

GENERAL:

⚠ ATTENTION: These instructions are intended for the use of qualified personnel trained and experienced in the installation and servicing of this type of heating equipment and its related system components. Some states may require installation and service personnel to be licensed. Persons not qualified should not attempt to repair this equipment according to these instructions. These instructions and procedures are not for the use of “do-it-yourself” consumers.



⚠ WARNING: BURN HAZARD The operation of the heater with the pump shut off could cause heater overheating and fire. Never operate heater with the pump shut off.

⚠ ATTENTION: As a preliminary check, make sure that all wire connections are clean and tight and that all wiring conforms to the wiring diagram.

AUTOMATIC RESET TIME:

The heater will automatically reset when an error condition is corrected and resume operation as detailed in the table below. The heater can be manually reset using the keypad by cycling the MODE button through “STANDBY” and back to the original operating mode (“POOL” or “SPA”).

ERROR CODES:

See Figure 52 for an error code chart.

TROUBLESHOOTING:

See Figure 53 for troubleshooting guide.

SUPPLY WIRING:

If the heater is connected to the **line** side of the circuit it will be powered at all times. In this situation, when the pump shuts down the heater will display a fault code of “LO”. If there is a call for heat and the pump then restarts there will be a 2-minute delay for the heater to fire. After the pump has been running for at least 2 minutes there is no delay for heater operation.

Wiring the heater to the load side of the timer or controller will not result in a 2-minute delay if the pump primes quickly enough to activate the heater’s water pressure switch. If the pump is slow to prime the heater may display an “LO” fault code and will take 2 minutes to automatically restart. If the pump has primed, this wait can be avoided by manually clearing the error code via the keypad by changing the mode through the “STANDBY” setting and returning to the initial setting (“SPA” or “POOL”).

When a heater is wired to the line side of the power circuit (continuous power) the blower will not operate when the pump is cycled via a time clock or other switch method.

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INTERNAL WIRING:

If the heater display is blank after the electrical has been installed see Figures 43 and 44 to determine the cause. The ribbon cable between the display board and the ignition control board is polarized and cannot be inserted upside down if it was removed when electrical was done.

FUSE SPECIFICATIONS:

The fuse designations are printed on the ignition board and the control board. See Figure 26 for board locations. Fuses are available as common hardware items or may be purchased from Hayward in a service parts kit. The fuse specifications are:

- F1 fuse (low voltage): 3A blade style fast-acting automotive fuse, type 257
- FC1 & FC2 (transformer primary): 3A slo-blo fuse, 5 x 20 mm
- FC4 (transformer secondary) fuse: 3A slo-blo, 5 x 20 mm

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Figure 52: **ERROR CODES**

Code	Description	Information
bD	Internal fault/power-up error	On initial trial for ignition. Automatic reset is immediate once the gas valve relay check results are acceptable.
bD	Gas valve sensed as "ON" error	If valve is open when it should be closed the heater will shut down and go into lockout. Blower will operate until error condition is corrected. Automatic restart 2 minutes after error is corrected.
bD	Gas valve sensed as "OFF" error	If valve is closed but flame is sensed the blower will run for 5 s then start a new ignition sequence. If error occurs 10 times during a call for heat the control will go into lockout. Automatic reset is 60 minutes.
bD	Data retrieval error	If control input data is corrupted the heater will shut down and go into lockout.
HF	Flame present with gas valve "OFF" error	If flame is sensed with the gas valve off the control will go into lockout. The blower will run until error condition is corrected. When corrected, control will run blower for 5 s then automatically restart after 2 minutes.
PF	Electrical supply wiring error	This code will display if 120V polarity is reversed, low voltage is detected, or if the ground path is not sufficient. Reset is immediate after error is corrected.
AO	Blower vacuum switch open error	If the blower prover switch does not close after the blower starts the control will stop the ignition trial go into lockout. The blower will continue to run. Automatic reset is immediate after the switch closes.
AO	Blower vacuum switch open when expected closed error	If the blower prover switch opens unexpectedly during operation the control will shut down and attempt to re-light. If the switch does not close after the blower starts the control will go into lockout with the blower running. Automatic reset is immediate after error is corrected.
AO	Blower vacuum switch open during post-purge error	If the blower prover switch opens during the postpurge cycle (heater is not firing) the control will display the error code. The post-purge cycle will be completed once the blower prover switch closes.
AC	Blower vacuum switch closed when expected open error	If the blower prover switch is closed before blower start-up the control will not start the blower. Automatic reset is immediate when the switch opens.
IO	Igniter open error	If the control is not in lockout and senses that the igniter circuit is open when the blower is running the control will turn off the blower and go into lockout. Automatic restart 2 min after error is corrected.
SF	Thermistor error	An excessive temperature difference between the two thermistors (5 °F or more) or an "out of bounds" condition on both sensors (less than 10°F or greater than 180°F) will result in the error code. Automatic restart is 2 minutes after the error is corrected.

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Figure 52: **ERROR CODES** (continued)

Code	Description	Information
HS	Water Temperature Sensing Error	A) Inlet water temperature sensor is reporting a temperature in excess of 104°F. Normal operation resumes 2 minutes after inlet water temperature sensor reports temperatures of 104°F or less. This error functions in both normal and remote thermostat modes. or B) Inlet water temperature sensor is reporting a temperature change at a rate faster than 6°F in 60 seconds, indicating a potentially damaging low water flow condition. Normal operation resumes when temperatures stabilize. If this condition is detected 3 times, the heater will lock-out until the electrical power is cycled off and back on.
Sb	Keypad button stuck closed error	If one of the keypad buttons is closed (or pressed) for more than 30 s the error code will be displayed but the control will continue to function. The error code will be cleared when the condition is corrected.
IF	Ignition failure error	If the control exceeds the maximum number of ignition retries or recycles the heater will shut down and go into lockout. Automatic reset is 60 minutes.
CE	Communication error	If communication between the ignition board and the display board is not established within 3 s of power-up an error will be displayed. After communication is established, if it is lost for 30 s, the error will be displayed. The error code will be cleared upon a valid data exchange between boards.
LO	Limit string open error	If the limit string opens the heater shuts down and goes into lockout. Automatic restart is 2 minutes after the error condition is corrected and the limit string closes. See below for more detail.
EE	EEPROM ERROR	An error was detected in the ignition control circuit board.

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Figure 53: TROUBLESHOOTING

Code	Fault	Diagnosis Step	Remedy
None	Heater will not power up.	1. Check for Low & High Voltage Output from Fuse Board	Disconnect plug from P5 connector from Fuse Board. Measure for 24VAC between pins of receptacle on Fuse Board. Reconnect plug. Disconnect plug from P6 of Fuse Board. Measure for 120VAC between pin 3 and 5 of receptacle on Fuse Board. Reconnect plug. If OK, proceed to section titled "Low voltage circuit fault". Otherwise, proceed to step 2.
		2. Ensure field power supply to heater is turned on.	Measure for field supply voltage across terminals of TB1 terminal block on Fuse Board. If OK, proceed to step 3
		3. Check for faulty Fuse Board wiring.	Inspect Fuse Board wiring. Ensure all plugs are securely fastened to Fuse Board. If OK, proceed to step 4.
		4. Verify that FC1 and FC2 Fuses on Fuse Board are not open.	Remove FC1 and FC2 fuses from fuseholder. Measure continuity across fuse. If fuses are open, proceed to section titled "Open FC1 and/or FC2 Fuses". If fuses are OK, reinstall them and proceed to step 5.
		5. Verify that 240vac Voltage Selector Plug is not installed with a 120vac field power supply	Check that proper Voltage Selector Plug is installed in Fuse Board. If OK, proceed to step 6
		6. Check for defective Transformer.	Disconnect plug from P4 connector from Fuse Board. Measure for 24VAC between pins 1 & 2 of plug of Transformer and 120VAC between pins 4 & 6. If 24VAC or 120VAC is not present, replace Transformer. Otherwise, proceed to step 7.
		7. Fuse Board is defective	Replace Fuse Board.
None	Low voltage circuit fault.	1. Check for Low Voltage Output from Fuse Board	Disconnect plug from P5 connector from Fuse Board. Measure for 24VAC across pins. Reconnect plug. If OK, proceed to step 2. Otherwise, proceed to step 5.
		2. Check for faulty Control Module wiring.	Inspect Control Module wiring. Ensure all plugs are securely fastened to Control Module. If OK, proceed to step 3.
		3. Verify low voltage input to Control Module.	Verify 24VAC across R and C terminals on Control Module. If not OK, replace harness. If OK, proceed to step 4.
		4. Verify that F1 Fuse on Control Board is not open.	Remove F1 fuse from fuseholder. Measure continuity across fuse. If OK, replace Control Module. If fuse is open, proceed to section titled "Open FC3 or FC1 Fuses".
		5. Verify that FC3 on Fuse Board is not open	Remove FC3 fuse from fuseholder. Measure continuity across fuse. If fuse is open, proceed to section titled "Open FC3 or FC1 Fuses". If OK, reinstall fuse and proceed to step 6.
		6. Check for defective Transformer.	Disconnect plug from P4 connector from Fuse Board. Measure for 24VAC between pins 1 & 2 of plug from transformer. If 24VAC is not present, replace Transformer. Otherwise, proceed to step 7.
		7. Fuse Board is defective	Replace Fuse Board
None	Open FC1 and/or FC2 Fuses.	1. Verify that 120VAC Voltage Selector Plug is not installed with a 240VAC field power supply.	Check that proper Voltage Selector Plug is installed. If OK, proceed to step 2. If 120VAC plug is installed and field supply voltage is 240VAC, FC1 and FC2 fuses will have to be opened. Install the correct Voltage Selector Plug and new FC1 and FC2 fuses.
		2. Check for faulty Transformer wiring.	Inspect Transformer wiring. Ensure insulation on wiring is not worn. If OK, proceed to step 3.
		3. Defective Transformer	Replace Transformer.

Figure 53: **TROUBLESHOOTING**

Code	Fault	Diagnosis Step	Remedy
None	Open FC3 and/or F1 Fuses	1. Check for faulty Gas Valve wiring.	Inspect Gas Valve wiring. Ensure insulation on wiring is not worn. If OK, proceed to step 2.
		2. Verify that Gas Valve is not defective.	Measure for resistance across Gas Valve terminals and between each terminal and ground. If short exists, replace Gas Valve. If OK, proceed to step 3.
		3. Check for faulty Control Module wiring.	Inspect Control Module wiring. Ensure insulation on wiring is not worn. If OK proceed to step 4.
		4. Control Module is defective.	Replace Control Module.
None	Open FC4 Fuse.	1. Check for faulty Igniter wiring.	Inspect Igniter wiring. Ensure insulation on wiring is not worn. If OK, proceed to step 2.
		2. Check for faulty Blower wiring.	Inspect Blower wiring. Ensure insulation on wiring is not worn. If OK, proceed to step 3.
		3. Check for defective Igniter.	Disconnect Igniter plug from Control Module. Measure resistance across Igniter. Resistance should be 10.9-19.7 ohms at 77°F. If out of this range, replace igniter. If OK, proceed to step 4
		4. Check for defective Blower.	Disconnect Blower plug from Control Module. Measure resistance across Blower windings. Winding resistance across lead should be in the following range: Red-to-White: 8 to 9 ohms. If measured values vary substantially from these values, blower is defective. Replace. Otherwise proceed to step 5.
		5. Control Module is defective.	Replace Control Module.
bD	Bad Board or Secondary High Voltage Fault	1. Verify that FC4 Fuse on Fuse Board is not open.	Remove FC from fuseholder. Measure continuity across fuse. If OK, reinstall fuse and proceed to step 2. If Fuse is open, proceed to section titled "Open FC4 Fuse".
		2. Verify high voltage output from Fuse Board.	Disconnect plug from P6 connector of Fuse Board. Measure for 120VAC across pins 3 and 5 of P6 receptacle on Fuse Board. If OK, reconnect plug and proceed to step 3. If not OK, go to step 4.
		3. Check for defective Harness.	Disconnect plug from E10 connector of Control Module. Measure for 120VAC across pins 1 and 3 of Plug on Harness. If OK, replace Control Module. If not OK, replace Harness.
		4. Check for defective Transformer.	Disconnect plug from P4 connector of Fuse Board. Measure for 120VAC between pins 4 and 6 of plug from Transformer. If OK, proceed to step 5. If not OK, replace Transformer.
		5. Fuse Board is defective	Replace Fuse Board.
EE	Bad Board	1. Defective Control Module	Replace Control Module.
CE	Communication Error between Control Module and Display Interface Assembly	1. Disconnect and then re-connect power to heater.	
		2. Check for faulty wiring or connection.	Inspect Display Interface Wiring. Ensure Display Interface Plug is securely attached to Control Module. If OK, proceed to step 2.
		3. Control Module and/or Display Interface Assembly are defective.	Replace Control Module and/or Display Interface Assembly.
IO	Igniter Failure	1. Check for faulty wiring or connection.	Inspect Igniter wiring. Ensure Igniter Plug is securely attached to Control Module. If OK, proceed to step 2.
		2. Igniter is defective	Replace Igniter.
Sb	Keypad Failure	1. Keypad is defective	Replace Display Interface Assembly.

Figure 53: TROUBLESHOOTING

Code	Fault	Diagnosis Step	Remedy
SF	Temperature sensor input failure	1. Check for faulty wiring or connection.	Inspect sensor wiring. Ensure sensor is plugged into back of control module. If OK, proceed to step 2.
		2. Sensor is defective	Replace temperature sensor.
HS	Water Temperature Sensing Error	1. Check remote thermostat setting	Verify set point setting of remote thermostat is at or below 104°F. If set point of remote thermostat is OK, or if heater is not configured for remote thermostat, proceed to step 2.
		2. Verify that the water flow is adequate	Verify that water flow to heater is above minimum required (20 GPM for H150FD and H200FD, 25 GPM for H250FD and H300FD, 30 GPM for H350FD and H400FD). Note that intermittent periods of low water flow will cause this error. If OK, proceed to step 3.
		3. Check inlet water temperature sensor	Compare the heater's temperature reading to the pool water temperature with an accurate thermometer. If significantly different, replace inlet water temperature sensor.
HF	Flame Present with Gas Valve not Energized	1. Gas Valve is defective	Replace Gas Valve
bO	Bypass Operation	1. Check to see if Control Module is in Bypass Operation	This is normal display when heater is being controlled by a remote thermostat. No service is required. If heater is not being controlled by remote thermostat, change setting by using the MODE key to put the heater into STANDBY. Press and hold the DOWN key and then press and hold the MODE key. Hold down both keys for 3 seconds until the indication "bO" is removed from the display.
LO	Water pressure switch fault	1. Verify that the pump is running.	This is a normal display when the pump is off. Turn pump on. LO code should clear. If LO does not clear, proceed to step 2.
		2. Verify that water flow is adequate	Verify that water flow rate to heater is above minimum required (20 GPM for H150FD and H200FD, 25 GPM for H250FD and H300FD, 30 GPM for H350FD and H400FD). If OK, proceed to step 3
		3. Check for faulty wiring or connection.	Inspect water pressure switch wiring. Ensure wire harness terminals are securely fastened to spade terminals on water pressure switch. If OK, proceed to step 4.
		4. Verify state of water pressure switch contacts.	Remove wire leads from water pressure switch and jumper leads. Operate heater. Measure continuity across water pressure switch. If open, proceed to step 5. If closed, LO code is not caused by water pressure switch fault. Remove jumper from wire leads and reconnect wire leads to water pressure switch.
		5. Ensure that low pump pressure does not exist.	Clean filter or clear blockages. Check position of valves in plumbing system. If OK proceed to step 6.
		6. Check for correct water pressure switch setting.	Adjust water pressure switch setting as shown on page 33 of Installation Manual (only if heater is above or below water level). If LO does not clear, proceed to step 7.
		7. Water pressure switch is defective	Replace water pressure switch.
	Vent pressure switch fault (applies only if indoor installation)	1. Check for faulty wiring or connection.	Inspect vent pressure switch wiring. Ensure wire harness terminals are securely fastened to spade terminals on vent pressure switch. If OK, proceed to step 2.
		2. Verify state of vent pressure contacts.	Remove wire leads from vent pressure switch and jumper leads. Operate heater. Measure continuity across vent pressure switch. If closed, LO code is not caused by vent pressure switch fault. If open, proceed to step 3. Remove jumper from wire leads and reconnect wire leads to vent pressure switch.
		3. Check for restricted or blocked flue.	Ensure that flue is not blocked or restricted. See indoor vent sizing requirements in installation manual. If OK, proceed to step 4.
		4. Vent pressure switch is defective.	Replace vent pressure switch.

Figure 53: **TROUBLESHOOTING**

Code	Fault	Diagnosis Step	Remedy
LO	Temperature limit switch fault	1. Check for faulty wiring or connection.	Inspect temperature limit switch wiring. Ensure wire harness terminals are securely fastened to spade terminals on temperature limit switches. If OK, proceed to step 2.
LO	Temperature limit switch fault (cont'd)	2. Verify state of temperature limits' contacts	Remove wire leads from limit switch and jumper leads. Operate heater. Measure continuity across limit switches. If closed, LO code is not caused by temperature limit switch fault. If open, proceed to step 3. Remove jumper from leads and reconnect leads to temperature limits.
		3. Verify that water flow is adequate	Verify that water flow rate to heater is above the minimum required (20 GPM for H150FD and H200FD, 25 GPM for H250FD and H300FD, 30 GPM for H350FD and H400FD). If OK, proceed to step 4.
		4. Temperature limit switch is defective.	Replace temperature limit switch.
IF	Ignition Failure	1. Ensure gas supply shutoff valves are open.	Ensure that main gas shutoff installed adjacent to heater is open. Ensure that knob on gas valve inside unit is in "on" position. If OK, proceed to step 2.
		2. Check for low gas supply pressure	Ensure inlet gas supply pressure is between the minimum and maximum values indicated on rating plate. If OK, proceed to step 3.
		3. Check for faulty flame sense wiring or connection.	Inspect flame sense wiring. Ensure wire harness terminals are securely fastened to flame sense and to control module. If OK, proceed to step 4.
		4. Check for faulty gas valve wiring or connection	Inspect gas valve wiring. Ensure wire harness terminals are securely fastened to spade terminals on gas valve. If OK, proceed to step 5.
		5. Check for gas valve failure or gas valve relay failure.	1. Measure voltage across gas valve during trial for ignition. If 24VAC is present and gas valve does not open, gas valve is defective. Replace gas valve.
			2. If 24VAC is not present, gas valve relay on control module is defective. Replace control module.
6. Check for blockages in gas orifices and burners	Inspect gas orifices for blockages which could prevent gas flow. Remove and inspect burners for blockages.		
AC	Blower vacuum switch closed.	1. Check for defective blower on relay or control module.	Disconnect Blower plug from Control Module. With heater off, measure continuity across pins 1 and 2 of receptacle on Control Module. If closed, control module relay is defective. Replace control module. If OK, proceed to step 2.
		2. Vacuum switch is defective.	Replace blower vacuum switch.
AO	Blower vacuum switch open.	1. Check for faulty vacuum switch tubing	Check tubing and replace if necessary. If OK, proceed to step 2.
		2. Check for faulty vacuum switch wiring or connection.	Inspect vacuum switch wiring. Ensure wire harness terminals are securely fastened to spade terminals on vacuum switch. If OK, proceed to step 3.
		3. Check for faulty blower wiring or connection	Inspect blower wiring. Ensure plug on blower is securely fastened to control module. If OK, proceed to step 4.
		4. Check for defective vacuum switch	Disconnect Blower plug from Control Module. Measure resistance across Blower windings. Winding resistance across lead should be in the following range; Red-to-White: 8 to 9 ohms. If measured values vary substantially from these values, Blower is defective. Replace. If OK, proceed to step 5.
		5. Check for defective blower relay.	Disconnect Blower plug from Control Module. Place heater in Pool or Spa Mode. Lower set point temperature to generate call for heat. During pre-purge period, measure for 120VAC across pins 1 and 2. If 120VAC is not present, control module relay is defective. Replace control module. If OK, proceed to step 6
		6. Vacuum switch is defective	Replace blower vacuum switch.