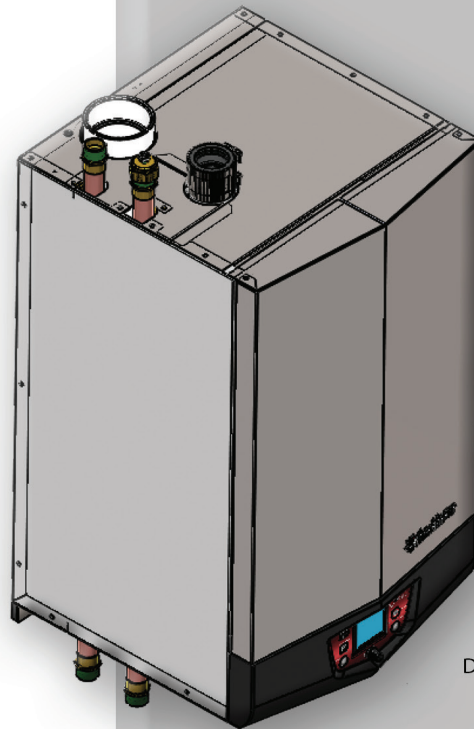




**User's Information Manual**  
**Models: 55 - 399**  
**Series: 100 & 101**



DIR #2000543091 00



**Lochinvar**<sup>®</sup>  
HIGH EFFICIENCY BOILERS & WATER HEATERS

**! 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.


**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

### NOTICE

The Knight Wall Hung Fire Tube Boiler Installation and Operation Manual along with the Knight Wall Hung Fire Tube Boiler Service Manual are for use only by a qualified heating installer/service technician. Refer only to this User's Information Manual for your reference. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure to hazardous materials) or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instruction before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

### 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

DO NOT install units in rooms or environments that contain corrosive contaminants (see Table 1 on page 4). Failure to comply could result in severe personal injury, death, or substantial property damage.

### Boiler service and maintenance –

- 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. This boiler is equipped with a control which will automatically shut down the boiler should air or vent be blocked. If vent or air blockage is easily accessible and removable, remove it. The boiler should attempt to restart. If blockage is not obvious or cannot be removed, have the boiler and system checked by a qualified service technician.
- Should overheating occur or gas supply fail to shut off, do not turn off or disconnect electrical supply to the 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.
- This product burns gas to produce heat. The appliance must be properly installed, operated, and maintained to avoid exposure to appreciable levels of carbon monoxide and the installer is required to confirm that at least one carbon monoxide alarm is installed in the living space before the appliance is put into operation. It is important for the carbon monoxide alarms to be installed, maintained, and replaced following the alarm manufacturer's instructions and applicable local codes

### Boiler water –

- Thoroughly flush the system (without boiler connected) to remove sediment. The high-efficiency heat exchanger can be damaged by build-up or corrosion due to sediment.
- Do not use petroleum-based cleaning or sealing compounds in the boiler system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
- Do not use “homemade cures” or “boiler patent medicines”. Serious damage to the boiler, personnel, and/or property may result.
- Continual fresh make-up water will reduce boiler life. Mineral buildup in the heat exchanger reduces heat transfer, overheats the stainless steel heat exchanger, and causes failure. Addition of oxygen carried in by makeup water can cause internal corrosion. Leaks in boiler or piping must be repaired at once to prevent makeup water.

### Freeze protection fluids –

- NEVER use automotive antifreeze. Use only inhibited propylene glycol solutions, which are specifically formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems.

# 1 Prevent combustion air contamination

**⚠ WARNING** If the boiler 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 boiler, resulting in possible severe personal injury, death, or substantial property damage.

**⚠ WARNING** If the boiler 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 boiler, they can form strong acids. The acid can eat through the boiler wall, causing serious damage and presenting a possible threat of flue gas spillage or boiler water leakage into the building.

Please read the information listed in Table 1. If contaminating chemicals will be present near the location of the boiler combustion air inlet, have your installer pipe the boiler combustion air and vent to another location, per the Knight Wall Hung Fire Tube Boiler Installation and Operation Manual.

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

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

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

**Table 1 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

<b>Service technician</b> (see the Knight Wall Hung Fire Tube Boiler Service Manual)		<b>Owner maintenance</b> (see pages 6 - 8 for detailed instructions)	
<b>ANNUAL START-UP</b>	<b>General:</b>	<b>Daily</b>	<ul style="list-style-type: none"> <li>• Check boiler area</li> <li>• Check pressure/temperature gauge</li> </ul>
	<ul style="list-style-type: none"> <li>• Reported problems</li> <li>• Inspect interior; clean and vacuum if necessary</li> <li>• Clean condensate trap and fill with fresh water</li> <li>• Check for leaks (water, gas, flue, condensate)</li> <li>• Verify flue and air lines in good condition and sealed tight</li> <li>• Check system water pressure/system piping/expansion tank</li> <li>• Check fill water meter</li> <li>• Test boiler water. When test indicates, clean system water with approved system restorer following manufacturer's information</li> <li>• Check control settings</li> <li>• Ignition and flame sense electrodes (sand off any deposits; clean and reposition)</li> <li>• Wiring and connections</li> <li>• Perform start-up checkout and performance verification per Section 10 in the Knight Fire Tube Installation and Operation Manual.</li> <li>• Flame inspection (stable, uniform)</li> <li>• Flame signal (at least 4 mA)</li> <li>• Clean the heat exchanger if flue temperature is more than 54°F above return water temperature.</li> </ul>	<b>Monthly</b>	<ul style="list-style-type: none"> <li>• Check vent piping</li> <li>• Check air piping</li> <li>• Check air and vent termination screens</li> <li>• Check relief valve</li> <li>• Check condensate drain system</li> </ul>
	<p><b>If combustion or performance indicate need:</b></p> <ul style="list-style-type: none"> <li>• Clean heat exchanger</li> <li>• Remove and clean burner using compressed air only</li> <li>• Clean the blower wheel</li> </ul>	<b>Periodically</b>	<ul style="list-style-type: none"> <li>• Test low water cutoff (if used)</li> <li>• Reset button (low water cutoff)</li> </ul>
		<b>Every 6 months</b>	<ul style="list-style-type: none"> <li>• Check boiler piping (gas and water) for leaks</li> <li>• Operate relief valve</li> </ul>
		<b>End of season months</b>	<ul style="list-style-type: none"> <li>• Shut boiler down (unless boiler used for domestic hot water)</li> </ul>


**WARNING**

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 boiler or system, resulting in severe personal injury, death, or substantial property damage.

## 2 Maintenance schedule

### Maintenance procedures

#### Boiler must be serviced and maintained

**WARNING** The boiler 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 boiler designated on page 5 of this manual and explained on pages 6 through 8 must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler 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 5. In addition to this maintenance, the boiler must be serviced and started up at the beginning of each heating season by a qualified service technician.

#### Check boiler area

**WARNING** To prevent potential of severe personal injury, death, or substantial property damage, eliminate all materials discussed below from the boiler vicinity and the vicinity of the boiler 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 boiler 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 boiler. Remove immediately if found.
2. Air contaminants -- Products containing chlorine or fluorine, if allowed to contaminate the boiler intake air, will cause acidic condensate in the boiler. This will cause significant damage to the boiler if allowed to continue.

Read the list of potential materials listed in Table 1 on page 4 of this manual. If any of these products are in the room from which the boiler takes its combustion air, they must be removed immediately or the boiler combustion air (and vent termination) must be relocated to another area.

#### Check pressure/temperature gauge

1. Make sure the pressure reading on the boiler pressure/temperature gauge does not exceed 24 psi. Higher pressure may indicate a problem with the expansion tank.
2. Contact a qualified service technician if problem persists.

#### 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 termination 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 boiler 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 boiler and system.

#### Check condensate drain system

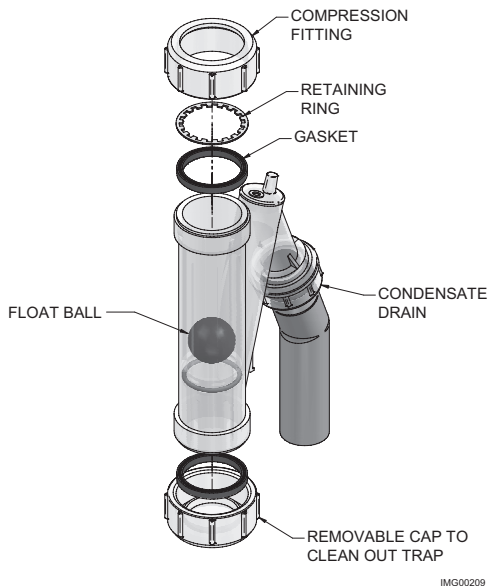
##### Inspect/check condensate lines and fittings

1. Inspect the condensate drain line, condensate PVC fittings and condensate trap (FIG. 2-1).



## 2 Maintenance schedule *(continued)*

**Figure 2-1 Condensate Trap**



### Condensate drain

1. This boiler is a high efficiency appliance that produces condensate.
2. The bottom of the boiler has a 1 1/4 inch pipe for connection of the condensate trap (FIG. 2-2).
3. The provided condensate trap is equipped with a ball that acts as a seal against harmful flue gases escaping in case there is no condensate in the trap. If this ball is not present, flue gases may be able to pass through the trap when there is no condensate present, resulting in an unsafe environment. It is important to check and make sure the ball is located in the trap, acting as a seal against flue gases.
4. Fill condensate trap with enough water to make the ball float (FIG. 2-1).
5. Loosen compression fitting (FIG. 2-1).
6. Slide the condensate trap onto the condensate drain at the bottom of the unit. As the trap is pressed on, a stainless steel retaining ring will engage the drain pipe allowing the trap to be pushed on, but not pulled off.
7. Tighten compression fitting.
8. Slope condensate tubing down and away from the boiler into a drain or condensate neutralizing filter. Condensate from the Knight Wall Hung Fire Tube boiler will be slightly acidic (typically with a pH from 3 to 5). Install a neutralizing filter if required by local codes.  
A Neutralizer Kit is available from the factory.
9. Do not expose condensate line to freezing temperatures.
10. Use only plastic tubing or piping as a condensate drain line (FIG. 2-2).

11. A condensate removal pump is required if the boiler is below the drain. When installing a condensate pump, select one approved for use with condensing boilers and furnaces. The pump should have an overflow switch to prevent property damage from condensate spillage. The switch should be wired in series with the air pressure switch inside the boiler.

#### NOTICE

Use materials approved by the authority having jurisdiction. In the absence of other authority, PVC and CPVC pipe must comply with ASTM D1785 or D2845. Cement and primer must comply with ASME D2564 or F493. For Canada use CSA or ULC certified PVC or CPVC pipe, fittings, and cement.

#### NOTICE

To allow for proper drainage on large horizontal runs, a second line vent may be required and tubing size may need to increase to 1 inch.

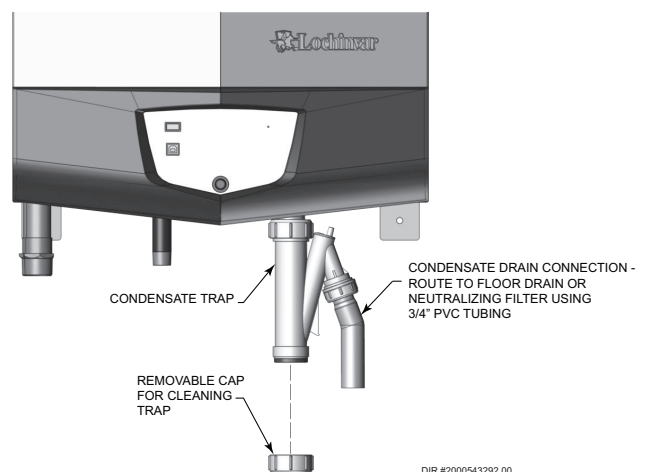
The condensate line must remain unobstructed, allowing free flow of condensate. If condensate is allowed to freeze in the line or if the line is obstructed in any other manner, condensate can exit from the condensate trap vent opening, resulting in potential water damage to property.

#### WARNING

The stainless steel retaining ring must be installed between the rubber sealing gasket and the compression fitting (FIG. 2-1). The compression fitting must be tightened.

The condensate trap must have the float ball (FIG. 2-1) in place during all times of boiler operation to avoid flue gas emission from the condensate drain line. Failure to ensure the float ball is in place could result in severe personal injury or death.

**Figure 2-2 Condensate Disposal**



DIR #2000543292 00

## 2 Maintenance schedule

### 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 boiler piping (gas and water)

1. Remove the boiler 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 boiler following the procedures 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 Knight Wall Hung Fire Tube Boiler 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. Read the boiler pressure/temperature gauge to make sure the system is pressurized. 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 boiler, following the operating instructions on page 9 of this manual. Call your qualified service technician to inspect the boiler and system.

### Shut boiler down (unless boiler is used for Domestic Water)

1. Follow "To Turn Off Gas to Appliance" on page 9 of this manual.
2. Do not drain the system unless exposure to freezing temperatures will occur.
3. Do not drain the system if it is filled with an antifreeze solution.
4. DO NOT shut down boilers used for domestic water heating, they must operate year-round.



### 3 Operating instructions

Figure 3-1 Operating Instructions\_ Models WH56 - WH286

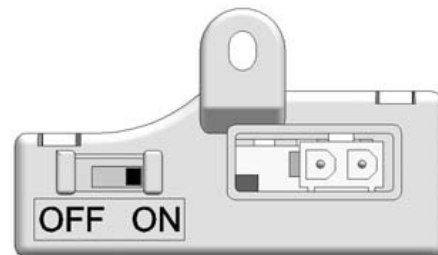
#### FOR YOUR SAFETY READ BEFORE OPERATING

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

- |  |  |
|--|--|
| <p>A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do <u>not</u> try to light the burner by hand.</p> <p>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.</p> <p><b>WHAT TO DO IF YOU SMELL GAS</b></p> <p>Do not try to light any appliance.</p> <p>Do not touch any electric switch; do not use any phone in your building.</p> | <p>Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.</p> <p>If you cannot reach your gas supplier, call the fire department.</p> <p>C. Use only your hand to move the gas control switch. Never use tools. If the switch will not move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.</p> <p>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.</p> |
|--|--|

#### OPERATING INSTRUCTIONS

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. <b>STOP!</b> Read the safety information above on this label.</li> <li>2. Set the thermostat to lowest setting.</li> <li>3. Turn off all electric power to the appliance.</li> <li>4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.</li> <li>5. Remove front door.</li> <li>6. Move switch to the "OFF" position.</li> <li>7. Wait five (5) minutes to clear out any gas. If you then smell gas, <b>STOP!</b> Follow "B" in the safety information above this label. If you don't smell gas, go to next step.</li> </ol> | <ol style="list-style-type: none"> <li>8. Move the switch to the "ON" position.</li> <li>9. Install front door.</li> <li>10. Turn on all electric power to appliance.</li> <li>11. Set thermostat to desired setting.</li> <li>12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.</li> </ol> |
|--|---|



#### TO TURN OFF GAS TO APPLIANCE

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Set the thermostat to lowest setting.</li> <li>2. Turn off all electric power to the appliance if service is to be performed.</li> <li>3. Remove front door.</li> </ol> | <ol style="list-style-type: none"> <li>4. Move switch the "OFF" position.</li> <li>5. Install front door.</li> </ol> |
|---|--|

## 3 Operating instructions

Figure 3-2 Operating Instructions\_ Model WH400

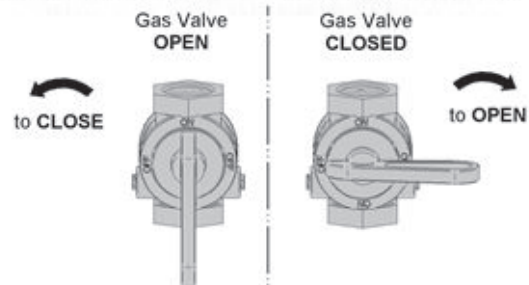
### FOR YOUR SAFETY READ BEFORE OPERATING

**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 top cover.
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 top cover.
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 top cover.
4. Turn gas shut off valve counterclockwise to "OFF". Handle will be perpendicular to pipe. Do not force
5. Install top cover.

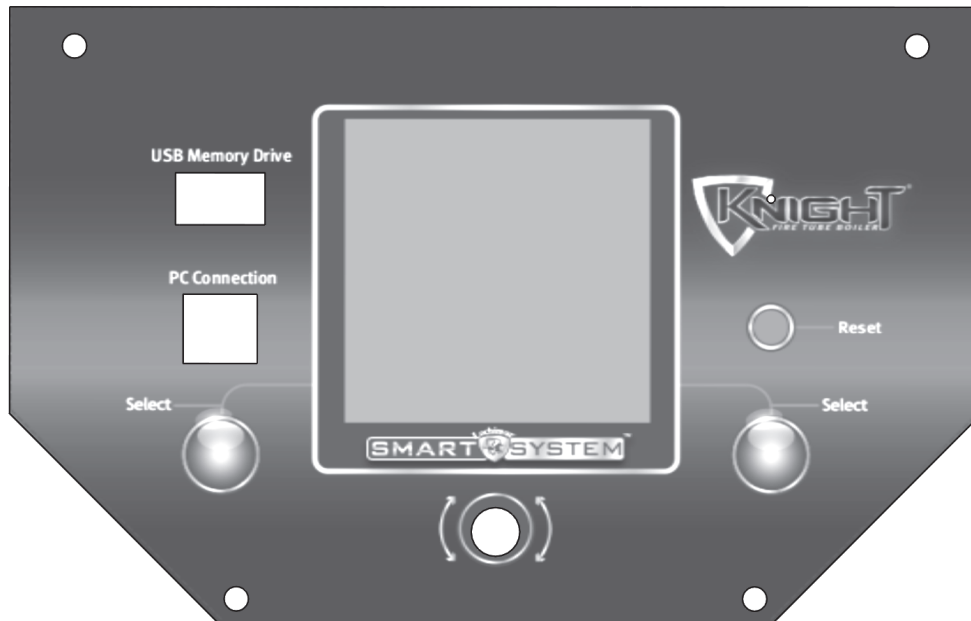
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## 4 SMART SYSTEM control module

### **SMART SYSTEM™ Knight Wall Hung Fire Tube Boiler control module**

Use the control panel (FIG. 4-1) to set temperatures, operating conditions, and monitor boiler operation.

**Figure 4-1** Control Panel



DIR #2000544469 00

The information on the bottom of the display shows the functions of the two SELECT keys (on either corner), and the NAVIGATION dial (in the center):

MENU = Left SELECT Key  
 SETPOINTS = NAVIGATION Dial - Pressing Down  
 SHDN = Right SELECT Key

#### Access modes

##### User

The user can adjust space heating and tank target temperatures by pressing the NAVIGATION dial when "↓SETPOINTS" is flashing at the bottom of the display. The date and time, and the temperature units can also be changed (see page 11).

##### Installer

Most parameters are available only to the installer, accessible by entering the installer password, see the Knight Wall Hung Fire Tube Boiler Service Manual.

**Saving parameters** (reference the Parameter Table in the Knight Wall Hung Fire Tube Boiler Service Manual)

#### NOTICE

Please note that the brackets ([]) denote screen status.

#### To save parameters and exit programming:

Press the RIGHT SELECT [SAVE] key and then press the RIGHT SELECT [HOME] key.

#### To enter a parameter and continue programming:

Press the RIGHT SELECT [SAVE] key 1 time to return to the parameter listings; press again to return to the menu listings. Remember to press the RIGHT SELECT [HOME] key when finished programming in order to save the changes made.

See the Knight Wall Hung Fire Tube Boiler Service Manual for a detailed description of parameters and access modes.

#### Set space heating operation

##### Determine controlling sensor

For space heating systems, the temperature control can be based on one of three sensors; the inlet, outlet, or system supply sensor. The SMART SYSTEM control is programmed at the factory to control the temperature of the outlet sensor. The control will automatically switch to the system supply sensor once it is connected. If it is desired to base the temperature control on the inlet sensor, the appropriate parameter must be changed in the control. See the Knight Wall Hung Fire Tube Boiler Service Manual for a detailed explanation of this procedure.

## 4 SMART SYSTEM control module *(continued)*

### Verify space heat circulator mode

The Space Heating Mode controls both the system pump (if connected), and the boiler pump. When the SMART SYSTEM control receives a space heating call for heat, it turns on the system pump. If the boiler is not heating an indirect DHW (Domestic Hot Water) tank, and the set point is not met, it also turns on the boiler pump. After the space heating call for heat ends, the system pump continues to run for a short period of time. The system pump can be programmed to run continuously, except during outdoor shutdown. If the boiler pump was running, it continues to run for a short period of time as well. These pump delays are factory set to 30 seconds. If different delays are desired, the appropriate parameters in the control must be changed. See the Knight Wall Hung Fire Tube Boiler Service Manual for a detailed explanation of this procedure.

### Adjust set point temperature(s)

#### NOTICE

Please note that the brackets ([]) denote screen status.

The NAVIGATION dial may be used during normal operation to adjust the space heating and tank set point temperatures.

1. From the Status Screen press the NAVIGATION dial.
2. Turn the NAVIGATION dial counterclockwise to select the appropriate set point.
3. Press the NAVIGATION dial to adjust the temperature.
4. Once the desired temperature is displayed, press the RIGHT SELECT [SAVE] key.
5. If necessary repeat Steps 3 and 4 to make adjustments to additional set points.
6. Press the RIGHT SELECT [HOME] key to upload the changes.
7. If the RIGHT SELECT [SAVE] key is not pressed, the new settings will be discarded.

### Set domestic hot water (DHW) operation

#### Verify DHW mode

There are two (2) modes of operation for DHW. In Normal Mode, when a DHW demand begins, the control will start the DHW pump, turn off the boiler pump (if running), and modulate to bring the outlet temperature to the DHW boiler set point. The maximum firing rate may be limited in this mode if desired.

In Zone Mode it is assumed that the indirect DHW tank is piped as a zone on the primary loop. When a DHW demand begins, the control will turn on the DHW pump output, and raise the system temperature set point to the DHW boiler set point (if higher). The boiler pump will be turned on. The system pump may be forced on, forced off, or not changed, depending on the System Pump Mode selected (reference the Knight Wall Hung Fire Tube Service Manual for details). In this mode, any low temperature zones (such as radiant heating) may need additional controls to limit the water temperature sent to those zones.

### Set DHW boiler target temperature

When in the DHW Mode, the control will modulate to maintain the boiler outlet temperature or system supply temperature to a set point. This set point is set at the factory to 180°F. If a different set point is desired, the appropriate parameter in the control must be changed. See the Knight Wall Hung Fire Tube Boiler Service Manual for a detailed explanation of this procedure.

### Set maximum DHW fan speed

If the rated input of the indirect tank is less than the maximum output of the boiler, change the maximum DHW fan speed setting to limit the boiler output accordingly, see the Knight Wall Hung Fire Tube Boiler Service Manual for a detailed explanation of this procedure.

### Set clock

#### NOTICE

Please note that the brackets ([]) denote screen status.

The SMART SYSTEM control has a built-in clock that it uses for its night setback feature and for logging events. This clock must be set when the boiler is installed, and anytime the boiler has been powered off for more than 4 hours. Use the following procedure to set the clock:

1. Press and hold the LEFT SELECT [MENU] key for at least 5 seconds.
2. The display changes to read [PASSWORD], with four (4) zeros below it.
3. Press the RIGHT SELECT [SAVE] key.
4. The display will then show a menu with the time and date and temperature unit.
5. Press the NAVIGATION dial twice.
6. Turn the NAVIGATION dial to adjust the hours. Press the NAVIGATION dial.
7. Turn the NAVIGATION dial to adjust the minutes. Press the NAVIGATION dial.
8. Turn the NAVIGATION dial to adjust the month. Press the NAVIGATION dial.
9. Turn the NAVIGATION dial to adjust the date. Press the NAVIGATION dial.
10. Turn the NAVIGATION dial to adjust the year. Press the RIGHT SELECT [SAVE] key.
11. Press the RIGHT SELECT [HOME] key.

#### NOTICE

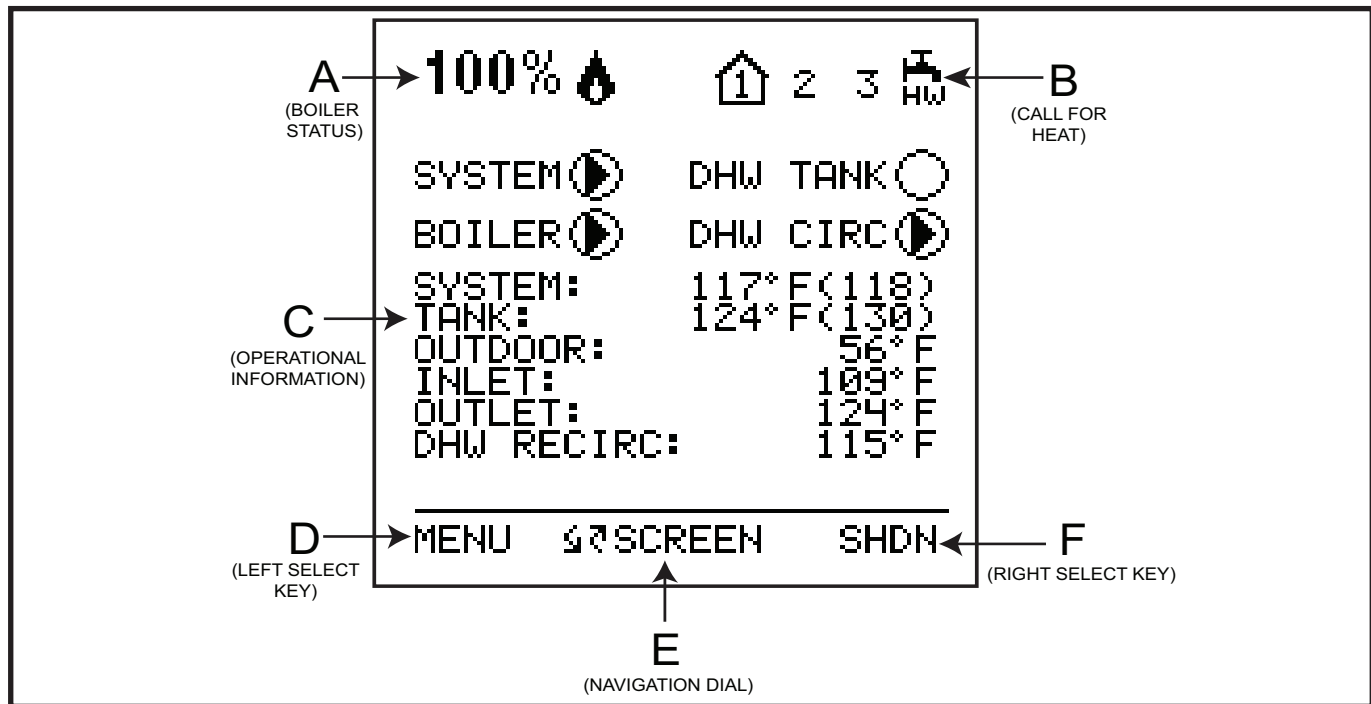
The internal clock does not adjust for Daylight Savings Time and therefore, will require a manual adjustment.

The clock is automatically updated whenever a PC is connected and the Win Pro-Installer program is started.



# 4 SMART SYSTEM control module

Figure 4-2 Status Display Screen



Status Display Screens		
NOTE: All screens show burner status, heat demands, lockout/blocking, pump status, and soft keys.		
Section	Display	Description
A (Boiler Status Bar)	STANDBY	The unit has not received a call for heat from a remote thermostat nor has it received a call for heat from a DHW thermostat.
	START	The unit has begun a burn cycle and is checking all safety circuits.
	PREPURGE	The unit has initiated a prepurge period on a call for heat.
	IGNITION	The unit has begun a spark period to ignite the main burner.
	% 🔥	The unit has fired and is running at the displayed percentage.
	POSTPURGE	The call for heat has been satisfied and the unit runs the fan for an additional postpurge period to clear the combustion chamber and vent system of residual flue products.
	SHUTDOWN	The unit has been placed in the OFF position.
	SETPOINT MET	The controlled temperature has exceeded its set point and its offset.
	BLOCKED	The unit has detected a condition that has temporarily interrupted the current call for heat.
B (Call for Heat Indicators)	1	Room Thermostat 1 has a call for heat.
	2	Room Thermostat 2 has a call for heat.
	3	Room Thermostat 3 has a call for heat.
	🏠 HW	The tank thermostat or sensor has a call for heat.
	🏠 🏠 🏠	Indicates which room thermostat demand has priority.
	🏠	The unit is being controlled by a 0 - 10V BMS signal.
	🏠	The member unit is supplying heat while in Cascade Mode.

## 4 SMART SYSTEM control module

Status Display Screens (cont'd)		
NOTE: All screens show burner status, heat demands, lockout/blocking, pump status, and soft keys.		
Section	Display	Description
<b>C</b> <b>(Operational Information)</b>	DETAILS SCREEN 1	a. SYSTEM TEMP b. TANK TEMP c. OUTDOOR TEMP d. INLET TEMP e. OUTLET TEMP f. DHW RECIRC TEMP - The temperature read by the DHW recirculation sensor (if connected).
	DETAILS SCREEN 2	a. DELTA T b. FLUE TEMP c. FLAME CURRENT d. FAN SPEED e. LOOP 1 TEMP - The temperature of Loop 1 reported by the MTLC control. f. LOOP 2 TEMP - The temperature of Loop 2 reported by the MTLC control. g. LOOP 3 TEMP - The temperature of Loop 3 reported by the MTLC control.
	I/O SCREEN	a. GAS PRESS SW - The state of the gas pressure switch. b. FLOW SW - The state of the flow switch. c. LOUVER RELAY - The state of the louver relay output. d. LOUVER SW - The state of the louver proving switch. e. BLOCKED DRAIN - The state of the blocked drain switch. f. GAS VALVE - The state of the gas valve output.
	BMS SCREEN	a. 0 - 10V BMS IN b. 0 - 10V RATE OUT c. BMS ADDRESS d. BMS CONTROL? e. SYS PUMP SPEED f. BLR PUMP OUT
	HISTORY SCREEN	a. SH RUN TIME - Total time running for Space Heat (SH). b. SH CYCLES - Total Space Heat (SH) demand cycles. c. DHW RUN TIME - Total time running for DHW. d. DHW CYCLES - Total DHW demand cycles. e. POWER TIME - Total time powered ON. f. IGNITIONS - Total number of successful ignitions. g. IGN ATTEMPTS - Total number of ignition attempts.
	LAST 10 FAULTS	a. FAULT NO. b. FAULT c. DATE d. TIME



## 4 SMART SYSTEM control module *(continued)*

### Status Display Screens *(cont'd)*

NOTE: All screens show burner status, heat demands, lockout/blocking, pump status, and soft keys.

Section	Display	Description
<b>C</b> (Operational Information cont.)	CASCADE STATUS	a. CASCADE STATUS b. CASCADE POWER c. PRESENT
	NIGHT SETBACK	a. TRIGGER 1 - Next Space Heat (SH) night setback trigger. b. TRIGGER 2 - Next DHW night setback trigger.
<b>D</b> (LEFT SELECT key function)	MENU	Press and hold the LEFT SELECT key for five (5) seconds to access the Parameter Settings Menu.
	HOME	Press the LEFT SELECT key to go back to the Home Status Screen and upload any changes.
	EXIT	Press the LEFT SELECT key to go back to the previous Menu Screen.
	YES	Press the LEFT SELECT key to accept current operation.
	SKIP	Press the LEFT SELECT key to skip / un-enable the current selected setback trigger.
	LIMITS	Press the LEFT SELECT key to access the High Limit Settings Menu.
<b>E</b> (NAVIGATION dial function)	MODIFY	Pressing the NAVIGATION dial will allow the installer to change the text.
<b>F</b> (RIGHT SELECT key function)	SHDN	Press the RIGHT SELECT key to turn the boiler OFF.
	ON	Press the RIGHT SELECT key to turn the boiler ON.
	NO	Press the RIGHT SELECT key to cancel the shutdown operation.
	SAVE	Press the RIGHT SELECT key to save the current change.
	HOME	Press the RIGHT SELECT key to return to the Status Screen and upload parameter changes.

**Revision Notes:** *Revision A (PCP #3000024795 / CN #500014734) initial release.*

*Revision B (PCP #3000056948 / CN #500043228) reflects the addition of a carbon monoxide advisory on page 3.*

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