only stay on for 5 minutes without refreshing by pressing any button on the front panel. The compressor timeout is 10 minutes.

View Faults and Counters - The control counts the number of times a fault is recorded. A fault is not displayed until 10 counts have been recorded to ensure a true failure has occurred. For example, if the upper element were to fail, each time the control energized the upper element, but the element failed to draw current, the count would increase by 1. If however, the element responded normally, the count would decrease by 1 down to 0, but not less than zero. This function starts by displaying any fault codes (counters that have reached 10) in the system. Pressing Down Arrow takes you to the next fault code, if any. If no fault codes are active, "- - -" is displayed. Pressing the Filter button switches the display to the fault counters. The fault counter designation alternates in the display with its count value. For example, if the thermistor T3a has registered 3 more failures than passes, its value will be 3 and the display will alternate between "F5" and "3". The fault codes and their explanations are listed in the fault code table shown on page 2. To clear all fault codes and fault counters, press and hold the Enter button for 5 seconds and listen for the Hold Tones.

Exiting Service Mode - To exit Service Mode without waiting for 15 minute timeout, press and hold the Up Arrow and Down Arrow simultaneously for 5 seconds and listen for two beeps.



Temperature Sensors				
Sensor	Description	Normal temperature Range	Resistance range in ohms	Resistance at 77° F
T2	Tank	30° F-160° F	34K-1.75K	10K
T3a	Evaporator Inlet	15° F-130° F	57K-3K	10K
T3b	Evaporator Outlet	15° F-130° F	57K-3K	10K
T4	Compressor Outlet	30° F-250° F	188K-3K	55K
T5	Ambient	15° F-130° F	57K-3K	10K

PASS/FAIL COMPONENT OPERATION				
Selected Mode	**SS**	**LE**	**UE**	**Temporary Mode (if component failure is detected)**
Any	P	P	P	Runs in selected mode
Any	F	P	P	Electric mode
Hybrid	P	F	P	Hybrid Mode (but uses SS when LE is called for)
Electric	P	F	P	Electric Mode (UE only)
Heat Pump (Only)	P	F	P	Heat Pump (Only) mode
High Demand/Boost	P	F	P	High Demand/Boost (but uses SS when LE is called for)
Hybrid	P	P	F	Control uses SS and LE based on demand algorithm
Electric	P	P	F	LE Only Mode
Heat Pump (Only)	P	P	F	Heat Pump (Only) Mode
High Demand/Boost	P	P	F	High Demand/Boost (but uses LE when UE called for)
Any	F	F	P	Electic Mode (UE only)
Any	P	F	F	Heat Pump (Only) Mode
Any	F	P	F	LE Only Mode
Any	F	F	F	Turn Heat Sources OFF, display 3 fault codes

SS = Sealed System
LE = Lower Element
UE= Upper Element

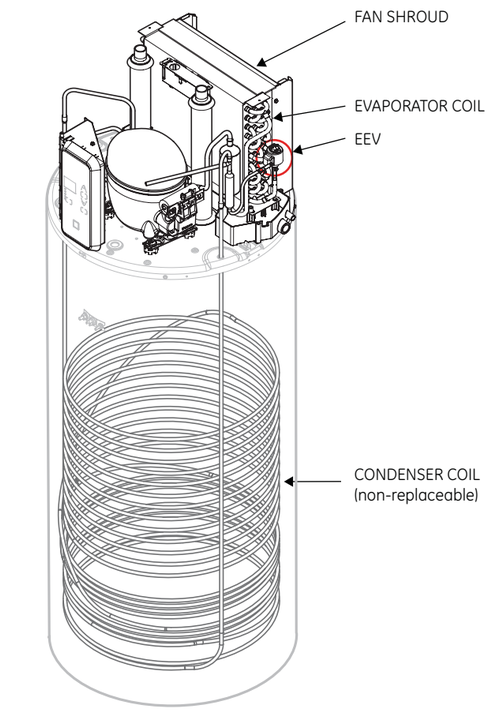
GeoSpring™ Hybrid Electric Water Heater Fault Codes

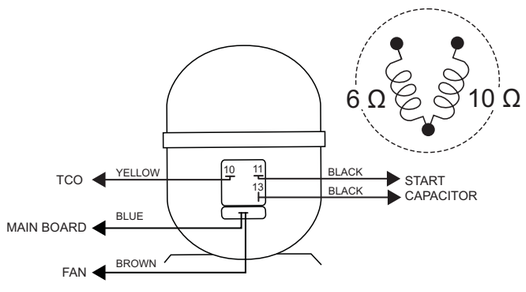
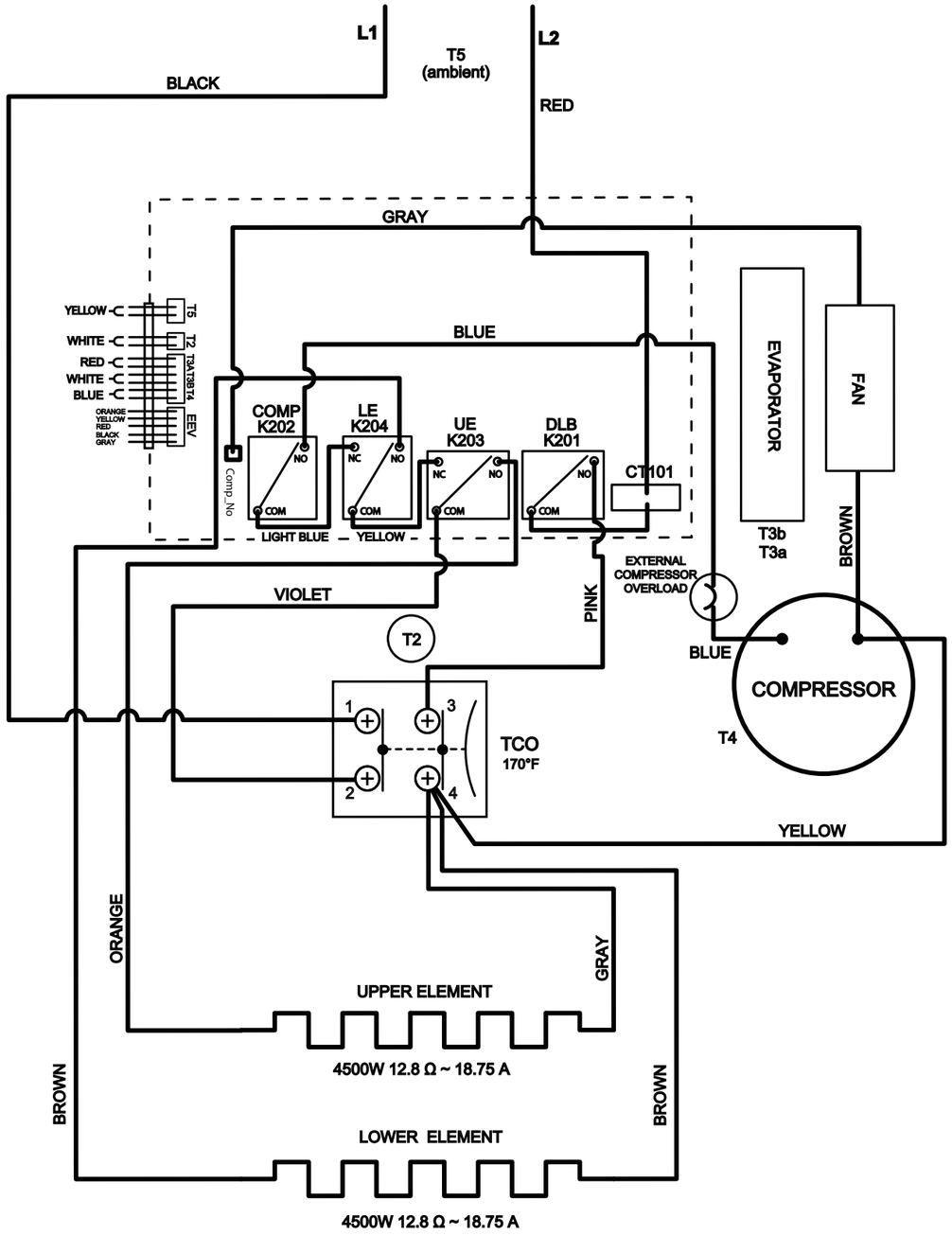
Fault Code Displayed	Condition	Check
FA	Control checks to ensure compressor discharge temperature is rising when the compressor starts running. T4 sensor (compressor outlet temperature) must rise at least 20F during the first 30 minutes of run time.	Check T4 sensor mounting, wiring and resistance. Check Electronic Expansion Valve (EEV) operation. Check sealed system for refrigerant leak.
Fb	Control checks to ensure compressor discharge temperature is stable while the compressor is running. Continuously verifies that T4 sensor (compressor outlet temperature) is greater than 120F after 30 minutes of run time.	Check T4 sensor mounting, wiring and resistance. In cold climates, insulate T4 sensor with mastic. Check Electronic Expansion Valve (EEV) operation. Check sealed system for refrigerant leak. In cold climates, recommend Hybrid or High Demand mode.
FC	Control checks to ensure evaporator is free of frost. Continuously verifies that T3a sensor (evaporator inlet temperature) is greater than 20F after 30 minutes of run time.	Check T3a sensor mounting, wiring and resistance. Check Electronic Expansion Valve (EEV) operation. Check sealed system for refrigerant leak.
Fd	Control checks to ensure evaporator superheat* is OK (controlled by EEV). Continuously verifies the temperature difference between T3a sensor (evap inlet temp) and T3b sensor (evap outlet temp) is greater than 5F after 30 mins of run time. Control also verifies that T3a is greater than 10F less than T5 ambient sensor.	Check that filter is clean. Check T3a, T3b and T5 sensor mounting, wiring and resistance. Check Electronic Expansion Valve (EEV) operation. Check sealed system for refrigerant leak.
FE	Control checks to ensure the compressor discharge temperature never exceeds 240F. Continuously verifies that T4 sensor (compressor outlet temperature) is less than 240F every minute of run time.	Check T4 sensor mounting, wiring and resistance. Check Electronic Expansion Valve (EEV) operation. Check sealed system for refrigerant leak.
FF	Control checks to ensure the EEV is operating properly and valve rotation is within range.	Check Electronic Expansion Valve (EEV) operation. Check T3a and T3b sensors mounting, wiring and resistance. Check sealed system for refrigerant leak.
F2	T2 tank temperature sensor failure Just before compressor starts, control checks T2 sensor is within 30F - 170F temperature range.	Check T2 sensor mounting, wiring and resistance. Use service mode to monitor T2 sensor temperature. Control assembly may have failed.
F3	Compressor failure Control energizes compressor, but current sensor detects no current flow.	Check compressor start capacitor. Check compressor, overloads, relay and wiring. Use service mode to manually cycle compressor on/off.
F4	Fan failure	Check fan and wiring.
F5	T3a sensor (evap inlet temperature) failure. The control detects the thermistor output is at or nearly shorted or open circuit.	Check T3a sensor mounting, wiring and resistance. Use service mode to monitor T3a sensor temperature. Control assembly may have failed.
F6	T3b sensor (evap outlet temperature) failure. The control detects the thermistor output is at or nearly shorted or open circuit.	Check T3b sensor mounting, wiring and resistance. Use service mode to monitor T3b sensor temperature. Control assembly may have failed.
F7	T4 sensor (compressor outlet) failure. The control detects the thermistor output is at or nearly shorted or open circuit.	Check T4 sensor mounting, wiring and resistance. Use service mode to monitor T4 sensor temperature. Control assembly may have failed.
F8	T5 sensor (ambient temperature) failure. The control detects the thermistor output is at or nearly shorted or open circuit.	Check T5 sensor mounting, wiring and resistance. Use service mode to monitor T5 sensor temperature. Control assembly may have failed.
F9	Lower heating element failure. Control energizes lower element, but current sensor detects no current flow.	Check lower heating element and wiring. Use service mode to cycle element and check current draw. Control assembly may have failed.
F10	Upper heating element failure. Control energizes Upper element, but current sensor detects no current flow.	Check Upper heating element and wiring. Use service mode to cycle element and check current draw. Control assembly may have failed.
F11	Dry Tank fault. This test is run within the first 7 minutes after the unit has powered on. The compressor is engaged for 5 minutes (after a 2 minute wait for the system to ensure the pressures are stabilized) and the tank temperature, T2, is read and verified it has not risen over 3.5 deg F. If it has, this indicates there is not enough water in the tank for safe operation.	Check to ensure the tank is full of water. Check T2 sensor mounting, wiring and resistance. Use service mode to monitor T2 sensor temperature. Control assembly may have failed.
F13	Stuck Key fault. This indicates there is a button on the front panel that is stuck down. This button is inoperable. Other buttons work normally. If the button becomes free, the fault code will clear by itself.	Check to see if all buttons are operable. Control assembly has failed
F15	DataFlash fault. The microcontroller has detected a problem in the DataFlash (permanent memory storage).	Control assembly may have failed.
bAd linE	The voltage is too low at power-up. The control monitors the input line voltage 5 seconds after power-up, and if the voltage is below 185, the fault code will be displayed.	Check electrical supply line connections. Voltage should measure either 208 VAC or 240 VAC, depending upon power supply.

Electronic Expansion Valve (EEV)

This valve replaces the capillary tube typically used in refrigeration appliances. The EEV meters the flow of liquid refrigerant entering the evaporator at the rate that matches the amount of refrigerant being boiled off in the evaporator (gas). the valve also maintains the proper "superheat" (T3b-T3a).

Superheat is the temperature of a gas above the boiling point for the liquid. If a refrigerant liquid boils at a temperature of 40ºF in a cooling coil, and then the refrigerant gas increases in temperature, superheat has been added. If this refrigerant changed from a liquid to a gas or vapor at 40ºF and then the refrigerant vapor increased in temperature to 50ºF, it has been superheated by 10ºF.





WIRING DIAGRAM