

95M-200
GAS-FIRED DIRECT VENT
MODULATING HOT WATER BOILER

**Control Manual And
Troubleshooting Guide**



1- TABLE OF CONTENTS

1- Table Of Contents	2
2 - Important Safety Information	3
3 - Operating Information.....	4
4 - Modulating Control Features.....	6
5 - Boiler Startup	7
6 - Checkout Procedures And Adjustments.....	9
7 - Detailed Sequence Of Operation	12
8 - Service Hints	13
9 - Troubleshooting.....	14
10 - User Interface Quick Reference.....	21
11 - Installation And Checkout Certificate	28

2 - IMPORTANT SAFETY INFORMATION

General

Boiler installation shall be completed by qualified agency.

WARNING

Fire, explosion, asphyxiation and electrical shock hazard. Improper installation could result in death or serious injury. Read this manual and understand all requirements before beginning installation.

**Keep this manual near boiler
Retain for future reference**

Become familiar with symbols identifying potential hazards.



This is the safety alert symbol. Symbol alerts you to potential personal injury hazards. Obey all safety messages following this symbol to avoid possible injury or death.

DANGER

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Used to address practices not related to personal injury.

Installation shall conform to requirements of authority having jurisdiction or in absence of such requirements:

- United States
 - National Fuel Gas Code, ANSI Z223.1/NFPA 54.
 - National Electrical Code, NFPA 70.
- Canada
 - Natural Gas and Propane Installation Code, CAN/CSA B149.1. and .2
 - Canadian Electrical Code, Part I, Safety Standard for Electrical Installations, CSA C22.1

Where required by authority having jurisdiction, installation shall conform to Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

Additional manual reset low water cutoff and/or manual reset high limit may be required.

WARNING

Revision, modification, substitution or elimination of factory equipped, supplied or specified components could result in death or serious injury.

Use of this manual shall be by a qualified heating installer or service technician only. Before programming control read and understand all instructions including :

- Installation, Operation and Maintenance Manual,
- Parameter Guide
- Control Manual and Troubleshooting Guide

Perform all steps in order specified.

3 - OPERATING INFORMATION

Boiler is controlled by microprocessor electronic control that senses:

- Outlet water temperature,
- Return water temperature,
- Outdoor temperature (when factory supplied, field installed outdoor sensor is installed).

Information sensed plus input from external limit and operating controls is used to regulate boiler on/off operation and will modulate boiler firing rate to more closely match output to demand.

Electrical Specifications

Boilers require 120 VAC/60 HZ power supply and are not polarity sensitive.

CONTROL SPECIFICATIONS	
Supply voltage	120 Vac/60 hz
Electrical demand	10 VA
Pre-purge timing	10 Seconds
Post-purge timing	15 Seconds
Min. off time, space heating	10.2 Seconds
Pump on after space htg.	0 Minutes
Min. off time, DHW	10.2 Seconds
Pump on after DHW	30.6 Seconds
Line voltage fuse, F1	5 Amp fast-blow
Low voltage fuse, F3	4 Amp slow-blow

Boiler Circulator

- Circulator has sufficient head to handle boiler pressure drop plus reasonable pressure drop in connecting piping. See the Installation, Operation and Maintenance Manual for piping information.
- Boiler control's internal relay contact is suitable for handling only the boiler circulator provided.
- Do not wire additional pumps in parallel with boiler circulator.
- To operate system circulator when boiler circulator is running, see "Electrical Wiring" section in Installation, Operation and Maintenance Manual for wiring required.

Boiler Temperature Regulation

Operating temperature (target): Control senses outlet water temperature and regulates boiler firing rate to achieve target temperature set by installer using Parameter 4.

Temperature can be set between 120°F and 194°F.

1. **Space heating:** Target temperature is fixed (equal to Parameter 4) when outdoor reset is not installed or calculated as described under "Outdoor Reset Operation" page 5, when outdoor sensor is connected.
2. **Exception:** See explanation of "Supply Temperature Boost" page 5.

3. **DHW heating:** Target temperature is determined by adding Parameter 1 to Parameter 33 (default 150°F and 30°F). Do not change Parameter 1 from factory default setting of 150°F unless application is specially engineered for other temperature. DHW heating default setting is 180°F.
4. **High limit operation:** If outlet water temperature exceeds target temperature (or 180°F, whichever is lower), high limit action occurs. Control module shuts burner off showing "b 9" followed by "26" on display.
5. **DHW operation (if used):** Boiler is factory set to change target outlet water temperature to 180°F on call for heat from DHW aquastat.
6. **Additional Thermal Overrun Protection:** High limit operation shuts down burner when outlet water temperature exceeds target temperature. Adverse conditions could cause water temperature to rise too quickly and overshoot this temperature. Control's advanced technology provides protection in event of thermal overrun. Using its electronics, control provides two additional levels of overrun protection:
 - **Level 1:** Indication occurs if supply water temperature reached 183°F. Control displays soft lockout code ("b 9" followed by "18" if on supply or "19" if on return). Control will not operate burner again until water temperature dropped 9°F below target temperature.
 - **Level 2:** Lockout occurs if supply water temperature reaches 200°F or if return water reaches 193°F. Control will enter hard lockout and display error code ("E" followed by "18" if on supply or "19" if on return).

NOTICE

Hard lockout requires manually pressing display panel reset button to restart operation. Service technician must troubleshoot cause of problem and correct it before placing boiler back in operation.

Low Water/Low Flow Protection

1. Boiler is factory equipped with manual reset probe type low water cutoff.
2. Boiler control uses temperatures sensed at both supply and return areas of heat exchanger. If flow rate is too low (temperature difference too high) or either temperature is too high, control shuts boiler down. Ensures boiler shutdown in event of low water or low flow conditions.

Freeze Protection

Do not install boiler in room likely to freeze. Following boiler control feature provides some protection for boiler only, not for the system.

3 - OPERATING INFORMATION

Control module provides freeze-up protection when boiler water temperature drops below 45° F:

- Below 45° F, boiler circulator operates constantly.
- Below 37° F, boiler operates at low fire.
- Boiler and circulator turn off if boiler water temperature rises above 50° F.

This boiler control feature does not eliminate possibility of freezing. Installation must use recognized design, installation and maintenance practice to prevent freeze potential for boiler and system.

Supply Temperature Boost

- Outdoor reset operation (factory supplied, field installed outdoor sensor connected), boiler control automatically increases target outlet water temperature if call for heat exceeds 10 minutes.
- At each 10 minutes of continuous call for heat, control module increases target temperature by 18°F. Module continues increasing target temperature until it reaches value set in Parameter 4.
- When call for heat ends while target temperature is "boosted," target temperature drops about 2°F for each minute thermostat is open.

Purpose of "Boosting": If target temperature is too low, control "boosts" target temperature until supply water meets system needs.

Outdoor Reset Operation

Target temperature with outdoor reset: All boilers ship with outdoor temperature sensor. When sensor is installed (low voltage terminal strip terminals A1 and A2), boiler control regulates target outlet water temperature based on outside temperature.

Set temperature curve by setting Parameter 4 to:

- ODT (outdoor design temperature for the area).
- ODT of 0°F or lower, set Parameter 4 to desired supply temperature at ODT.
- ODT above 0°F, set Parameter 4 to desired system temperature when outdoor temperature is 0°F.

Reset curve: See reset curve graph, shows how boiler control calculates target temperature.

- Outdoor temperature at or below 0°F, target temperature equals Parameter 4 and never higher.
- Outdoor temperature above 0°F, target temperature is reduced on a curve that would result in 60°F supply temperature at 70°F outdoor temperature.

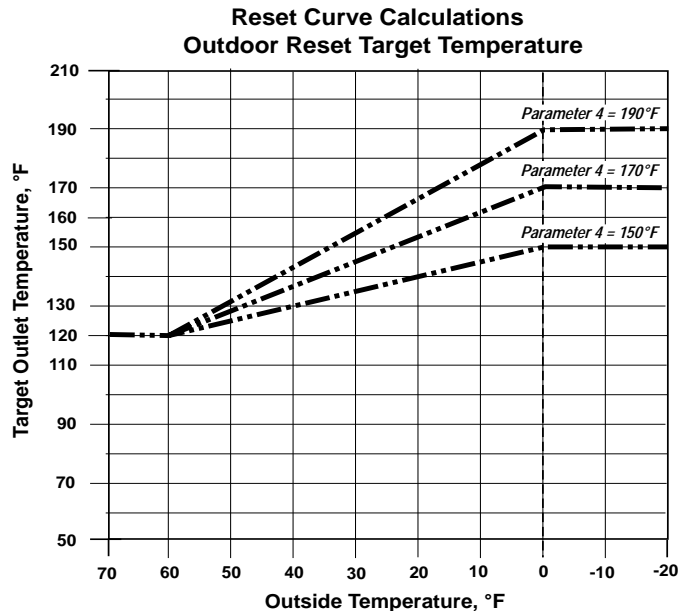
Summer/winter switch option: Install summer/winter switch, if desired, to disable boiler (space heating) circulator during non-heating months. Connect switch across outdoor sensor terminals. When switch closes, boiler circulator is disabled and boiler operates only on call for

DHW heating.

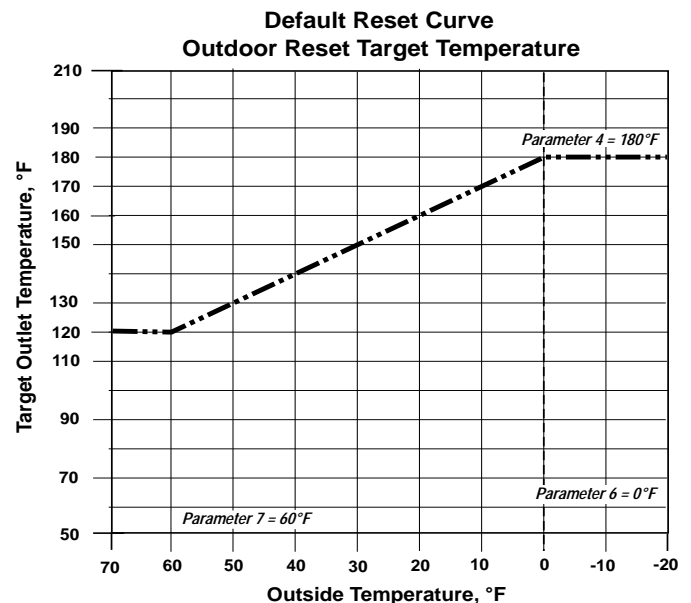
DHW Operation (option)

Control allows connection of DHW aquastat to low voltage terminal strip terminals DHW T1 and DHW T2. When DHW aquastat calls for heat, module shuts down boiler circulator activated DHW circulator and immediately sets target outlet water temperature to 180°F. This provides automatic priority heat allocation to indirect water heater for maximum response and recovery. DHW circulator continues for 30.6 seconds after heating cycle to deliver heat.

Reset Curve Calculations



Default Reset Curve



4 - MODULATING CONTROL FEATURES

Boiler Control Design

- Integrated modulating boiler control is designed for central heating (CH) hot water boilers with modulating fan and gas-air control.
- Modulation is based upon data relayed to control by temperature sensors.
- Burner uses direct spark igniter (DSI).
- Modulating boiler control is intended for use in combination with user interface display unit for both information and operation.
- Control is designed for installation with conventional on/off dry contact room thermostat.
- Control is able to provide hot water and outdoor reset functions.

Main Controller Functions

Central Heat (CH): Control uses sensors on supply water, return water and outside air to determine heat load of heating system. Results in boiler supplying just enough heat to satisfy demand which results in fewer overshoots and less short cycling than conventional boiler.

Domestic Hot Water (DHW): When used in conjunction with indirect hot water heater boiler has capability to provide domestic hot water. An on/off dry contact aquastat is used to activate call for domestic hot water.

Outdoor Reset: Control senses outside air temperature using factory supplied, field installed sensor. Controller detects presence of sensor and reacts according to parameters programmed into controller.

User Interface Display

User interface display allows installer and home owner to scroll through control settings and customize boiler to heat delivery system used in installation location. See "User Interface Quick Reference" Section 10, page 21 for more information on using and programming boiler control.

IMPORTANT:

This boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function.

This Override Must Not Be Used Unless At Least One Of The Following Conditions Is True:

- An external energy management system is installed that reduces the boiler water temperature as the heating load decreases.
- This boiler is not used for any space heating.
- This boiler is part of a modular or multiple boiler system having a total input of 300,000 BTU/hr or greater.

5 - BOILER STARTUP

NOTICE

Instructions in this manual are based on factory default parameter settings.

Startup

1. Start boiler after completing all instructions in Installation, Operation and Maintenance Manual.
2. Start boiler by turning thermostat up to call for heat.
3. Once boiler has started and is operating, continue startup procedure by performing all following steps to set and verify operation of controls.

Set Space Heating Operation

1. Verify Space Heating Mode
 - A. Press "Mode" button until display shows [PARA]. This is parameter mode.
 - B. Press "Step" button until first digit of display shows "3."
 - C. Last digit must show "1." If any other number displays, press "+" button until "1" shows in right-hand digit, then press "Store" button to save this setting.
2. Set space heating target temperature
 - A. Press "Step" button until first digit of display shows "4." Last three digits show outlet water temperature setting.
 - B. Press "+" or "-" buttons to change setting to desired outlet water temperature. Factory default setting is 180°F.
 - Outdoor sensor installed: Setting is target temperature for outdoor temperature at or below factory setting (32°F). At higher outside temperatures, control module calculates target temperature.
 - When summer/winter switch is used, closing switch will disable boiler (space heating) circulator during summer operation.
 - Outdoor sensor not installed: Setting is target temperature at all times.
 - C. Press "Store" button to save setting.

Check DHW Operation Setup

If control is already in parameter mode, skip step 1 (below) and proceed to step 2.

1. Press "Mode" button until display shows [PARA] (parameter mode).
2. Press "Step" button until first digit of display shows "2."
3. Last digit must show "1." If another number displays, press "+" button until "1" shows in right-hand digit, press "Store" button to save this setting.

4. Control module turns on DHW circulator when indirect water heater operating control closes. Control module shuts off boiler circulator (stops space heating) during calls for DHW heating.

Verify Operation – Space Heating

Information below presented in brackets "[]" represents actual boiler control panel display with first digit indicating boiler status and last three digits showing measured boiler water temperature. (Ex.- [A180] indicates status of "A" and boiler water temperature of 180°F.)

1. Turn down DHW aquastat on DHW tank (if used). If necessary, turn off power and remove one of DHW aquastat wires to ensure boiler will not receive DHW heat call.
2. Turn off power to boiler at service switch.
3. Wait few seconds, then turn on power to boiler.
 - [180] Self-check on power-up for a few seconds.
 - [0180] No call for heat.
4. Raise room thermostat to call for heat.
 - [5180] Blower/boiler circulator on. Blower and boiler circulator energize and control checks for air flow.
 - [1180] Pre-purge. Blower speed will increase to ignition speed. Blower will run in pre-purge for 10 seconds.
 - [2180] Ignition. After pre-purge, control module opens gas valve and starts ignition spark.
 - If burner flame proves within 4.5 seconds, burner continues to fire. Burner will fire at startup rate for about 10 seconds to allow flame to stabilize.
 - If burner flame does not prove within 4.5 seconds, control module attempts ignition sequence again. Flame must prove within 6 attempts or control will lockout (display will show [E 02]).
 - Verify flame failure operation by closing boiler manual gas cock to prevent gas flow. Open manual gas valve after testing.
 - [3180] Burner on, space heating. Once flame is proven and stable, burner turns down to low fire for approximately 2 minutes.
 - After this low fire period, burner is allowed to modulate. Firing rate depends on actual outlet water temperature versus target temperature.
5. Allow boiler to bring water temperature to target temperature.
 - [6180] Target temperature reached. Burner shuts down. Blower runs in post-purge (see below), then turns off. Boiler circulator continues to run as long as there is call for heat.
6. Lower room thermostat to stop call for heat.

5 - BOILER STARTUP

- [1180] Post-purge. When room thermostat is satisfied (call for heat ended), burner turns off. Blower continues for 15-second post-purge, then turns off. If another call for heat occurs, boiler remains off for ten seconds before starting again, and display shows [6180].
 - [0180] No call for heat. Boiler is in standby mode (waiting for heat call).
7. Repeat steps 1-6 several times to verify operation.
 8. Return room thermostat to normal setting.

Verify Operation – DHW

1. If necessary, reconnect DHW aquastat wiring to boiler.
2. Turn off power to boiler at service switch.
3. Wait few seconds, turn on power to boiler.
 - [A150] Self-check on power-up for a few seconds.
 - [0150] No call for heat.
4. Raise DHW aquastat above tank temperature to call for heat.
 - [5150] Blower/DHW circulator on. Blower and DHW circulator energize and control checks for air flow.
 - [1150] Pre-purge. Blower speed increases to ignition speed. Blower runs in pre-purge for 10 seconds.
 - [2150] Ignition. After pre-purge, control module opens gas valve and starts ignition spark.
 - If burner flame proves within 4.5 seconds, burner continues to fire. Burner fires at startup rate for about 10 seconds to allow flame to stabilize.
 - If burner flame does not prove within 4.5 seconds, control module attempts ignition sequence again. Flame must prove within 5 attempts or control will lockout (display will show [E 02]).
 - Verify flame failure operation by closing boiler manual gas valve to prevent gas flow. Open gas valve after testing.
 - [4150] Burner on, DHW. Once flame is proven and stable, burner is allowed to modulate. Firing rate depends on actual outlet water temperature versus target temperature.
5. Allow boiler to bring water temperature to target temperature.
 - [6150] Target temperature reached. Burner shuts down. Blower runs in post-purge, then turns off. DHW circulator continues to run as long as there is call for DHW heating.

6. Lower DHW aquastat to stop call for heat.
 - [1150] Post-purge. When room thermostat is satisfied (call for heat ended), burner turns off. Blower continues for 15 second post-purge, then turns off. If another DHW heat call occurs, boiler begins heating cycle after 10 second delay. If CH call for heat occurs after DHW demand, heating cycle begins after 30 second delay.
 - [8150] DHW circulator run-on. DHW circulator continues to run for 30 seconds.
 - [0150] No call for heat. Boiler is now in standby mode (waiting for heat call).
7. Repeat steps 1-6 several times to verify operation.
8. Return DHW aquastat to normal setting.

Operating Information

1. To check operating conditions (Ex - actual or target temperature), see "User Interface Quick Reference" Section 10 page 21, for explanation of boiler control's "Information" mode.
2. During normal operation (no shutdown or lockout), right 3 display digits show actual boiler outlet water temperature.

Perform Check-out Procedures

Complete "Checkout Procedures and Adjustments" as indicated in Section 6 page 9.

Replace boiler front jacket panel after performing any service to boiler.

6 - CHECKOUT PROCEDURES AND ADJUSTMENTS

Verify Sequence Of Operation

Detailed sequence of operation containing faults can be found in Sections 7, "Detailed Sequence of Operation." Refer to this section and Section 8, "Service Hints," for more information.

Inspect Venting And Air Intake

Operate boiler and verify all vent/air intake connections are gas tight and watertight. Repair any leaks immediately.

Inspect Condensate Drain And System Piping

Verify condensate flows freely and all connections are watertight. Repair any leaks immediately.

Test Ignition System Safety Shutoff Device

1. Remove front panel from appliance.
2. Turn off manual gas ball valve.
3. Set thermostat for a call for heat.
4. Boiler begins normal sequence of operation.
5. After approximately 30 seconds of pre-purge appliance will attempt to light.
6. After 4 seconds gas valve closes and control retries 5 times, before entering lockout mode.
7. To reset the control, follow the instructions in Section IV of this manual, "Putting The Boiler In Operation."
8. Return thermostat to previous setting.

Test And Adjust High Limit Control

- With burner operating, adjust setting on high limit control below actual boiler water temperature.
- Burner will go off while circulator continues to operate.
- Raise limit setting above boiler water temperature and burner will reignite after pre purge and igniter warm-up period.
- Set high limit control to 10°F above parameter 4 setting as described in "Parameter Guide".
- Maximum high limit setting is 200°F. Minimum high limit setting is 100°F.

Test Low Water Cut Off

1. Disconnect wire from LWCO sensor probe.
2. Set thermostat for call for heat.
3. Boiler will not begin normal sequence of operation.
4. Attach wire to sensor probe.
5. Return thermostat to previous setting.

Test Other Field Installed Safety Controls (if used)

If boiler is equipped with any additional safety controls, test for operation as outlined by control manufacturer. Burner should be operating and go off when controls are tested. When safety controls are restored, burner should reignite.

Set Field Installed Thermostat

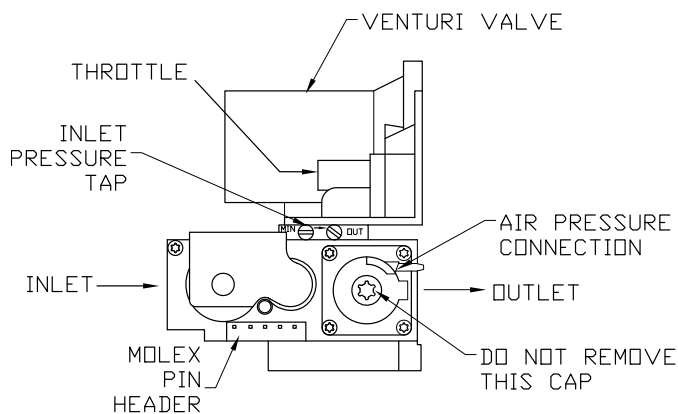
Heat Anticipator (if used)

- For single thermostat connected to T-T screw terminals on low voltage terminal strip on control board of boiler, set heat anticipator at 0.1 amps.
- For other wiring configurations, refer to instructions provided by thermostat manufacturer regarding heat anticipator adjustment.
- Cycle boiler with thermostat. Raise thermostat to highest setting. Verify boiler goes through normal start up cycle. Lower thermostat to lowest setting. Verify boiler goes off.

Boiler Adjustment

1. Check incoming gas pressure to appliance using pressure gauge with resolution of 0.1" w.c. or better and range from 0" to at least 14" w.c.
2. Close gas shutoff inside boiler jacket.
3. Locate inlet pressure tap on gas valve. See Figure 1.
4. Open inlet pressure tap screw ½ turn.
5. Connect positive side of gauge to inlet pressure tap.
6. Open gas shutoff.
7. Gas pressure at high fire should read between 4" and 10" w.c. for natural gas and between 10" and 14" w.c. for LP gas.

Figure 1 - Gas Valve



6 - CHECKOUT PROCEDURES AND ADJUSTMENTS

8. Drill ½" hole in plastic CPVC vent pipe or exhaust tee, just large enough to allow access for combustion analyzer sample probe.
9. Turn thermostat to closed position so appliance is activated.
10. Set appliance to high fire mode as described in "User Interface Quick Reference" section 10 page 21 and allow it to run for approximately 5 minutes.
11. Insert sample probe of your combustion analyzer into drilled hole from Step 8. Insert about halfway into exhaust gas stream. Take flue gas reading and observe % CO₂ and CO values. Adjust throttle screw until correct readings are reached.
12. Turning throttle screw clockwise decreases rate and CO₂ value. Turning throttle screw counter clockwise increases rate and CO₂ value.
13. Allow appliance to stabilize for one minute after adjusting throttle screw before you take reading with combustion analyzer.

NOTICE

CO levels should not exceed 80 ppm.

14. Set appliance to low fire mode as described in "User Interface Quick Reference" section. Check CO₂ level as stated in Step 5. Low fire and high fire values should be approximately same.
15. After adjustments are made stop appliance. Disconnect pressure gauge, tighten inlet pressure tap on gas valve, remove CO₂ meter from CPVC pipe, and seal hole with ¼" NPT black iron plug. Use thread sealing compound or teflon tape to ensure proper seal.
16. Return thermostat switch to its original position.

Measure Natural Gas Input Rate

1. Correct input rate is essential for proper and efficient operation of burner and boiler.
2. Determine elevation at installation site.
3. See "Installation, Operation and Maintenance Manual" to determine correct approximate input rate for local elevation.
4. Obtain yearly average heating value of local gas utility. At sea level elevation, it should be about 1000 BTU per standard cubic foot.
5. Operate boiler for 5 minutes.
6. Turn off all other gas appliances, extinguishing standing pilots where applicable.
7. At gas meter, measure time in seconds required to use one cubic foot of gas.

8. Boiler must be in high fire mode for this operation. See "User Interface Quick Reference" section 10, for more information on placing boiler in high fire mode.

Calculate BTUH Input Rate as follows:

$$\text{Btuh input rate} = \frac{3600 \times \text{heating value from Step 4}}{\text{time in seconds}}$$

9. Measured input rate varies with vent length, gas calorific content, altitude and ambient temperature. Set boiler with combustion specifications in "Boiler Adjustment" section 6 page 9.

Determine Lp Gas Input Rate

Determine LP gas input rate by measuring CO₂ produced during combustion. Set this value according to guidelines table on page 11.

Measure Flame Sense

Flame sense can be indicator of issues with air intake venting, exhaust venting, burner and ignitor condition and supply gas piping pressure.

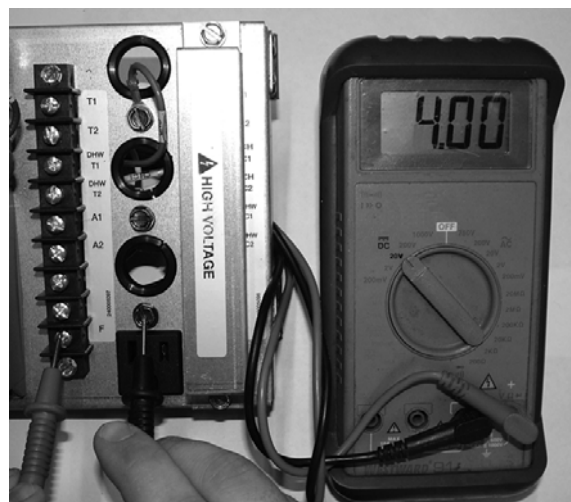
Use multi meter capable of reading 0-20 VDC.

Attach one lead to "F" terminal on low voltage terminal block on boiler control.

Attach other lead to any ground surface on boiler. See Figure 2.

Flame sense voltage shall be in accordance with values listed in Flame Signal Guidelines chart page 11.

Figure 2 Multimeter



6 - CHECKOUT PROCEDURES AND ADJUSTMENTS

Pressure Guidelines					
Fan Speed	Minimum RPM			Maximum RPM	
Fuel	Natural Gas	LP		Natural Gas	LP
Gas Line Inlet Pressure	N/A	N/A		At least 4" WC	At least 10" WC
Differential Pressure	0.3" WC			2.0" WC	

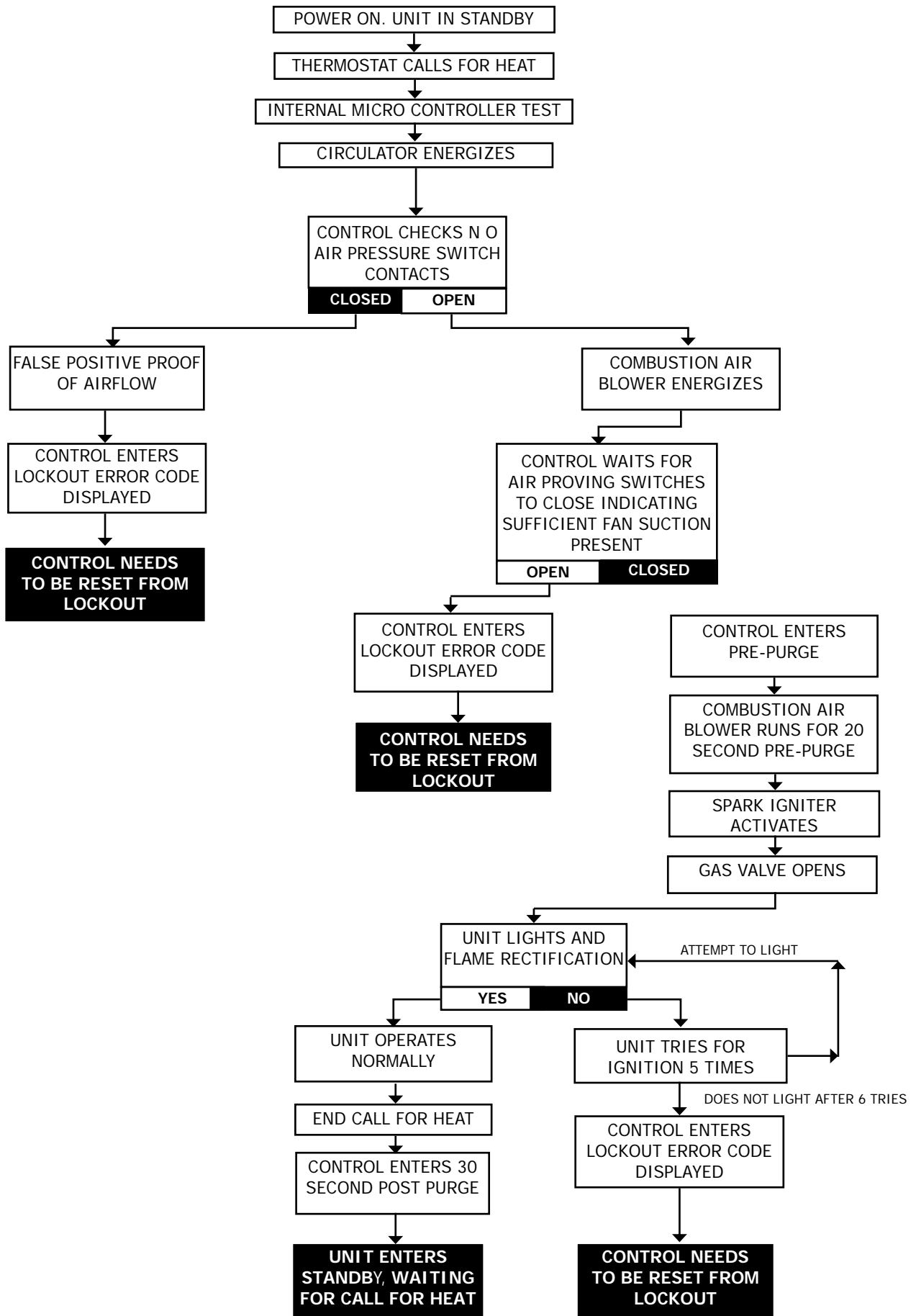
Note: Differential pressure values listed for comparison only. These values will change with vent length and altitude of installation.

Combustion Guidelines						
Outside	Natural Gas			LP Gas		
Temperature	*%CO ₂	*%O ₂	CO	*%CO ₂	*%O ₂	CO
70°F and up 21°C and up	9.6% to 10%	3.9% to 3.2%	Less than 80 PPM	11.1% to 11.5%	4.1% to 3.4%	Less than 80 PPM
30°F to 70°F -1°C to 21°C	9.3% to 9.6%	4.4% to 3.9%	Less than 80 PPM	10.8% to 11.1%	4.5% to 4.1%	Less than 80 PPM
30°F and below -1°C and below	9.0% to 9.3%	5.0% to 4.4%	Less than 80 PPM	10.5% to 10.8%	4.9% to 4.5%	Less than 80 PPM

** Percent CO₂ values may exceed those listed and percent O₂ values may be less than those listed in order to achieve nominal input rate of boiler.*

Flame Signal Guidelines		
Fan Speed	Minimum RPM	Maximum RPM
Flame Signal	Greater than 3.0 VDC	Greater than 3.0 VDC

7 - DETAILED SEQUENCE OF OPERATION



WARNING

Fire, Explosion, Shock Hazard. Revision, modification, substitution or elimination of factory equipped, supplied or specified components could result in death or serious injury.

Important Service Information

- If any component does not function properly, make sure it is correctly installed and wired before replacing it.
- Static electricity discharge can damage the integrated modulating boiler control (IMBC). Touch metal surface to discharge static electricity before touching control.
- Boiler control cannot be repaired. If it malfunctions it must be replaced.
- Only trained, experienced service technicians should service boiler control systems.
- After troubleshooting, follow "Detailed Sequence of Operation" Section 7 page 12, for normal light off procedure.
- All controls are factory tested, a defective control is generally least likely cause. If you suspect you have a defective boiler control, read "Troubleshooting" Section 9 before you replace it.
- It is unlikely that two consecutive controls are defective. Chances are that either there is nothing wrong with the control or it is damaged by some other problem (for example, an electrical short burning out a transformer).

Troubleshooting Tools

Tools needed for troubleshooting your boiler:

- Voltmeter that can check 120 VAC, 24 VAC, and 12 VDC
- Continuity Tester
- Contact Thermometer
- Inclined Manometer or Pressure Gauge with 0-6.0" range (0.01" scale) for measuring suction pressures at pressure switch
- U-Tube Manometer or Differential Pressure Gauge with 0-14" range (0.1" scale) for measuring inlet and manifold gas pressures

Initial Service Checks

Prior to troubleshooting:

1. Verify circuit breaker is ON or fuse is okay at electrical panel.
2. Verify service switch is ON.
3. Verify 120 VAC (minimum 102 VAC to maximum 132 VAC) to boiler.
4. Verify thermostat is calling for heat and contacts (including appropriate zone controls) are closed. Check for 24 VAC between thermostat wire nuts and ground.
5. Verify all external limit controls are either installed (and closed) or temporarily jumpered for testing.
6. Verify gas is ON at gas meter, at all appropriate manual shutoff valves, and at gas control valve. Gas pressures should be maximum of 10" w.c. (natural gas) or 14" w.c. (for LP gas) with no flow (lockup) or with boiler on and minimum of 5" w.c. with gas flowing (verify during boiler startup with boiler at high fire).
7. Verify wire connectors at boiler control and at originating control are securely plugged in or connected.
8. Verify all hoses are securely connected and are not plugged in or damaged.

⚠ DANGER

Electric shock hazard! Following procedures may expose you to dangerous line voltage. Use caution to avoid touching live electrical contacts. All service must be performed by a trained, experienced service technician. Failure to follow these instructions WILL result in death or serious injury

⚠ WARNING

Fire, Explosion. Shut off gas at a location external to appliance should overheating occur or gas supply fail to shut off. Do not turn off or disconnect electrical supply to pump. Do not use the boiler if any part of the gas control system has been underwater.

Only a qualified service technician should inspect the boiler and replace any part of control system and any gas control which has been underwater.

Use only your hand to turn gas control knob. Never use tools. If knob will not turn by hand, don't try to repair it.

Failure to follow these instructions could result in death or serious injury.

⚠ CAUTION

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

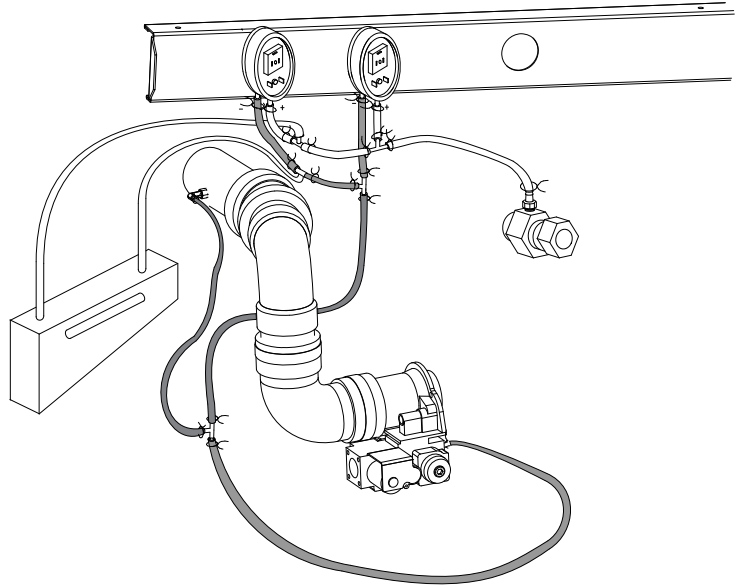
Differential Air Pressure

Differential air pressure switch is a safety device which prevents boiler from firing if there is an air intake, boiler heat exchanger or vent blockage.

To check differential air pressure:

1. Turn off service switch or lower thermostat setting.
2. Remove vinyl caps from tee.
3. Install testing lines as shown to inclined manometer or differential pressure gauge with ability to read 0.01" increments to at least 6.0" w.c.
4. Turn on service switch and set thermostat to call for heat.

Checking the Differential Air Pressure



Boiler Status	Diff. Pressure	Switch Contacts	
		3.5"	Closed
Not Running	0"	0.14"	Open
		3.5"	Closed
Running with Blockage	Greater Than or Equal To Setpoints	3.5"	Open
		0.14"	Closed
Running w/out Blockage (approx.)	Min. Fire: 0.3" Max. Fire: 2"	3.5"	Closed
		0.14"	Closed

If manometer readings do not correspond with chart above, check for possible causes:

- Blockage or moisture in suction lines to switch.
- Blockage in air intake or vent pipes.
- Undersized air intake or vent pipes.
- Loose blower wheel on motor shaft.
- Incorrect pressure switch or pressure switch setpoint

When pressure reading is correct and pressure switch is operating properly, remove testing lines and reinstall vinyl caps to Tee and 3-way connector.

⚠ DANGER

Electric shock hazard! Disconnect power before servicing. All service must be performed by a trained, experienced service technician. Never jumper (bypass) any device except for momentary testing as outlined on the following pages of this manual. Failure to follow these instructions WILL result in death or serious injury

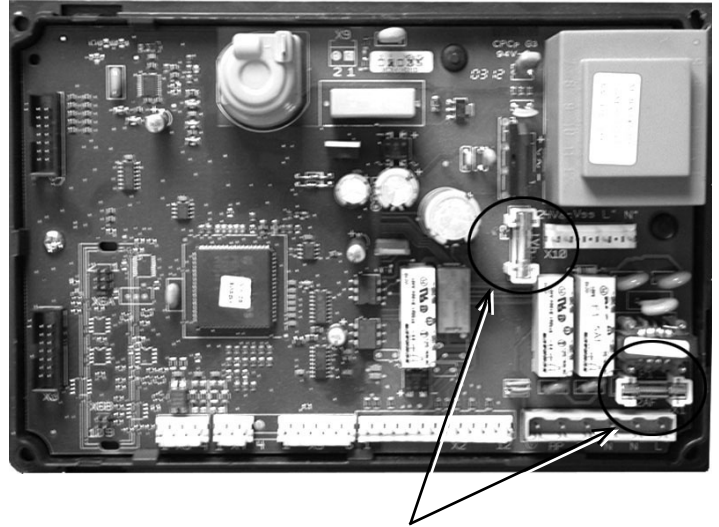
Control Module Fuses

Check control module fuses before replacing control module or any major components (blower, etc.) If one of these fuses is blown, it can prevent control module or other components from operating.

1. Turn OFF power to boiler at external line switch.
2. Remove jacket front panel.
3. Remove control module cover.
4. Inspect fuses F1 and F3 (shown below).
5. Boiler is shipped with four spare fuses attached to control module cover.
6. If necessary, replace open fuse (F1 is 115V, 5-amp fast-blow; F3 is 24V, 4-amp slow-blow).
7. Install control module cover and jacket top front cover after fuse inspection.
8. Restore power to boiler at external line switch and verify boiler operation after completing boiler service.

Checking Temperature Sensors

1. Boiler temperature sensors (outdoor, return water, and supply water) are all resistance-type devices.
2. Table 1 shows correct resistance value for sensor at various temperatures.
3. Use resistance values at 32°F, 60°F, 70°F and 212°F to measure sensor resistance at known temperatures (ice point, room temperature and sea level boiling point). For ice point and boiling point, insert sensor in water at that temperature. Use ohm meter to read resistance value.
4. To verify control module is correctly sensing temperature, use a resistance decade box. Connect decade box temporarily in place of sensor. Use control module "Information" mode to read temperature.



F1 and F3 Fuses

Table 1 - Sensor Resistance Values at Various Temperatures

Temp °F	Sensor Ohms		Temp °F	Sensor Ohms	
	Min	Max		Min	Max
32	34,265	37,871	130	3,698	4,088
40	27,834	30,764	140	3,043	3,364
50	21,630	23,907	150	2,517	2,782
60	16,944	18,727	160	2,091	2,311
70	13,372	14,780	170	1,744	1,928
80	10,629	11,747	180	1,461	1,615
90	8,504	9,399	190	1,229	1,359
100	6,847	7,568	200	1,038	1,147
110	5,545	6,129	210	880	972
120	4,517	4,992	212	851	941

9 - TROUBLESHOOTING

Boiler Not Firing And:	Check For:	Step	Corrective Actions:
Control display blank	120 vac at terminals L1 and L2 of line voltage strip?	1	NO - Check external line switch and fuse or breaker.
		2	Determine if red light on line voltage monitor is flashing indication fault. If there is fault verify input voltage dial is properly set in accordance with steps in installation manual. If fault does not clear after ten minutes replace line monitor.
	120 vac on both sides of fuse F1? (Turn OFF external power to boiler before removing cover.	1	NO - Turn off power to boiler and replace fuse if necessary. Inspect boiler interior wiring to determine cause of fuse opening.
	Wiring correct, in good condition, and securely attached?	1	Correct if needed. Replace any damaged wiring or components. Replace control module if problem persists.
Display first digit shows 0; last digits show 2 or 3-digit number (boiler outlet water temp.)	Room thermostat and DHW aquastat satisfied?	1	YES - Boiler off, no call for heat. Turn up thermostat or aquastat. Boiler should start.
	Thermostat or aquastat calling for heat but boiler not firing.	1	Check voltage on both sides of low voltage fuse F3. (Turn OFF external power before removing cover.) If necessary, replace fuse. Determine reason for fuse failure if possible.
		2	Check/set boiler parameters 2 and 3. Make sure space heat or DHW is turned on. Turn on if necessary.
		3	Turn off power to boiler. Temporarily jumper low voltage terminal strip terminals T1 and T2 or DHW T1 and DHW T2. Retry. If boiler operates, check CH and DHW thermostat and wiring. Replace if necessary. Remove temporary jumper(s).
		4	Turn off power to boiler. Check wiring against wiring diagram; verify all wiring in good condition and secure.
		5	Replace wire harnesses and retry.
		6	Replace control module.
Display first digit shows number from 1 to 8; last digits show 2 or 3-digit number (boiler outlet water temp.)	1	Boiler in normal operating mode.	
Display flashes "9," then "b." Last two digits show code number.	1	See <i>User Interface Quick Reference</i> and <i>Soft Lockout Troubleshooting</i> for more information on soft lockout code.	

9 - TROUBLESHOOTING

SOFT LOCKOUT (Display flashes "9" and then "b" in first position; last two digits on steady (code))

Code	Reason For Soft Lockout	Corrective Actions (pressing RESET should restart boiler immediately):	
08	0.14" Pressure switch contacts open	1	Check pressure switch for proper operation. Replace pressure switch if moisture has entered switch. Check venting for blockage. Clear if present.
18	High Limit Operation: Burner off until outlet water temperature drops below 180 °F	1	Happen when heat demand is lower than lowest firing rate of boiler, such as operation of single, small zone. Check system for: <ul style="list-style-type: none"> • Verify boiler and system are full of water. • Verify system does not have trapped air. • Inspect and verify system piping and components. • Verify piping agrees with boiler manual recommendations.
		2	Use contact thermometer to check outlet water temp. Compare to temperature shown with display in "INFO" mode ("1" in first digit). Replace return temperature sensor if results are not close. Replace control module if sensor replacement doesn't solve problem.
19	High Limit Operation: Burner off until return water temp. drops below 190 °F	1	Check system for: <ul style="list-style-type: none"> • Verify boiler and system are full of water. • Verify system does not have trapped air. • Inspect and verify system piping and components. • Verify water flow is not reversed or pipes crossed.
		2	Use contact thermometer to check return water temp. Compare to temperature shown with display in "INFO" mode ("2" in first digit). Replace return temperature sensor if results are not close. Replace control module if sensor replacement doesn't solve problem.
24	High Limit Operation: Return temp. is higher than supply temp.	1	<ul style="list-style-type: none"> • Verify boiler and system are full of water. • Verify system does not have trapped air. • Inspect and verify system piping and components. • Verify water flow is not reversed or pipes crossed.
		2	Use contact thermometer to check return water temp. Compare to temperature shown with display in "INFO" mode ("2" in first digit). Replace return temp. sensor if results are not close. Replace control module if sensor replacement doesn't solve problem.
25	High limit operation: Outlet water temp. increased too quickly. Non-adjustable default setting 9.8°F/sec	1	Indicates flow rate too low. Check system for: <ul style="list-style-type: none"> • Verify boiler and system are full of water. • Make sure system does not have trapped air. • Inspect and verify system piping and components. • Verify piping agrees with boiler manual recommendations.
		2	Verify operation of boiler circulator: <ul style="list-style-type: none"> • Check voltage at circulator junction box to ensure 120 vac when boiler operates. If no voltage, check wiring and wiring connections. • High voltage terminal strip terminals 5 and 6 should show 120 vac for space heating; terminals 3 and 4 should show 120 vac for DHW. Replace circulator if powered but not operating. • Replace line voltage wire harness if necessary. Replace control module if wire replacement doesn't resolve.
26	Aquastat contacts open or LWCO contacts open or 3.5" Switch open	1	Verify proper setting of control. Water temp too high, wait for temperature to drop below 180 degrees.
		2	Check water level in boiler, fill if low. Press LWCO reset switch on display panel If problem still exists, check LWCO probe and board according to manufacturer's instructions. Replace if necessary.
		3	Check pressure switch for proper operation. Replace if moisture has entered switch. Check venting for blockage. Clear if present.

9 - TROUBLESHOOTING

29	Blower turning when it should be off.	1	<p>Check boiler wiring against wiring diagram. Replace line voltage and low voltage wiring harnesses if necessary. Replace control module if wire replacement doesn't resolve.</p>
30	<p>High limit operation: Temperature rise across boiler too high.</p>	1	<p>Flow rate too low. Check system for: Verify boiler and system are full of water. Inspect and verify system piping and components. Verify piping agrees with boiler manual recommendations. Make sure system pressure drop is not too high.</p>
		2	<p>Verify operation of boiler circulator. Check voltage at circulator junction box to ensure 120 vac when boiler operates. If no voltage, check wiring and wiring connections. High voltage terminal strip terminals 5 and 6 should show 120 vac for space heating; terminals 3 and 4 should show 120 vac for DHW. Replace circulator if powered but not operating. Replace line voltage wire harness if necessary. Replace control module if wire replacement doesn't resolve.</p>
61	Pressure switch contacts closed.	1	<p>Check pressure switches for proper operation. Replace pressure switch if moisture has entered switch.</p>
65	Blower not operating when turned on.	1	<p>Turn off power to boiler. Remove line voltage connector at blower. Restart boiler and check voltage across blower plug terminals. If 120 vac is NOT present, inspect wiring and tightness of connections. Replace line voltage wire harness if necessary. Replace control module if wire harness replacement doesn't resolve.</p>
		2	<p>If 120 vac is present on blower wire harness, replace harness and retry. If problem persists, replace blower motor.</p>

9 - TROUBLESHOOTING

HARD LOCKOUT (Display flashes first digit "E" and last two digits (code))

Code	Reason For Hard Lockout	Corrective Actions (pressing RESET should restart boiler immediately):	
00	Flame detected on startup.	1	<p>Burner may be operating too hot due to incorrect combustion. Inspect flame during operation following procedure in this manual. If flame is acceptable at both high and low fire, go to step 2. If flame is not acceptable:</p> <p>For propane boilers, verify propane orifice is correct and properly installed. Obtain and install propane orifice if necessary.</p> <p>For correct orifice propane or natural gas boilers, replace gas valve if burner glows excessively.</p>
		2	<p>Look into the burner inspection window after the boiler shuts down. If flame is still present, gas valve may be leaking. Replace gas valve. BEFORE replacing valve, check gas line pressure coming to boiler. Pressure must not exceed 13" w.c. or valve damage could occur.</p>
02	Ignition failed through 5 attempts.	1	<p>If no ignition spark occurs: Check ignition electrode cable, electrode connector, and connections. Inspect ignition electrode cable and electrode for insulation damage. Check ground lead from ground terminal strip to heat exchanger access cover.</p>
		2	<p>If spark occurs, but no flame: Verify manual gas valve in boiler is open. Verify plastic line from gas valve to air inlet elbow is connected to gas valve and elbow, and line is unobstructed with no kinks. Check incoming gas pressure. Verify gas lines are free of obstruction and purge gas lines of air if necessary. Verify flue gas vent and air supply piping are correctly installed, in good condition, and free of obstructions. Check voltage to gas valve (approx. 19-21 VDC (24 vac) during ignition attempt). Check gas meter to verify gas flows when gas valve is activated. Remove and inspect/clean ignition electrode. Clean white oxides if necessary and replace ignition electrode if in poor condition or unable to be cleaned. Disconnect gas valve from Venturi. Inspect Venturi gas line to verify there are no obstructions. Replace gas valve. Check for possible flue gas recirculation at vent/air terminations or inside boiler housing. If gas valve is powered, gas flows when activated, and above steps have been verified, replace gas valve and retry.</p>
		3	<p>Flame occurs but flame signal too low (less than 3 vdc between X1-5 and ground): Inspect flame at both low and high fire rates. Inspect and clean burner if necessary. Replace burner if not in good condition. Check gas flow rate at gas meter with boiler at high fire. If input is not within about 10% of boiler rating, replace gas valve. (Length of the vent/air piping will affect boiler firing rate, with longer piping causing lower inputs.) Check ground wire and connections from ground terminal screw to X1-6 terminal on wiring harness. Use ground continuity meter to verify good ground path. Follow procedure to inspect and clean ignition electrode. Replace ignition electrode if necessary. If above does not correct problem, replace control module.</p>
03	Gas Valve Disconnected.	1	Verify gas valve connection.
04	Voltage lost after lockout occurred.	1	Control module will only restart with manual reset, even after power loss (but the error code information is lost).
05	Internal control failure.	1	Reset control and retry. If problem persists, replace control module.
06			
07			
08			

9 - TROUBLESHOOTING

HARD LOCKOUT (Display flashes first digit "E" and last two digits (code))			
Code	Reason For Hard Lockout	Corrective Actions (pressing RESET should restart boiler immediately):	
WARNING: Electrical shock hazard. Turn off power to boiler when working with wiring or replacing any boiler component.			
09	Internal control failure.	1	Reset control and retry. If problem persists, replace control module.
11			
12	Casting temperature switch opened.	1	Determine reason for limit action and correct. Check for air trapped at top of casting.
		2	If limits are closed, check wiring and connections. Apply a temporary jumper across terminals 6 and 8 and check operation. If problem persists, check boiler internal wiring. Replace low voltage harness if necessary. Replace control module if harness replacement doesn't resolve.
13 - 17	Internal control failure.	1	Reset control and retry. If problem persists, replace control module.
18	Thermal Overrun Condition: Outlet water temp. above 200 °F	1	Check system for: Verify boiler and system are full of water. Make sure system does not have trapped air. Inspect and verify system piping and components. Make sure water flow is not reversed or pipes crossed.
		2	Use contact thermometer to check outlet water temp. Compare to temp. shown with display in "INFO" mode ("1" in first digit). Replace return temp. sensor if results are not close. Replace control module if sensor replacement doesn't solve problem.
19	Thermal Overrun Condition: Return water temp. above 190 °F	1	See Code 18, Corrective Action#1 (above).
		2	Use contact thermometer to check return water temp. Compare to temp. shown with display in "INFO" mode ("2" in first digit). Replace return temp. sensor if results are not close. Replace control module if sensor replacement doesn't solve problem.
28	Blower not running.	1	Turn off power to boiler. Remove line voltage connector at blower. Restart boiler and check voltage across blower plug terminals. If 120 vac is NOT present, inspect wiring and tightness of connections. Replace line voltage wire harness if necessary. Replace control module if wire harness replacement doesn't resolve.
		2	If 120 vac is present on blower wire harness, replace harness and retry. If problem persists, replace blower motor.
29	Blower signal not 0 when it should be.	1	Inspect wiring and connections. If wiring is correct, replace blower assembly. If blower assembly replacement is unsuccessful, replace control module.
30	Temp difference between supply & return, indicated by blocking code b30, was too large for 20 successive times. Non adjustable default Max Delta set to 100°F	1	Inspect supply & return water sensors for proper resistance.
		2	Inspect piping for proper configuration. For example, when used in a radiant heating application.
31	Outlet water temp. short circuit.	1	Inspect outlet water temp. sensor and wiring. Replace sensor if wiring correct and in good condition. Replace low voltage wiring harness if problem persists. Replace control module if harness replacement doesn't resolve.
32	Return water temp. short circuit.	1	Inspect return water temp. sensor and wiring. Replace sensor if wiring correct and in good condition. Replace low voltage wiring harness if problem persists. Replace control module if harness replacement doesn't resolve.
36	Supply water temp. sensor open circuit.	1	See Corrective Action# 1 under Code 31 (above)
37	Return water temp. sensor open circuit.	1	See Corrective Action# 1 under Code 32 (above)
44	Internal control failure.	1	Rest control and retry. If problem persists, replace control module.
60			
61			
65	Blower signal too low (not enough driving force).	1	Inspect wiring and connections. If wiring is correct, replace blower assembly. If blower assembly replacement is unsuccessful, replace control module.

10 - USER INTERFACE QUICK REFERENCE

STANDBY MODE - KEY FUNCTIONS AND DISPLAY

When boiler is powered on, the display will always show a single character (which represents the boiler's current operating sequence) followed by the measured outlet water temperature during self-test.

When entering Standby Mode, user interface display briefly shows Stby	Stby	then displays Sequence and Measured or Target Outlet Temperature .	O 180
Press and Hold Key(s) in BLACK ⁽¹⁾	Duration	Result	Display
[MODE] [STEP] [STORE] [+] [-]	Tap	Outlet water target temperature. (Display shows "c" and outlet water target temp.) ⁽²⁾	c 190
	Hold	Turn space heating OFF/ON. (Display shows "c" and outlet water temp. or OFF.)	
[MODE] [STEP] [STORE] [+] [-]	Tap	Show factory setting for DHW. (Make sure to adjust desired water temperature for DHW on the DHW tank aquastat.)	d 140
	Hold	Turn DHW OFF/ON. (Display shows "d" and DHW factory setting or OFF.)	
[MODE] [STEP] [STORE] [+] [-]	Hold	Set burner to high fire. (Display shows "H" and measured outlet water temp.)	H 180
[MODE] [STEP] [STORE] [+] [-]	Hold	Set burner to low fire. (Display shows "L" and measured outlet water temp.)	L 180
[MODE] [STEP] [STORE] [+] [-]	Hold	Deactivate forced high/low firing. (Display shows sequence and measured outlet water temp.)	O 180
[MODE] [STEP] [STORE] [+] [-]	Tap	Change to next mode. (Para)	Para

⁽¹⁾ Where two keys are shown pressed at the same time, you must press the keys together. A slight delay in pressing one of the keys may cause a different result.

⁽²⁾ **Outlet water "target temperature" means:**

Outdoor sensor not connected - Target is fixed setpoint temp. Control attempts to maintain boiler outlet water temperature to setpoint.

Outdoor sensor connected - Target is temperature calculated by control module based on outside air temperature.

10 - USER INTERFACE QUICK REFERENCE

STANDBY MODE - BOILER SEQUENCE DISPLAY

After display shows **Stby** for a brief period, first character shows boiler status, followed by boiler outlet water temp. If the burner is being held off due to a soft lockout, the display alternates between showing "9" followed by boiler outlet water temp. and "b" followed by the two-digit codes below. Soft lockout means the boiler will start again automatically if the condition is corrected or timed out.

Press **[RESET]** button to restart boiler without waiting for timeouts below.

First Digit	Other Digits	Boiler Status	First Digit	Code #	Boiler is in soft lockout when "9" or "b" shown. Reason for boiler soft lockout is:
0	Actual (measured) outlet water temperature	Standby - no call for heat	"9" alternating with "b"	_18	Outlet temp. too high (over 203°F). Burner off until outlet water temp. drops 9°F below target temp.
1		Pre-purge (10 seconds) or Post-purge (15 seconds)		_19	Return temp. too high (over 203°F). Burner off until both outlet and return water temp. drops 9°F below target temp.
2		Ignition		_24	Return temp. higher than supply temp. Burner off waiting for correction.
3		Burner on for CH heating		_25	Outlet water temp. rose too quickly. Burner off 10 min. (burner recycles, increasing wait 1 min. each attempt to max. 15 min.)
4		Burner on for DHW heating		_26	External limit open, LWCO tripped or 3.5" press switch open on limit wired in soft lockout (auto reset) circuit. Burner off for 2½ minutes.
5		Checking airflow before pre-purge		_29	Blower signal not 0 when it should be. Burner off until signal condition terminates.
6		Burner off because temperature setting has been reached		_30	Temp. rise across boiler more than 100°F. Burner off for 2½ minute wait (plus 1 minute for each failed attempt, up to max. of 22 minutes each time).
7		Pump on after CH heating cycle for run-on of 10 seconds		_61	Air pressure switch does not open.
8		Pump on after DHW heating cycle for run-on of 30 seconds		_65	Waiting for blower to start.
H		Burner on, running in high fire mode (manually set for test)			
L		Burner on, running in low fire mode (manually set for test)			

10 - USER INTERFACE QUICK REFERENCE

PARAMETER MODE				
Press [MODE] button 1 time from Standby Mode.				
Display shows Para until a key is pressed	Para	then displays Parameter and Current Status .		1 180
Press and Hold Key(s) in BLACK ⁽¹⁾	Duration	Result	Display	
[MODE] [STEP] [STORE] [+] [-]	Tap	Step to next parameter (continue tapping) Step to change to 1, 2, 3, or 4 ▶	DHW Setting ↓	1 140
[MODE] [STEP] [STORE] [+] [-]	Tap	Increase setting	DHW Setup ↓	2 01
	Hold	FAST increase setting		
[MODE] [STEP] [STORE] [+] [-]	Tap	Decrease setting	Space Heating Setup ↓	3 01
	Hold	FAST Decrease setting		
[MODE] [STEP] [STORE] [+] [-]	Tap	Store current setting (tap this key after setting the parameter as desired)	Outlet Temperature	4 190
			<i>(See details below)</i>	
[MODE] [STEP] [STORE] [+] [-]	Tap	Next mode (info)	Info	
DHW Setting: Left digit shows "1" and right digit shows "140." DO NOT change this setting. Performance could be unreliable. Set DHW tank temp. on DHW aquastat.	DHW Setup: Left digit shows "2" and right digit should show "01." DO NOT change this setting. DHW performance could be unreliable or unsafe.	Space Heating (SH) Setup: Left digit shows "3" and right digit should show "01." DO NOT change this setting as it might affect performance of your boiler.	SH Temperature: Left digit shows "4" and right three digits show target outlet water temp. (at 32°F outside if outdoor sensor is used). Adjust to desired settings with + and - keys.	
(1) After the [STORE] button is pressed, the set value will flash twice to confirm the change. Change will take effect after you leave Parameter Mode.				

10 - USER INTERFACE QUICK REFERENCE

INFORMATION MODE

Press [MODE] button 2 times from Standby Mode.

Display shows Info until a key is pressed	Info	Then displays Parameter, Flashing Dot, and Current Status.	1. 190
Press and Hold Key(s) in BLACK (1)	Duration	Result	Display
[MODE] [STEP] [STORE] [+] [-]	Tap	Step to next parameter	Measured outlet water temperature (First digit shows 1 and dot flashes) (1)
<p>(1) Digits after flashing dot show measured outlet temperature. (2) Digits after flashing dot show -18. (3) Digits after flashing dot show outside temperature. (4) Digits after flashing dot show target outlet temperature. (5) Digits after flashing dot show rate of change in °F per second. (6) Digits after flashing dot show -32.</p> <p>NOTE: Display will show A-32 if [STEP] is pressed after "9" appears.</p>		Return water temperature (First digit shows 2 and dot flashes) (1)	2. 150
		This function not used (First digit shows 3 and dot flashes) (2)	3. -18
		Outside temperature (First digit shows 4 and dot flashes) (3)	4. 42
		This function not used (First digit shows 5 and dot flashes) (2)	5. -18
		Target outlet water temperature (First digit shows 6 and dot flashes) (4)	6. 190
		Outlet water temp. change over time (First digit shows 7 and dot flashes) (5)	7. 1
		Return water temp. change over time (First digit shows 8 and dot flashes) (5)	8. 1
		This function not used (First digit shows 9 and dot flashes) (6)	9. -32

10 - USER INTERFACE QUICK REFERENCE

HARD LOCKOUT MODE

Boiler in hard lockout (requires manual RESET)

Display flashes first digit E	E	and last two digits (lockout code) (<i>see below</i>)	XX
Code	Reason for hard lockout	Code	Reason for hard lockout
00	Flame detected on start-up	18	Supply water temperature higher than 200°F
02	Ignition failed after 5 retries	19	Return water temperature higher than 190°F
03	Gas valve disconnected	25	Outlet temperature increased too fast
04	Power lost after lockout	28	No signal from blower; blower not running or defective blower motor
05	Internal control failure	29	Blower signal not "0" when it should be
06	Internal control failure	30	Max difference (b30) was too large for 20 successive times. Non adjustable default max delta set to 100°F.
07	Internal control failure	31	Outlet temperature sensor short circuit
11	Internal control error	32	Return temperature sensor short circuit
12	Casting temperature switch open	36	Outlet temperature sensor open circuit
13	Internal control failure	37	Return temperature sensor open circuit
14	Internal control failure	44	Internal control failure
15	Internal control failure	60	Internal error reading parameters
16	Internal control failure	61	Air flow circuit failure
17	Internal control failure	65	Not enough blower driving force

11 - INSTALLATION AND CHECKOUT CERTIFICATE

Boiler Model:	Boiler Serial Number:	Date of Installation:
Measured BTUH Input:	Boiler Location:	Altitude of Location:
Honeywell AM Kit Installed? (Yes/No):	Service Dates:	
System Type (Give Brief Description):		
Installation Instructions Have Been Followed Checkout Procedure/Adjustments Performed Maintenance/Service Issues Reviewed With Owner or Maintenance Person Installation Manual Affixed Adjacent To or On Boiler		
Installer/Technician's Company:		
Installer's Name:		
Company Address:		
Company Phone Number:		
Installer's Signature:		