



User's Information Manual

Models: 1250 - 4000

Series: 100 & 101



Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury, or death.

-- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

-- **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 nearby 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.

Save this manual for future reference.

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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 and the Armor 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 appliance 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 appliance – Please have the appliance model and serial

number from the appliance rating plate.

Consider piping and installation when determining appliance 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 nearby 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.

⚠ WARNING DO NOT install units in rooms or environments that contain corrosive contaminants (see Table 1B on page 5). Failure to comply could result in severe personal injury, death, or substantial property damage.

⚠ WARNING The California Safe Drinking Water and Toxic Enforcement Act requires the Governor of California to publish a list of substances known to the State of California to cause cancer, birth defects, or other reproductive harm, and requires businesses to warn of potential exposure to such substances.

This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. This appliance can cause low level exposure to some of the substances listed in the Act.

When servicing appliance –

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

Appliance operation –

- Do not block flow of combustion or ventilation air to the appliance.
- 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 appliance 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.

Please read before proceeding *(continued)*

Check/control water chemistry

NOTICE

Conduct water quality testing prior to installing the appliance. Various solutions are available to adjust water quality.

See the following table for properly operating the appliance with the appropriate water chemistry. Good water quality will help extend the life of the appliance by reducing the effects of scale buildup and corrosion.

Table 1A Water Chemistry

WATER CHEMISTRY		
Specification	Range	Requirement
Hardness	< 5 gpg	Follow recommendations detailed below (See Notice 3)
	5 to 12 gpg	Use Table 6C* for pump recommendation
	12 to 15 gpg	Use Table 6C* for pump recommendation
	> 15 gpg	Water softening system required (See Notice 4)
Dissolved Solids	< 350 ppm	Hardness level must be met
pH Level	6.5 to 8.5	Acceptable range
Chloride	< 150 ppm	Acceptable range
*located in the Installation & Operation Manual		

NOTICE

- Do not use the water heater to directly heat swimming pool or spa water.
- At initial fill and during water heater start-up and testing, check system thoroughly for any leaks. Repair all leaks before proceeding further.
- When water hardness levels are less than 5 gpg or 85.5 mg/l, the following is recommended:
 - Flush and clean existing water heating system prior to installation.
 - Inspect and, if necessary, replace the anodes in any existing tanks.
 - Install a Y-strainer on the inlet of each water heater as detailed in Section 6.
 - Limit the run time of the hot water recirculation loop.
 - Filter the hot water recirculation loop to a level of 10 microns. CAUTION: Check recirculation pump size to verify it is sized for filter addition and upsize if necessary.
- When water softener is required, a Template Assisted Crystallization system is recommended.

1 Prevent combustion air contamination

⚠ WARNING If the appliance combustion air inlet is located in any area likely to cause contamination, or if products which would contaminate the air cannot be removed, you must have the combustion air and vent re-piped and terminated to another location. Contaminated combustion air will damage the appliance, resulting in possible severe personal injury, death, or substantial property damage.

⚠ WARNING If the appliance combustion air inlet is located in a laundry room or pool facility, for example, these areas will always contain hazardous contaminants.

Pool and laundry products and common household and hobby products often contain fluorine or chlorine compounds. When these chemicals pass through the appliance, they can form strong acids. The acid can eat through the appliance wall, causing serious damage and presenting a possible threat of flue gas spillage or water leakage into the building.

Please read the information listed in Table 1B. If contaminating chemicals will be present near the location of the appliance combustion air inlet, have your installer pipe the appliance combustion air and vent to another location, per the Armor Installation and Operation Manual.

⚠ WARNING To prevent the potential of severe personal injury or death, check for areas and products listed in Table 1B before installing the appliance or air inlet piping.

If contaminants are found, you **MUST**:

- Remove products permanently.
- OR—
- Relocate air inlet and vent terminations to other areas.

Table 1B Corrosive Contaminants and Sources

Products to avoid:
Spray cans containing chloro/fluorocarbons
Permanent wave solutions
Chlorinated waxes/cleaners
Chlorine-based swimming pool chemicals
Calcium chloride used for thawing
Sodium chloride used for water softening
Refrigerant leaks
Paint or varnish removers
Hydrochloric acid/muriatic acid
Cements and glues
Antistatic fabric softeners used in clothes dryers
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Adhesives used to fasten building products and other similar products
Areas likely to have contaminants
Dry cleaning/laundry areas and establishments
Swimming pools
Metal fabrication plants
Beauty shops
Refrigeration repair shops
Photo processing plants
Auto body shops
Plastic manufacturing plants
Furniture refinishing areas and establishments
New building construction
Remodeling areas
Garages with workshops

2 Maintenance schedule

Service technician (see the following pages for instructions)		Owner maintenance (see pages 6 - 7 for detailed instructions)	
ANNUAL START-UP	General: <ul style="list-style-type: none">• Address reported problems, if any• Inspect interior; clean and vacuum if necessary;• Clean condensate trap and fill with fresh water• Check for leaks (water, gas, flue, condensate)• Verify flue and air lines in good condition and sealed tight• Check system water pressure/system piping/expansion tank• Check control settings• Check the ignition and both flame sense electrodes (sand off any deposits; clean and reposition)• Check wiring and connections• Perform start-up checkout and performance verification per Section 10 of the Armor Installation and Operation Manual.• Flame inspection (stable, uniform)• Check flame signal (at least 8 microamps at high fire)• Test low water cutoff.	Daily	<ul style="list-style-type: none">• Check appliance area• Check pressure/temperature gauge
	If combustion or performance indicate need: <ul style="list-style-type: none">• Clean heat exchanger• Remove and clean burner using compressed air only• Clean the blower wheels	Monthly	<ul style="list-style-type: none">• Check vent piping• Check air piping• Check air and vent termination screens• Check relief valve• Check condensate drain system• Check Delta T• Remove debris from Y-strainer• Check building recirculation filter (if filter required)
		Every 6 months	<ul style="list-style-type: none">• Test low water cutoff• Reset button (low water cutoff)• Check appliance piping (gas and water) for leaks• Operate relief valve• Check water chemistry



Follow the maintenance procedures given throughout this manual. Failure to perform the service and maintenance or follow the directions in this manual could result in damage to the appliance or system, resulting in severe personal injury, death, or substantial property damage.

2 Maintenance schedule *(continued)*

Maintenance procedures

Appliance must be serviced and maintained

WARNING

The appliance must be inspected and started annually at the beginning of the heating season by a qualified service technician. In addition, the maintenance and care of the appliance designated on page 6 of this manual and explained on pages 7 through 8 must be performed to assure maximum appliance efficiency and reliability. Failure to service and maintain the appliance and system could result in equipment failure, causing possible severe personal injury, death, or substantial property damage.

NOTICE

The following information provides detailed instructions for completing the maintenance items listed in the maintenance schedule on page 6. In addition to this maintenance, the appliance must be serviced and started up at the beginning of each heating season by a qualified service technician.

Check appliance area

WARNING

To prevent potential of severe personal injury, death, or substantial property damage, eliminate all materials discussed below from the appliance vicinity and the vicinity of the appliance combustion air inlet. If contaminants are found:

Remove products immediately from the area. If they have been there for an extended period, call a qualified service technician to inspect the appliance for possible damage from acid corrosion.

If products cannot be removed, immediately call a qualified service technician to re-pipe vent and air piping and locate vent termination/air intake away from contaminated areas.

1. Combustible/flammable materials -- Do not store combustible materials, gasoline, or any other flammable vapors or liquids near the appliance. Remove immediately if found.
2. Air contaminants -- Products containing chlorine or fluorine, if allowed to contaminate the appliance intake air, will cause acidic condensate in the appliance. This will cause significant damage to the appliance if allowed to continue.

Read the list of potential materials listed in Table 1B on page 5 of this manual. If any of these products are in the room from which the appliance takes its combustion air, they must be removed immediately or the appliance combustion air (and vent termination) must be relocated to another area.

Check vent piping

1. Visually inspect the flue gas vent piping for any signs of blockage, leakage, or deterioration of the piping. Notify your qualified service technician at once if you find any problems.

WARNING

Failure to inspect the vent system as noted above and have it repaired by a qualified service technician can result in vent system failure, causing severe personal injury or death.

Check air piping

1. Visually inspect the air inlet elbow to be sure it is unobstructed. Inspect the entire length of air piping to ensure piping is intact and all joints are properly sealed.
2. Call your qualified service technician if you notice any problems.

Check relief valve

1. Inspect the appliance relief valve and the relief valve discharge pipe for signs of weeping or leakage.
2. If the relief valve often weeps, the expansion tank may not be working properly. Immediately contact your qualified service technician to inspect the appliance and system.

Check condensate drain system

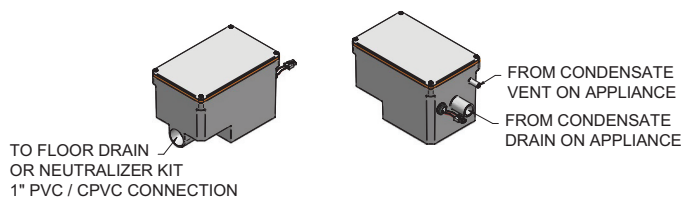
1. Inspect the condensate drain line, vent line, condensate PVC fittings, and condensate trap.

Flush condensate trap with water

1. Remove the four (4) screws securing the top cover to the condensate trap and remove the cover (FIG. 2-1).
2. Locate the plastic ball inside the float tube. Verify there is nothing under the ball causing it to not seat properly.
3. Fill with fresh water until the water begins to pour out of the drain.
4. Replace the top cover and the screws removed in Step 1.

2 Maintenance schedule

Figure 2-1 Condensate Trap



Test low water cutoff (if installed)

1. If the system is equipped with a low water cutoff, test the low water cutoff periodically during the heating season, following the low water cutoff manufacturer's instructions.

Reset button (low water cutoff)

1. Testing the low water cutoff shuts the unit off. Press the RESET button on the low water cutoff to turn the unit back on.

Check appliance piping (gas and water)

1. Remove the appliance front access door and perform a gas leak inspection per steps 1 through 7 of the Operating Instructions on page 9. If gas odor or leak is detected, immediately shut down the appliance following the procedure on page 9. Call a qualified service technician.
2. Visually inspect for leaks around water piping. Also inspect the circulators, relief valve, and fittings. Immediately call a qualified service technician to repair any leaks.



WARNING Have leaks fixed at once by a qualified service technician. Failure to comply could result in severe personal injury, death, or substantial property damage.

3. Replace the front access door.

Operate relief valve

1. Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.



WARNING To avoid water damage or scalding due to valve operation, a metal discharge line must be connected to the relief valve outlet and run to a safe place of disposal. This discharge line must be installed by a qualified heating installer or service technician in accordance with the instructions in the Armor Installation and Operation Manual. The discharge line must be terminated so as to eliminate possibility of severe burns or property damage should the valve discharge.

2. Lift the relief valve top lever slightly, allowing water to relieve through the valve and discharge piping.
3. If water flows freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the seat again to attempt to clean the valve seat. If the valve continues to weep afterwards, contact your qualified service technician to inspect the valve and system.
4. If water does not flow from the valve when you lift the lever completely, the valve or discharge line may be blocked. Immediately shut down the appliance, following the operating instructions on page 9 of this manual. Call your qualified service technician to inspect the appliance and system.

3 Operating instructions

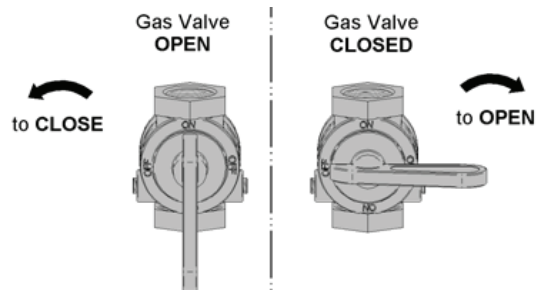
FOR YOUR SAFETY READ BEFORE OPERATING

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

4 SMART TOUCH CON•X•US Interface

w/Armor CON•X•US Interface

The Home Screen displays basic information on how the unit is running. It is divided into the following sections: Status, Demand, Modulation, Sensors, and Navigation.

Figure 4-1 Home Screen



- The **Status** Section is located on the top left of the screen and displays how the unit is currently running (i.e. Off, Stand-by, Blocking, and Lockout) including: current driving demand, the next Hot Water Setback scheduled, the reason for any blocking or lockout, and a power button.
- The **Demand** Section is located on the bottom left of the screen and displays information about the targets and limits of the current demand being serviced.
- The **Modulation** Section is located on the top right of the screen and displays the target modulation of the unit. This section also includes target and actual fan speeds.
- The **Sensor** Section is located on the bottom right of the screen and displays both factory installed and field installed sensor including: Inlet Water Temperature, Delta T Water Temperature, Outlet Water Temperature, Flue Temperature, and HW Tank Temperature.
- The **Navigation** Section is located down the left side of the screen. There are five (5) sections located below the Lochinvar icon: Home, View, Setup, Information (About), and Settings. The Home Section is the screen shown above. The View Section provides more detailed information including subsections for: History, Cascade, Graphing, and a complete list of current Sensor Values. The Setup Section has several screens to aid in setting up the appliance. The Setup Section includes screens for adjusting: Set Points, Pump Settings, Cascade, BMS, Ramp Delay, and Night Setback. The Information Section provides information about the hardware and software including the current software version of the interface, the version of the appliance control, and the CON•X•US device serial number. The Setting Section enables several interface setup features including: Time Setup, Temperature Unit Select, Loch'n Link, System Update, and WiFi Setup.

Notes

Revision Notes: Revision A (PCP #300022340 / CN #500012474) initial release.

Revision B (PCP #3000024735 / CN #500014579) reflects an update to the series information.

Revision C (PCP #3000028201 / CN #500017801) reflects an update to the Home Screen and text on page 9.

Revision D (PCP #3000030779 / CN #500020179) reflects an update to Table 1A and the Owner Maintenance section on page 6.

Revision E (PCP #3000058272 / CN#500044398) reflects the removal of the term "boiler".