XII. Troubleshooting

WARNING

Electrical Shock Hazard. Turn off power to boiler before working on wiring.

A. Troubleshooting problems where no error code is displayed.

Condition	Possible Cause
Boiler not responding to call for heat, "Status" and "Priority" show "Standby".	Boiler is not seeing call for heat. Check thermostat or zone wiring for loose connection, miswiring, or defective thermostat/zone control.
Boiler not responding to a call for heat, "Status" shows "Standby" and "Priority" shows Central Heat or Domestic Hot Water.	Boiler is not firing, temperature is greater than setpoint. Water flow through boiler primary loop non-existent or too low.
Boiler Running but System or Boiler Circulator is not running	• Check wiring for loose connection, miswiring. Flow switch is defective and needs replacement. • When there is a Domestic Hot Water Heat Request the System or Boiler pumps will be forced "off" when there "Run Pump for" parameter is set to "Central heat, off DHW demand" or "Central Heat, Optional Priority". This has been set to allow all of the heat to be provided for fast indirect water heater recovery. After one hour of "priority protection" or the end of the Domestic Hot Water Heat Request the system and boiler pumps will be free to run.
Home is cold during mild weather days	• Increase Low Boiler Water Temperature parameter 5°F (2.8°C) per day.
Home is cold during cold weather days	• Increase High Boiler Water Temperature parameter 5°F (2.8°C) per day

B. Display Faults:

Faults are investigated by selecting the "Help" button from the "Home" screen. When a fault is active the "Help" button flashes and the home screen turns a red color. Continue to select flashing buttons to be directed to the Fault cause.

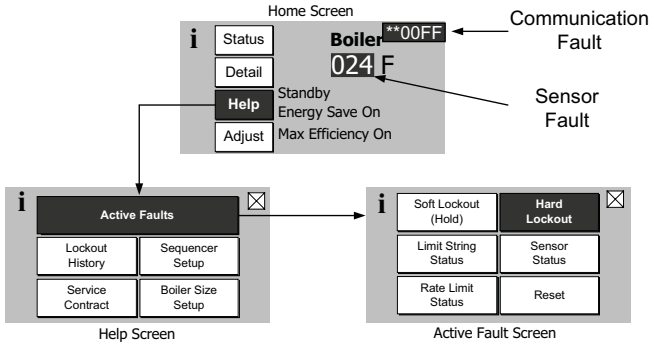


Figure 41: Help Menu

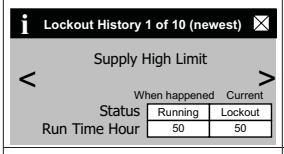
Indication	Condition	Possible Cause
Display Completely Dark Fan off, LWCO lights off, no green power light on Control	No 120 VAC Power at Boiler	Check breaker and wiring between breaker panel and boiler.
Display Completely Dark, Fan running	No 24 VAC Power to Control	- Loose/defective 120Vac connection wiring between boiler J-Box and transformer and/or transformer and Control. - Loose 24 Vac connection wiring between transformer and Control.
Blinking Green power light on Control	Control Fault	- The green light is connected to internal power supply. The power supply is repeatedly starting and stopping (not normal) making the light flash. The microprocessors are not running. - Try disconnecting all terminals except 24VAC to power the Control. The green light should be steady. If it is not then the control is defective. If steady, start plugging in all the connectors while watching the green light. When faulty wiring reconnected green light will begin to flash.
Display Completely Dark but Boiler fires	No 5 VDC Power to Display	- Loose 5 VDC connection wiring between display and Control - Defective display.
****00FF**	Display lost communication with control	- Loose or defective display harness - Defective Display - Defective Control
ER0011	Adjustment Mode Password Timeout	- The Control and Display are **NOT** defective. The password has timed out. Simply cycle power to the Display to restore operation.

XII. Troubleshooting (continued)

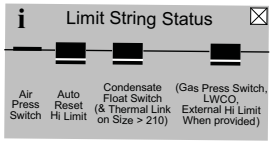
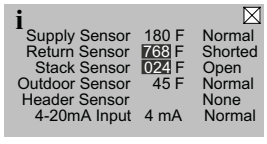
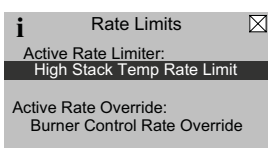
C. Help Screen Faults

Indication	Condition	Possible Cause
 Flashing	Sequencer Setup Fault	This alarm is active if the slave boiler has lost communication with the Sequence Master. Check the following: - RJ 45 peer-to-peer network disconnected - Sequencer Master was Enabled and then Disabled - Master's Boiler has been powered down. - To clear fault restore communication or cycle power
 Flashing	Boiler Size Fault	**WARNING!** Boiler size setting may not match actual boiler size. The Boiler size setting determines min, max and light-off blower speeds. Incorrect boiler size can cause hazardous burner conditions and improper operation that may result in PROPERTY LOSS, PHYSICAL INJURY, OR DEATH. Refer to Page 80 for boiler size setting instructions.

D. Help Screen Diagnostic Features

Indication	Possible Cause
	Lockout History is stored in a first-in, first-out basis. Each History file is stored with boiler run hour of when the lockout occurred. The "When happened" and "Current" provide: - "Current" is the run hour and status the boiler just finished. - "When happened" is the run hour and status when the lockout occurred.
	The user is given the contact information of the responsible service provider. Refer to page 84 for data entry instructions.

E. Active Fault Screen Faults

Indication	Condition	Possible Cause
Limit String Status 	Limit String Fault	The Limit String Status screen shows the faulty safety limit and/or open flow switch. A contact icon, either "open" or "closed", graphically represents each safety limit and flow switch. The "closed" contact icon is steady; the "open" contact icon is blinking. For example, the screen shown to the left illustrates a "closed" Air Pressure Switch contact and an "open' Auto Reset High Limit contact. The Auto Reset High Limit is causing the boiler to stop firing. NOTE: Since the limit string items are wired in series, all limits downstream of the "open" limit will also appear on the screen as "open" (blinking) icons regardless of whether or not they are actually open.
Sensor Status 	Sensor Fault	The Sensor Status screen shows the status of all sensors. Possible states include: None: Feature requiring this sensor has not been selected. Normal: Sensor is working normally. Shorted: Sensor is shorted or is defective. Open: There is a break in the wiring between the Control and the sensor or the sensor is defective Out of Range: Sensor is defective or is being subjected to electrical noise. Unreliable: Sensor is defective or is being subjected to electrical noise. When a sensor fails "opened" or "shorted" the value is changed to reverse video (background black and value white) "024" or "768" respectively to indicate that there is a fault with the sensor.
Rate Limit 	High Stack Temperature Rate Limit	The following messages appear when the firing rate is limited or reduced to help avoid a lockout. Refer to lockout section for potential corrective action. - High Stack Temperature Limit - High Supply Temperature Limit - High Differential Temperature Limit The following messages appear as part of a normal start and stop sequence: - Minimum Modulate (normal start/stop sequence) - Forced Modulation (normal start/stop sequence) - Burner Control Rate (normal start/stop sequence) - Manual Firing Rate (User selection)

XII. Troubleshooting (continued)

F. Troubleshooting problems where a Soft Lockout Code is displayed. When a soft lockout occurs, the boiler will shut down, the display will turn red and the "Help" button will "blink". Select the "blinking" "Help" button to determine the cause of the soft lockout. The boiler will automatically restart once the condition that caused the lockout is corrected.

Soft Lockout Codes Displayed

Lockout Number	Condition	Possible Cause
1 Anti Short Cycle	Minimum time between starts has not been reached. Normal delay used to avoid excessive cycles.	
2 Boiler Safety Limit Open	Boiler Safety Limit wired to terminals J6-1, 2 or 3 OPEN: • Condensate Trap Float Switch contact open. • Thermal Link Switch contact open. • Burner Door Thermostat with manual reset contact open. • Air Pressure Switch contact open. • Auto Reset High Limit contact open.	• Loose wiring to limit device. • Auto Reset Supply high limit sensor detected temperature in excess of 200°F. • Defective Auto Reset Supply High Limit Switch. • Plugged Condensate Trap - also check to ensure boiler is level. • ***Thermal Link Switch blown due to temperature rise above 604°F (318°C).*** • Burner Door Thermostat with manual reset contact open due to temperature rise above 500°F (260°C) - check the cause of overheating (burner door insulation, loose mounting, etc.). • Air Pressure Switch contact open - check for blocked vent. • See possible causes for "Hard Lockout 4". NOTE Block Vent Special Note Before a call for heat the air pressure switch is closed. When there is a call for heat with a blocked vent the air pressure switch will open (due to excessive pressure of the blower against a blocked flue pipe) after the blower starts. The control stops the start sequence and stops the blower. After the blower stops the pressure switch re-closes and the cycle continues. The displays shows the cause of trip for only the time the pressure switch is open.
3 Boiler Safety Limit Open	Boiler Safety Limit, or External Limit wired to terminals J5-1 OPEN: • Jumper for External Limit wired to terminals 11 and 12 or device connected to it open. • Jumper for Flow Switch or device connected to it open. • Jumper for Low Gas Pressure Switch or device connected to it open.	• See possible causes for "Hard Lockout 4". • Loose wiring to limit device. • External Limit defective or jumper not installed. • Low Gas Pressure Switch contact open (if installed). • Flow switch not installed and jumper missing. • No flow or insufficient flow through boiler loop or flow switch defective. • If neither yellow or green light is on, check LWCO harness.
7 Return sensor fault	Shorted or open return temperature sensor.	• Shorted or mis-wired return sensor wiring. • Defective return sensor.
8 Supply sensor fault	Shorted or open supply temperature sensor.	• Shorted or mis-wired supply sensor wiring. • Defective supply sensor.
9 DHW sensor fault	Shorted or open Domestic Hot Water (DHW) temperature sensor.	• Shorted or mis-wired DHW sensor wiring. • Defective DHW sensor.
10 Stack sensor fault	Shorted or open flue gas (stack) temperature sensor.	• Shorted or mis-wired stack sensor wiring. • Defective stack sensor.
11 Ignition failure	Model PHNTM399 flame failure after 5 tries to restart.	• No gas pressure. • Gas pressure under minimum value shown on rating plate. • Gas line not completely purged of air. • Defective Electrode. • Loose burner ground connection. • Defective Ignition Cable. • Defective gas valve (check for 24 Vac at harness during trial for ignition before replacing valve). • Air-fuel mixture out of adjustment - consult factory.
13 Flame rod shorted to ground	Flame rod shorted to ground	• Shorted or mis-wired flame rode wiring. • Defective flame rod.
14 ΔT inlet/outlet high	Temperature rise between supply and return is too high.	• Inadequate boiler water flow. Verify that circulator is operating and that circulator and piping are sized per Section VI of this manual.
15 Return temp higher than supply	The Control is reading a return sensor temperature higher than the supply sensor temperature. Condition must be present for at least 75 seconds for this error code to appear.	• Flow through boiler reversed. Verify correct piping and circulator orientation. • No boiler water flow. Verify that system is purged of air and that appropriate valves are open. • Sensor wiring reversed. • Supply or return sensor defective.
16 Supply temp has risen too quickly	Supply water temperature has risen too quickly.	• See possible causes for "Hard Lockout 4". • Inadequate boiler water flow. • Verify that circulator is operating and that circulator and piping are sized per Section VI of this manual.
17 Blower speed not proved	Normal waiting for blower speed to match purge and light-off setpoint.	

G. Troubleshooting problems where a Hard Lockout Code is displayed. When a hard lockout occurs, the boiler will shut down, the display will turn red and the "Help" button will "blink". Select the "blinking" "Help" button to determine the cause of the Hard Lockout. Once the condition that caused the lockout is corrected, the boiler will need to be manually reset using the Reset button on the "Active Fault" display or located on the R7910 Control.

Hard Lockout Codes Displayed

Lockout Number	Condition	Possible Cause
4 Supply high limit	R7910 supply sensor detected temperatures in excess of 210°F.	• Heating load at time of error was far below the minimum firing rate of the boiler. • Defective system circulator or no flow in primary loop. • Defective boiler circulator, no flow or insufficient flow in boiler loop, or defective flow switch. • Control system miswired so that the boiler operation is permitted when no zones are calling.
5 DHW high limit	R7910 DHW sensor detected temperatures in excess of Setpoint.	• DHW load at time of error was far below the minimum firing rate of the boiler. • Control system miswired so that boiler operation is permitted when no DHW are calling.
6 Stack High limit	R7910 Flue gas (Stack) sensor detected temperatures in excess of 204°F (95.6°C).	• Heat exchanger needs to be cleaned. • Boiler over-fired. • Air-fuel mixture out of adjustment - consult factory.
12 Flame detected out of sequence	A flame signal was present when there should be no flame.	• Defective gas valve - make sure inlet pressure is below maximum on rating plate before replacing valve.
18 Light off rate proving failed	Blower is not running at Light-off rate when it should or blower speed signal not being detected by R7910.	• Loose connection in 120 VAC blower wiring. • Loose or miswired blower speed harness. • Defective blower
19 Purge rate proving failed	Blower is not running at Purge rate when it should or blower speed signal not being detected by R7910.	• Loose connection in 120 VAC blower wiring. • Loose or miswired blower speed harness. • Defective blower
20 Invalid Safety Parameters	Unacceptable R7910 control Safety related parameter detected.	Safety Parameter verification required. Contact factory.
21 Invalid Modulation Parameter	Unacceptable R7910 control Modulation related parameter detected.	Reset the control.
22 Safety data verification needed	Safety related parameter change has been detected and a verification has not been completed.	Safety related R7910 control parameter has been changed and verification has not been performed.
23 24VAC voltage low/high	R7910 control 24Vac control power is high or low.	• Loose connection in 24Vac VAC power wiring. • Loose or miswired 24Vac harness. • Miswired wiring harness causing power supply short to ground. • Defective transformer. • Transformer frequency, voltage and VA do not meet specifications.
24 Fuel Valve Error	Power detected at fuel valve output when fuel valve should be off.	• Loose or defective gas valve harness. Check electrical connections. • Defective gas valve (check for 24 Vac at harness during trial for ignition before replacing valve).
25 Hardware Fault	Internal control failure.	• Reset the control. If problem reoccurs, replace the R7910.
26 Internal Fault	Internal control failure.	• Reset the control. If problem reoccurs, replace the R7910.
27 Ignition failure	Model PHNTM500: Flame failure after 1 try to restart.	• No gas pressure. • Gas pressure under minimum value shown on rating plate. • Gas line not completely purged of air. • Defective Electrode. • Loose burner ground connection. • Defective Ignition Cable. • Defective gas valve (check for 24 Vac at harness during trial for ignition before replacing valve). • Air-fuel mixture out of adjustment - consult factory.