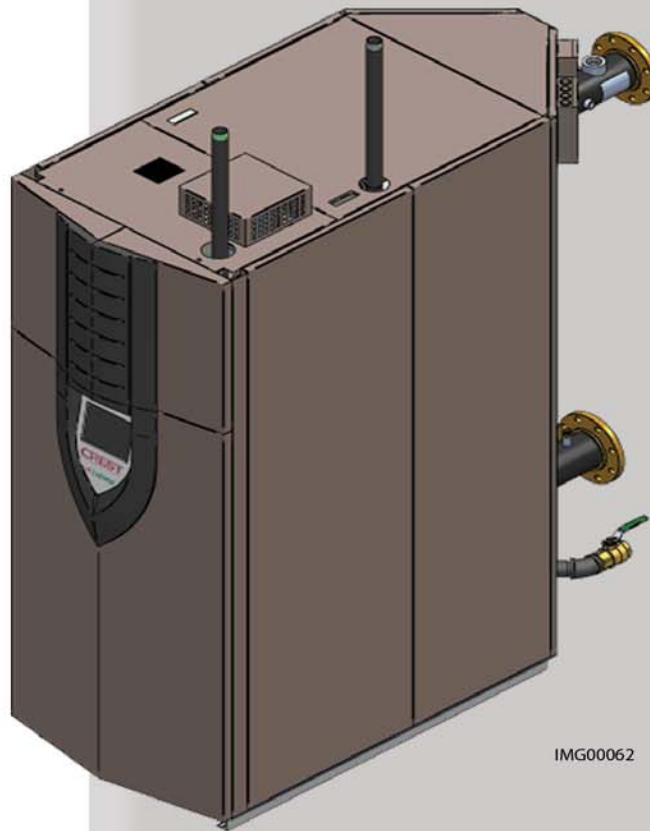


# CREST<sup>®</sup>

## CONDENSING BOILER

### Dual Fuel Supplemental Manual Models: FBD 2.5 - 5.0



IMG00062



#### **⚠ WARNING**

This manual must only be used by a qualified heating installer / service technician. Read all instructions, including this manual along with the Crest Installation and Operation Manual, and the Crest Service Manual, before installing. Perform steps in the order given. Failure to comply could result in severe personal injury, death, or substantial property damage.

**Save this manual for future reference.**

# CONTENTS

HAZARD DEFINITIONS .....	2	<b>2. START-UP</b>	
PLEASE READ BEFORE PROCEEDING .....	3	Start the Boiler .....	8
THE CREST -- HOW IT WORKS .....	4	Check System and Boiler.....	8
RATINGS .....	5	Operating Instructions .....	9
<b>1. GAS CONNECTIONS</b>		Check Flame and Combustion.....	10
Check Inlet Gas Supply .....	6	Dual Fuel Switching Instructions .....	11
Gas Pressure .....	7	<b>3. DIAGRAMS.....</b>	<b>12-17</b>
Gas Valve Replacement .....	7	Revision Notes .....	Back Cover

## Hazard definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

### **DANGER**

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

### **WARNING**

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

### **CAUTION**

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

### **CAUTION**

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

### **NOTICE**

NOTICE indicates special instructions on installation, operation, or maintenance that are important but not related to personal injury or property damage.

## Please read before proceeding

### **WARNING**

**Installer** – Read all instructions, including this manual, the Crest Installation and Operation Manual and the Crest Service Manual, before installing. Perform steps in the order given.

**User** – This manual is for use only by a qualified heating installer/service technician. Refer to the User's Information Manual for your reference.

Have this boiler serviced/inspected by a qualified service technician, at least annually.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

### **NOTICE**

When calling or writing about the boiler – Please have the boiler model and serial number from the boiler rating plate.

Consider piping and installation when determining boiler location.

Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

Factory warranty (shipped with unit) does not apply to units improperly installed or improperly operated.

### **WARNING**

Failure to adhere to the guidelines on this page can result in severe personal injury, death, or substantial property damage.

### **WARNING**

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

This appliance **MUST NOT** be installed in any location where gasoline or flammable vapors are likely to be present.

### WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a near by phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

### When servicing boiler –

- To avoid electric shock, disconnect electrical supply before performing maintenance.
- To avoid severe burns, allow boiler to cool before performing maintenance.

### Boiler operation –

- Do not block flow of combustion or ventilation air to the boiler.
- Should overheating occur or gas supply fail to shut off, do not turn off or disconnect electrical supply to circulator. Instead, shut off the gas supply at a location external to the appliance.
- Do not use this boiler if any part has been under water. The possible damage to a flooded appliance can be extensive and present numerous safety hazards. Any appliance that has been under water must be replaced.

# The Crest Dual Fuel - How it works...

## 1. Propane gas connection

The propane gas connection pipe is a threaded black iron pipe connection. This pipe should be connected to the incoming gas supply to deliver propane gas to the boiler.

## 2. Natural gas connection

The natural gas connection pipe is a threaded black iron pipe connection. This pipe should be connected to the incoming gas supply to deliver natural gas to the boiler.

## 3. Fuel selection switch

Switches the unit between natural and propane gas.

## 4. Natural gas indicator light (green)

Indicates that natural gas operation has been selected.

## 5. Propane gas indicator light (red)

Indicates that propane gas operation has been selected.

## 6. Small natural gas valve (Valve 1 Natural)

The small natural gas valve senses the negative pressure created by the blowers, allowing gas to flow only if the gas valves are powered and combustion air is flowing.

## 7. Small propane valve (Valve 1 Propane)

The small propane gas valve senses the negative pressure created by the blowers, allowing gas to flow only if the gas valves are powered and combustion air is flowing.

## 8. Large natural gas valve (Valve 2 Natural)

The large natural gas valve senses the negative pressure created by the blowers, allowing gas to flow only if the gas valves are powered and combustion air is flowing.

## 9. Large propane gas valve (Valve 2 Propane)

The large propane gas valve senses the negative pressure created by the blowers, allowing gas to flow only if the gas valves are powered and combustion air is flowing.

## 10. Natural shutoff valve

The natural shutoff valve is used to isolate the boiler gas train from the gas supply.

## 11. Propane shutoff valve

The propane shutoff valve is used to isolate the boiler gas train from the gas supply.

## 12. Natural ball valve (Valve 1)

The ball valve for natural valve 1 is used to isolate natural valve 1 from the propane gas supply.

## 13. Propane ball valve (Valve 1)

The ball valve for propane valve 1 is used to isolate propane valve 1 from the natural gas supply.

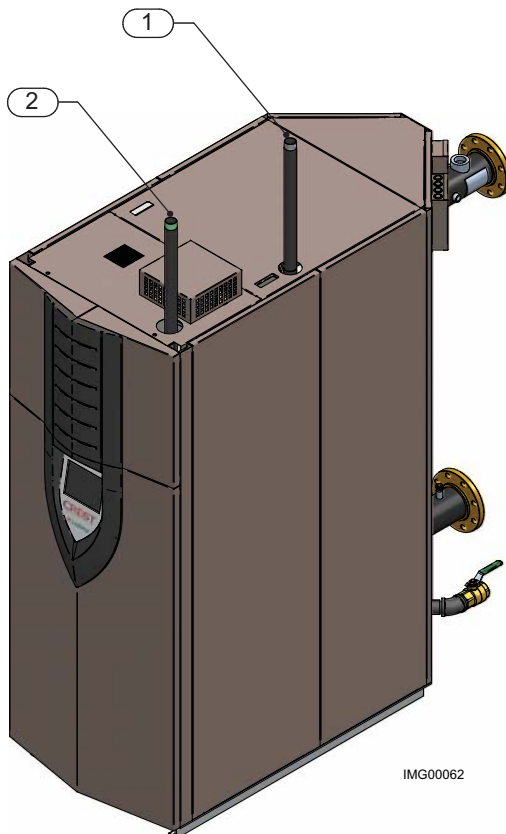
## 14. Natural ball valve (Valve 2)

The ball valve for natural valve 2 is used to isolate natural valve 2 from the propane gas supply.

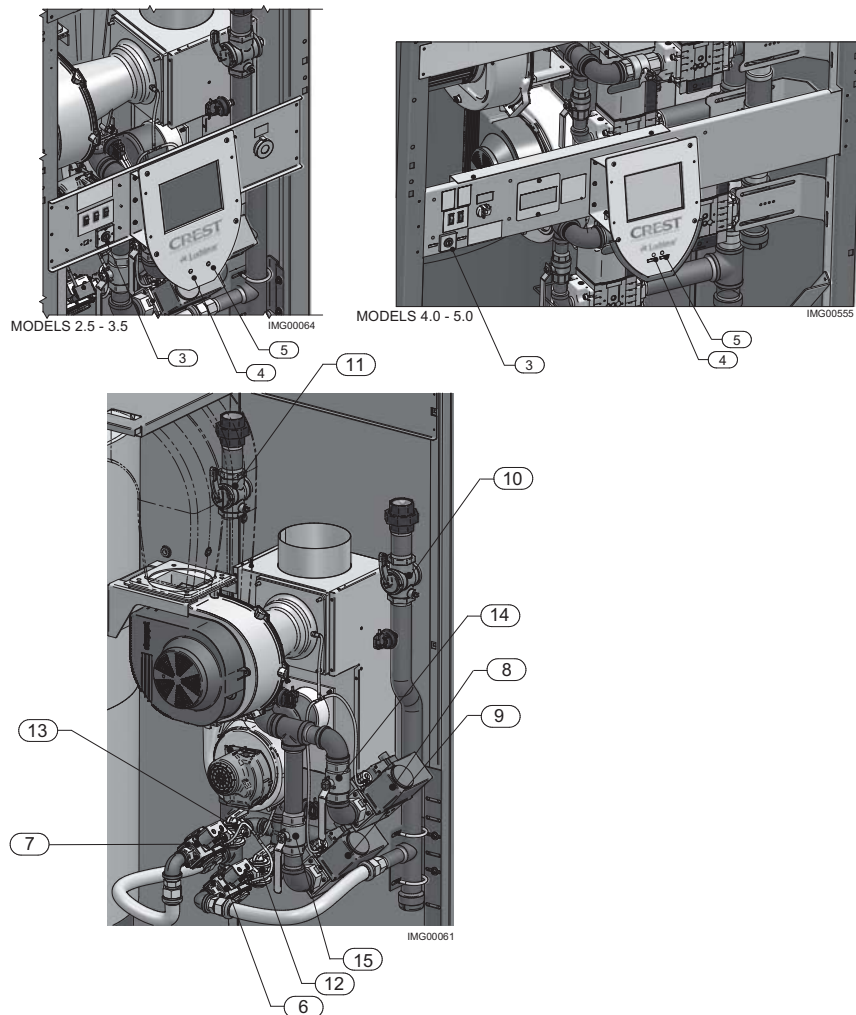
## 15. Propane ball valve (Valve 2)

The ball valve for propane valve 2 is used to isolate propane valve 2 from the natural gas supply.

## Models FBD 2.5 - 5.0



Front View




Left Side (inside unit)

# Ratings



DOE

<div><div><div>Crest AHRI Rating</div></div></div>					Other Specifications						
Model Number  Note: Change "N" to "L" for L.P. gas models.	Input MBH  (Notes 4 - 8)		Gross Output MBH  (Note 1)	Net AHRI Ratings Water, MBH  (Note 2)	Appliance Water Content Gallons	Pipe Size Outlet	Pipe Size Inlet	Gas Inlet Size	Air Size	Vent Size  (Note 3)	Weight w/Water (lbs.)
	Min	Max									
	FB(N,L,D)2500	125									
FB(N,L,D)3000	150	3000	2760	2400	181	4"	4"	2"	10"	10"	4125
FB(N,L,D)3500	200*	3500	3220	2800	215	4"	4"	2"	10"	10"	4750
FB(N,L,D)4000	335	4000	3720	4043	291	4"	4"	2 1/2"	12"	12"	6500
FB(N,L,D)5000	500	5000	4650	3235	380	4"	4"	2 1/2"	14"	14"	8000

\*For LP models the minimum input is 420 MBH.

## NOTICE

Maximum allowed working pressure is located on the rating plate.

### Notes:

- The ratings are based on standard test procedures prescribed by the United States Department of Energy.
- Net AHRI ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pickup. Ratings are based on a piping and pickup allowance of 1.15.
- Crest boilers require special gas venting. Use only the vent materials and methods specified in the Crest Installation and Operation Manual.
- Standard Crest boilers are equipped to operate from sea level to 4,500 feet **only** with no adjustments.
- High altitude Crest Models 2.5, 3.0 and 3.5 boilers are equipped to operate from 3,000 to 12,000 feet and high altitude Crest Models 4.0 and 5.0 boilers are equipped to operate from 3,000 to 5,500 feet. High altitude models are manufactured with different control parameters for high altitude operation, but the sequence of operation given in this manual remains the same as the standard boilers. A high altitude label (as shown in FIG A.) is also affixed to the unit.
- Standard Crest boilers will de-rate by 2.2% for each 1,000 feet above sea level up to 4,500 feet when combustion calibration is performed and CO<sub>2</sub>'s are adjusted to the recommended levels.
- High altitude Crest Models 2.5, 3.0 and 3.5 will de-rate by 1.4% for each 1,000 feet above sea level up to 5,500 feet and 1.8% for each 1,000 feet above 5,500 feet.
- High altitude Crest Models 4.0 and 5.0 will not de-rate up to 5,500 feet.
- For Crest Models 4.0 and 5.0, installations above 5,500 feet contact the factory.
- Ratings have been confirmed by the Hydronics Section of AHRI.

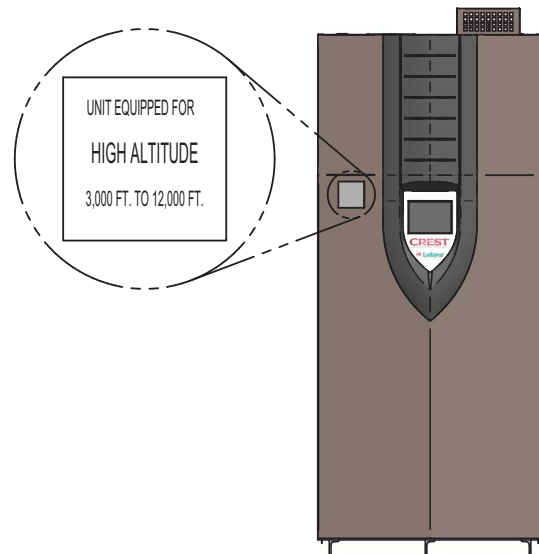


Figure A High Altitude Label Location

# 1 Gas connections

**Table 1A First Stage Piping at High Pressure\_10 PSI**

Nominal Iron Pipe Size Inches		Length of pipe or tubing, feet											
		10	20	30	40	50	60	70	80	90	100	125	150
		Maximum Capacities of Pipe in KBTUH/Hr											
Pipe Size (I.D.)	1/2	2442	1885	1580	1382	1240	1133	1048	979	921	872	775	703
	3/4	4831	3812	3230	2842	2561	2346	2175	2035	1917	1816	1618	1470
	1	8531	6916	5939	5270	4776	4392	4083	3829	3614	3429	3063	2789
	1 1/4	16626	13771	11963	10691	9736	8987	8378	7872	7443	7074	6336	5779
	1 1/2	23670	19957	17510	15749	14407	13341	12470	11740	11119	10581	9501	8682
	2	42521	36514	32398	29359	27001	25104	23538	22216	21082	20097	18104	16580
		Notice: Capacities shown are for Natural Gas. Please consult supplier for proper gas pipe sizing for propane.											

**Table 1B Second Stage Piping at Low Pressure\_1/2 PSI**

Nominal Iron Pipe Size Inches		Length of pipe or tubing, feet											
		10	20	30	40	50	60	70	80	90	100	125	150
		Maximum Capacities of Pipe in KBTUH/Hr											
Pipe Size (I.D.)	1 1/4	2205	1496	1212	1039	913	834	771	724	677	630	567	511
	1 1/2	3307	2299	1858	1559	1417	1275	1181	1086	1023	976	866	787
	2	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1496
	2 1/2	10140	7046	5695	4778	4343	3908	3618	3329	3160	2991	2654	2412
	3	17990	12510	10110	8481	7708	6936	6422	5908	5608	5309	4711	4281
	4	36710	25520	20620	17300	15730	14150	13100	12050	11440	10830	9613	8736
		Notice: Capacities shown are for Natural Gas. Please consult supplier for proper gas pipe sizing for propane.											

## Check inlet gas supply

### ⚠ WARNING

DO NOT adjust or attempt to measure gas valve outlet pressure. Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death, or substantial property damage.

### NOTICE

The Dual Fuel Crest is equipped with two (2) inlet gas connections. Each connection must be checked to ensure proper operation.

The gas piping must be sized for the proper flow and length of pipe, to avoid excessive pressure drop. Both the gas meter and the gas regulator must be properly sized for the total gas load.

If you experience a pressure drop greater than 1 inch w.c. (249 Pa), the meter, regulator, or gas line is undersized or in need of service. Perform the steps below when checking inlet gas supply:

1. Turn the main power switch to the "OFF" position.
2. Shut off gas supply at the manual gas valve in the gas piping to the appliance.
3. Remove the 1/8" pipe plug on the flange to the factory supplied gas shutoff valve and install a suitable 1/8" fitting (field supplied) for the manometer tubing. Place the tubing of the manometer over the tap once the 1/8" fitting is installed as shown in FIG.'s 1-1 and 1-2.

4. Slowly turn on the gas supply at the factory installed manual gas valve.
5. Turn the power switch to the "ON" position.
6. Adjust the temperature set point on the control panel of the SMART TOUCH control module to call for heat or utilize Service Mode, see page 10 of this manual.
7. Observe the gas supply pressure as the burner fires at 100% of rated input. Percent of burner input will be displayed on the Modulation Screen.
8. Ensure inlet pressure is within specified range. Minimum and maximum gas supply pressures are specified in this section of the manual.
9. If gas supply pressure is within normal range and no adjustments are needed, proceed on to Step 11.
10. If the gas pressure is out of range, contact the gas utility, gas supplier, qualified installer or service agency to determine the necessary steps to provide proper gas pressure to the control.
11. Turn the power switch to the "OFF" position.
12. Shut off the gas supply at the manual gas valve in the gas piping to the appliance.
13. Remove the manometer from the pressure tap on top of the gas valve. Remove the 1/8" (3 mm) field supplied fitting and reinstall the pipe plug removed in Step 3.



# 1 Gas connections *(continued)*

## **⚠ WARNING**

Do not check for gas leaks with an open flame -- use the bubble test. Failure to use the bubble test or check for gas leaks can cause severe personal injury, death, or substantial property damage.

14. Turn on the gas supply at the manual gas valve.
15. Turn the power switch to the "ON" position.
16. Adjust the temperature set point on the control panel of the SMART TOUCH control module to the desired water temperature so the appliance will call for heat.
17. Check burner performance by cycling the system while you observe burner response. The burner should ignite promptly. Flame pattern should be stable. Turn system off and allow burner to cool, then cycle burner again to ensure proper ignition and flame characteristics.
18. Repeat Steps 1 - 17 for both natural and LP gas supply.

## Gas Pressure

The gas pressure must remain between 4 inches w.c. (.99 kPa) minimum and 14 inches w.c. (3.5 kPa) maximum for Natural gas and between 4 inches w.c. (.99 kPa) minimum and 14 inches w.c. (3.5 kPa) maximum for LP gas during standby (static) mode and while in operating (dynamic) mode. If an in-line regulator is used, it must be a minimum of 10 feet (3 m) from the Crest boiler. It is very important that the gas line is properly purged by the gas supplier or utility company. Failure to properly purge the lines or improper line sizing, will result in ignition failure.

Ignition problems are especially noticeable in NEW LP installations and also in empty tank situations. This can also occur when a utility company shuts off service to an area to provide maintenance to their lines.

## Gas valve replacement

The gas valve **MUST NOT** be replaced with a conventional gas valve under any circumstances. As an additional safety feature, the gas valves have flanged connections to the venturis and blowers.

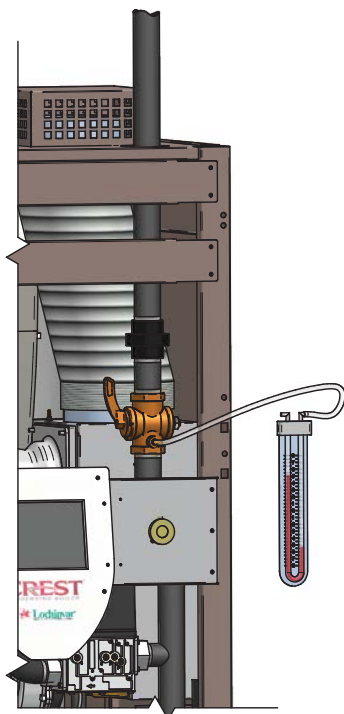
## **⚠ WARNING**

Failure to follow all precautions could result in fire, explosion, or death!

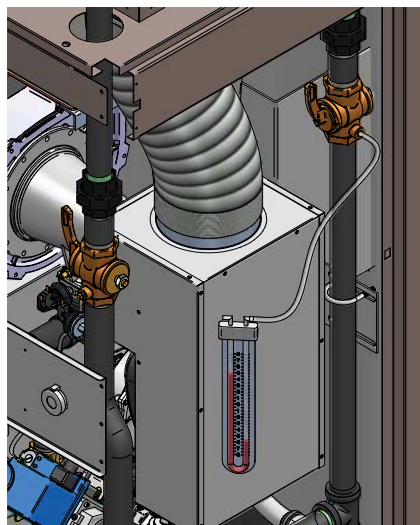
## **⚠ WARNING**

DO NOT adjust or attempt to measure gas valve outlet pressure. Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death, or substantial property damage.

**Figure 1-1 Inlet Gas Supply Check\_Natural**



**Figure 1-2 Inlet Gas Supply Check\_Propane**



IMG00065

## 2 Start-up

### Final checks before starting the boiler

- ❑ Read the Crest Service Manual to familiarize yourself with SMART TOUCH control module operation. Read this manual, page 9 for proper steps to start boiler.
- ❑ Verify the boiler and system are full of water and all system components are correctly set for operation.
- ❑ Verify the preparation procedures of Section 9 of the Crest Installation and Operation Manual have been completed.
- ❑ Verify electrical connections are correct and securely attached.
- ❑ Inspect vent piping and air piping for signs of deterioration from corrosion, physical damage or sagging. Verify air piping and vent piping are intact and correctly installed per this manual.

### Start the boiler

1. Read and follow the Operating instructions in FIG. 2-1, page 9.

### If boiler does not start correctly

1. Check for loose connections, blown fuse or service switch off?
2. Is external limit control (if used) open? Is boiler water temperature above 200°F (93°C)?
3. Is the boiler receiving a call for heat?
4. Is gas turned on at meter and boiler?
5. Is incoming gas pressure less than 4 inches w.c. (.99 kPa)?

If none of the above corrects the problem, refer to the Troubleshooting Section of the Crest Service Manual.

### Check system and boiler

#### ❑ Check water piping

1. Check system piping for leaks. If found, shut down the boiler and repair immediately. (See WARNINGS in the Crest Installation and Operation Manual (startup) regarding failure to repair leaks.)
2. Vent any remaining air from the system using manual vents. Air in the system will interfere with circulation and cause heat distribution problems and noise.

#### ❑ Check vent piping and air piping

1. Check for gastight seal at every connection, seam of air piping, and vent piping.

#### **WARNING**

Venting system must be sealed gastight to prevent flue gas spillage and carbon monoxide emissions, which will result in severe personal injury or death.

#### ❑ Check gas piping

1. Check around the boiler for gas odor following the procedure in the Crest Installation and Operation Manual (connecting gas supply piping).

#### **WARNING**

If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with a bubble test and repair immediately. Do not start the boiler again until corrected. Failure to comply could result in severe personal injury, death, or substantial property damage.



## 2 Start-up *(continued)*

Figure 2-1 Operating Instructions

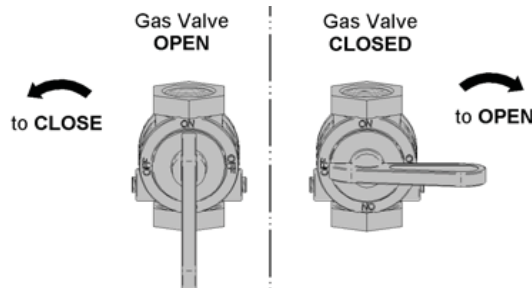
### FOR YOUR SAFETY READ BEFORE OPERATING

**WARNING:** If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
  - B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any appliance.
  - Do not touch any electric switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas control knob. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
  - D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

### OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove front door.
6. Turn gas shutoff valve counterclockwise to "OFF". Handle will be perpendicular to pipe. Do not force.
7. Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above this label. If you don't smell gas, go to next step.
8. Turn gas shutoff valve clockwise to "ON". Handle will be parallel to pipe.
9. Install front door.
10. Turn on all electric power to appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.



### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front door.
4. Turn gas shut off valve counterclockwise to "OFF". Handle will be perpendicular to pipe. Do not force.
5. Install front door.

LBL20053 REV B

## 2 Start-up

### Check flame and combustion

#### NOTICE

A flame and combustion check must be performed on natural gas and then repeated on propane.

1. Turn the main power off to the boiler by placing the "On/Off" switch in the OFF position.
2. Remove the flue temperature sensor from the flue collector. **Note:** Combustion measurements will be made at this point.
3. Turn the main power on to the boiler by placing the "On/Off" switch in the ON position.
4. Navigate to the Service Maintenance Screen from the Home Screen by pressing the SETUP button, enter the installer password, and then using the scrolling menu feature on the left side, scroll down to the SERVICE MAINTENANCE button.
5. On the Service Maintenance Screen place heater into Service Mode by selecting the START button, then selecting **Set Gas Valve 1 - High**.
6. Insert the probe from a combustion analyzer into the hole left by the removal of the flue temperature sensor.
7. Once the heat exchanger has modulated up to rate, measure the combustion. The values should be in the range listed in Table 2A. CO levels should be less than 200 ppm for a properly installed unit. If the combustion is not within range reference the *Troubleshooting* Section in the Crest Service Manual for possible causes and corrective actions.

**Table 2A** Flue Products Chart

Gas Valve	Natural Gas		Propane	
	CO <sub>2</sub>	O <sub>2</sub>	CO <sub>2</sub>	O <sub>2</sub>
1 - High	3.5% - 5.5%	11.2% - 14.8%	5.1% - 6.8%	10.5% - 13.2%
2 - High	7.8% - 8.6%	5.6% - 7.1%	9.4% - 11.0%	4.1% - 6.6%

8. After **Gas Valve 1** is set, repeat the same procedure for the second gas train by selecting **Set Gas Valve 2 - High** on the Service Screen.
9. Once the heater analysis is complete, test the safety shutoff device by turning the manual shutoff valve to the OFF position and ensuring that the heater shuts down and registers an alarm. Open the manual shutoff valve and reset the control.

10. Repeat the same procedure for propane gas. Reference the Dual Fuel Switching Instructions on pages 10 and 11 of this manual.
11. Turn the main power off to the boiler and replace the flue temperature sensor into the flue pipe connection.
12. Place the boiler back into normal operation.

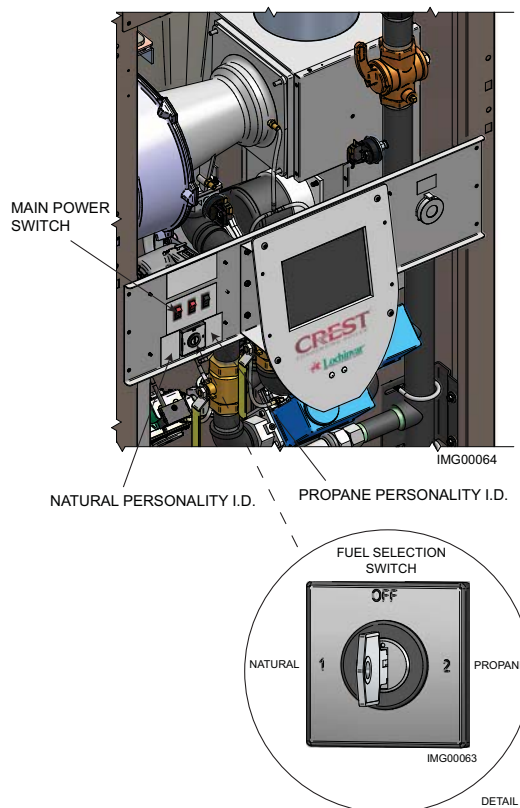
#### WARNING

You must replace the flue gas temperature sensor to prevent flue gas spillage into the room. Failure to comply could result in severe personal injury, death, or substantial property damage.

### Dual fuel switching instructions

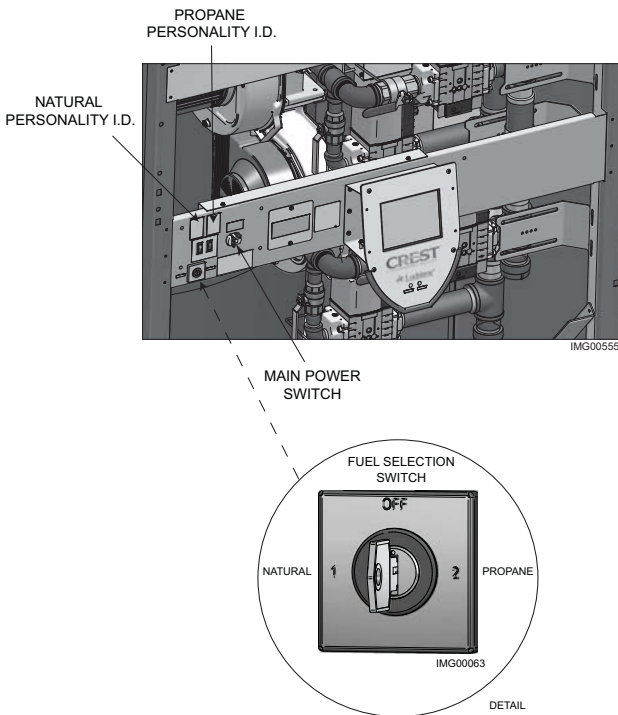
1. Turn the main power off to the boiler by placing the "On/Off" switch in the OFF position (FIG.'s 2-2A and 2-2B).
2. Using the fuel selector switch (FIG.'s 2-2A and 2-2B), select the desired fuel.

**Figure 2-2A** Fuel Selector Switch - Models 2.5 - 3.5



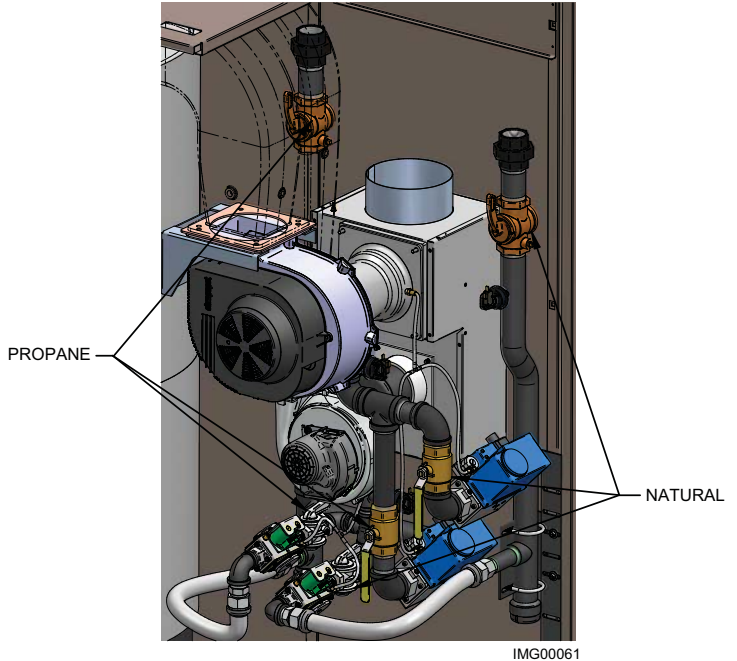
## 2 Start-up *(continued)*

**Figure 2-2B Fuel Selector Switch - Models 4.0 - 5.0**



3. Turn off all ball valves (3 total) for the fuel not in use (FIG. 2-3).

**Figure 2-3 Ball Valves**



4. Turn on the ball valves for the ones in use (3 total).
5. Turn the main power ON.
6. Using the Touch Screen, accept the appropriate personality identification as shown in FIG. 2-4.

**Figure 2-4 Personality Plug Screen**



### Personality Plug

This screen indicates that the personality plug has changed or is missing. To ensure that the correct personality plug is installed, reference the label located to the left of the display. By pressing the Accept button you are verifying that the personality plug ID# below is correct. If the wrong personality plug is accepted, the boiler will not operate properly.

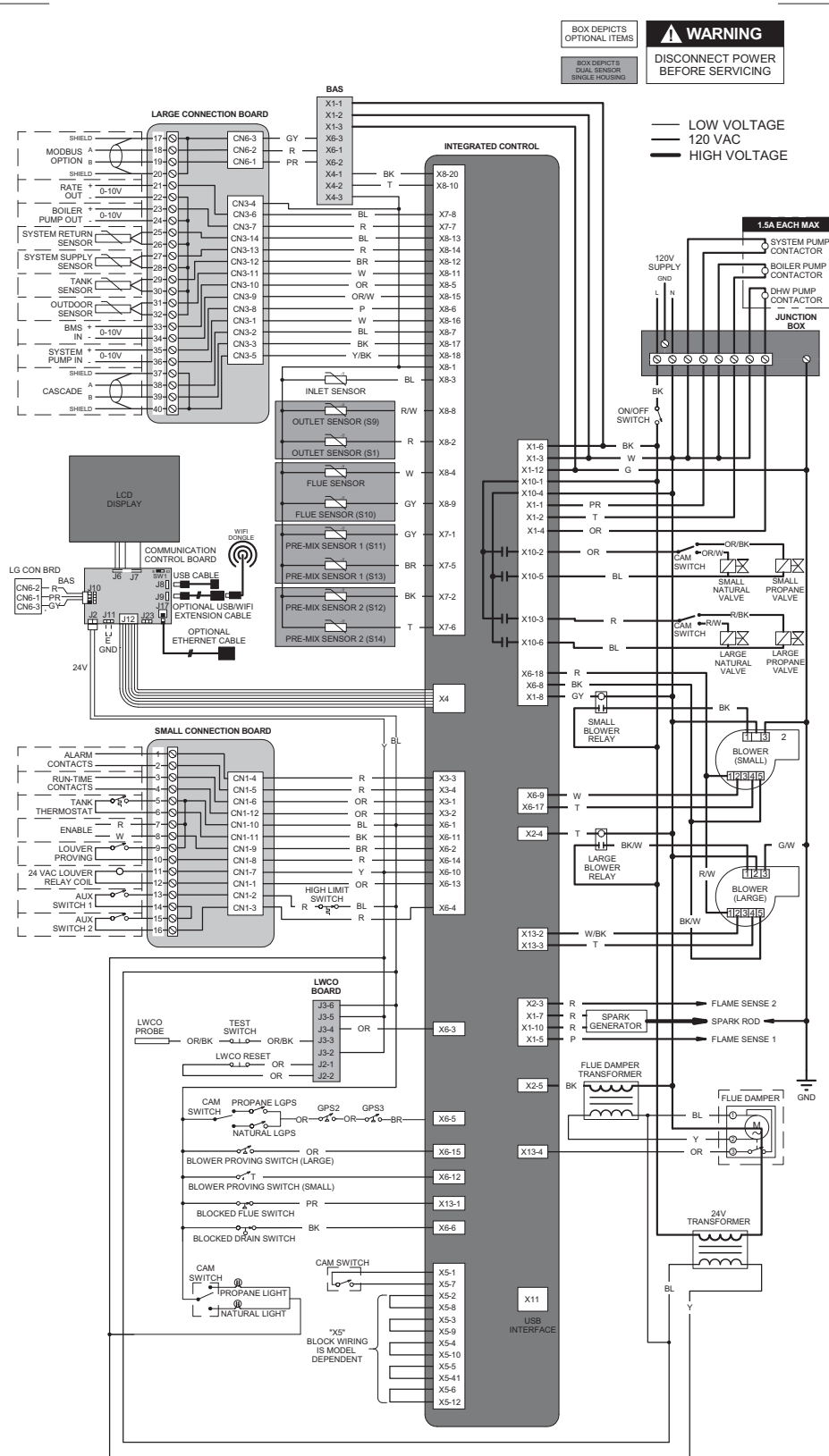
Previous Personality Plug ID # 8

Current Personality Plug ID # 0

Accept

# 3 Diagrams

Figure 3-1 Wiring Diagram\_2.5 - 3.5 Models

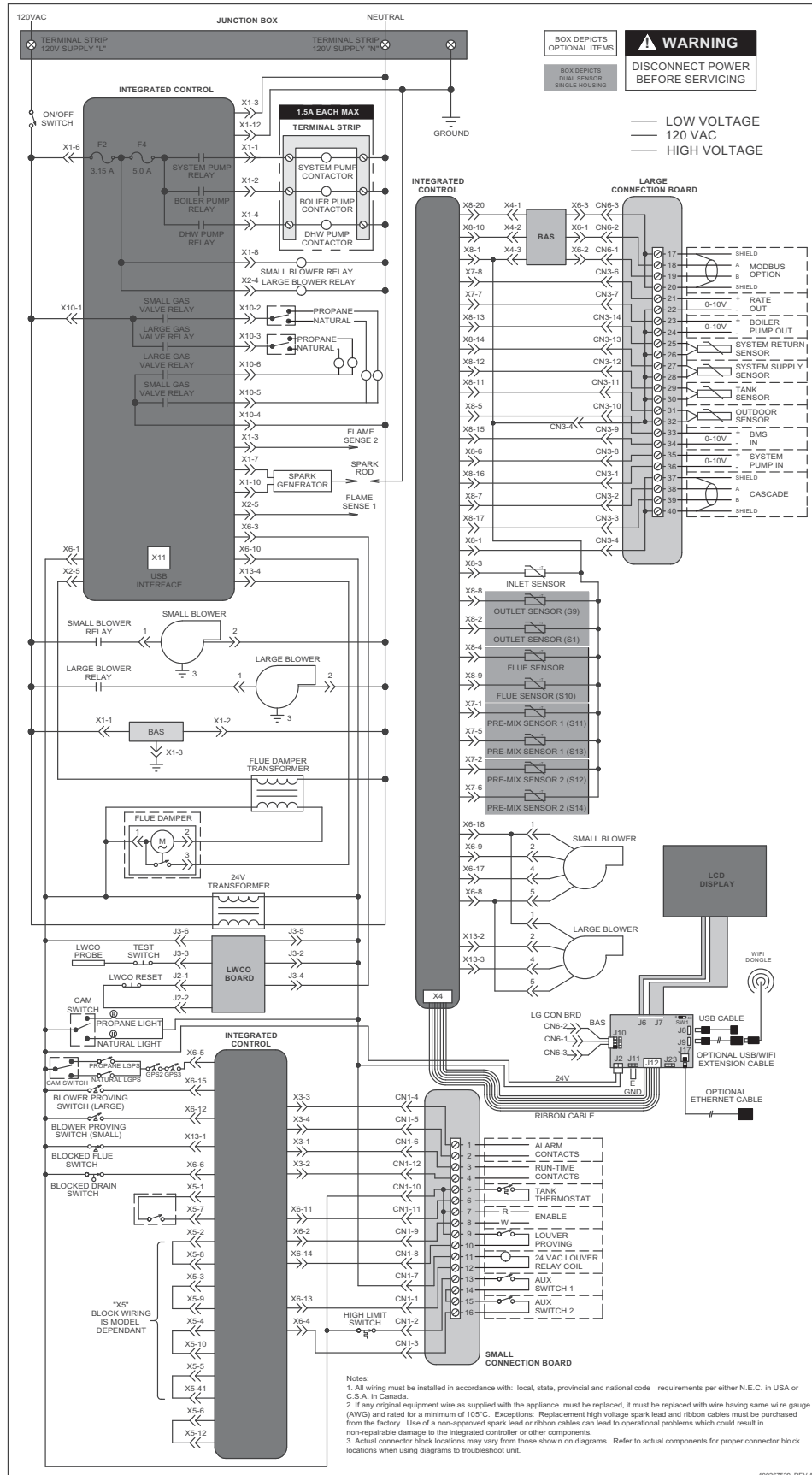


Notes:

1. All wiring must be installed in accordance with: local, state, provincial and national code requirements per either N.E.C. in USA or C.S.A. in Canada.
2. If any original equipment wire as supplied with the appliance must be replaced, it must be replaced with wire having same wire gauge (AWG) and rated for a minimum of 105°C. Exceptions: Replacement high voltage spark lead and ribbon cables must be purchased from the factory. Use of a non-approved spark lead or ribbon cables can lead to operational problems which could result in non-repairable damage to the integrated controller or other components.
3. Actual connector block locations may vary from those shown on diagrams. Refer to actual components for proper connector block locations when using diagrams to troubleshoot unit.

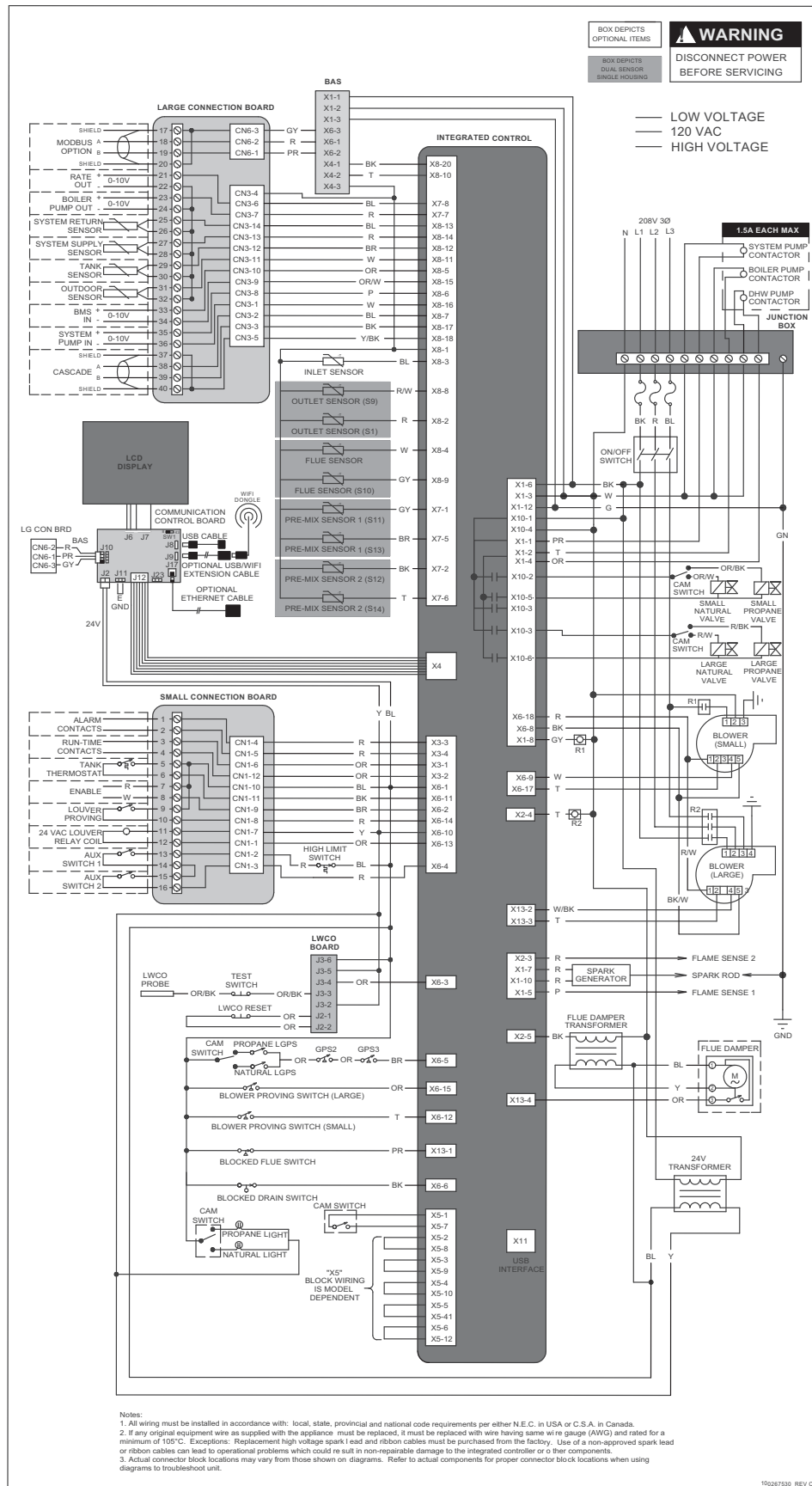
# 3 Diagrams (continued)

Figure 3-2 Ladder Diagram\_2.5 - 3.5 Models



# 3 Diagrams (continued)

Figure 3-3 Wiring Diagram\_4.0 Model

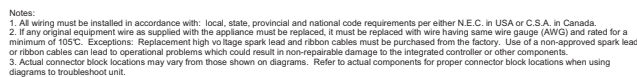






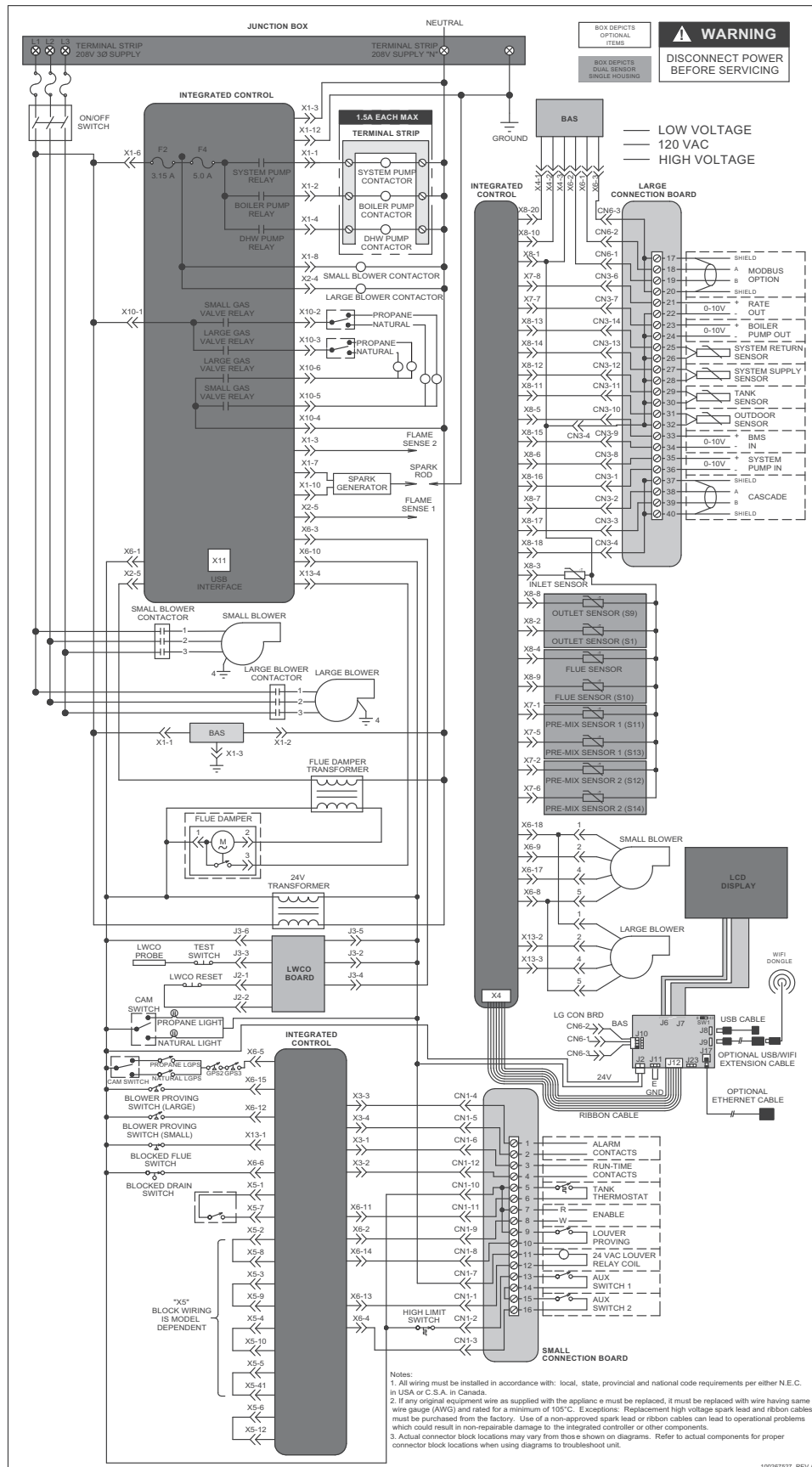
**Figure 3-5** *Wiring Diagram\_5.0 Model*

**Figure 3-5** *Wiring Diagram\_5.0 Model*



# 3 Diagrams (continued)

Figure 3-6 Ladder Diagram\_5.0 Model



# Notes

# Notes

**Revision Notes:** Revision A (ECO #C08841) initial release.

Revision B (EC) #C10391 reflects the update of wiring and ladder diagrams on pages 12 and 13.

Revision C (ECO C11685) reflects the addition of models 4.0 and 5.0.

Revision D (Change #500001029) reflects the removal of Models 1.5 and 2.0 along with updates to the control.