



Glow

Brand™

Installation & Operation Manual

Models **B85, B120 & B160** *Condensing ASME Boiler*

To Installer: Affix this manual adjacent to the appliance.
To Consumer: Retain these instructions for future reference

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 neighbour's 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.

ANSI Z21.13-2017 CSA 4.9-2017



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Warranty

Homeowner Registration Form

Warranty Part Form

Commissioning Sheet

⚠ DANGER

Read and understand this entire document prior to proceeding with the installation of the Glow Boiler. Failure to follow the instructions outlined in this document will result in property damage, serious injury or death.

⚠ WARNING

This Boiler must be installed by a licensed, certified and trained heating technician or the Warranty is Void. Failure to properly install this unit may result in property damage, serious injury to occupants, or possibly death.

HAZARD SYMBOLS & DEFINITIONS

The following safety symbols are used in this manual.

⚠ DANGER

Indicates an imminently hazardous situation, which, if not avoided, will result in severe injury or death.

⚠ WARNING

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

⚠ CAUTION

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

⚠ NOTICE

Indicates a potentially hazardous situation, that, if not avoided, could result in property damage.

1. General Information**1.1 Prior to Installation**




1. Safe, reliable operation of this boiler depends upon installation by a professional heating contractor in strict accordance with this manual and the requirements of the authority having jurisdiction.
 - In the absence of an authority having jurisdiction, installation must be in accordance with this manual and the National Fuel Gas Code, ANSI Z223.1. In Canada, installation must be in accordance with the B149.1 Installation Code.
 - Where required by the authority having jurisdiction, this installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers (ANSI/ASME CSD-1).
2. Read Section 4 “Venting” to verify that the maximum combustion air and exhaust pipe lengths will not be exceeded in the planned installation.
3. Make sure that the boiler is correctly sized:
 - For heating systems employing convection radiation (baseboard or radiators), use an industry accepted sizing method such as the I=B=R Guide RHH published by the Air-Conditioning, Heating and Refrigeration Institute (AHRI).
 - For new radiant heating systems, refer to the radiant tubing manufacturer’s boiler sizing guidelines.
 - For system which includes an indirect water heater, make sure the boiler has the output called for by the indirect water heater manufacturer’s instructions.
4. All Glow Boilers are shipped from the factory configured for 0 - 4,500 ft. altitude. Use sea level input rate for 0 - 2,000 ft. For high altitude installation above 4,500 ft., contact Glow Brand Manufacturing.
5. All Glow Boilers are shipped from the factory configured for use with either natural gas or LP (where applicable). They **cannot** be field converted for use with a different gas.

! WARNING

Crystalline Silica- Certain components confined in the combustion chamber may contain this potential carcinogen. Improper installation, adjustment, alteration, service or maintenance can cause property damage, serious injury (exposure to hazardous materials) or death. Refer to Section 14 for information on handling instructions and recommended personal protective equipment. Installation and service must be performed by a qualified installer (who must read and follow the supplied instructions before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

! WARNING

VOID WARRANTY-This boiler must have water flowing through it whenever the burner is on or it will damage the unit and void the warranty. Failure to follow these instructions may result in serious injury or death

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 a direct 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 operate the remote control keypad. Never use tools. If the remote keypad doesn't work, do not try to repair it, call a qualified service technician. Forced or improper repair may result in a fire or explosion.

D. Do not use this appliance if any part has been underwater. 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 before proceeding.
2. Set the thermostat to the lowest setting.
3. Turn off all power to the electrical appliance.
4. This appliance does not have a pilot. It is equipped with a direct ignition device, which automatically lights the burner. Do not try to light the burner by hand.
5. Turn the manual valve located at the gas inlet of the appliance clockwise to "OFF"

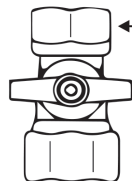
6. Wait (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
7. Turn the manual valve located at the gas inlet of appliance counterclockwise to "ON".
8. Turn on all electric power to the appliance.
9. Set the thermostat to desired setting.
10. 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 THE APPLIANCE

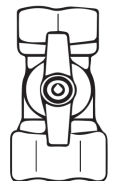
1. STOP! Read the safety information above before proceeding.
2. Set the thermostat to the lowest setting clockwise to "OFF".

3. Turn off all electric power to the appliance if service is to be performed.
4. Turn the manual valve at gas inlet of appliance to  "OFF"

Manual Gas Valve



CLOSED MANUAL VALVE
("OFF" POSITION)



OPEN MANUAL VALVE
("ON" POSITION)

“In the State of Massachusetts only”

For all horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned and operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed and on each additional level of the dwelling, building or structure served by the equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.
 - a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
 - a. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of 30 days to comply with the above requirements, provided, however, that during said 30 day period a battery operated carbon monoxide detector with alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, “GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS”.
4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

Notice prior to installation

This appliance must be installed by a licensed professional in accordance with the Massachusetts Plumbing and Fuel Gas Code 248 CMR Sections 2.00 and 5.00.

If you are not properly training, you must not install this unit.



WARNING



Flammable Vapors

FIRE AND EXPLOSION HAZARD



Can result in serious injury or death

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance can result in serious injury or death.

Vapors from flammable liquids can explode and catch fire causing death or severe burns.

Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near this appliance, or any other appliance or any possible ignition source.

Keep flammable products:

Vapors:

1. far from any possible ignition source,
2. in approved containers
3. tightly closed and
4. out of children's reach

1. cannot be seen,
2. are heavier than air
3. go a long way on the floor
4. can be carried away from other rooms to possible ignition sources by air currents

Boilers in residential garages must be installed and located, or protected, to avoid physical damage.

Read and follow boiler warnings and instructions. If owner's manual is missing contact the distributor or manufacturer.



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 vapours 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 neighbour's 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.

Minimum clearances from combustible construction.

0-inches sides, 0-Inches back. 0- inches top.

For closet installation, 0-inches front or for alcove installation.

This appliance is provided with a pressure relief valve, for safe operation of the appliance, the relief valve(s) must not be removed from its designated point of installation or plugged.

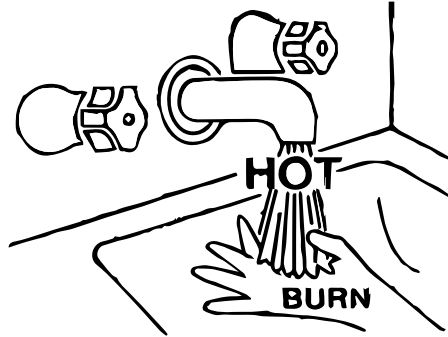
The pressure relief valve provided by the manufacturer shall be installed at the time of installation of the heater in the location specified by the manufacturer. Local codes shall govern installation of relief devices.

"Warning"

"This appliance must be installed in accordance with the local codes or, in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1, Natural Gas and Propane Installation Code'.



DANGER



The temperature at which injury occurs varies with the person's age and time of exposure. Water temperature over 125°F/52°C can cause severe burns instantly or death from scalding.

The slower response time of disabled persons increases the hazards to them. Never allow small children to use a hot water tap, or to draw their own bath water. Never leave a child or disabled person unattended in a bathtub or shower.

The appliance should be located in an area where the general public does not have access to the temperature control.

Lower water temperatures should be used to avoid the risk of scalding. It is further recommended, in all cases, that the domestic water temperature be set for the lowest temperature which satisfies the user's hot water needs. This will also provide the most energy efficient operation of the water heater and minimize scale formation in the heat exchanger, thus prolonging the life of the unit.

Setting the domestic hot water temperature at 120°F/49°C will reduce the risk of scalds. Some jurisdictions require settings at specific lower temperatures. The table below shows the approximate time-to-burn relationship for normal adult skin.

Hot water temperatures required for automatic dishwasher and laundry use can cause scalds and burns resulting in serious personal injury and/or death.

Table - Risks of Scalds

Temperature Setting	Time to Produce 2nd, 3rd Degree Burns on Adult Skin
Over 170°F/77°C	Nearly instantaneous
160°F/71°C	About 1/2 second
150°F/66°C	About 1-1/2 seconds
140°F/60°C	Less than 5 seconds
130°F/54°C	About 30 seconds
120°F/49°C or less	More than 5 minutes

To protect against injury, installing a tempering valve in the domestic hot water supply is recommended. This valve will reduce point of discharge temperature by mixing cold and hot water in branch supply lines. Such valves are available from the local plumbing supplier.

 **DANGER**

Read and understand this entire document prior to proceeding with the installation of the Glow Boiler. Failure to follow the instructions outlined in this document will result in property damage, serious injury or death.

 **WARNING**

Failure to have the boiler properly serviced and inspected on a regular basis by a qualified service technician may result in property damage, serious injury or death.

 **WARNING**

Failure to keep the Vent and Combustion Air-inlet clear of ice, snow, and other debris may result in property damage, serious injury, or death.

 **DANGER**

Failure to use the appropriate gas as listed on the rating plate when operating the Glow Boiler may result in extremely dangerous burner operation leading to property damage, serious injury or death. Always ensure the type of gas being used corresponds with what is listed on the rating plate

1.2 General information

1.2.1 General Installation Requirements

The installation of your Glow Brand boiler must conform to the requirements of this manual, your local authority, and the National Fuel Gas Code ANSI Z223.1 and or CAN/CGA B149 Installation Codes. Where required by the Authority, the installation must conform to the standard for “Controls and Safety Devices for Automatically Fired Boilers ANSI/ASME CSD-1.

This document pertains to the correct instruction and installation of the Glow Brand Boilers B85, B120 and B160. The instructions detailed in this document supersede any and all previous instructions provided by Glow Brand Manufacturing, written or otherwise. Each unit is provided with an Installation Manual and a User Information Manual

1.2.2 User Responsibilities

The Glow Boiler must be installed and serviced by a qualified service technician and must be serviced and inspected annually when operating in normal residential applications. Demanding applications or extreme conditions (i.e. commercial) may require more frequent service and inspection. As the User/Owner of this equipment, you are responsible for ensuring the maintenance is performed at the required intervals; see Section 14.2- Annual Maintenance and Inspection. Failure to follow this maintenance schedule will void the Warranty.

1.2.3 Installer Responsibilities

A qualified installer is a licensed person who had the appropriate training and a working knowledge of the applicable codes, regulations, tools, equipment and methods necessary to install a boiler. The installer assumes all responsibility for a safe installation and that it meets the requirements of the boiler instruction manuals, as well as National and local installation codes. It is also the installer’s responsibility to inform the User/Owner of their obligation with respect to the description under “User Responsibilities”. Failure to follow this warning could result in fire, serious injury, or death

Ensure the type of gas being used corresponds to what is listed on the rating plate.

Natural Gas to Liquefied Petroleum (LP) conversions kits are not available.

The materials used, such as copper, brass, stainless steel, etc., form a compact, homogeneous, highly functional unit that is easy to install and simple to operate. In its simplicity, the wall-mounted appliance is equipped with all the appropriate accessories required to make it a fully independent boiler capable of satisfying domestic hot water production and central heating needs if installed. All boilers are fully inspected. This manual must be kept in a safe place and must accompany the water heater at all times.

Glow Brand will not be held responsible for any misinterpretation of this manual.

Glow Brand will not be held responsible for the consequences in the case of non-observance of the instructions contained in this manual or in the case where actions not specifically described herein are undertaken.

! WARNING

Combustion – At elevations above 2000 feet, the combustion of the boiler must be checked with a calibrated combustion analyzer to ensure safe and reliable operation. It is the Installers responsibility to check the combustion and to adjust the combustion in accordance to Section 10.0. Failure to follow these instructions may result in property damage, serious injury, or death.

1.2 High Altitude Operations

The Glow boiler is designed to operate at its maximum listed capacity in installations less than or equal to 2000 ft [610 m] above Sea Level. Since the density of air decreases as elevation increases, maximum specified capacity should be de-rated for elevations above 2000 ft [610 m] in accordance with Table 1.1.

ELEVATIONS	2000 ft [610 m]	3000 ft [914 m]	4000 ft [1219 m]	4500 ft [1372 m]	5000 ft [1524 m]
In Canada ¹	de-rate by 10%	de-rate by 10%	de-rate by 10%	de-rate by 10%	de-rate % may vary
In USA ²	-	de-rate by 12%	de-rate by 16%	de-rate by 18%	de-rate by 20%

Notes:
¹ Canada: Altitudes between 200-4500 ft [610-1372 m], de-rate by 10%. Consult local authorities for de-rating capacities for altitudes above 4500 ft [1372 m].
² USA: De-rate capacity by 4% for every 1000 ft [305 m], if altitude is over 2000 ft [610 m].

Table 1.1: De-rate % High Altitudes

2. Technical Characteristics

2.1 Technical Data

Specification	B85 (NG)	B85 (LP)	B120 (NG)	B120 (LP)	B160 (NG)	B160 (LP)
Central Heating Input – Min MBH (KW)	9.8 (2.9)	9.8 (2.9)	14.1 (4.1)	14.1 (4.1)	17.9 (5.2)	17.9 (5.2)
Central Heating Input – Max MBH (KW)	85 (24.9)	85 (24.9)	120 (35.1)	120 (35.1)	160 (46.9)	160 (46.9)
DOE Heating Capacity – Max MBH (KW)	79.3 (23.2)	79.3 (23.2)	111.9 (32.8)	111.9 (32.8)	148.2 (43.4)	147.8 (43.3)
A.F.U.E	95%	94%	95%	94%	95%	95%
Min Gas Pressure – inch w.c.	3.5	8	3.5	8	3.5	8
Max Gas Pressure – inch w.c.	10.5	13	10.5	13	10.5	13
Power (120Vac/60Hz) - Watts @ full fire not including pump(s)	50	45	60	56	92	
Min Operating Pressure – Space Heating - psig	10		10		10	
Max Operating Pressure – Space Heating - psig	30		30		30	
Min water Temperature - Space Heating - °F (°C)	95 (35)		95 (35)		95 (35)	
Max water Temperature – Space Heating - °F (°C) ¹	171 (77)		171 (77)		171 (77)	
Min water flow requirement through Heat Exchanger (gpm)	3		6		7	
Max equivalent vent length 2" (each side) - ft	100		40		40	
Max equivalent vent length 3" (each side)- ft	125		125		125	
Vent/Air-Intake Pipe Diameter, inches (mm)	2 (51) or 3 (76)					
CH Water Connections - NPT, in.	3/4					
Gas Connection - NPT, in.	3/4					
Dimensions H x W x D - inches (mm)	31.2 x 16.9 x 14.0 (793 x 430 x356)		31.2 x 16.9 x 18.0 (793 x 430 x 457)			
Weight (empty) – lbs (Kg)	90 (41)		110 (50)			
¹ The CH supply temperature is limited to 140°F(60°C). For CH supply temperatures greater than 140°F(60°C) refer to Section 4.5.2 Exhaust Vent Material and Section 11.7 CH Modes.						

Table 2.1: Unit Specifications

2.2 Unit Dimensions

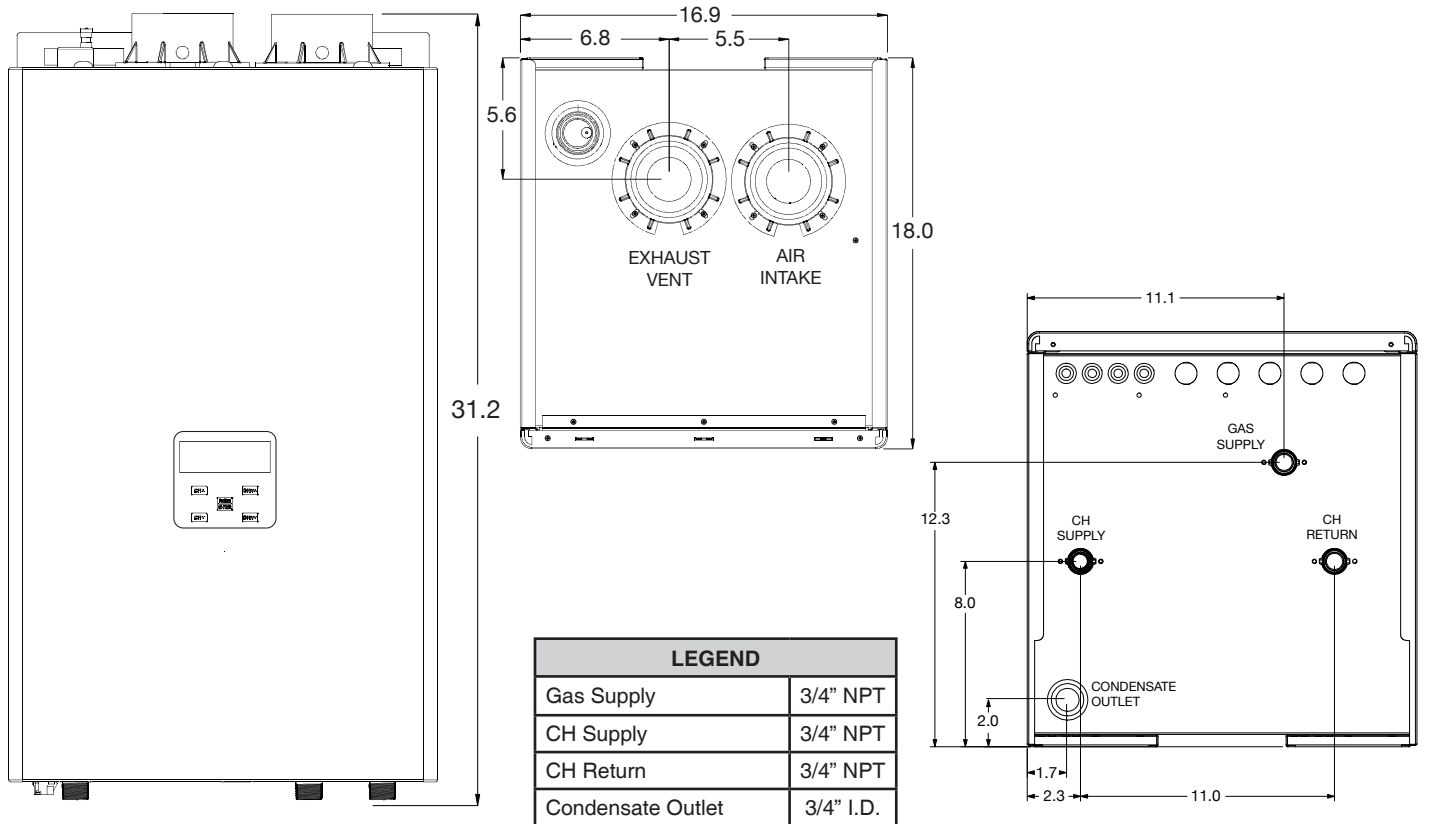
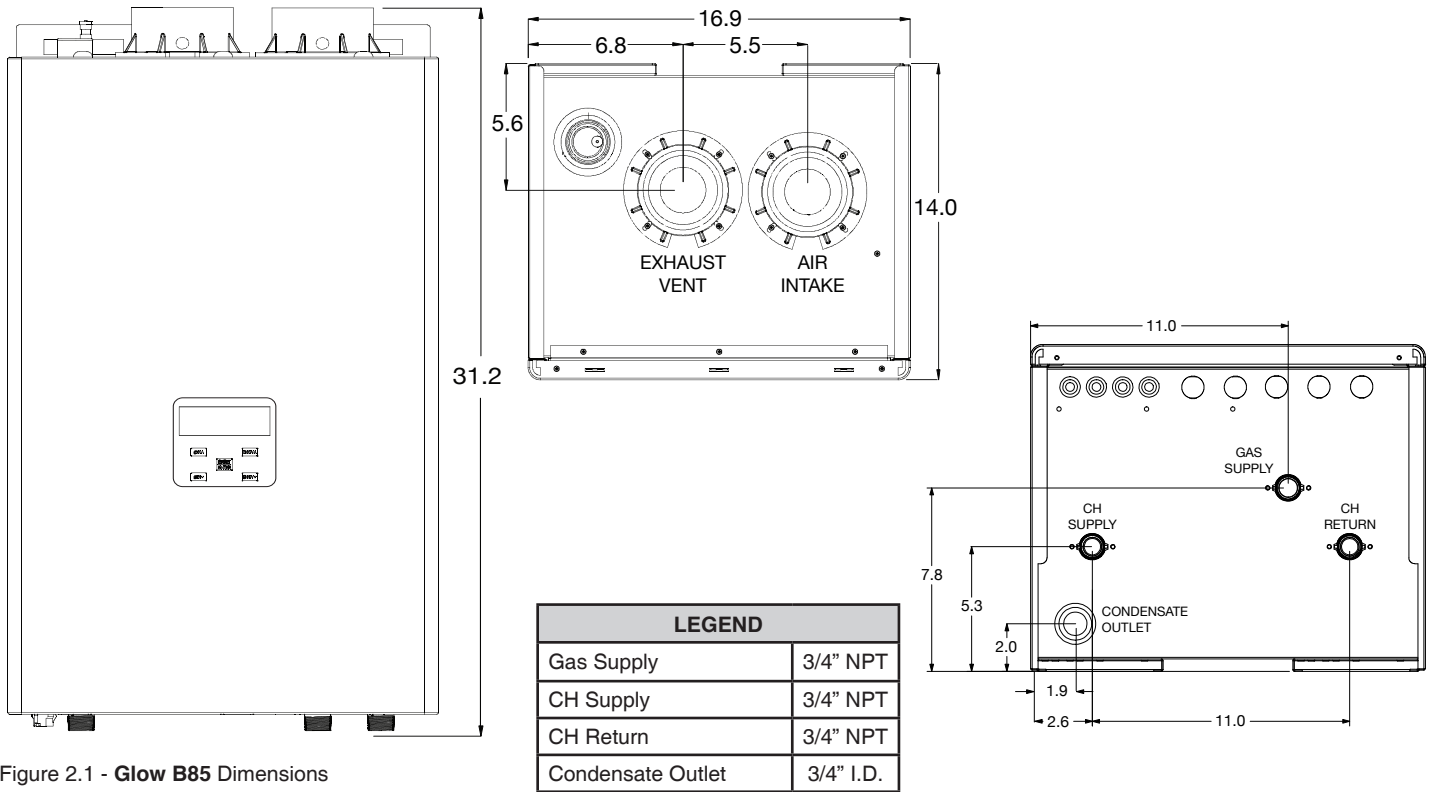


Figure 2.2 - Glow B120/ B160 Dimensions

2.3 Unit Performance

2.3.1 Boiler Head Loss

Example: B85 Target flow of 8 gpm

Figure 2.3 indicates the pressure drop in the heat exchanger to be **5.6 psi (13 ft)** at the target flow of 8 gpm.

Therefore 13 ft is required for the boiler plus the pressure drop required for piping and heating devices..

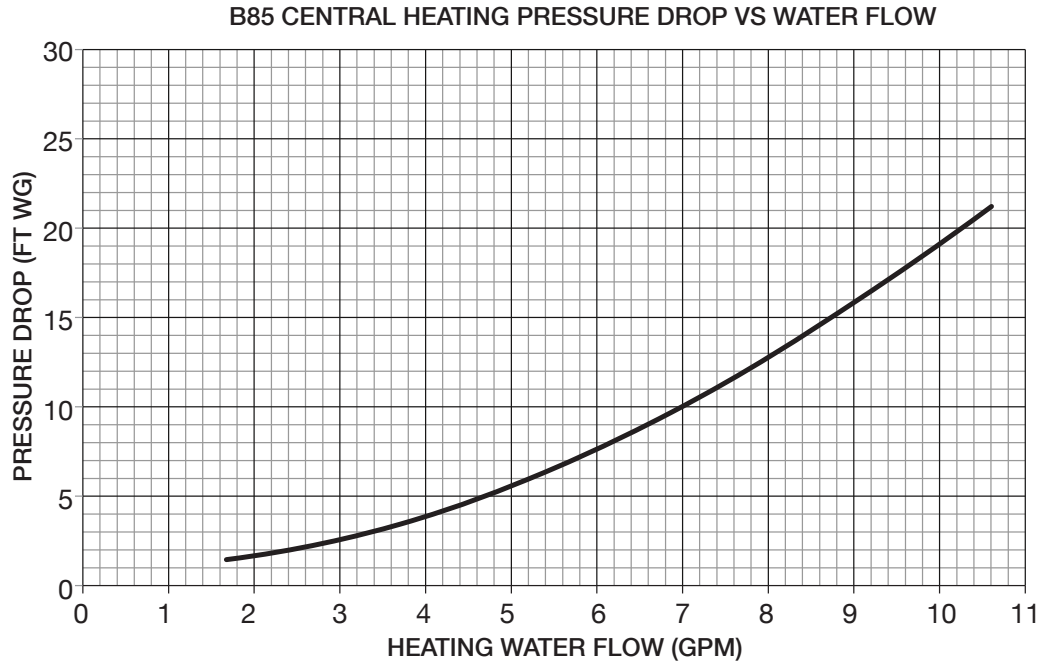


Figure 2.3- B85 Pressure Drop Curve

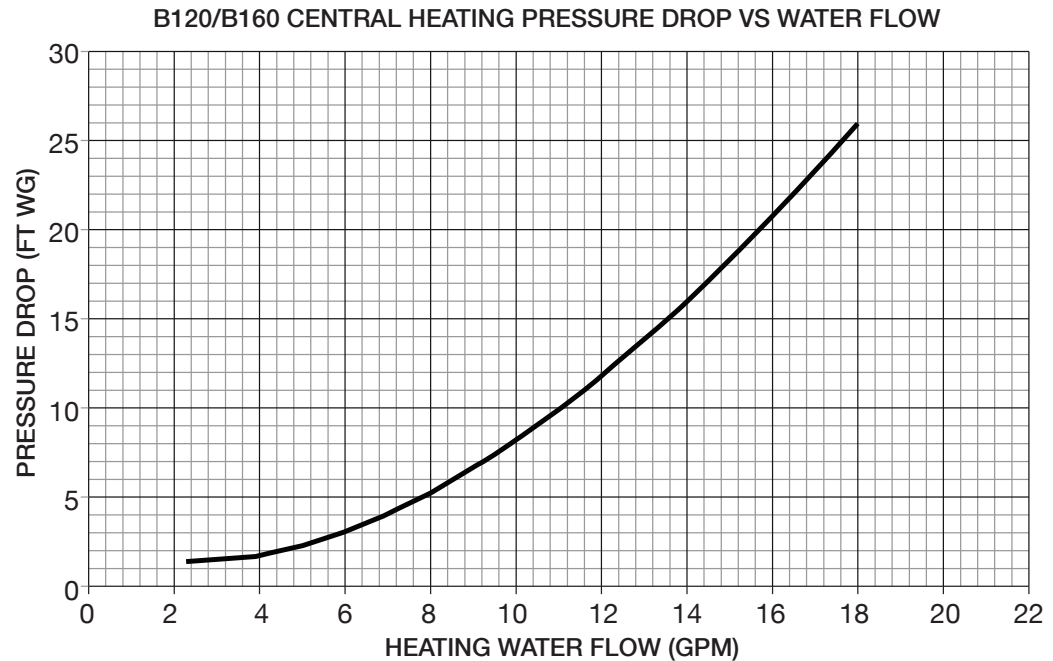


Figure 2.4- B120 & B160 Pressure Drop Curve

3. Storage, Handling & Installation

3.1 Storage

The Glow Boiler should be stored in the horizontal position with no more than three units to a stack; Ensure that the units are stored in dry conditions and the temperature does not drop below 0°C/32°F when in storage.

3.2 Unpacking

- The materials (cardboard) used for packing the appliance are fully recyclable.
- It is recommended that the packing material is only removed prior to installing the unit. The manufacturer will not be held responsible for damage caused by incorrect storage of the product.
- Packing materials (plastic bags, polystyrene, etc.) must not be left within reach of children, in that these items represent a potential hazard.

- Place the packed appliance on the floor (see fig. 3.1) making sure that the unit is in its upright position. Open out the four flaps of the box.
- Rotate the packed appliance 180° so that the top is upside down while manually supporting it from underneath.
- Lift the box and remove the foam packaging.
- Firmly grip the unit. Lay the unit on its back away from the work area and continue with the installation.
- Two people are required to safely lift this boiler onto the wall mounting bracket.

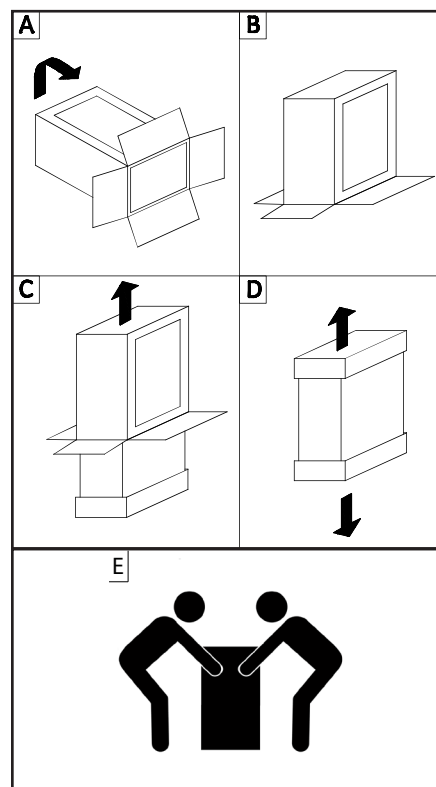


Figure 3.1 - Unpacking the Boiler

3.3 Boiler Location

In all cases, the Glow Boiler must be installed indoors in a dry location where the ambient temperature must be maintained above freezing. The gas components must be protected from dripping and or spraying water. Consider the proximity of system piping, gas and electrical supply, drain for condensate disposal, and proximity to vent termination when determining the best boiler location.

If the Glow Boiler is installed in an unheated area it is recommended to leave the unit continually powered in order to ensure the frost protection function is active. In order to allow access to the interior of the unit for maintenance purposes, it is important that the minimum distances indicated are respected.

See Fig 3.2: Minimum Installation Clearances

WARNING

Water or flood damaged components must be replaced immediately with new factory approved components as failure to do so may result in property damage, serious injury, or death.

! WARNING

This boiler must not be installed on carpeting as failure to do so may result in property damage, serious injury, or death.

Clearance to Combustibles:

Minimum clearance from combustible or non combustible construction. (Fig. 3.2)

- Front – 0 inches
- Sides – 0 inches
- Rear – 0 inches
- Top – 0 inches

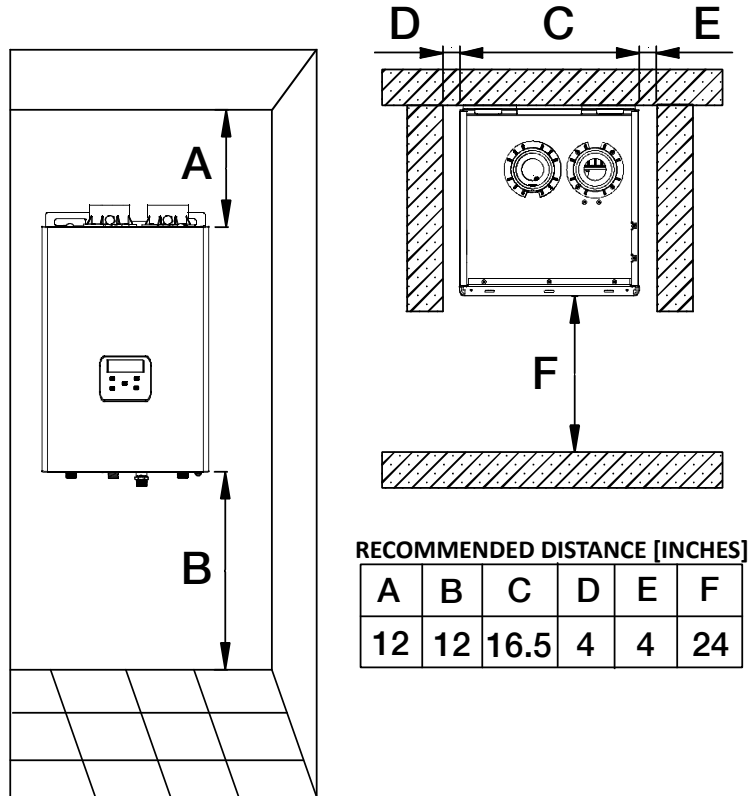


Figure 3.2 - Minimum Installation Clearances

! WARNING

For closet and alcove installations, CPVC vent material MUST BE used in a closet structure due to elevated temperatures. Failure to follow this warning could result in fire, personal injury, or death.

3.4 Closet and Alcove Installations

A closet is any room the boiler is installed in which is less than 80 cubic feet for B85, B120 and B160 models.

An alcove is any room which meets the criteria for a closet with the exception that it does not have a door.

3.5 Wall Mounting Installations

Included within the packaging of the Glow Boiler is a wall mount support bracket. Mounting the support bracket (fig. 3.3) on a field supplied 3/4" piece of plywood will add additional structural integrity to the installation. Make sure the supplied wall mounting support bracket is anchored to a structure capable of supporting the weight of the boiler and attached piping when filled with water. For mounting on a cement wall, use appropriately sized masonry anchors or equivalent. Two people are required to safely lift this boiler onto the wall support mounting bracket.

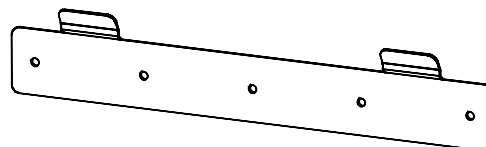


Figure 3.3 - Support Bracket

**DANGER**

The flue exhaust and combustion air intake are to be piped separately. The Glow Boiler cannot share a common flue exhaust or combustion air intake with multiple appliances. Failure to comply may result in property damage, serious injury, or death.

**DANGER**

Do not install the Glow Boiler into a common venting system with any other appliances. Failure to comply with this warning may cause flue gas spillage and leech carbon monoxide emissions into the surrounding air resulting in serious injury or death.

**WARNING**

Insulation cannot be used on PVC or CPVC venting materials in a conditioned space. The use of insulation will cause increased vent wall temperatures, which could result in vent pipe failure.

4. Venting

4.1 General Venting

The Glow Boiler is certified as a “Category IV” boiler requiring a “Special Venting System” designed for pressurized venting. The exhaust vent must be piped to the outdoors, using the vent materials and rules outlined in this section. Under no conditions may this unit vent gases directly into a masonry chimney, unless it is vacant, and utilizes the approved venting material and rules described in this section. Venting into a masonry chimney is only acceptable when the chimney is no longer being used for its initial intended purpose therefore considering it a chase for the exhaust and combustion air vent pipe.

4.2 Removing an Existing Boiler from Common Venting System

Upon removal of an existing boiler, the following steps shall be followed for each boiler remaining in the common venting system; prior to commencing this procedure, shutdown all boilers remaining in the common venting system.

Steps to Removing an Existing Boiler:

When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the remaining boilers connected to it. Instructions have been provided on how to remove the existing boiler and how to resize the remaining venting system. Failure to follow these instructions may result in property damage, serious injury or death.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each boiler remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning boiler to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms to the National Fuel Gas Code, ANSI Z223.1/ NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Chapter 13 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1.

! NOTICE

The boiler shall be located so as not to interfere with proper circulation of combustion, ventilation, and dilution air

! WARNING

Make up air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion air requirements. Failure to ensure adequate make up air to all appliances may result in personal injury or death

! NOTICE

It is **BEST PRACTICE** to pipe the combustion air-inlet directly to the outdoors (Direct Vent installation) to avoid contamination often contained in indoor air.

! WARNING

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Failure to follow instructions may result in serious injury or death.

4.3 Installation Using Indoor Combustion Air

When the installation uses Indoor Combustion Air (i.e. piping is not directly connecting the appliance air-inlet fitting to the outdoors), provisions for combustion and ventilation air, in accordance with section “Air for Combustion and Ventilation,” of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 (U.S.), or Clause 8.2, 8.3 or 8.4 of Natural Gas and Propane Installation Code, CAN/CSA B149.1 (Canada), or applicable provisions of the local building codes, must be adhered to.

4.3.1 Contaminated Make-Up Air Will Damage the Unit

Do not to operate the boiler in an area that is or will be under construction or renovation. Combustion air containing dust, debris or air-borne contaminants will drastically increase the required maintenance and may cause a corrosive reaction in the Heat Exchanger which could result in premature failure, fire, serious injury, or death. The Glow Brand Manufacturing Warranty will not cover damage and premature wear caused to the unit due to installation in a contaminated environment.

All of the exhaust venting connections must be leak checked with a soap solution upon initial startup of the boiler. Any leaks must be repaired before continuing operation of the unit. Warranty will not be available if the unit is used for construction heat.

Products to Avoid	Contaminated Sources to Avoid
Antistatic fabric softeners, bleaches, detergents, cleaners	Laundry facilities
Perchloroethylene (PCE), hydrocarbon based cleaners	Dry cleaning facilities
Chemical fertilizer, herbicides/pesticides, dust, methane	Farms or areas with livestock and manure
Paint or varnish removers, cements or glues, sawdust	Wood working or furniture refinishing shops
Water chlorination chemicals (chloride, fluoride)	Swimming pools, hot tubs
Solvents, cutting oils, fiberglass, cleaning solvents	Auto body or metal working shops
Refrigerant charge with CFC or HCFC	Refrigerant repair shops
Permanent wave solutions	Beauty shops
Fixer, hydrochloric acid (muriatic acid), bromide, iodine	Photo labs, chemical / plastics processing plants
Cement powder, crack fill dust, cellulose, fiber based insulation	Concrete plant or construction site

4.4 Venting Guidelines

- Keep the vent system as short and straight as possible.
- Locate the unit as close as possible to the vent termination.
- The vent must not be common vented with any other gas appliance or vent stack.
- Slope vent upwards towards the termination at a minimum rate of 1/4” per foot (2% slope).
- Vent termination must be a minimum of 12” above grade or expected snowfall.
- Vent and air intake pipe must be supported at least every 5 feet of horizontal run and every 5 feet of vertical run.

4.5 Direct Vent Installation

Direct Vent installation dictates that the combustion air-inlet must be piped directly to the outdoors using the methods described in this section and in accordance with the National Fuel Gas Code, ANSI Z223.1 (U.S.) or CSA B149.1 (Canada) and local requirements. Install the entire venting system securely cementing all fittings. This Glow Boiler uses a 2” or 3” diameter exhaust vent pipe made up of Schedule 40 PVC/CPVC or CPVC System 636. The air intake pipe uses 2” or 3” diameter pipe made of Schedule 40 ABS, DWV, PVC, or CPVC materials and in accordance with all applicable local building codes.

4.5.1 Vent/Air-Inlet Pipe Material

The temperature setpoint has a direct relationship with the type of vent material being used. When selecting which vent material is to be used, the chart shown below should be referenced.

CH & DHW Temperature Applications up to 140°F (60°C)											
Boiler	Appliance Setting (Parm 2.138)	Max. Flue Temp. ¹	Max. CH setting ² (param 2.003)	Max. DHW setting ² (param 2.115)	Items	Materials ^{3,4}	Venting System Standards				
							United States	Canada ⁵			
B85 NG B120 NG	50	149°F (65°C)	140°F (60°C)	140°F (60°C)	Vent Piping and Fittings	PVC	ANSI/ASTM D2265	In Canada, all exhaust vent material must be ULC S636 approved.			
B160 NG B160 LP	51					Schedule 40 PVC	ANSI/ASTM D1785				
						Schedule 40 CPVC	ANSI/ASTM F441				
B85 LP B120 LP	54	Pipe Cement	PVC	ANSI/ASTM D2564							
			CPVC	ANSI/ASTM F493							
		Primers	PVC / CPVC	ANSI/ASTM F656							
CH & DHW Temperature Applications up to 171°F (77°C)											
Boiler	Appliance Setting (Parm 2.138)	Max. Flue Temp. ¹	Max. CH setting ² (param 2.003 & 2.024)	Max. DHW setting ² (param 2.091 & 2.115)	Items	Materials ^{3,4}	Venting System Standards				
							United States	Canada ⁵			
B85NG B120NG	52	194°F (90°C)	171°F (77°C)	171°F (77°C)	Vent Piping and Fittings	Schedule 40 PVC/ CPVC For 2" venting applications the first 6" of straight pipe and one 90° elbow plus an additional seven (7) equivalent feet of pipe shall be CPVC (field supplied). For 3" venting applications the first 6" of straight pipe and one 90° elbow plus an additional three (3) equivalent feet of pipe shall be CPVC (field supplied). The remaining vent length can be Schedule 40 PVC/CPVC.	ANSI/ASTM D1785 ANSI/ASTM F441	In Canada, all exhaust vent material must be ULC S636 approved.			
B160 NG B160 LP	53								Pipe Cement	PVC	ANSI/ASTM D2564
										CPVC	ANSI/ASTM F493
B85 LP B120 LP	55	Primers	PVC / CPVC	ANSI/ASTM F656							

¹ If flue temperature exceeds the Maximum Allowable Flue Temperature, the appliance will go into Loc 16.
² These parameter value(s) are set by the Installer. If set value(s) is more than maximum allowable value, the unit will go into Loc 16.
³ PVC venting (exhaust and air-inlet) is not permitted within the Closet/alcove of a Closet/alcove installation.
⁴ The Air-inlet does not require high temperature pipe material; ABS, DWV and PVC Foam Core piping is acceptable. Check applicable local codes for acceptable materials.
⁵ ULC S636 PVC is approved for flue gas temperatures up to 149°F (65°C) and must only be used for low temperature applications. High temperature applications requiring boiler supply water temperatures greater than 140°F(60°C) must use ULC S636 CPVC.

Table 4.1: Approved Vent and Air-Inlet Pipe Material

! WARNING

Use of cellular core Schedule 40 PVC (ASTM F891), cellular core CPVC, or Radel (polyphenylsulfone) in non-metallic venting systems is prohibited. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

! WARNING

All Vent and Air-Inlet materials installed on gas fired appliances in CAN/US must meet the specifications provided in this table. Failure to do comply could result in fire, serious injury or death.

! WARNING

This appliance requires a special venting system. The exhaust vent connection to the appliance is made of CPVC. Field supplied vent fittings must be cemented to the CPVC fitting on the boiler. Use only the vent materials, primer and cement specified in the manual to make the vent connections. Failure to follow this warning could result in fire, personal injury, or death.

4.5.2 Exhaust Vent Pipe Materials

Use only 2" or 3" solid schedule 40 PVC/CPVC or ULC S636 pipe and fittings. Venting requirements in USA and Canada are different. Consult the most recent edition of the National Fuel Gas Code (ANSI Z223.1 / NFPA 54) or CAN/CSA B-149.1 as well as local codes for applicable venting regulations and restrictions. For installation in Canada, field supplied plastic vent piping must comply with CAN/CSA B-149.1 (latest edition) and be certified to the standard for type BH Gas Venting Systems. ULC S636 components of this listed system shall not be interchanged with other vent systems or unlisted pipe/fittings. All plastic components and specified primers and glues of the certified vent system must be from a single manufacturer and not intermixed with other system manufacturer's vent system parts. The supplied CPVC exhaust vent adapter is certified as part of the boiler.

The CH and DHW setpoints are set at the factory to 140°F(60°C). This temperature setting coincides with the flue temperature sensor setpoint at 149°F(65°C) for use with Schedule 40 PVC or S636 PVC venting.

For applications where a higher CH setpoint above 141°F(60.5°C) and up to 171°F(77°C) is required, Schedule 40 CPVC/PVC or CPVC/PVC S636 venting shall be used (see below for specific details). Parameter 2.003 must be changed to reflect the required CH setpoint temperature. Parameter 2.024 must be changed to reflect the maximum CH setpoint temperature. Parameter 2.138 must also be changed to limit the maximum flue temperature to 194°F(90°C). Refer Section 11.6 - Installer Menu.

For applications where a higher DHW setpoint above 141°F(60.5°C) and up to 171°F(77°C) is required, Schedule 40 CPVC/PVC or CPVC/PVC S636 venting shall be used (see below for specific details). Parameter 2.115 must be changed to reflect the required DHW tank setpoint. Parameter 2.091 must be changed to reflect the maximum DHW setpoint temperature. Parameter 2.138 must also be changed to limit the maximum flue temperature to 194°F(90°C). Refer Section 11.6 - Installer Menu.

For 2" venting applications the first 6" of straight pipe and one 90° elbow plus an additional seven (7) equivalent feet of pipe shall be CPVC (field supplied).

For 3" venting applications the first 6" of straight pipe and one 90° elbow plus an additional three (3) equivalent feet of pipe shall be CPVC (field supplied).

Units installed with vertical exhaust, must have an additional condensate drain installed on the exhaust vent pipe. In Canada fittings must be ULC S636 approved. Schedule 40 PVC/CPVC and S636 pipe/fittings have been approved for use on this appliance with zero clearance to combustibles.

4.5.3 Intake Vent Pipe Materials

Schedule 40 PVC, CPVC or ULC S636 pipe and fittings and ABS or DWV pipe and fittings can be used for combustion air intake on **Glow Brand** products. Transition cement must be used if ABS or DWV pipe is connected to the PVC/CPVC appliance adapters.

All plastic components and specified primers and glues of the certified vent system must be from a single manufacturer and not intermixed with other system manufacturers vent system parts.

! WARNING

Flammable Cements and Primers – It is the installers’ responsibility to familiarize themselves with the hazards associated with explosive solvents and to take all precautions to reduce these risks. Failure to follow these instructions can cause explosions, property damage, injury or death. All venting must be supported to reduce strain on piping joints. The exhaust vent shall maintain a 1/4” slope upwards towards the vent termination outlet. In situations when excessive amounts of condensate is being produced maintaining a 1/2” slope upwards towards the vent termination may be required.

The vent for this appliance shall not terminate over public walkways, near soffit vents, crawl spaces or other areas where condensate or vapour could create a nuisance or hazard or cause property damage or where condensate vapour could cause damage or could be detrimental to the operation of regulators, relief valves of other equipment.

4.5.4 Flammable Solvents and Plastic Piping

Due to the extremely flammable characteristics of most glues, cements, solvents and primers used in the process of joining plastic vent and air-inlet pipe, explosive solvent vapors must be evacuated from the vent and air-intake prior to start-up. Avoid using excess cement or primer that may lead to pooling inside the pipe assembly. Freshly assembled piping assembly should be allowed to cure before operating the gas fired appliance.

Improper venting of the Glow Boiler can result in excessive levels of carbon monoxide which can result in severe personal injury or death. This unit must be vented in accordance with the “Venting of Equipment” section of the latest edition of the ANSI Z223.1 / NFPA 54 Natural Gas Code and/or the “Venting systems and air supply for appliances” section of the latest version of the CAN/CSA B149.1 Natural Gas and Propane Installation Code in Canada and in accordance with all applicable local building codes.

4.5.5 Equivalent Lengths

- Reduce the maximum vent length accordingly for each elbow used.
- Each 2” & 3” 45° elbow equates to 2.5 linear feet of vent pipe.
- Each 2” & 3” 90° short radius elbow equates to 7.5 linear feet of vent pipe.
- Each 2” & 3” 90° long radius elbow equates to 5 linear feet of vent pipe.
- The minimum vent length is 6" plus one elbow for both 2" and 3" pipe diameter.
- Each 2" & 3" concentric or low profile termination kit equates to 5 linear feet of vent pipe.
- The maximum length listed is for flue exhaust vent. The intake length shall not exceed the exhaust vent length.
- The total maximum equivalent vent pipe distance cannot exceed the values indicated in Table 4.2 for horizontal and vertical venting distance.
- The maximum lengths are including elbows. Exceeding the maximum venting distances will cause the appliance to malfunction or cause an unsafe condition.

AVAILABLE VENT LENGTHS			
MODEL	B85 NG	B120 NG	B160 (NG/LP)
Vent Diameter Size	2” or 3” Diameter	2” or 3” Diameter	2” or 3” Diameter
Max Equivalent Intake/Exhaust	2” Diameter 100ft 3” Diameter 125ft	2” Diameter 40ft 3” Diameter 125ft	2” Diameter 40ft 3” Diameter 125ft
Exhaust Vent	System 636, Schedule 40 PVC/CPVC	System 636, Schedule 40 PVC/CPVC	System 636, Schedule 40 PVC/CPVC
Intake Vent	PVC/CPVC/ABS/DWV	PVC/CPVC/ABS/DWV	PVC/CPVC/ABS/DWV

Table 4.2: Available Vent Lengths

4.5.6 Termination Options

The venting system of the Glow Boiler may be terminated using field supplied piping to construct a “Two-Pipe” termination, alternatively, the venting may be terminated using a manufacturer approved concentric vent kit.

! WARNING

Extra precaution must be taken to adequately support the weight of the Vent/Air-inlet piping in applications using horizontal or vertical roof terminations. Failure to follow these instructions may result in venting or boiler component failure resulting in flue gas spillage leading to property damage, serious injury or death.

! WARNING

Any time the exhaust vent passes through an unconditioned space, care should be taken to ensure the vent pipe is insulated in order limit the amount of condensate collecting within the vent. Make certain the system has been installed in accordance with the latest version of CAN/CSA B149.1 Natural Gas and Propane Installation Code and in full compliance with all local codes.

! DANGER

Under no circumstances may an existing chimney or chase-way be used to vent or provide combustion intake air to a Glow boiler. Failure to follow these instructions will result in fire, property damage, serious injury or death.

Sidewall Termination

Due to potential moisture building up along the exterior wall, sidewall venting may not be the preferred venting option. Refer to roof top venting options.

Straight Out Termination – The exhaust vent can terminate straight to an outside wall. A reducer of 1 pipe diameter smaller can be fitted on the exhaust to increase the velocities of the exiting gases. The reduced diameter pressurizes the exhaust vent and helps to keep the flue gases from entering the intake. The reduced pipe diameter of 1 size shall be between 4” to 8” in length.

In the United States (U.S.), provide a minimum of 4 feet (1.22 m) horizontal clearance from electrical meters, gas meters, gas regulators, and relief equipment as per National Fuel Gas Code, ANSI Z223.1/NFPA 54. In no case shall the exit terminal be above or below the aforementioned equipment unless the 4 foot horizontal distance is maintained.

In Canada, provide minimum horizontal clearance from electrical meters, gas meters, gas regulators, and relief equipment as per The Canadian Natural Gas And Propane Installation Code, B149.1.

The vent for this boiler shall not terminate over public walkways; or near soffit vents or crawl space vents or other area where condensate of vapor could create a nuisance or hazard or cause property damage;

Vertical Roof Termination - All terminations that end vertically through the roof must have an additional condensate tee installed on the vent pipe before the unit. This condensate line shall include a trap. See Fig. 4.2.

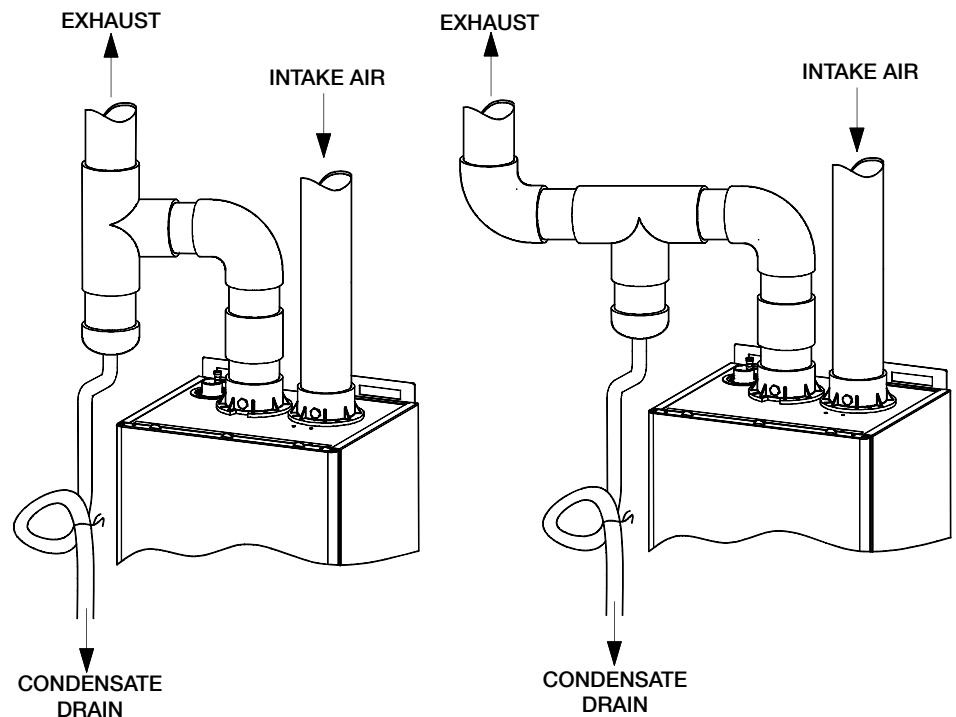


Fig 4.: Vertical Drain Tee with Trap

4.5.7 Venting Rules and Guidelines

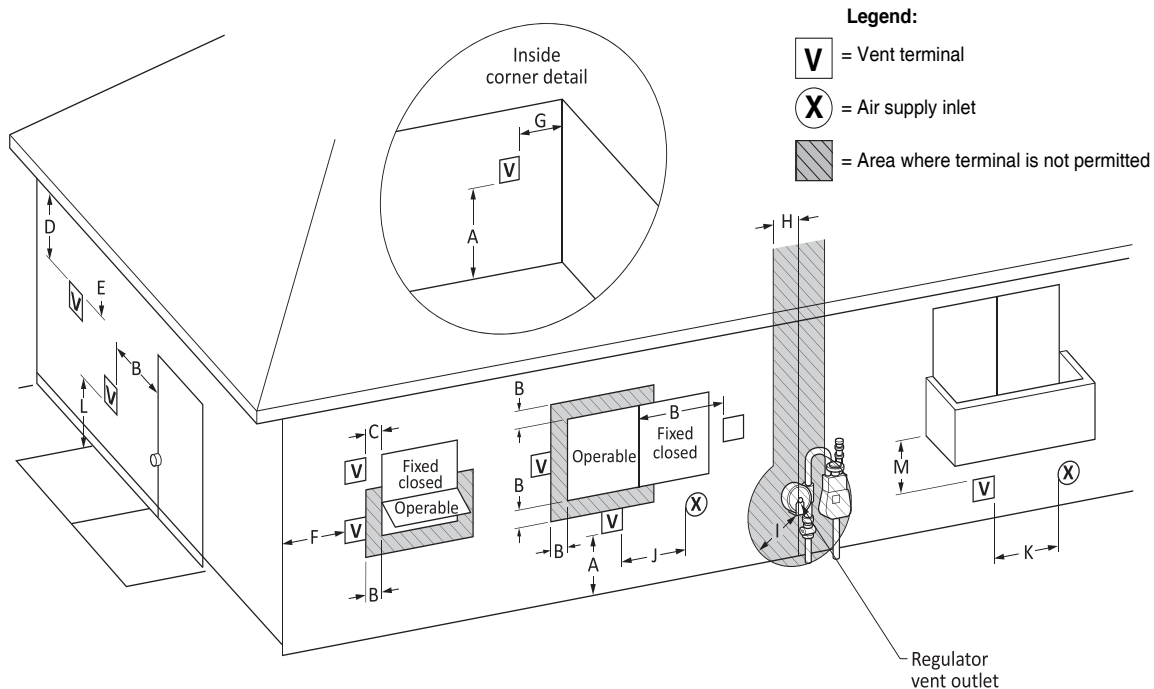
1. **Prevailing Winds:** Ensure the vent is located where it will not be exposed to normal prevailing winds.
2. **Combustion Air Intake Contamination:** Air for combustion must be drawn from an area free of dust and contaminants. Combustion air containing chemicals such as chloride, fluoride, bromine, iodine or dust and debris will cause damage of the heat exchanger voiding your Glow Brand Warranty.
3. **Vertical Separation:** The exhaust outlet must be a minimum of 8" to a maximum of 24" above the combustion air intake. The combustion air intake must always be a minimum of 12" plus snow allowance above any surface that will support snow.
4. **Horizontal Separation:** The horizontal distance between the intake and exhaust must be a minimum of 6" center to center.
5. **Flue Gas Hazard:** The vent for this appliance shall not terminate over public walkways, near soffit vents, crawl spaces or other areas where condensate or vapour could create a nuisance or hazard or cause property damage. Condensate vapour could cause damage or could be detrimental to the operation of regulators, relief valves of other equipment.
6. **Vent Sloping:** All exhaust piping must maintain a ¼" per foot upwards slope towards the outlet of the vent termination. For applications where, excessive condensation is possible, a ½" per linear foot upward slope is recommended.
7. **Vent Supports:** All exhaust and air intake piping shall be secured to the wall for rigidity. Exhaust and air intake pipe must be supported horizontally and vertically at a maximum of every 5 feet or as per local building codes.
8. **Roof Exhaust:** In all roof applications the discharge must point away from the pitch of the roof and must be a minimum 24" apart.
9. **Roof Flashing:** Install adequate flashing where the pipe enters the roof, to prevent water leakage.
10. **Venting Below Grade:** For installations that exit the wall below grade, refer to the latest version of the CAN/CSA B149.1 Natural Gas and Propane Installation Code.
11. **Vent Screens:** Factory supplied vent screens may be installed on the intake and or exhaust termination. Two ½" by ½" galvanized screens are provided in a package. Vent screen installation is optional.
12. **Condensate Hazard:** Do not locate vent over public walkways, driveways or parking lots. Condensate could drip and freeze resulting in a slip hazard or damage to vehicles and machinery.
13. **Venting Options:** Due to potential moisture loading (build-up) along the exterior wall, sidewall venting may not be the preferred venting option.
14. **Wall Thickness:** Direct vent terminations are designed to work with any standard wall thickness. Installation guidelines for min/max wall thickness are as follows: Min.= 1" [25mm], Max.= 50" [1.27 m].

4.6 Venting Diagrams

4.6.1 Venting Clearances- Direct Vent

Clearance Requirements from Vent Terminations to Building Openings

*All clearance requirements are in accordance with ANSI Z21.10.3 and the National Fuel Code, ANSI/Z223.1/NFPA54 and CSA B149.1 National Gas and Propane Installation Code and the requirements of the gas supplier.



		Canadian Installations ¹	US Installations ²
A	Clearance above grade, veranda, porch deck or balcony	12 in (30 cm)	12 in (30 cm)
B	Clearance to window or door that may be opened	6 in (15 cm) for appliances ≤ 10,000 BTUh (3kW), 12 in (30cm) for appliances > 10,000 BTUh (3kW) and < 100,000 BTUh (30kW), 36 in (91 cm) for appliances > 100,000 BTUh (30kW)	6 in (15 cm) for appliances ≤ 10,000 BTUh (3kW), 9 in (23 cm) for appliances >10,000 BTUh (3kW) and ≤ 50,000 BTUh (15kW), 12 in (30 cm) for appliances > 50,000 BTUh (15kW)
C	Clearance to permanently closed window	*	*
D	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet from the center of the terminal	*	*

Table 4.3: Direct Vent Terminal Clearances (continued next page)

		Canadian Installations ¹	US Installations ²
E	Clearance to unventilated soffit	*	*
F	Clearance to outside corner	*	*
G	Clearance to inside corner	*	*
H	Clearance to each side of centre line extended above meter / regulator assembly	*	*
I	Clearance to service regulator vent outlet	Above a regulator within 3 ft (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m)	*
J	Clearance to non mechanical air supply inlet or combustion air inlet to any other appliance	6 in (15 cm) for appliances ≤ 10,000 BTUh (3kW), 12 in (30cm) for appliances > 10,000 BTUh (3kW) and < 100,000 BTUh (30kW), 36 in (91 cm) for appliances > 100,000 BTUh (30kW)	6 in (15 cm) for appliances ≤ 10,000 BTUh (3kW), 9 in (23 cm) for appliances >10,000 BTUh (3kW) and ≤ 50,000 BTUh (15kW), 12 in (30 cm) for appliances > 50,000 BTUh (15kW)
K	Clearance to mechanical air supply inlet	6 ft (1.83 m)	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 ft (2.13 m)*	*
M	Clearance under veranda, porch deck or balcony	12 in (30 cm)**	*

Table 4.3: Direct Vent Terminal Clearances

* For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, one of the following shall be indicated:

A) a minimum clearance value determined by testing in accordance with Clause 5.21, Draft hoods, or

B) a reference to the following footnote:

“Clearance in accordance with local installation codes and the requirements of the gas supplier.”

+ A vent shall not terminate directly above or sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

++ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.

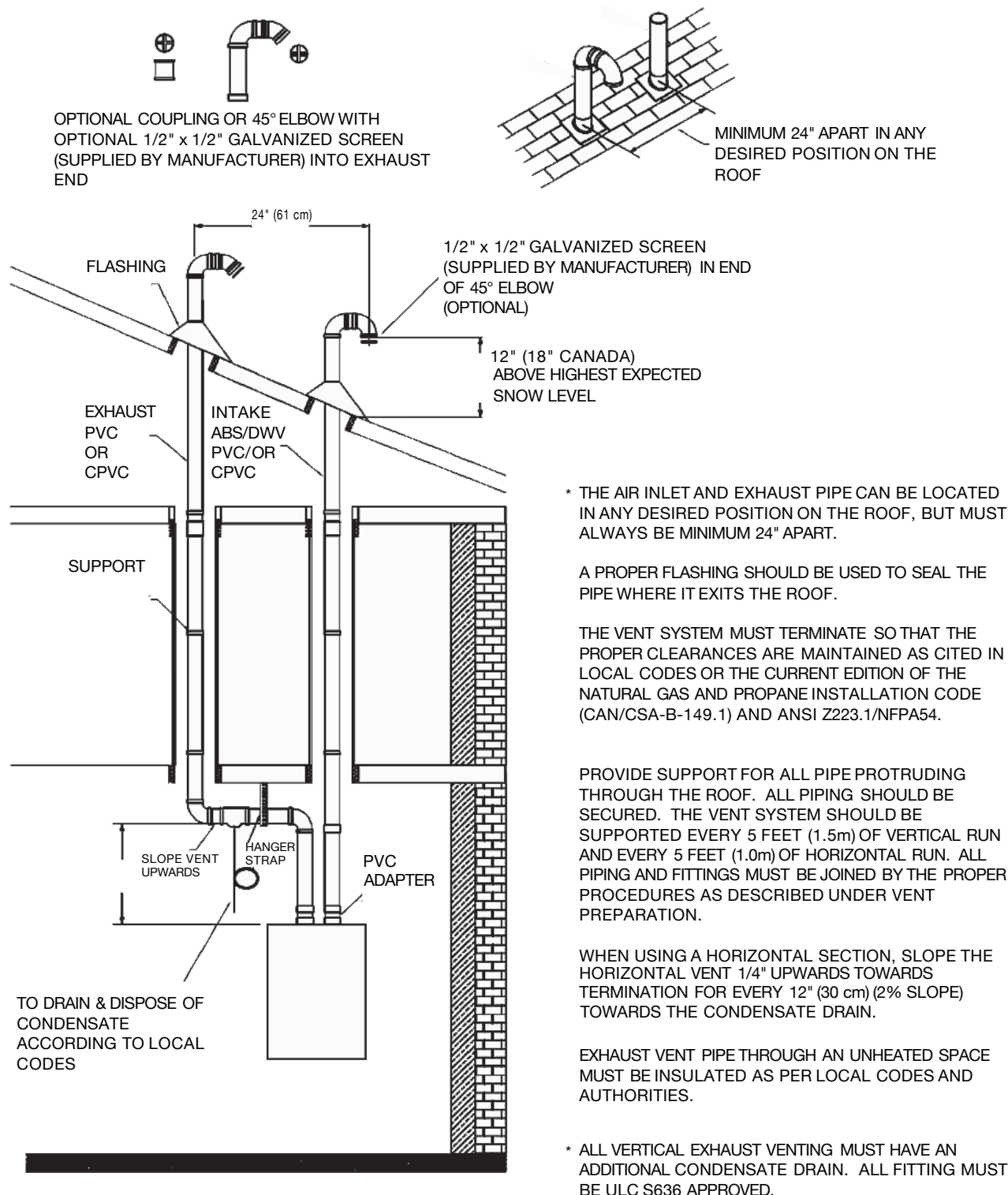
Notes:

1) In accordance with the current CSA B149.1, Natural Gas and Propane Installation Code

2) In accordance with the current ANSI Z223.1/ NFPA 54, National Fuel Gas Code

4.6.2 Venting Materials

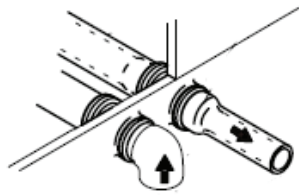
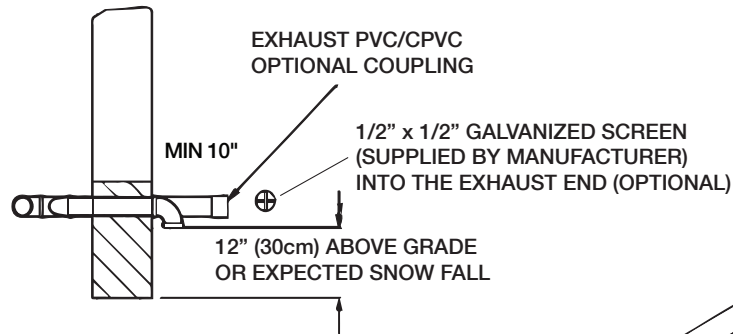
Vertical Vent Termination-PVC/CPVC Material Only 2" or 3" Vertical Intake ABS/DWV or PVC/CPVC Material 2" or 3"



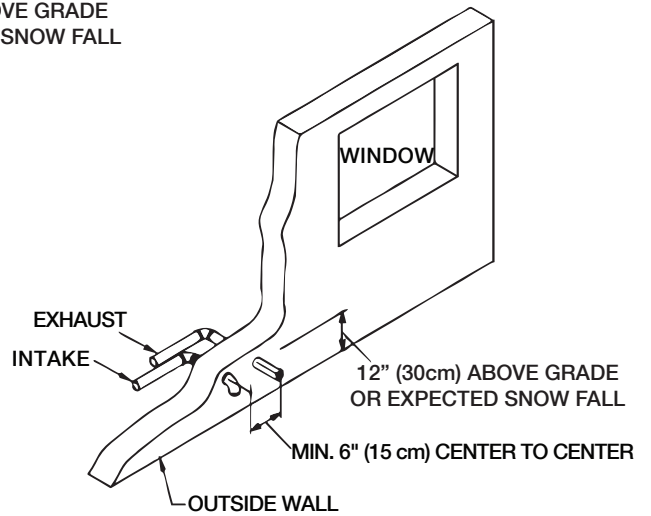
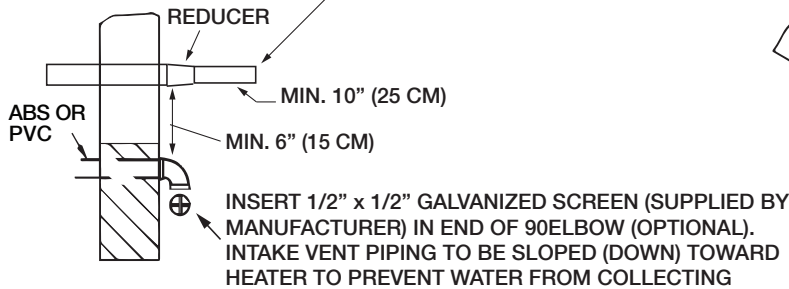
4.6.3 Horizontal Vent Termination

Horizontal Vent Termination-PVC/CPVC Material Only 2" OR 3"
 Horizontal Intake ABS/DWV or PVC/CPVC Material 2" OR 3"

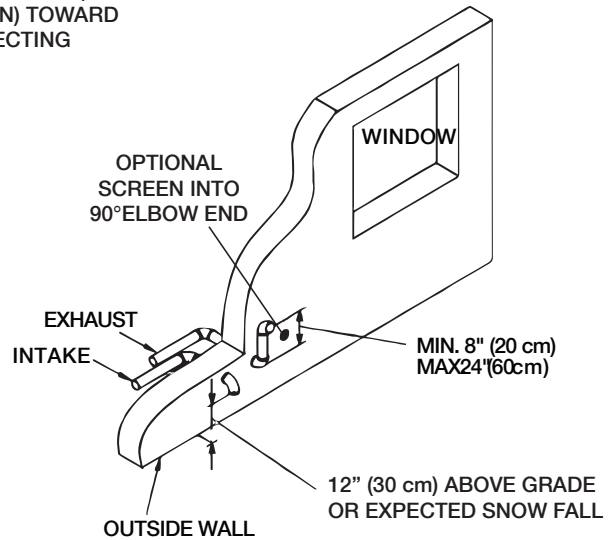
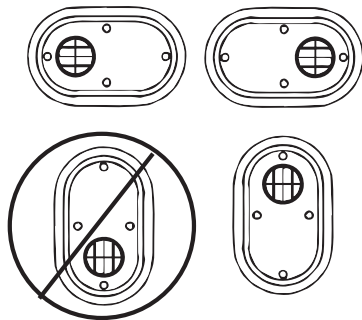
A REDUCER MAY BE USED ON THE VENT TERMINATION TO INCREASE THE VELOCITIES OF THE EXITING GASES AWAY FROM THE INTAKE



THE EXHAUST VENT FITTED WITH THE REDUCER MAY BE POSITIONED ABOVE OR BESIDE THE INTAKE PIPE

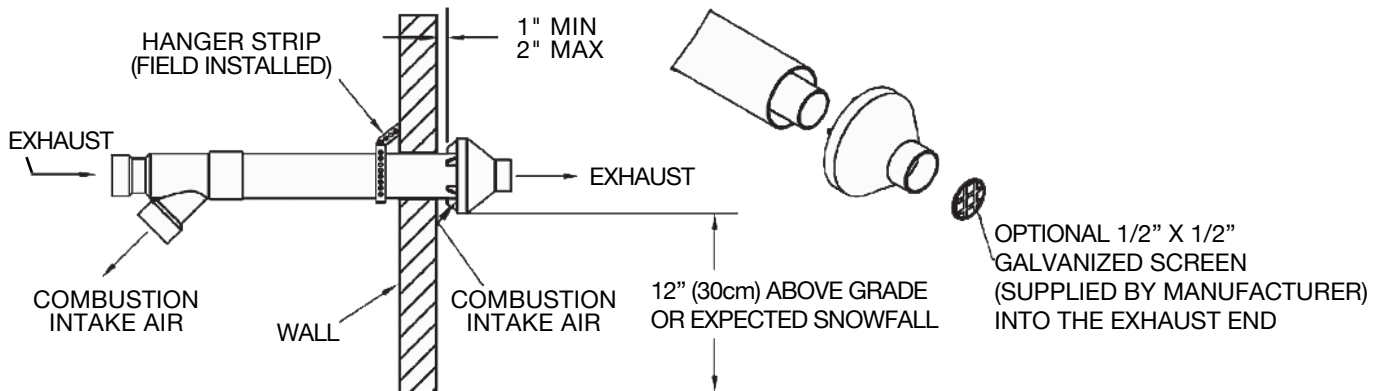
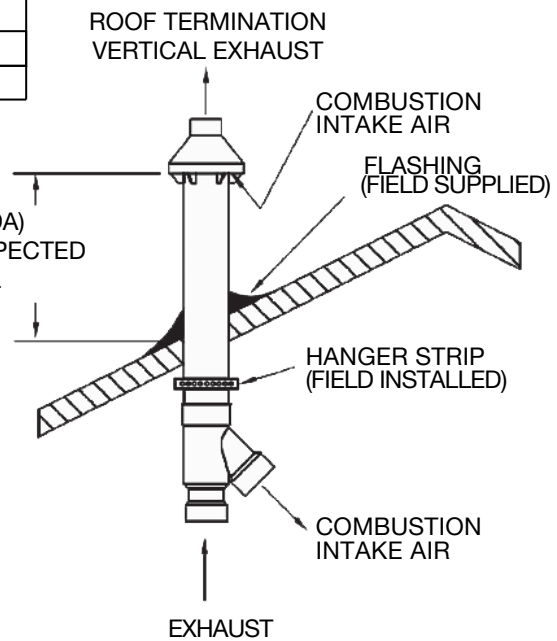
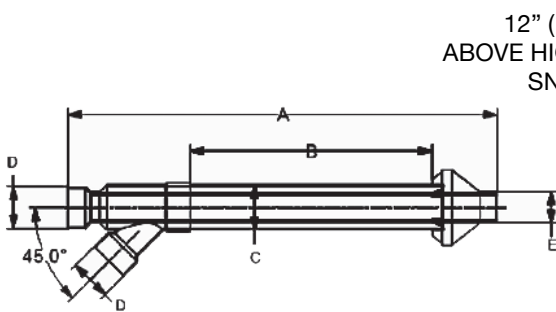


OPTIONAL
 LOW PROFILE SIDE WALL
 TERMINATION KIT 2" OR 3"
 MUST BE ULC S636 APPROVED



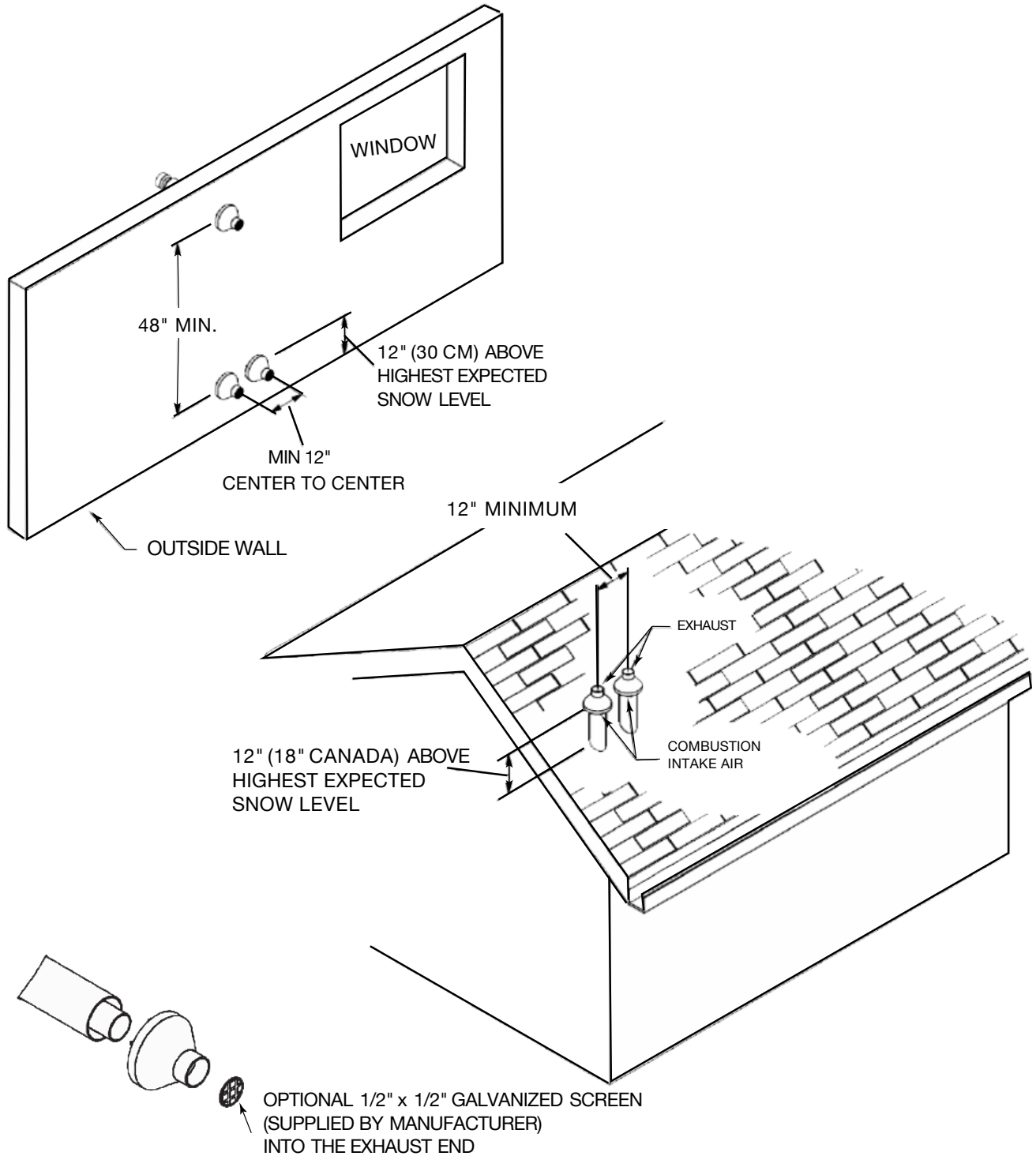
4.6.4 Concentric Venting Materials
Concentric Vent Termination - 2" or 3" PVC/CPVC

	Dimensions (inches)				
	A	B	C	Nominal Pipe Size	
				D	E
2" Concentric Kit	29	16.5	3.5	2	2
3" Concentric Kit	36.1	20.5	4.5	3	3



NOTE: USE ONLY ULC S636 APPROVED CONCENTRIC VENT TERMINATION - 2" or 3" PVC

4.6.5 Concentric Venting Materials
Concentric Vent Termination - 2" or 3" PVC/CPVC



5. Condensate Drain

5.1 Condensate Drain

! NOTICE

Attention! It is recommended to clean the condensate trap, after a few months of boiler operation, to remove deposits/residuals left after the first condensate passage within the boiler new components that may interfere with the correct operation of the trap itself.

! NOTICE

Check with your municipality, or local gas company to determine if the disposal of combustion condensate is permitted in your area (e.g. in the State of Massachusetts the condensate must be neutralized prior to entering a drain)

! DANGER

Carefully follow the above instructions and the accompanying figure – check to ensure the condensate trap is secure to the bottom of the boiler and that no strain is placed on it. Failure to install the condensate trap properly will result in flue gas spillage and leeching of carbon monoxide emissions into the surroundings resulting in serious injury or death.

This unit produces condensate in the heat exchanger and venting system as a product of combustion. Steps must be taken to ensure that condensate does not collect in the venting system; therefore, all exhaust piping must slope back towards the boiler a minimum 1/4" per linear foot of vent. In extreme cases where excessive condensate is being produced a 1/2" per linear foot should be maintained.

All condensate which forms in the boiler or vent system passes through the heat exchanger and out of a bottom drain port which is connected to the condensate trap. This trap allows condensate to drain from the heat exchanger while retaining flue gases in the boiler. This trap is an integral part of the boiler and must be connected to a drain. A length of 3/4" I.D. corrugated condensate hose is supplied with the boiler and is connected to the drain trap.

The following are important notes that must be taken into consideration when constructing the condensate drain system.

1. DO NOT install condensate lines outside. A frozen or blocked drain will cause the condensate to collect in the combustion chamber. This will result in a no heat condition as the unit will shut down, and can possibly damage the internal components.
2. Condensate can be acidic. NEVER use copper, steel, or galvanized piping in the construction of the condensate disposal system as condensate is very corrosive and will corrode most metallic drains and sewer pipes. Do not route the drain line through areas that could be damaged by leaking condensate.
3. If the corrugated condensate drain line must be extended, the use of poly, vinyl tubing or other materials that will not corrode is acceptable.
4. Some jurisdictions may require that the condensate be neutralized before being disposed of. Dispose of condensate in accordance with local codes.
5. When a condensate pump is used or required, select a pump that is designed for its purpose.
6. Do not attempt to substitute another trap for the one provided with the boiler.

The condensation trap must be primed prior to starting the boiler in order to prevent flue gases from entering the building.

The filling operation is carried out as follows (see Fig. 5.1)

- Remove flue gas inlet plug T and fill the trap S three quarters full with water.
- Replace flue gas inlet plug T.

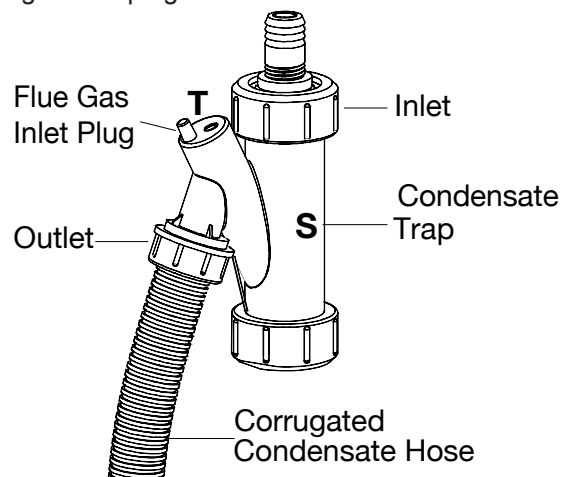


Figure 5.1: Condensate Drain

 **WARNING**

Failure to follow these instructions will void the Glow Brand Manufacturing warranty and may result in property damage, fire, serious injury or death.

 **CAUTION**

Failure to rid the heating system of the contaminants as listed above will void your Glow Brand Manufacturing warranty and may result in premature heat exchanger failure and property damage.

6. Boiler and Heating System Piping

The heat exchanger of the Glow Boiler is designed to attain the highest level of heat transfer in a compact design. To accomplish this, the heating water flows through a series of stainless steel tubes, designed to maximize the heat transfer area. To maintain the efficient and reliable operation of the heat exchanger, and to avoid heat exchanger failure, it is critical to ensure the rules and guidelines in this section are followed.

6.1 Boiler System Preparation

Prior to connecting plumbing to the boiler, flush the entire system to ensure it is free of sediment, flux, solder, scale, debris or other impurities that may be harmful to the system and boiler. During the assembly of the heating system, it is important to keep the inside of the piping free of any debris including construction and copper dust, sand and dirt.

For retrofit applications ensure that all system piping including radiators, black iron pipe and fitting must be cleansed of all build-up including sludge and scale. All systems, old and new, must be cleansed to remove flux, grease, magnetite and carbon residue. Glow Brand recommends cleansing the boiler system with a suitable cleaning agent designed for this purpose. For retrofit applications with heavy lime scale and sludge deposits, a heavier duty cleaner may be required.

6.2 Piping Material

When installing the boiler ensure the piping material being used is compatible with the system. Black malleable iron, flexible corrugated stainless steel tubing, copper, PEX and PERT piping is the only material to be used when plumbing the heating loop. **The PEX and PERT material being used shall be rated as heating pipe and have an oxygen barrier infused within the material. It is strongly recommended that inhibitors be added to the heating water as a means of maintaining water quality within the heating loop.**

6.3 Boiler Water

WATER QUALITY AND BOILER WATER ADDITIVES IMPORTANT NOTE

The heat exchanger used in this boiler is made from stainless steel. Once filled with system water, it will be subjected to the effects of corrosion, as well as fouling from any debris introduced from the system. Take the following precautions to minimize the chance of severe heat exchanger damage caused by corrosion and/or overheating:

1. Flush the system before connecting the boiler and repeat as necessary. Flushing the system will remove impurities, such as sediment, solder flux, metal shavings, and traces of old boiler additives. If necessary, a cleaning agent may be used to assist in system cleaning.
2. Make sure the system is water tight - This is the single most important guideline when installing the unit.
3. Tap water contains dissolved oxygen and other gases which causes corrosion. In a tight system, these gases come out of solution when heated and is quickly removed from the system through the automatic air vent and when the de-air feature is activated. The system then remains essentially free of these gases. Frequent additions of make-up water can expose the heat exchanger to oxygen on a continuous basis. Hard make-up water can cause calcium deposits to collect in the heat exchanger, causing severe damage. To minimize additions of make-up water follow the guidelines below:

- a. Inspect the system thoroughly for leaks before placing it in service.
- b. If the system includes underground piping, or other piping in which a leak might go undetected, consider isolating the boiler from the system with a heat exchanger.
- c. Make sure that the expansion tank is properly sized and in good condition. If not, the relief valve may open frequently, resulting in regular additions of make-up water.
- d. An automatic fill valve can be installed to maintain the system pressure. When doing so the installation must be done in accordance with local codes or the authority having jurisdiction.
- e. Non-Metallic Tubing - Even if the system is tight, oxygen can be introduced into the system through some types of non-metallic tubing used in radiant systems. Other nonmetallic tubing is equipped with an oxygen barrier to prevent migration of oxygen into the water. If the boiler is to be installed in a system containing non-metallic tubing without an oxygen barrier, it must be isolated from the boiler with a brazed plate heat exchanger.
- f. Water Chemistry, Antifreeze, and Boiler Water Additives – Improper boiler water chemistry can damage the heat exchanger, as well as deteriorate the seals. Observe the water chemistry requirements shown below.

Water Chemistry – The installer of the Glow Boiler must consider the condition of the water in the heating system. Ensure the condition of the boiler water falls within the following range:

- PH – between 6.5 & 8.5
- Iron – less than 0.3 mg/l
- Chloride – less than 200 mg/l
- Copper – less than 0.1 mg/l
- Conductivity – 100 to 300 $\mu\text{S}/\text{cm}$ (at 25°C);
- TDS 50 to 120 ppm or Total Hardness 3 to 7 grains/USgal.

Treatment - Should the boiler water fall outside of the conditions listed above it is strongly recommended that the unit is treated with a suitable corrosion inhibitor.

Anti-freeze - For systems requiring freeze protection, use only inhibited propylene glycol, specially formulated for hydronic heating systems; use of other types of antifreeze may be harmful to the system and will void the warranty. Note: the use of glycol may reduce the usable output capacity of the boiler, thus requiring the unit to be “de-rated” by limiting the maximum operating capacity and/or the maximum water temperature. Glow Brand recommends against exceeding 35% concentration of glycol.

System Pressure - The Glow Boilers are intended solely for use in pressurized closed loop heating systems operating with a minimum pressure of 10 PSI at the boiler outlet. To obtain the minimum system design pressure, follow the piping diagrams illustrated in this section.

Oxygen Elimination - This boiler may only be installed in a pressurized closed-loop heating system, free of air (oxygen) and other impurities. To avoid the presence of oxygen, ensure all of the air is removed from the system during commissioning via strategically placed adequately sized air-removal devices, located throughout the heating system. Immediately repair any leaks in the system plumbing to avoid the addition of make-up water; make-up water provides a source of oxygen and minerals that can lead to heat exchanger failure. Failure

! CAUTION

DO NOT use inhibited glycol with non-compatible boiler inhibitors. Non-compatible inhibitors may counteract each other rendering them ineffective.

! NOTICE

To maintain protection, the level of corrosion inhibitor must be monitored periodically for the correct concentration.

! NOTICE

The Glow boiler is not approved for operation in an “open system”, thus it cannot be used for direct potable water heating or process heating of any kind.

! CAUTION

If the pressure relief valve is not installed in the correct orientation (horizontally with drain pipe out the bottom) the relief valve may not function properly resulting in property damage or personal injury.

! WARNING

Ensure the discharge of the pressure relief is piped to a location where the steam or water will not cause property damage or serious injury.

! DANGER

Operating the boiler without sufficient water level will result in overheating and may result in property damage, fire, personal injury or loss of life.

! WARNING

Failure to ensure the minimum water flow rate through the boiler when the burner is on will not only reduce the operating efficiency of the boiler, but may also cause premature failure, overheating and void the warranty. Failure to follow instructions may result in fire, property damage, serious injury or death.

to follow these instructions will result in poor performance, unnecessary wear of system components and premature failure.

Dirt Separation- A Wye strainer should be installed on the return pipe of the boiler. Wye strainers can be installed in either a horizontal or vertical position. They mechanically remove solids from the flowing liquid piping system with the use of a perforated or wire mesh straining screen. These devices are essential in protecting the boiler from obstructions when used with cast iron radiators.

De-Air Sequence - The De-Air sequence it is a safety function starting at every power ON and is used to remove the air from the heat-exchanger. The de-air sequence can be cancelled by pressing and holding buttons CHv +DHWv for up to 3 seconds. The De-Air sequence can be disabled by installer; see Section 11.6- Installer menu, parameter 2.139.

Pressure Relief Valve - A pressure relief valve is supplied with each unit and must be installed at the boiler outlet in the vertical position with the drain pipe outlet exiting the side of the pressure relief valve horizontally and elbowing down. The maximum allowable working pressure is 30 psi.

Water Pressure Sensor – Glow boilers are provided with a factory installed water pressure sensor; in the event the pressure drops below 10 psi, the burner is inhibited from firing.

Pressure Relief Assembly – A pipe assembly with a pressure relief valve. This fixture requires a 3" clearance radius from the gas and piping system. (See Fig. 6.1).

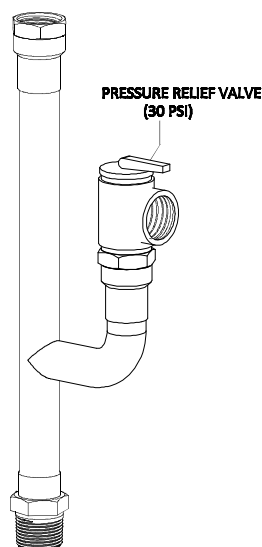


Figure 6.1: Pressure Relief Assembly

Low Water Pressure Sensor – Glow Boilers are designed with a factory installed Water Pressure Sensor. The sensor provides a reading of the boiler inlet water pressure on the display. If the pressure drops below 4 PSI, the control will go to a blocking error “FILL” and inhibit burner operation. Where required by the Authority having jurisdiction, an external LWCO may have to be installed.

! NOTICE

Follow the installation instructions included with the air removal device when placing it in the system; air removal devices generally work better when placed higher in the system. Always locate air removal devices in areas of the system that have a guaranteed positive pressure, e.g., in close proximity to the water fill and expansion tank.

! CAUTION

Ensure the external expansion tank does not become isolated from the boiler anytime the system is operating. Failure to follow these instructions may result in discharge of the Pressure Relief Valve may result in property damage or personal injury.

! NOTICE

The installation of flow checks, motorized valves or other shutoff devices (other than for the purpose of servicing) are not permitted between the location of the “Closely Spaced Tees” and the expansion tank.

6.4 Boiler & System Plumbing

The Glow Boiler uses a low mass heat exchanger that requires a minimum rate of forced water circulation any time the burner is operating. To ensure the minimum flow rate is attained, see Table 6.1.

Minimum Flow Rate Requirements	
MODEL	FLOW (USgpm)
B85	3
B120	6
B160	7

Table 6.1: Minimum Flow Requirements

Air Removal – The boiler and system plumbing layout must be configured to promote the removal of air from the water. The Glow Boiler has one internal automatic air vent in the heat exchanger aiding in the purging of air from the boiler during the initial fill. This automatic air vent is intended to purge the air from the boiler during the commissioning. This device is NOT intended, nor sufficient to remove the air from the entire system plumbing. It is not designed to support the entire system. Additional air vents and bleeders must be strategically placed throughout the system.

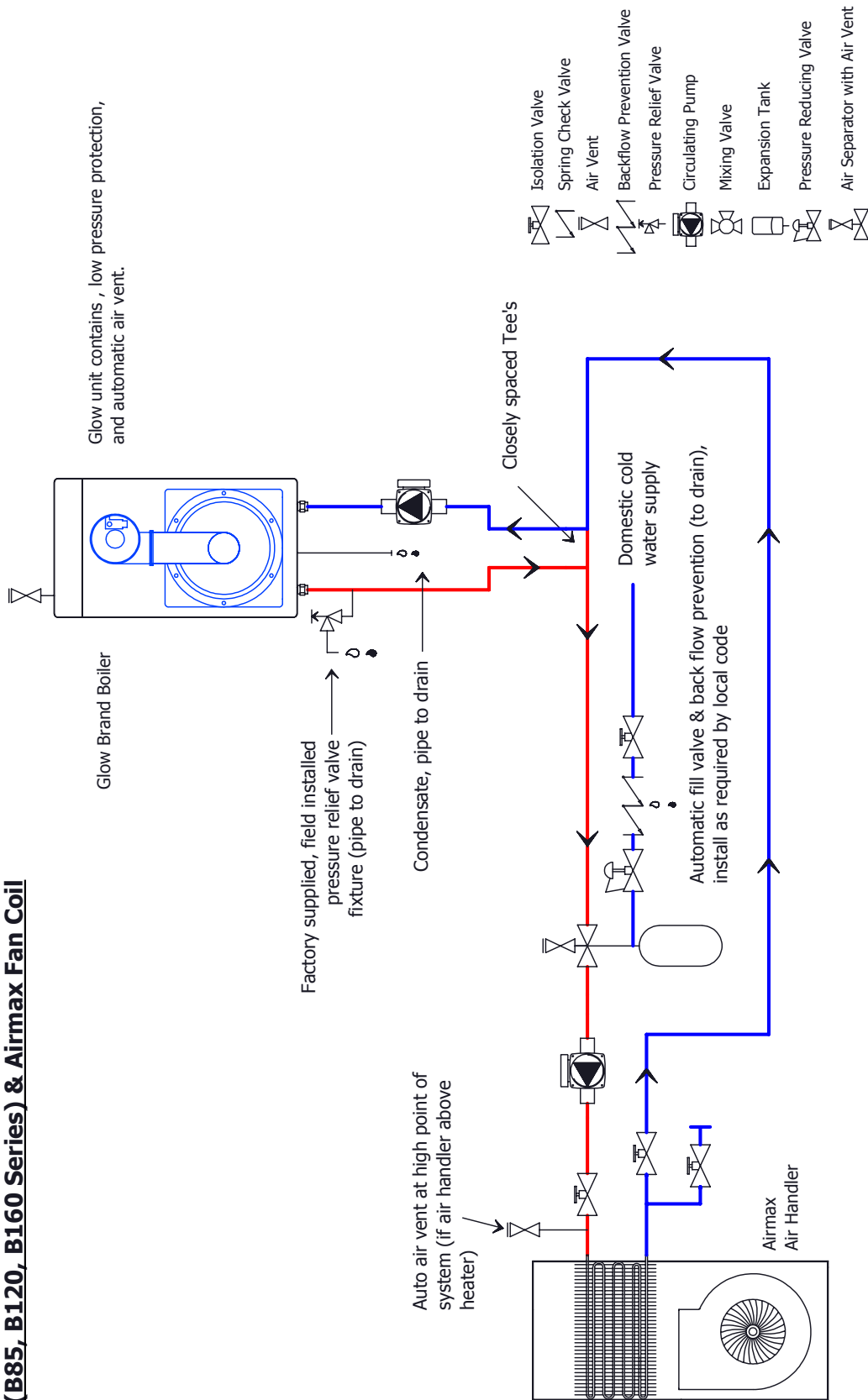
External Expansion Tank – An expansion tank is required and should be sized in accordance with the water volume of the system as well as the firing rate of the boiler. It is important to locate the additional expansion tank, and make-up water fill if required/installed, on the inlet side of any circulator in the system.

Back Flow Preventer - A field supplied back flow preventer is required by some jurisdictions to prevent water in the heating loop from backing up into the city water supply when an automatic fill valve is used. This is especially important on systems in which glycol solution is used as the heating medium.

NOTE: Figures in Section 6.5 - Plumbing Schematics illustrate typical piping systems. These piping schematics do not illustrate all of the required concepts and components required to have a proper installation. It is the responsibility of the installing contractor and system designer to determine which system best meets the need of the installation and to consider all aspects of a proper system design. Contractor modifications to these instructions may be required, based upon existing piping and system design.

6.5 Plumbing Schematics

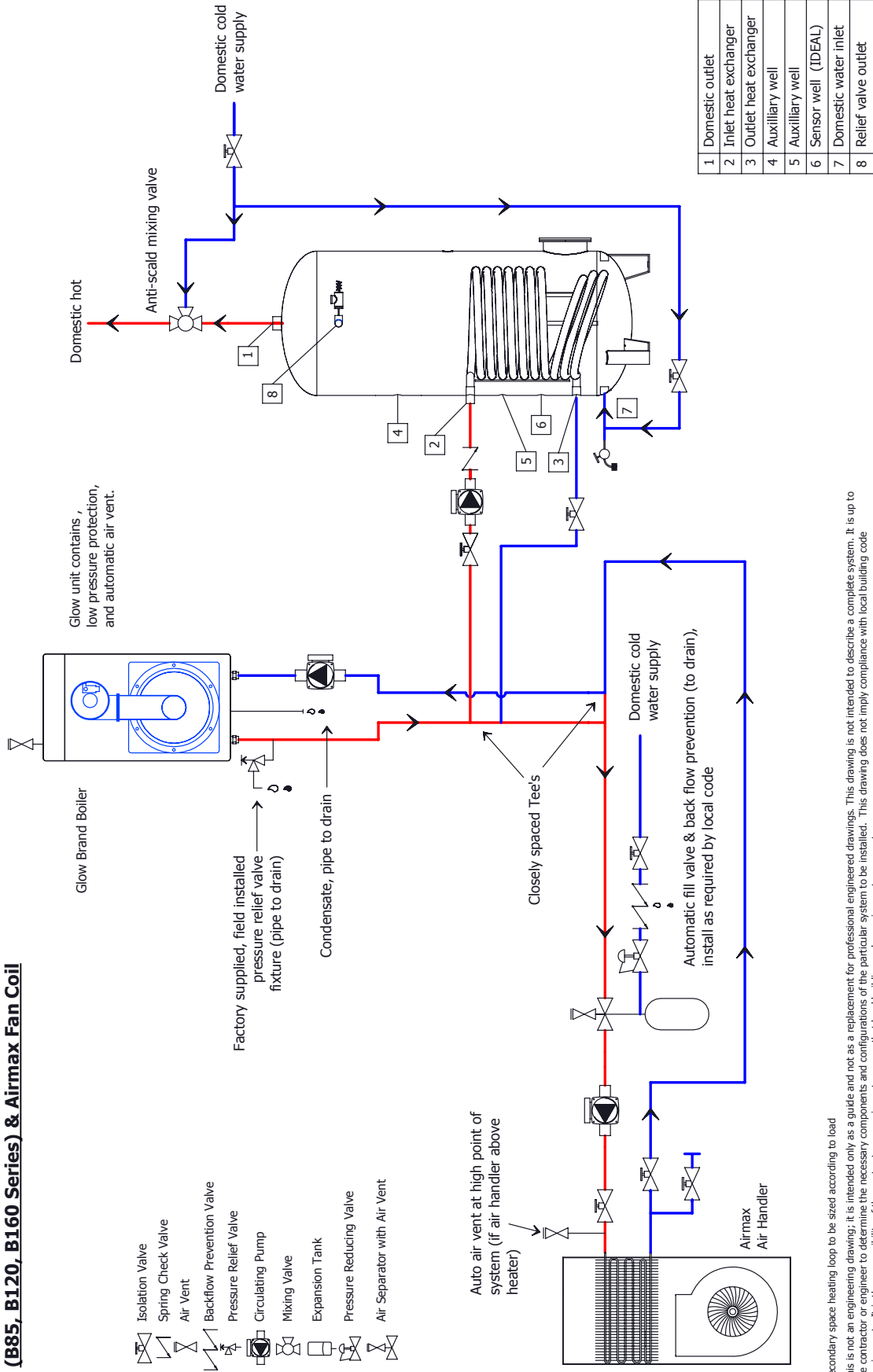
Suggested Piping Layout for Glow Boiler (B85, B120, B160 Series) & Airmax Fan Coil



Secondary space heating loop to be sized according to load
 This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineered drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configurations of the particular system to be installed. This drawing does not imply compliance with local building code requirements. It is the responsibility of the contractor or engineer to ensure that local building code requirements are met.

Figure 6.3

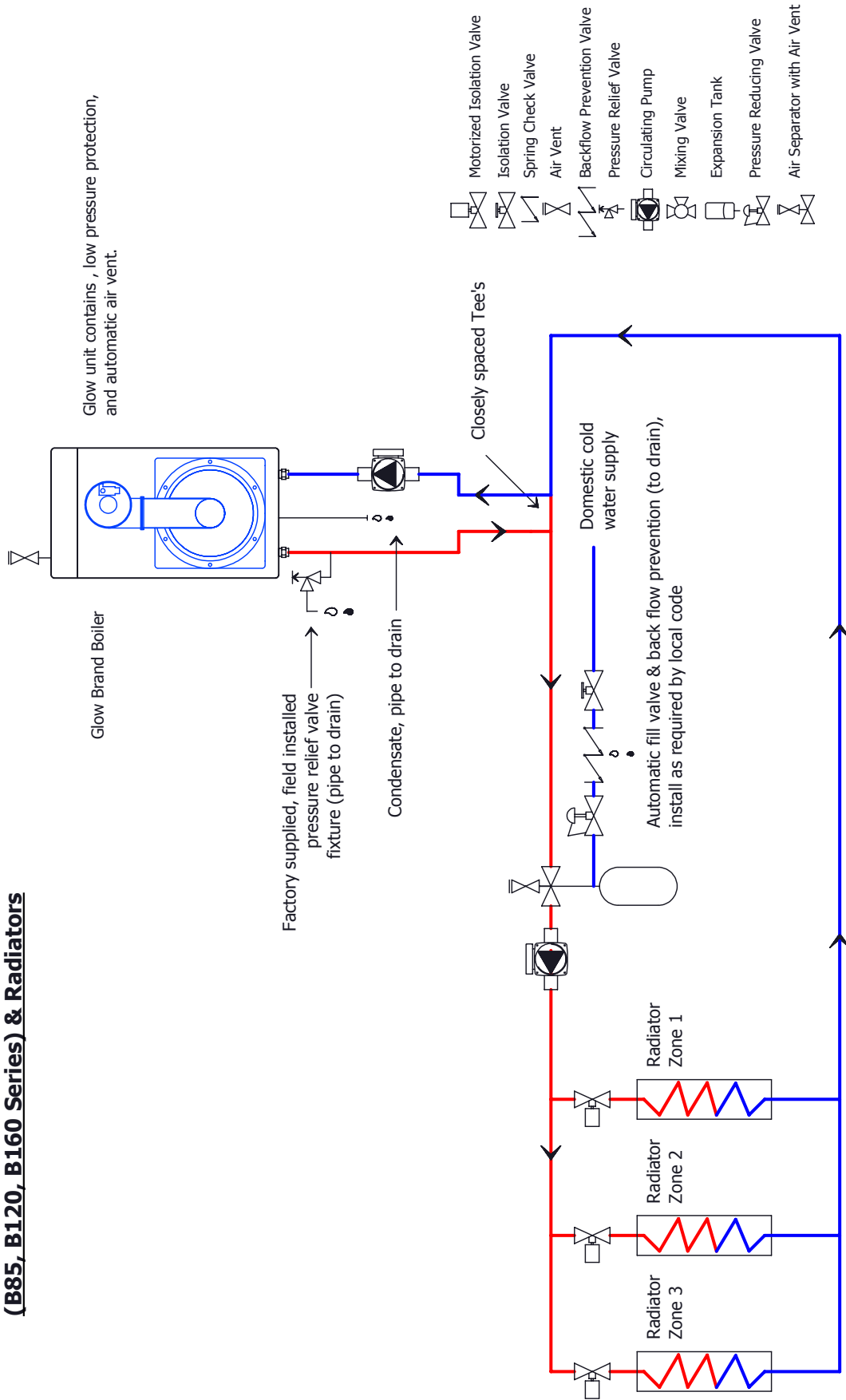
Suggested Piping Layout for Glow Boiler (B85, B120, B160 Series) & Airmax Fan Coil



Secondary space heating loop to be sized according to load
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Figure 6.4

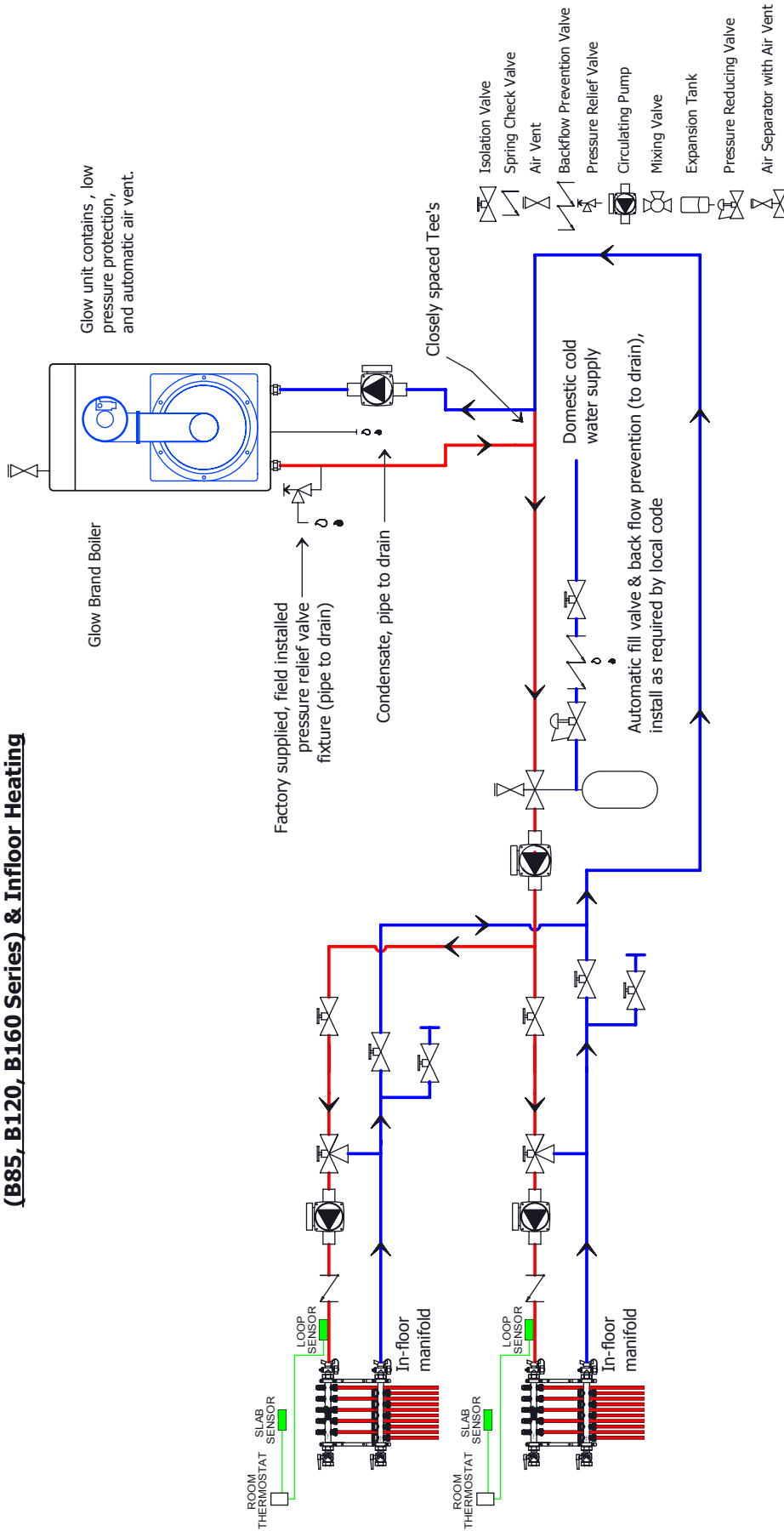
**Suggested Piping Layout for Glow Boiler
(B85, B120, B160 Series) & Radiators**



Secondary space heating loop to be sized according to load
 This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineered drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configurations of the particular system to be installed. This drawing does not imply compliance with local building code requirements. It is the responsibility of the contractor or engineer to ensure that local building code requirements are met.

Figure 6.5

**Suggested Piping Layout for Glow Boiler
(B85, B120, B160 Series) & Infloor Heating**



Secondary space heating loop to be sized according to load
 This is not an engineering drawing; it is intended only as a guide and not as a replacement for professional engineered drawings. This drawing is not intended to describe a complete system. It is up to the contractor or engineer to determine the necessary components and configurations of the particular system to be installed. This drawing does not imply compliance with local building code requirements. It is the responsibility of the contractor or engineer to ensure that local building code requirements are met.

 **WARNING**

Scald Hazard - Hotter water increases the risk of scald injury. There is a hot water scald potential if the thermostatic mixing valve is not installed or set too high. Be sure to follow the adjustment instructions provided with the thermostatic mixing valve. Failure to follow the instructions may result in serious injury or death.

7. Boiler Operation

The Glow Boiler is designed to provide central heating (CH) and domestic hot water (DHW) with an indirect tank.

Flue Temperature Sensor – The Glow Boiler is equipped with a flue temperature sensor located at the exhaust outlet of the primary heat exchanger. If the thermal exhaust temperature exceeds 149°F(65°C) (default for PVC venting), the sensor will shut down the burner and an error message and code number will appear on the screen. The installer can set the flue temperature as high as 194°F(90°C) to accommodate higher CH temperature. When doing so, parameters need to be configured to reflect the changes and the vent material selected must be S636 CPVC venting as described in Section 4.5.2-Exhaust Vent Pipe Materials.

Flue Microfuse – The Glow Boiler is equipped with a flue microfuse located on the top right of the primary heat exchanger. The fuse is designed to open when the temperature within the heat exchanger exceeds 336°F (169°C). Should this occur the primary heat exchanger must be replaced.

7.1 Pump Operation

On any demand the controller energizes the primary circulating pump. If the demand is from the thermostat the CH pump is energized. If the demand is from the DHW sensor, the DHW pump is energized. Both CH and DHW pumps do not run at the same time. The controller then operates the burner to maintain the CH or DHW temperature set-point.

- a. Primary Circulating Pump** - Circulates water through the boiler. This pump is hydraulically separated from the CH pump by closely spaced tees or a primary loop. The primary pump is always operating when the system is responding to a call for CH and or DHW.
- b. CH Circulating Pump** - Circulates water through the piping towards the air handler or other heat emitters.
- c. DHW Circulating Pump** - Circulates water directly through the indirect water tank.

Mode 1: Anti-frost (default)

The heat exchanger will be maintained at a pre-programmed temperature to prevent frost damage. If the supply, return or flue temperature drops below 50°F(10°C), the CH pump is activated. If the temperature continues to drop by more than 9°F (5°C) the burner fires at minimum power and continues until the return temperature reaches 59°F(15°C). Frost icon flashes on display when active. "1" indicates the Anti-Frost Pre-heat is ACTIVE.

! WARNING

The Glow Brand Boiler is factory equipped to operate with one specific Gas type only, as specified on the rating plate. Conversion kits to Propane Gas or Natural Gas are not available. Property damage, serious injury or death may occur if any gas other than what is specified on the rating plate is applied.

! WARNING

Strain on the gas valve and fittings may result in vibration, premature component failure and leakage and may result in a fire, explosion, property damage, serious injury or death.

! WARNING

Do not use an open flame to test for gas leaks. Failure to follow these instructions may result in fire, property damage, serious injury or death.

! WARNING

When performing a pressure test on the gas line piping, be sure the boiler is disconnected and or isolated if the test pressure is expected to exceed 1/2 PSI (14" w.c.), as damage to the internal gas valve could occur resulting in fire, property damage, serious injury or death.

! WARNING

Do not store or use gasoline or other flammable vapors & liquids in the vicinity of this or any other appliance. Failure to follow instructions could result in explosion causing property damage, serious injury or death.

8. Gas Piping

8.1 Installation

Refer to the current National Fuel Gas Code ANSI Z223.1/NFPA 54 or CAN/CGA B149.1 installation codes, and local codes for gas piping requirements and sizing. Pipe size running to the unit depends on:

- Length of pipe.
- Number of fittings.
- Type of gas.
- Maximum input requirement of all gas appliances in the residence.

Ensure that:

- The appliance gas line to the boiler does not apply any additional weight to the internal gas valve. Using an approved and properly sized flexible gas connector to connect to the boiler is acceptable provided it complies with local codes. This ensures there will be no strain on the internal gas components.
- A manual gas shut-off valve is installed before the approved flexible connector if used. Gas valve must be listed by a nationally recognized testing lab.
- The gas piping is large enough for all the appliances in the home. No appreciable drop in line pressure should occur when any unit (or combination of units) lights or runs.
- Pipe-threading compound that is resistant to natural gas solvent action. Apply an adequate amount to all male threads, starting at two threads from the end.
- All gas piping, including gas components in the boiler, are checked for leaks using a "Bubble Test", prior to operating the boiler.
- All water and gas piping does not interfere with the vent pipe, or the removal of the valve, burner, and serviceable components.
- The boiler shall be installed in such a manner that the gas ignition system components are protected from water (dripping, spraying, rain etc.) during installation and servicing.
- When a vertical section of piping is used, the installation of a sediment trap at the inlet of the gas connection to the boiler must be installed.
- Piping is not installed directly in front of the boiler. Always provide access to the front door and side panel openings

8.2 Gas Valve and Burner Setup

8.2.1 Gas Line Pressure

The Glow Boiler is equipped with a gas valve with a line pressure test port. The following procedures must be followed to properly measure the gas line pressure to the boiler and to ensure it falls within the specified range given in the table below.

The minimum and maximum inlet gas pressures for Natural Gas (NG) are Min. 3.50" WC – Max. 10.50"WC.

The minimum and maximum inlet gas pressures for Liquid Propane (LP) are Min. 8.0" WC – Max. 13.0"WC.

GAS	LINE PRESSURE (inches w.c.)		
	Nominal	Min.	Max
Natural	7.0	3.5	10.5
Liquid Propane	11.0	8.0	13.0

Table 8.1: Gas Chart

! DANGER

Prior to turning the gas supply on and lighting the boiler, ensure all aspects of the installation are complete and in conformance with the instructions provided in this manual, including the venting, condensate drain, and system water piping. Failure to precisely follow these instructions will cause a fire or explosion resulting in property damage, serious injury or death.

! WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, serious injury or death

! WARNING

Should overheating occur or the gas supply fail to shut off, turn off the manual gas shut off valve to the boiler. Failure to follow instructions could result in explosion causing property damage, serious injury or death

! WARNING

The Glow Boiler must be set-up and commissioned by a certified, trained and qualified service technician. Improper commissioning may result in incorrect operation, damage to components or property, injury or death.

8.2.2 Prior to Lighting the Boiler

The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at test pressures equal to or less that 1/2 PSI (14" w.c.),

The gas appliance and its gas connections must be leak tested before placing the appliance in operation. Leaks can be found by using a gas leak detection device or by applying soapy water to all gas fittings. Should bubbles occur, tighten those connections and re-test.

Always purge the gas line for any debris before connecting to the water heater gas inlet.

Never use an open flame to test for gas leaks as property damage, personal injury or death could result.

The maximum inlet gas pressure must not exceed the valve specified by the manufacturer and that the minimum valve listed as for the purposes of input adjustment.

The connection to the gas supply must be carried out by professionally qualified personnel in accordance with the relevant standards.

- Check the internal and external seals of the gas supply system.
- A gas shut-off valve must be installed upstream of the appliance
- Before starting up the boiler, make certain the type of gas being used corresponds to what is listed on the rating plate.
- The gas supply pressure must be between the values reported on the rating plate.

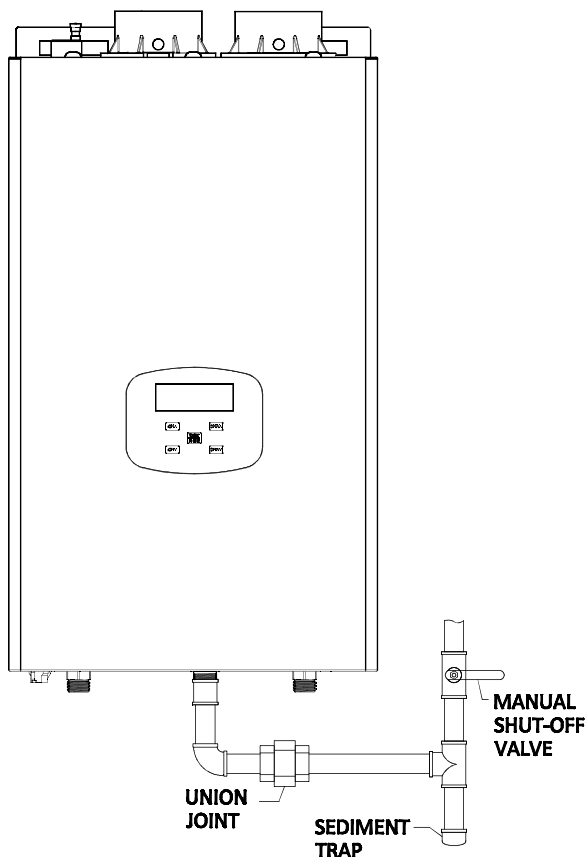


Figure 8.1: Gas Piping

 **WARNING**

Gas pressures over and above the specified range will result in adverse performance and dangerous operating conditions; any damage resulting from extreme gas supply pressures will not be covered by the limited warranty.

 **WARNING**

Until pressure testing of the main gas supply line is completed, ensure the gas line to the GLOW boiler is disconnected to avoid any damage to the water heater.

 **NOTICE**

The line pressure is a function of the gas supply and is affected solely by field provided parameters such as line size and regulator settings. Under no circumstances can the boiler gas valve influence or be used to adjust the gas line pressure.

 **DANGER**

Failure to close the bleed screw of the Line Pressure Test Port will allow gas to leak, resulting in a fire or explosion causing property damage, serious injury or death.

8.2.3 Checking the gas pressure

Turn off the gas supply to the boiler.

1. Open the bleed screw of the line pressure test port approximately 1-1/2 turns. This port is directly connected to the gas line feeding the boiler.
2. Place an appropriate sized length of tubing over the port of the line pressure test port in order to properly measure the gas pressure with a manometer. Ensure both ends of the tubing make a tight connection.
3. Open the supply of gas to the boiler and check for gas leaks.
4. Observe the line pressure under static conditions and compare it to the Gas Chart-Table 8.1. The pressure will be greatest under static conditions.
5. With all other gas appliances operating, operate the burner to the maximum firing rate and note the gas pressure fluctuations if any. Compare to the minimal range as listed in the Gas Chart Table.
6. Should the line pressure not correspond with what is listed in the Gas Chart Table 8.1, contact the local gas utility and have them increase the gas pressure.
7. Upon completion of the line pressure testing, return the bleed screw of the line pressure test port to the closed position.

⚠ WARNING

Avoid Shocks - To Avoid Electrical Shock, turn off electrical power to the boiler prior to opening any electrical box within the unit. Ensure the power remains off while any wiring connections are being made. Failure to follow these instructions may result in component failure, serious injury or death

⚠ CAUTION

Field Wiring - Wire grommets must be used to secure wiring and prevent chafing when passing wiring through the cabinet wall. Failure to follow instructions may damage unit.

⚠ WARNING

Wire Protection - When passing any wiring through the cabinet of the boiler, the installer must use wire grommets suitable for securing the wiring and preventing chafing. Failure to follow instructions may result in component failure, serious injury or death.

⚠ WARNING

Power Supply - The Glow boiler is designed to be powered using a single phase 120VAC power supply that is protected via a circuit breaker to allow a maximum of 10 Amps. Failure to follow instructions may result in component failure, serious injury or death.

9. Field Wiring

All wiring must be in accordance with the Canadian Electrical code, CSA C22.2 and any applicable local codes. Ensure that the wiring complies with this manual. The boiler must be electrically grounded in accordance with the National Electrical Code ANSI/NFPA 70, local codes, and/or the Canadian Electrical Code CSA C22.1.

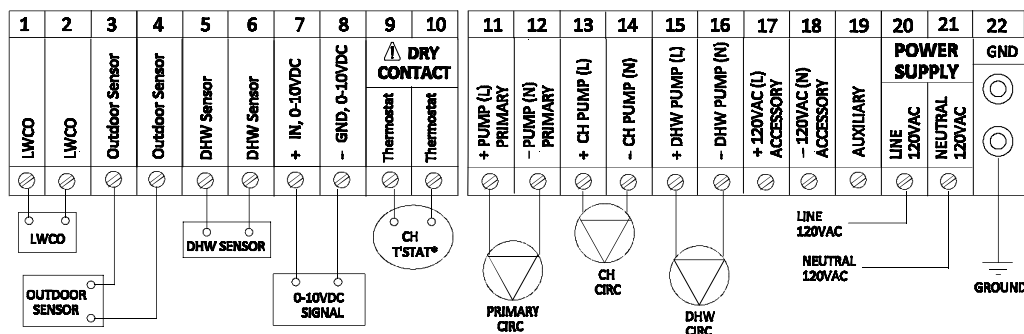
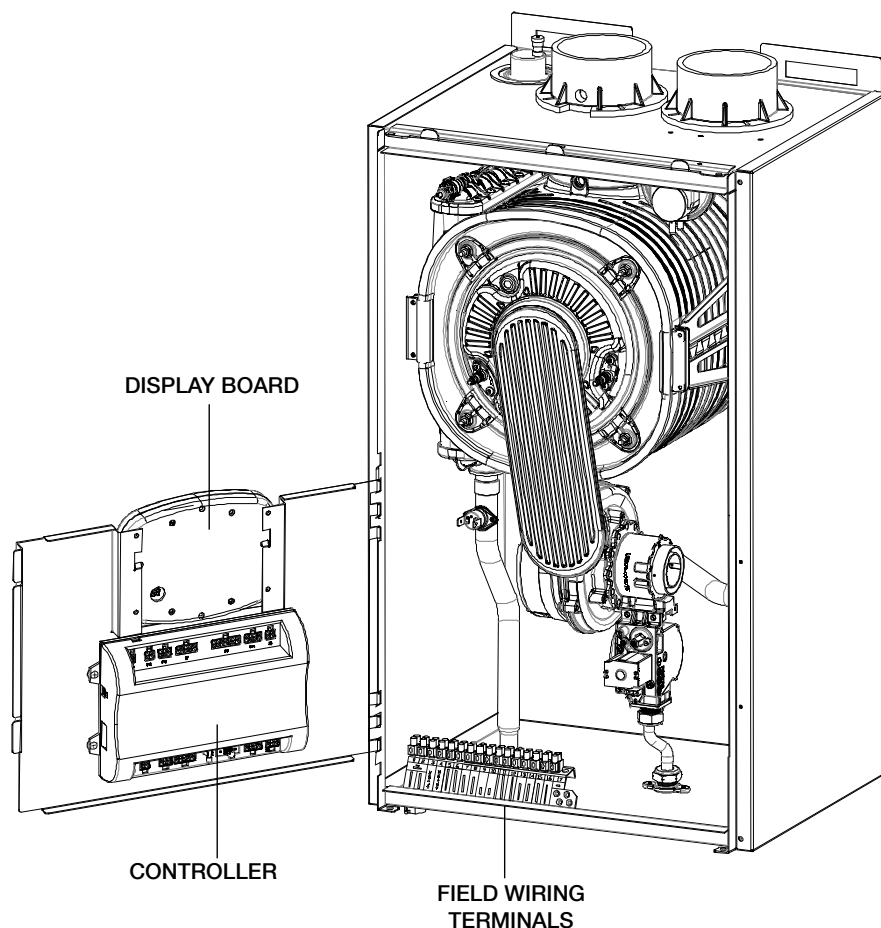


Figure 9.1: Simplified Wire Connections

5AT Fuse (120VAC) – The Glow Boiler controller is equipped with one Anti-Surge 5 Amp fuse to protect the 120VAC pump outputs. The fuse is located under the cover of the controller.

! CAUTION

Labeling - Label all wires prior to disconnecting them when servicing controls. Wiring errors can cause improper and dangerous operation. Failure to follow instructions may result in property damage or personal injury.

! CAUTION

Continuity - Before connecting the line voltage wiring, perform a continuity check between all wires and ground to make sure that there are no electrical leaks that could blow a fuse or damage electrical components. Also check the polarity of the line and neutral wires. Line must measure 120VAC to ground; neutral must measure zero. Failure to follow instructions may damage the unit.

! NOTICE

The Glow Boiler has a 0-10 DC low voltage connection that utilizes a DC signal for communicating inputs when used with an Energy Management System (EMS). Power cannot be applied to these terminals, nor can the low voltage power supply from these terminals be used to power anything else. These terminals are strictly reserved for EMS. DIGITAL THERMOSTATS CANNOT be directly connected to the boiler 10VDC terminals.

	Location	Connection	Description
Low Voltage	1 & 2	LWCO	Connect leads of an approved LWCO sensor to terminals 1 & 2.
	3 & 4	Outdoor Temperature Sensor	An Outdoor Sensor is optional for each boiler. When connected to terminals 3 & 4, and activated by the installer, the control will indicate the outdoor temperature and adjust the boiler temperature set point during a Space Heat demand.
	5 & 6	DHW Sensor	Connect leads of a DHW Tanks Sensor to terminals 5 & 6. set DHW=1. See Section 11.7
	7 & 8	0-10 VDC Input	When using an Energy Management System (EMS).
	9 & 10	Thermostat / End Switch	Input requiring contact 9 & 10 terminal to initiate a demand for heating. Contact made via an isolated end switch (dry contact) from a load (Heat Emitter).
High Voltage	11 & 12	Primary Pump	120 VAC output to the main boiler circulator; powered during all demands. Total load of Primary Pump and CH Pump (or DHW Pump) must not exceed 2.0 Amps. Field Wired.
	13 & 14	CH Pump	120VAC output to the CH circulator; powered during a demand for Central Heat. Total load of Primary Pump and CH Pump must not exceed 2.0 Amps. Field Wired.
	15 & 16	DHW Pump	120VAC output to the DHW circulator; powered during a demand for DHW. Total load of Primary Pump and DHW Pump must not exceed 2.0 Amps. Field Wired.
	17 & 18	Accessory 120 Vac	Accessory voltage source 120 Vac, 5 Amperes. Can be used as a source for pumps or for zone valves when total connected load will exceed 2.0 Amperes.
	19	Auxiliary	Dry Auxiliary terminal connection set.
	20 & 21	120 Vac Power Supply	Unit power connection. 120 Vac. Line voltage connected to terminal 20. Neutral connected to terminal 21.
	22	Ground	Location for connecting earth ground and for grounding all of the circulators.

Figure 9.2: Field Connections

9.1 Line Voltage Connections

Field wiring enters the cabinet through holes located on the bottom (underside) of the boiler cabinet; use suitable strain-relief grommets to protect the wires. Field wiring connections are to be installed in accordance with instructions provided in Figure 9.2: Field Connections.

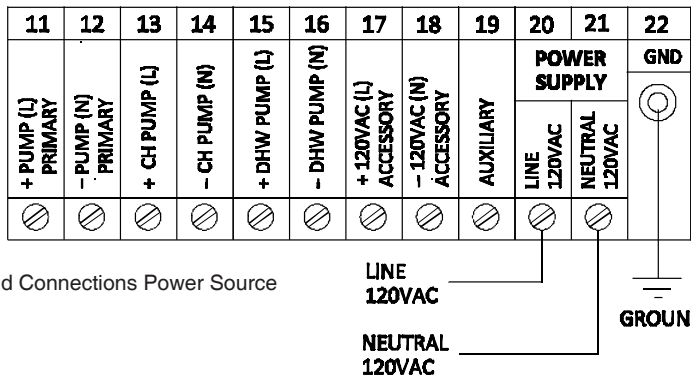


Figure 9.3: Field Connections Power Source

9.1.1 Primary Pump and CH (or DHW Pump) Less Than 2 Amps

If the total load of the Primary pump and CH Pump (or DHW Pump) will not exceed 2.0 Amperes, they may be wired as indicated in Figure 9.4

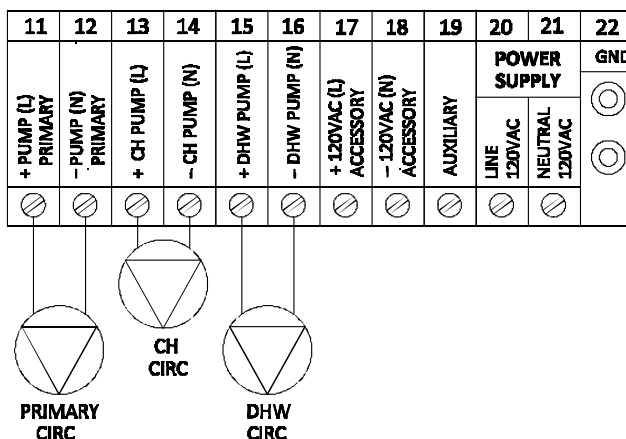


Figure 9.4: Field Connections Pumps Less Than 2 Amps Combined

9.1.2 External Voltage Source (Pump & External Pump)

If the total load of the Primary pump and CH Pump (or DHW Pump) will exceed 2.0 Amperes, an external secondary voltage source must be provided as indicated in Figure 9.3. Total available current at terminals 17 & 18 is 5 Amperes.

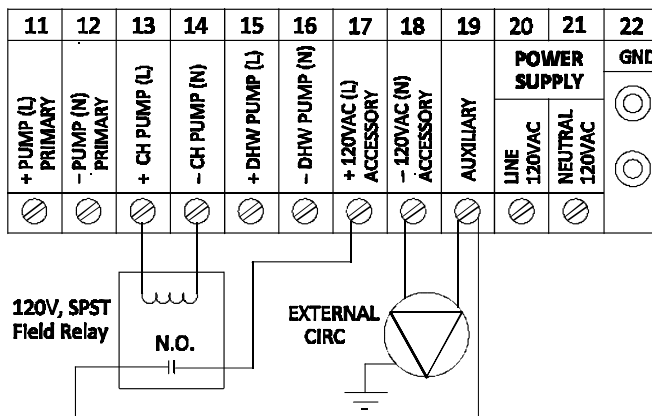


Figure 9.5: Field Connections External Voltage Source

! NOTICE

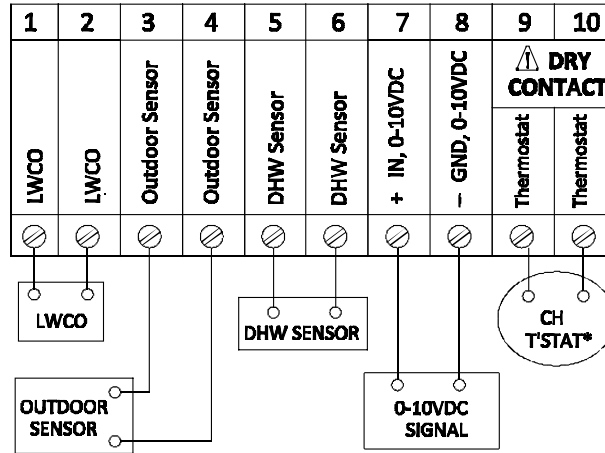
Max Electrical Load - Primary and CH (or DHW Pump) are limited to operating a circulator with a maximum total current load of 2.0 Amps.

! NOTICE

Max Electrical Load - Terminals 17 & 18 are limited to operating a circulator with a maximum total current load of 5.0 Amps.

9.2 Low Voltage Connections

The Glow Boiler low voltage connections are located within the cabinet just below the control module. Low voltage field connections are to be installed in accordance with the wiring diagram shown below.



* Dry contact , Don't apply any voltage

Figure 9.6: Field Connections Low Voltage

9.2.2 Low Water Cut Off (LWCO)

The appliance is shipped with a factory installed jumper between terminals 1 & 2 in the absence of a LWCO switch. See Section 15.2 for part number. The LWCO switch is field wired into the terminal strip of the unit as shown in Figure 9.7. Wiring can be 18ga LVT up to 20 ft length.

When the LWCO installation is complete, TEST THE LWCO to ensure the burner shuts down when the water level drops. See Section 11.9- Special Operations

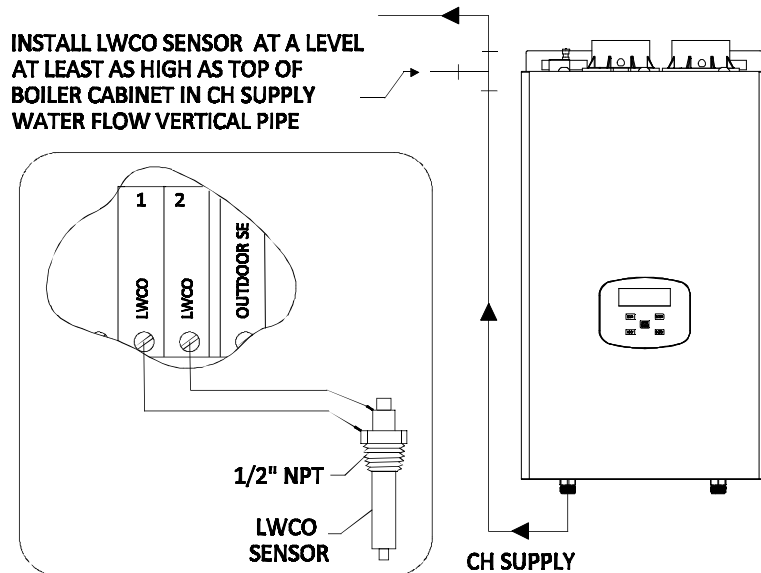
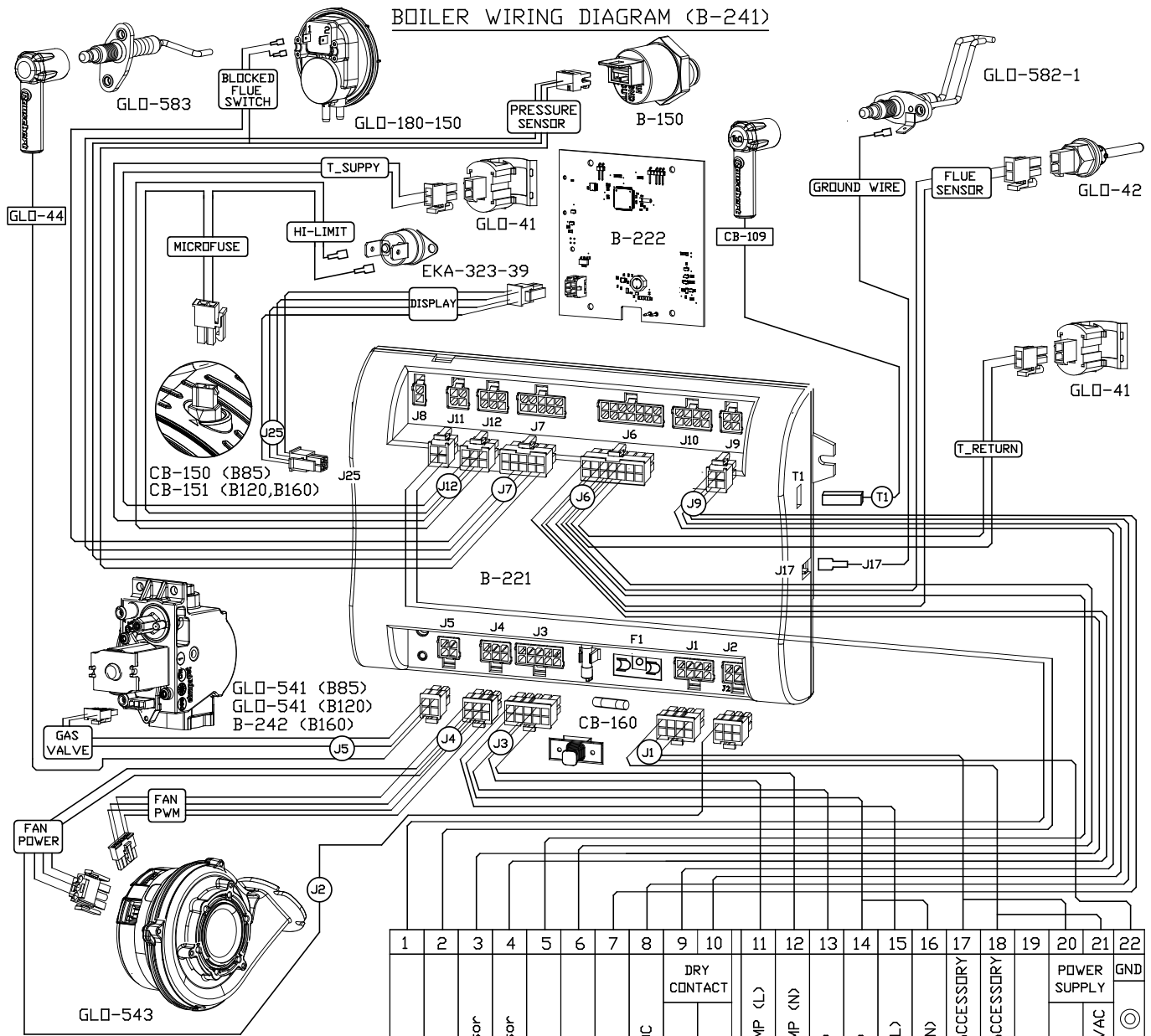


Figure 9.7: Field Connections LWCO



SENSORS & COMPONENTS LIST

- B-150 BOILER PRESSURE SENSOR
- B-221 IGNITION CONTROL BOARD (ICB)
- B-222 BOILER DISPLAY
- B-242 (B160) GAS VALVE, B160
- CB-109 IGNITION ELECTRODE CABLE
- CB-150 B85 HEAT EXCHANGER WITH BUILT IN MICROFUSE
- CB-151 B120/B160 HEAT EXCHANGER WITH BUILT IN MICROFUSE
- CB-160 FUSE, IGNITION CONTROL BOARD
- EKA-323-39 HIGH TEMP LIMIT SWITCH
- GLO-180-150 BLOCKED FLUE SWITCH
- GLO-41 SUPPLY & RETURN TEMP SENSOR
- GLO-42 FLUE TEMP SENSOR, HEAT EXCHANGER
- GLO-44 IONIZATION ELECTRODE CABLE
- GLO-541 (B85) GAS VALVE, B85
- GLO-541 (B120) GAS VALVE, B120
- GLO-543 FAN
- GLO-582-1 IGNITION ELECTRODE
- GLO-583 IONIZATION ELECTRODE

ACRONYM

- T_SUPPLY CH SUPPLY TEMP
- T_RETURN CH RETURN TEMP

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
										DRY CONTACT										POWER SUPPLY	GND
		Outdoor Sensor	Outdoor Sensor	DHW Sensor	DHW Sensor	+IN, 0-10VDC	-GND, 0-10VDC	Thermostat	Thermostat	+PRIMARY PUMP (L)	-PRIMARY PUMP (N)	+CH PUMP (L)	-CH PUMP (N)	+DHW PUMP (L)	-DHW PUMP (N)	+120VAC(L) ACCESSORY	-120VAC(N) ACCESSORY	AUXILIARY	LINE 120VAC	NEUTRAL 120VAC	
																	FIELD WIRING				

CONNECTOR	HARNESS #	DESCRIPTION
J1	B-HRN-005	CONTROLLER AND ACCESSORY 120VAC SUPPLY WIRING HARNESS
J2,J4	CB-HRN-002	FAN WIRING HARNESS
J3	B-HRN-001	PUMP WIRING HARNESS
J5	CB-HRN-003	GAS VALVE & IONIZATION WIRING HARNESS
J6	B-HRN-002	TEMP SENSORS WIRING HARNESS
J7	B-HRN-003	CH PRESSURE SENSOR & BLOCK FLUE SWITCH WIRING HARNESS
J9	CB-HRN-004	ROOM THERMOSTAT AND 0-10VDC WIRING HARNESS
J11	B-HRN-004	LOW WATER CUT-OFF (LWCO) WIRING HARNESS
J12	CB-HRN-006	HI-LIMIT & MICROFUSE, CH SUPPLY TEMP SENSOR WIRING HARNESS
J17	CB-HRN-008	GROUND WIRING HARNESS
J25	CB-HRN-007	DISPLAY WIRING HARNESS

! WARNING

If the unit fails to light consistently and smoothly, contact Glow Brand Manufacturing for technical support. Never allow the boiler to operate if the ignition or operation of the burner is rough or erratic. Failure to follow these instructions may result in serious injury or death.

! WARNING

An ionization electrode located to the left of the burner uses a single electrode that is wired directly to the ignition control board. An ignition electrode is located on the opposite side also on the burner plate. DO NOT remove this wire from the ICB while the unit is in operation. The ICB internal transformer delivers a very high voltage which could result in an EXTREME ELECTRICAL SHOCK possibly causing serious injury or death.

! WARNING

Failure to perform the flue gas analysis and adjustment detailed in this section may result in erratic and unreliable burner operation, leading to reduced efficiency, increased fuel consumption, reduced component life, heat exchanger combustion deposits, and general unsafe operation. Failure to follow these instructions may result in serious injury or death.

10. Starting Up the Boiler

10.1 Filling the unit

The heating loop must be filled with water prior to starting the unit. A pressure reducing valve/automatic fill valve can be used and installed in the heating loop. This valve will ensure the unit does not enter into a low water condition when installed properly. If using a pressure reducing valve ensure the use and application complies with local codes. The minimum system pressure should be approximately 16 psi. Ensure the field installed expansion tank pressure matches system operating pressure before filling.

Once the heating loop has been filled with water, the purging air exercise can begin. There are two (2) devices that will assist in the removal of air from the system;

1. **Automatic Air Vent-** Installed in the factory and located on top and to the rear of the cabinet on the left side primary heat exchanger. The 1/4" cap must be loosened to allow air to escape when the heating loop is pressurized.
2. **Manual Air Bleed Valve-** Located at the top left side of the primary heat exchanger. A suitable 3/8" I.D. drain hose shall be fitted on the barb fitting of the valve. Turning the valve counter clockwise for a minimum of three (3) turns will start to allow air and water to exit the primary heat exchanger. This valve will help eliminate the bulk of the air trapped in the system.

10.2 Start-Up & Ignition Safety Shutoff Test

Apply power to the Glow Boiler and create a heating demand by closing the end switch (place wire jumper between terminal 9 & 10). The boiler will initiate a purge cycle, and an ignition should occur. (The control system has a built-in ignition retry, allowing the system to try at least three times, before locking-out.)

1. With the unit operating at full capacity, verify that the gas line pressure is 3.5-10.5 inches w.c. for Natural gas or 8.0-13.0 inches w.c. for Liquid Propane.
2. Perform at least three lights in succession to ensure proper operation.
3. After three (3) successive ignitions, test the system safety shutoff device by shutting the gas control valve immediately outside the boiler. The internal safety system will allow the unit to go through three (3) ignition cycles before going to "Loc 1". Once you have confirmed this safety feature, press RESET to clear all errors. Confirm proper ignition.

10.2.1 Re-lighting Unit

1. Stop and read these instructions very carefully.
2. Set the CH setpoint to the lowest setting, and then remove all power to the boiler.
3. This unit does not have a pilot. It is equipped with an ignition device that automatically lights the burner.
4. Turn the gas shut-off valve to the OFF position, and then remove the front cover.
5. Wait five (5) minutes to clear out any gas. Then check for gas, including near the floor. If you smell gas "Stop" continue to look for the source of the leak. If you don't detect any gas proceed to the next step.
6. Turn the gas shut-off valve to the ON position, wait an addition five (5) minutes and check for gas.
7. Replace the front cover.

! WARNING

Carbon Monoxide
 Never leave the boiler operating if emitting Carbon Monoxide (CO) concentrations in excess of 200 ppm. Failure to comply may result in injury of death.

! WARNING

Manifold Pressure
 DO NOT adjust the manifold pressure on the gas valve. The correct manifold pressure has been set at the factory. Field adjustment could result in improper burner operation resulting in fire, explosion, property damage or death.

! WARNING

When running the unit in system test mode, the unit is locked in CH mode and a heat load must be present and available to dissipate the hot water energy.

! NOTICE

Make certain appropriate measures are taken to ensure the 1/2" gas test port cap does not leak condensate when refitted. Applying Teflon tape and or an appropriate amount of approved pipe sealant should suffice.

! NOTICE

Low fire values are factory set. Contact Glow Brand Manufacturing if values fall outside limits.

8. Set the CH setpoint to the highest setting, and then apply power to the boiler.
9. Ignition sequence is automatic, combustion will occur after a brief fan purge. Ignition will retry two (2) more times should previous attempts fail.
10. If ignition does not occur, "Turn off the gas and electricity to the boiler" and contact a qualified gas service technician.

10.2.2 Combustion Analysis

Combustion Calibration - To calibrate burner operation, the following procedure shall be performed using a calibrated combustion analyzer capable of measuring CO₂ and CO for Natural Gas or Liquid Propane burning appliances. Each Glow Boiler is factory set to operate with either Natural Gas or Liquid Propane. Make certain the gas being used matches what is stated on the rating plate. A combustion analysis and adjustment is mandatory.

1. Operate the unit at **maximum fire** by selecting 'Hi' in the System Test Menu. (See Section 11.9-System Test). Ensure there is an adequate heat load.
2. Allow the unit to operate for at least 5 minutes prior to measuring any values.
3. Ensure the gas line pressure is maintained within its min. and max values.
4. While at the maximum modulation rate, measure the CO₂ and CO; adjust as necessary, using the throttle screw, to be within the limits listed in Table 10.1.
5. Operate the unit at the minimum modulation rate (see table listed below). Ensure the combustion remains smooth and CO₂ and CO remain within the limits. If not, do not adjust further, contact Glow Brand Manufacturing for assistance.

Analysis - The Glow Boiler is equipped with an integrated flue 1/2" gas test port for combustion analysis located within the exhaust vent adapter. When measuring the combustion, ensure the analyzer probe is firmly inserted within the 1/2" gas test port so that exhaust gases can be properly sampled. Perform the flue gas analysis and adjust the gas throttle/input screw as required until CO₂ and CO levels are within acceptable limits, see Table 10.1 below.

MODEL	CO ₂ (%) Range @ Max. Fire			CO (ppm) MAX
	MIN	NOMINAL	MAX	
B85 NG B120 NG B160 NG	9.2	9.4	10.7	200
B85 LP B120 LP B160 LP	10	10.5	11.0	200

Table 10.1: CO₂ Percentages at Maximum Fire.

Table 10.2 displays the CO₂ and CO levels and their acceptable limits at Minimum fire ('Lo'). This table is for reference only. Contact Glow Brand Manufacturing if these values fall outside limits stated in Table 10.2.

MODEL	CO ₂ (%) Range @ Min. Fire		CO (ppm) MAX
	MIN	MAX	
B85 NG B120 NG B160 NG	9.2	11.6	75
B85 LP B120 LP B160 LP	10	12.5	75

Table 10.2: CO₂ Percentages at Minimum Fire.

! WARNING

The throttle screw on the gas valve should only be adjusted when performing a combustion analysis. Adjusting the throttle screw without having a combustion analyzer may lead to an unsafe and erratic operation that may result in serious injury or death.

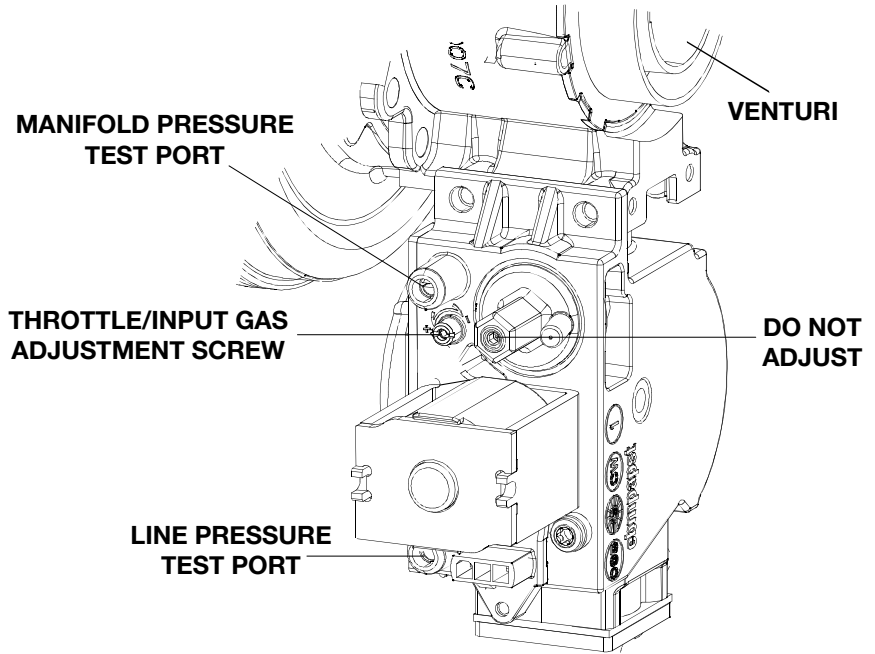
! WARNING

Adjustments to the throttle screw may only be made by a qualified gas technician, while using a calibrated combustion analyzer capable of measuring CO₂ and CO. Failure to follow these instructions may result in serious injury or death.

! WARNING

Adjustments to the throttle screw may only be performed if the gas line pressure is maintained above minimum levels throughout the duration of the test.

Throttle Input Adjustments - The boiler is equipped with a throttle/input adjustment screw, located on the gas valve. The throttle screw is used to adjust the flow of gas leaving the gas valve and entering the venturi to be mixed with the combustion air. By turning the throttle screw clockwise, the flow of gas is reduced and the combustion becomes leaner, thus reducing the concentration of CO₂ in the flue gases. To increase the CO₂ the throttle screw must be turned counterclockwise, thus increasing the flow of gas from the gas valve to the combustion air stream. See Figure 10.1 for throttle/input adjustment screw location.



Throttle Adjustment

ADJUST CO₂ % BY ROTATING THROTTLE ADJUSTMENT SCREW WITH A 5/64 (2mm) ALLEN KEY OR FLAT HEAD SCREW DRIVER

Turn adjustment screw clockwise to decrease CO₂ value



Turn adjustment screw counter clockwise to increase CO₂ value

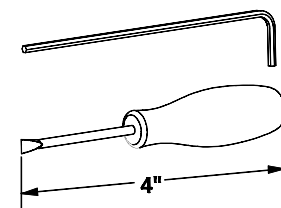


Figure 10.1: Gas Valve Throttle Adjustment Locations

11. Controls

11.1 LCD Display & Button Layout

! CAUTION

Before adjusting the control settings, read the control instructions carefully

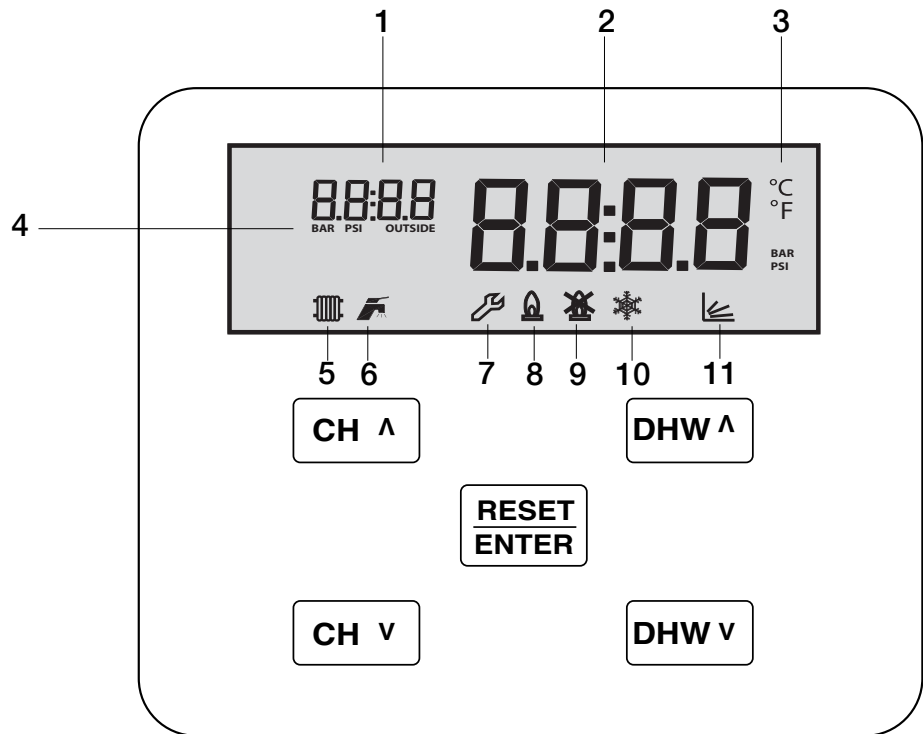


Figure 11.1: Combi LCD Display & Button Layout

Function	Description
CH ^	Increase the CH set-point
CH v	Decrease the CH set-point
DHW ^	Increase the DHW set-point
DHW v	Decrease the DHW set-point.
RESET/ENTER	Status overview: Enter the main menu or reset a lockout error by pressing the button for at least 2 seconds.

Table 11.1: Display Button & Functions

No.	Icon	Description
1	Small Digits	Displays the actual (CH) pressure and/or outside temperature (when available).
2	Large Digits	Display section that shows actual status information: CH, DHW temp, error number etc
3	Unit(s)	Unit for the value that is being displayed on the large digits Temperature in degrees Celsius or Fahrenheit. Pressure in bar or psi.
4	Selection/Unit	Specifies what is being displayed on the small digit display section. The bar/psi icon below indicates that the (CH) pressure is shown. The outside icon indicates that the outside temperature is displayed.
5	Radiator Icon	Icon is shown when CH is enabled. Icon blinks when appliance is handling CH demand.
6	Faucet Icon	Icon is shown when DHW is enabled. Icon blinks when appliance is handling DHW demand.
7	Wrench Icon	Icon blinks when service is required.
8	Flame	Burner is ON (and the appliance is heating)
9	No Flame	Appliance is unable to start. Icon is displayed when the appliance has a lockout or blocking error.
10	Frost	Blinking when (anti) frost protection is active.
11	OTC	Outdoor Temperature Compensation is active. The control regulates CH supply water temperature based on the outside temperature.

Table 11.2: Display Symbols & Function

11.2 Initial Power-up

When the display powers up it will attempt to communicate with the ignition control board and retrieve the required data. During this process the 'init' message is displayed on the screen, with a moving loading bar (Fig. 11.2). When all data is successfully retrieved, the De-air sequence is activated and the text 'dAir' is displayed. The De-air sequence will initiate on the first power-up or after each power loss to the appliance (Fig. 11.3).

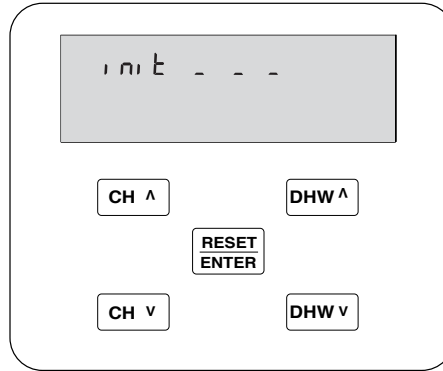


Figure 11.2: Display showing 'init' screen.

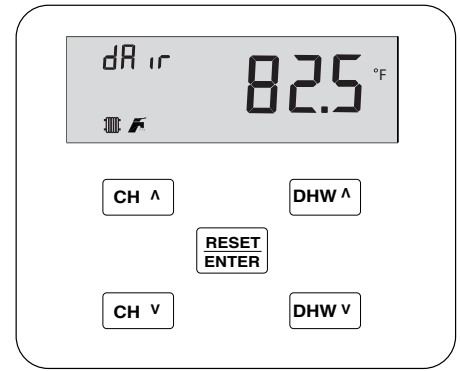


Figure 11.3: De-air sequence.

! CAUTION
 Before adjusting the control settings, read the control instructions carefully

11.2.1 Main Screen in Stand-by

Following power-up of the boiler (after the De-air sequence), the boiler defaults to Stand-by (Fig. 11.4). Under normal operating conditions (no errors) the Main Screen displays the boiler supply temperature and water pressure, as well as an indication of the current heat demand (CH or DHW), burner status and outdoor reset function.

The small digits section will alternate flashing between the CH pressure and/or outside temperature when it is available (outdoor sensor installed)

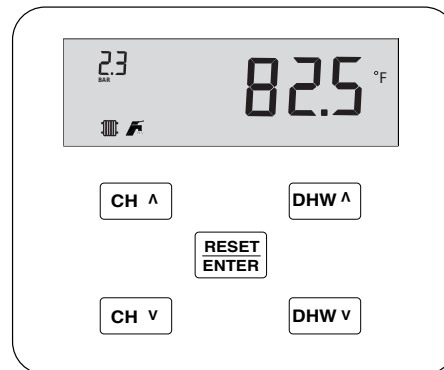


Figure 11.4: Main Screen in standby mode.

11.3 Main Menu

Pressing the RESET/ENTER button once will allow the user to enter the Main menu. Here the user can select different sub menu items.

Navigate through the menus with buttons DHW ^ and DHW v to change the selected menu item and press RESET/ENTER to select the desired item. To exit the menu (go back one level) use buttons CH ^ and/or CH v.

A parameter can be edited by selecting it with RESET/ENTER, after which the value will start blinking. Then use DHW ^ and DHW v to change the value and press RESET/ENTER again to store the value. Editing can be canceled by

pressing CH ^ or CH v; the value will not be stored. When the user does not press any button for over 4 minutes, the menu is closed automatically and the editing of a parameter is canceled. The following sub menu items can be selected in the main menu:

Sub Menu	Description
0.000	User settings menu
1.000	Information menu
CodE	Enter password to access Installer Menu level 2.000 parameters

Table 11.3: Controller Sub Menu

11.4 User Settings Menu (0.000)

In the User Settings Menu the user can change the basic settings of the appliance according to their preference. From the Main Screen press the RESET/ENTER button on the console to gain access to the Main Menu Screen (Fig.11.5). Pressing RESET/ENTER again will grant, access to the User Menu. (Fig.11.6) A parameter can be edited by selecting it with RESET/ENTER, after which the value will start blinking. Then use DHW ^ and DHW v to change the value and press RESET/ENTER again to store the value. Editing can be canceled by pressing CH ^ or CH v; the value will not be stored.

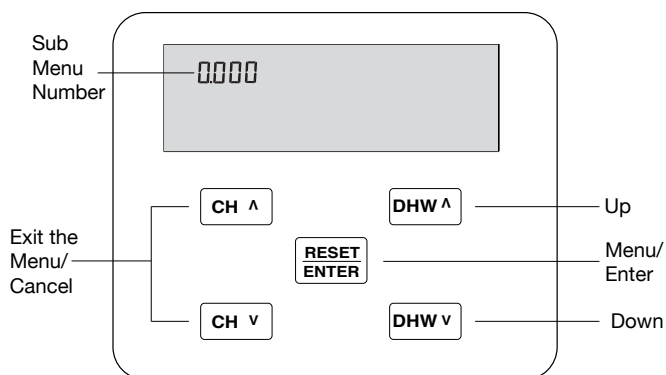


Figure 11.5: User Sub Menu Featured

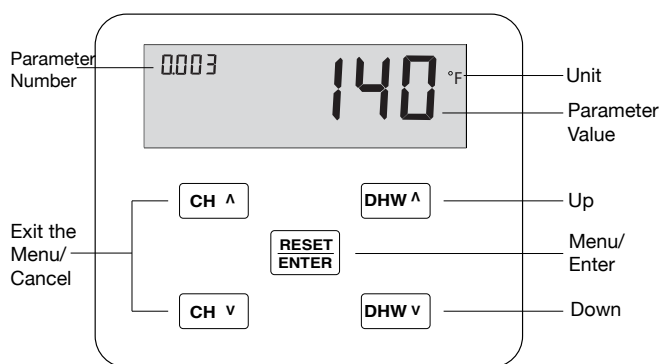


Figure 11.6: Inside User Menu

NOTICE

The Information Menu only permits the user to view boiler information. Editing of settings must be done from the Installer Menu. See Installer Menu section for more details.

Param. #	Description	Value
0.003	CH setpoint	Temperature
0.048	DHW setpoint	Temperature
0.064	Preheat Mode - Preheat helps limit the effect of “cold water sandwich”. 0: OFF: Preheat mode is disabled and the boiler does not preheat the DHW. 1: Anti-Frost: In this mode the burner is activated when any temperature sensor reads 41°F (5°C). 2: ECO Mode: In this mode the water in the heat exchanger is maintained at approximately 86°F (30°C). 3: Comfort Mode: In this mode the water in the heat exchanger is maintained at the Preheat Setpoint temperature, which equals DHW Setpoint - 10°C (DHW set point- 18 °F)	0,1,2,3
0.200	System Test Menu (visible only after input of Installer code)	
0.901	Temperature unit setting	°C / °F
0.902	Pressure unit setting	bar / psi
0.997	Display test. All LCD segments light up. Press any button to quit.	

Table 11.4: User Menu Parameters

11.5 Information Menu (1.000)

The Information Menu allows for easy viewing of the current boiler operating conditions, including pump status, sensor inputs, common set points, and boiler target temperature. The parameters cannot be edited but only viewed. From the Main Screen press the RESET/ENTER button on the console to gain access to the Main Menu Screen (Fig. 11.7). Pressing DHW ^ cycles to the desired Information Sub Menu. Pressing ENTER/RESET again will grant access to the Information Menu (Fig.11.8). Then use DHW ^ and DHW v to view any parameter within the menu. The menu can be exited by pressing CH ^ or CH v twice.

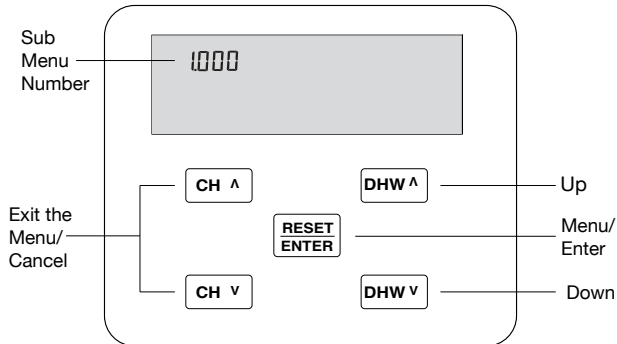


Figure 11.7: Information Sub Menu Featured

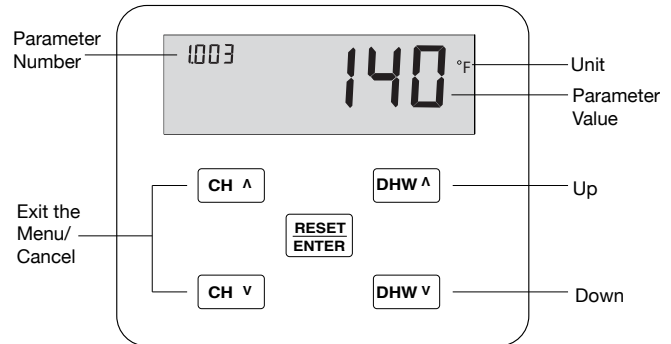


Figure 11.8: Inside Information Menu

Param. #	Description	Value
1.001	CH Supply temperature - displays the central heating supply water temperature.	Temperature
1.002	Indirect DHW temperature - displays the DHW supply temperature from Indirect Storage Tank.	Temperature
1.004	Outside temperature - displays reading from outdoor temperature sensor.	Temperature
1.005	Second Supply temperature - N/A	Temperature
1.006	Flue temperature - displays exhaust flue temperature.	Temperature
1.007	Return temperature - displays the central heating return water temperature.	Temperature
1.008	Ionization / flame current - displays the flame strength signal sensed from the ionization electrode; minimum signal to sustain normal burner operation is 1.5µA.	µA
1.010	CH Pump - indicates the status (ON/OFF) of the CH Pump output. Note: the CH Pump output is on during central heat demands; the CH Pump will turn off during priority DHW demands.	On/Off
1.011	DHW Pump - indicates the status (ON/OFF) of the DHW Pump output. Note: the DHW Pump output is on during priority DHW demands.	On/Off
1.012	CH setpoint - displays the target central heating supply water temperature.	Temperature
1.013	Thermostat / End switch Input (Dry Contact) - Normally open.	Open/Closed
1.030	State - displays the state of the burner ignition cycle.	#
1.031	Error Number - displays the last error number.	#
1.033	CH Pressure - displays the central heating closed loop pressure.	Pressure
1.040	Actual fan speed - displays speed at which the fan is operating.	RPM
1.041	Ignition fan speed - displays the factory programmed fan speed to initiate burner ignition.	RPM
1.042	Minimum fan speed - displays the minimum factory programmed fan speed for burner operation.	RPM

Table 11.5: Information Menu Parameters

Param. #	Description	Value
1.043	Maximum fan speed - displays the maximum factory programmed fan speed for burner operation.	RPM
1.051	Last lockout error number - displays the last 16 lockouts (Loc); see Section 12.1.	#
1.052	Last blocking error number - displays the last blocking error (Err); see Section 12.2.	#
1.053	Number of flame failures - accumulation of the number of flame outages that occurred during a run.	#
1.054	Number of successful ignitions - accumulation of the number of successful ignitions.	# x 16
1.055	Number of failed ignitions - accumulation of the number of failed ignition attempts.	#
1.056	Total hours of operation for CH - accumulation of the number of hours that the burner has been firing for the purpose of central heating.	Hours x 10
1.057	Total hours of operation for DHW - accumulation of the number of hours that the burner has been firing for the purpose of DHW via indirect storage tank.	Hours x 10
1.058	Total system run time - accumulation of the total number of hours that the burner has been firing for the purpose of CH and DHW.	Days
1.059	Interval between lockout - Displays the duration period between lockout errors.	1:MIN 2:HRS 3:DAY 4:WK
1.060	Interval between blocking error - Displays the duration period between blocking errors	1:MIN 2:HRS 3:DAY 4:WK
1.063	0-10V input - displays the EMS (Energy Management System) in DC voltage.	Volt
1.098	ICB Group number	Hexadecimal
1.099	ICB software version	Hexadecimal
1.995	Display Board software version	Hexadecimal

Table 11.5: Information Menu Parameters

11.6 Installer Menu (2.000)

The Installer Menu allows access to all settings for adjustment, as well as viewing of statistical data for troubleshooting. Access the Installer Menu from the Main Screen by pressing the RESET/ENTER button on the console to gain access to the Main Menu Screen (Fig.11.9). Pressing DHW ^ cycles to the desired Code Sub menu (CodE). Pressing ENTER/RESET again will prompt the user to input a 4 digit password. (Fig. 11.10)

WARNING

Installer Menu settings shall only to be adjusted by a certified, trained and qualified installer or service technician that understands the repercussions of incorrect control settings. Improper control settings may negatively affect the operation of the boiler and/or the heating system; resulting in property damage, serious injury or even death.

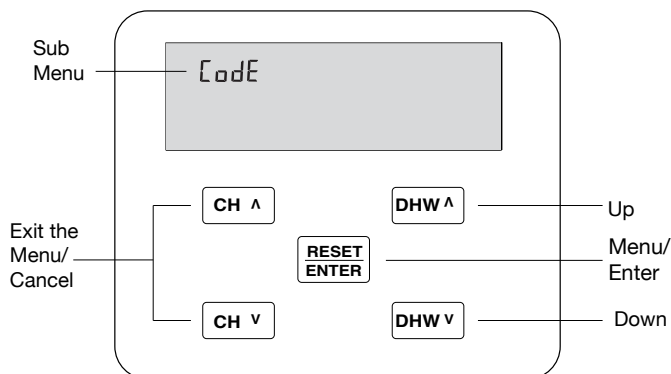


Figure 11.9: Main Menu Screen with CodE Menu Highlighted

Password - Input password using the following procedure:

1. With the 0 value flashing, use the DHW ^ or DHW V button to increase or decrease the value to the desired digit. Press the RESET/ENTER button to save the new value. At this point the next value will start flashing.
2. Repeat the above step till all 4 digits have been entered. If all four digits have been entered correctly, pressing ENTER/RESET on the fourth digit will grant access to the Installer Menu (Fig.11.11).

NOTICE
 Password- A certified, trained and qualified installer or service technician that understands the repercussions of incorrect control settings can contact Glow Brand Technologies to gain access to the 4-digit password.

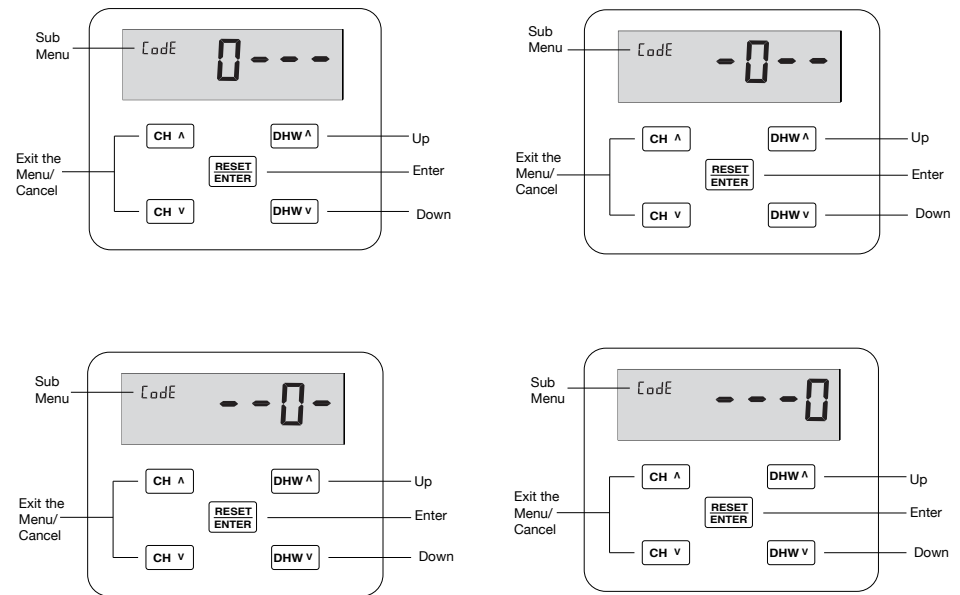


Figure 11.10: Password Input prompts

Adjusting settings – Once the Installer Menu is accessed; adjust settings using the following procedure:

1. Use the DHW ^ or DHW V button to scroll through the menu until the desired setting number is displayed in the top left of the screen (i.e. 2.001) Press the RESET/ENTER button to access the setting; at this time the setting will flash.
2. With the value flashing, use the DHW ^ or DHW V button to increase or decrease the setting. Once the desired value is displayed, press the RESET/ENTER button to save the new value. The value will stop flashing.
3. Repeat for the next setting. Once complete, return to the Main Screen by pressing CH ^ or CH V. Editing can be canceled at any time by pressing CH ^ or CH V; the value will not be stored.

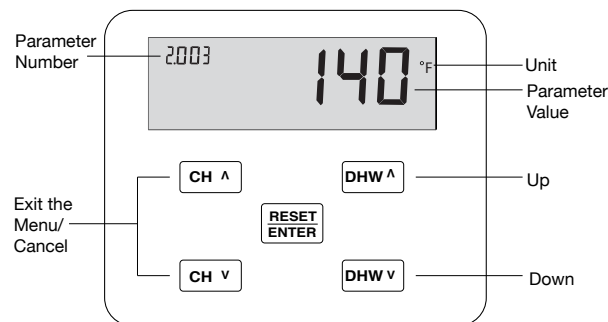


Figure 11.11: Installer Menu Screen

Param #	Description	Default Value	Range
2.001	CH Mode- determines the operational mode for central heating. See Section 11.8- CH Modes.	0	0,1,2,3,4,5
2.003	CH Setpoint - establishes the boiler operating temperature during central heat demands. This setpoint cannot be increased beyond maximum CH setpoint limit set in Parameter 2.024	140°F 60°C	95°F-171°F 35°C-77°C
2.005	CH post circulation period - amount of time the primary and CH pumps remain powered at the end of a central heat demand. Timer commences following the combustion fan post purge.	120 sec	0-900 sec
2.007	CH Hysteresis Up - Establishes how much the boiler outlet supply temperature must exceed the CH setpoint before the burner is turned off. If using CPVC vent (described in Section 4.5.1) this value can be increased to speed up the storage tank recovery rate. If using PVC vent the maximum set point must remain at 9°F(5°C).	9°F 5°C	0°F-36°F 0°C-20°C
2.014	Maximum CH power - Establishes the percentage value that controls the maximum CH power. Do not exceed default values. Doing so will cause damage and void warranty	100%	
2.019	Design CH Supply Temperature - establishes the maximum boiler operating temperature during central heat demands when the outdoor temperature is 0°F (-18°C) or less. Max setpoint 140°F (60°C) for PVC vent Max setpoint 171°F (77°C) for CPVC/PVC vent†	140°F 60°C	95°F-171°F 35°C-77°C
2.020	Design Outdoor Temperature - establishes the minimum outdoor temperature during central heating demands at which the boiler will fire to target the Design Supply Temperature (2.019)	23°F -5°C	-13°F-77°F -25°C-25°C
2.021	Baseline Supply Temperature - establishes the minimum boiler operating temperature during central heat demands	104°F 40°C	95°F-171°F 35°C-77°C
2.022	Baseline Outdoor Temperature - establishes the maximum outdoor temperature at which boiler fire to target Baseline Supply Temperature (2.021)	73°F 23°C.	32°F-86°F 0°C-30°C
2.024	Maximum CH Setpoint - establishes the maximum allowable CH setpoint Max setpoint 140°F (60°C) for PVC vent Max setpoint 171°F (77°C) for CPVC/PVC vent†	140°F 60°C	95°F-171°F 35°C-77°C
2.025	Warm weather shutdown - inhibits central heat operation when the outdoor temperature is above this setting.	72°F 22°C	32°F-95°F 0°C-35°C
2.026	Boost function: temperature increment - determines the increase in boiler target temperature for every 15 minutes of continuous central heat demand. Only applicable when an outdoor sensor is used (i.e. CH Modes 1 & 2). Target temperature will not exceed CH setpoint setting 2.003.	0°F 0°C	0°F-54°F 0°C-30°C
2.027	Boost function: delay time - In any CH mode utilizing outdoor reset, the boost function is activated after this selected delay time	20 min.	1-120 min
2.028	CH Night setback temperature - applicable only when CH mode is set to 2 (menu setting 2.001), determines the reduction in boiler target temperature during "Night Setback Mode". (i.e. an external clock opens the contact between field terminals 1 and 2).	18°F 10°C	0°F-54°F 0°C-30°C
2.035	DHW Mode - determines the operational mode for DHW. See Section 11.7 - DHW Modes	0	0,1,2,5
2.038	DHW Tank Supply extra (offset) - CH Supply temperature (1.001) is determined by the DHW set point (2.048) + DHW tank supply extra (2.038) in DHW mode 1, storage tank with sensor.	9°F 5°C	0°F-54°F 0°C-30°C

† Refer to Section 4.5.2: Exhaust Vent Pipe Materials
Table 11.6: Installer Menu Parameters

Param #	Description	Default Value	Range
2.042	DHW Priority mode - Different DHW Priority types can be chosen 0 - The priority timer starts when both CH and DHW demand are present. After the DHW Max Priority Time (2.043) is achieved, the control will switch from DHW to CH operation. CH has priority now for a maximum period of DHW Max Priority Time (2.043) . 1 - CH always has priority to DHW. 2 - DHW always has priority to CH.	2	0,1,2
2.043	DHW Priority time - indicates the maximum amount of time that the boiler should operate to satisfy a simultaneous CH or DHW demand. Each time the timer exceeds this setting, the priority switches from one demand to the other.	60 min	1-255 min
2.048	N/A		
2.091	Maximum DHW temperature - establishes the maximum allowable DHW temperature for unit. Max setpoint 140°F (60°C) for PVC vent Max setpoint 171°F (77°C) for CPVC/PVC vent †	140°F 60°C	104°F-171°F 40°C-77°C
2.109	CH calculated setpoint offset (CH Mode 1, 2) - The calculated target design supply temperature increase by this value in CH mode 1 & 2	Off	OFF, -19°F- 18°F -10°C-10°C
2.111	Maximum CH Mode 4 setpoint - establishes the maximum CH setpoint for CH mode 4. See Section 11.8 - CH Modes.		95°F-171°F 35°C-77°C
2.113	DHW power - Establishes the percentage value that controls the maximum DHW power.	100%	0-100%
2.115	DHW Tank setpoint - establishes the storage tank DHW set-point in DHW Mode 1. This setpoint limit cannot increase beyond allowable maximum DHW set in Parameter 2.091.	140°F 60°C	104-171°F 40°C-77°C
2.130	Flow Scaling Factor - establishes factor used to multiply RPM in order to calculate actual DHW flow.	N/A	N/A
2.138	Appliance Setting - establishes the appliance model for a required flue temperature. See Section 11.9- Appliance Settings.		50 to 55
2.139	De-Air Functionality - determines whether the de-air function occurs on power up or after loss of power. 0 - de-air sequence occurs every 24 hours 1 - de-air sequence occurs after every power recycle 2 - de-air sequence disabled	1	0,1,2
2.201	N/A		
2.202	N/A		
2.203	Service reminder setting - a service reminder, indicated by the wrench icon on the screen, occurs every 365 days. The service reminder is reset by adjusting 2.203 to "RESET".	Off	On/Off/ Reset
2.204	Service days - determines the period between service days.	1000 d	30-1275 days
2.205	Frost protection enabled setting - If the supply, return or flue temperature drops below 50°F(10°C), the CH pump is activated. If the temperature continues to drop by more than 9°F (5°C) the burner fires at minimum power and continues until the return temperature reaches 59°F (15°C). Frost icon flashes on display when active.	enable	Enable/ disable
2.206	Anti-legionella enabled setting - This parameter enables or disables the Anti-legionella function in DHW mode 1. see Section 11.9- Anti-legionella.	enable	Enable/ disable
2.207	DHW detection delay - This feature allows the installer to adjust the time taken for the boiler to initiate DHW demand after flow of water is detected.	1 sec	0-5 sec

Table 11.6: Installer Menu Parameters

! NOTICE

CH setpoint is limited to a maximum temperature of 140°F (60°C) for PVC venting. For any setpoint greater than 140°F (60°C) see Section 4.5.2 Exhaust Vent Materials.

11.7 CH Modes

Mode 0 – Thermostat / End Switch (no outdoor sensor)

Central heat demand is generated by a thermostat or end switch call to boiler terminals 9 and 10. **DO NOT apply 24 Vac to terminals 9 and 10.** Boiler operates to achieve CH set point (2.003).

Mode 1 – Thermostat / End Switch using Outdoor Sensor

Central heat demand is generated by a thermostat or end switch call to boiler terminals 9 and 10. Boiler operates in-between settings Design Supply Temperature (2.019) and Baseline Supply Temperature (2.021) depending on outdoor temperature range between Design Outdoor Temperature (2.020) and Baseline Outdoor Temperature (2.022). see Figure 11.13.

As the outdoor temperature increases, the calculated CH setpoint is decreased.

Mode 2 – Permanent Demand using Outdoor Sensor

Central heat demand is generated when the outdoor temperature is below the Warm Weather Shutdown temperature setting (2.025). Boiler operates in-between settings 2.019 and 2.022 depending on outdoor temperature. No end switch or thermostat closure is required between terminals 9 & 10. The boiler will attempt to constantly maintain the target temperature based on the outdoor air sensor.

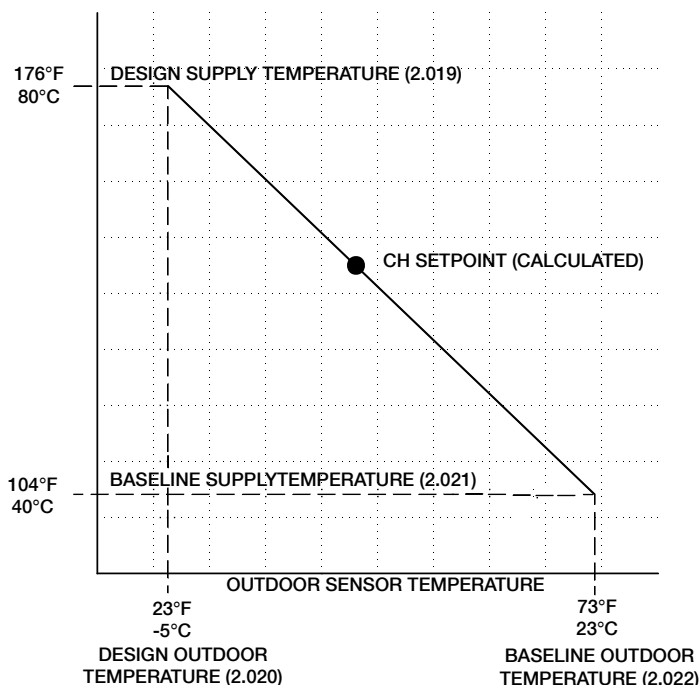


Figure 11.13: Outdoor Reset

Mode 3 – Permanent Demand

Operates without an end switch or a thermostat closure even though a set CH temperature (2.003) is selected from the Installer Menu.

Mode 4 – 0-10 VDC Input

The controller accepts an external analog 0-10 VDC signal which changes the supply temperature. A minimum input of 2 VDC is required to activate the boiler. Voltage inputs between 7 & 8 VDC will proportionally adjust the boiler outlet temperature within range of minimum and maximum CH setpoint. This mode is commonly used in conjunction with an Energy Management System (EMS) to control the boiler outlet target based on the building requirements.

Mode 5 – 0-10 VDC Input to Modulate Firing Rate

Similar to Mode 4, a minimum input of 2 VDC is required to activate the boiler. At 2 VDC, the display will show 1% of modulation which is equivalent to the minimum input (minimum fan RPM). 10 VDC will cause the modulation to increase to 100% of input (maximum fan RPM). The input rate between these two points is proportional to the signal.

11.8 DHW Modes

Mode 0 – No DHW (Default)

DHW circuit is disabled. The unit does not respond to any DHW demand.

Mode 1 – Indirect Storage tank with Sensor

The controller accepts a temperature input from an indirect storage tank sensor. This sensor reads the temperature of the water within the indirect storage tank and instructs the burner to operate. The control targets the installer selected DHW Tank Setpoint (2.115) and modulates the boiler firing rate accordingly. While in this mode, 120v is applied to the DHW Pump terminals 15 & 16. Ensure the primary and DHW pump does not exceed 2.0 Amperes.

Contact Glow Manufacturing for additional technical support

! NOTICE
 DHW setpoint cannot be changed during DHW demand.

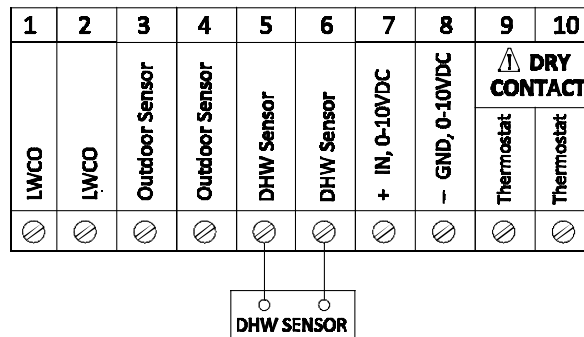


Figure 11.12: DHW Mode 1 Indirect Storage Tank Wiring

11.9 Appliance Settings

The factory set default value for each unit is designed for a maximum flue temperature of 149°F (65°C). The appliance setting (param. 2.138) must be changed from the factory set default value when a higher flue temperature is required.

Boiler	Appliance Setting	Min. Fan Speed (RPM)	Ignition Fan Speed (RPM)	Max. Fan Speed (RPM)	Max. Flue Temp. °F(°C)
85NG/120NG	50*	1400	4250	6100	149 (65)
160NG/160LP	51*	1350	4250	7400	149 (65)
85NG/120NG	52	1400	4250	6100	194 (90)
160NG/160LP	53	1350	4250	7400	194 (90)
85LP/120LP	54*	1550	4250	6000	149 (65)
85LP/120LP	55	1550	4250	6000	194 (90)

*Factory set default values

Table 11.7: Appliance Types

11.10 Special Operations

When a special operation is being handled by the appliance, it will not respond to any CH or DHW demand. The special operation is displayed as text in the small digit section. The Glow boiler can perform 3 special operations: De-air, Anti-legionella and System Test.

De-air

The de-air sequence cycles the circulators off and on, for a period of 14 minutes, in an attempt to free air pockets that may exist in the heat exchanger and boiler piping. If air has already been adequately purged from the system the de-air sequence can be cancelled by pressing and holding buttons CH v + DHW v for at least 3 seconds. When de-air sequence is activated, the text 'dAir' is displayed. Installer can de-activate this function by disabling parameter 2.139

Anti-Legionella

Applicable to DHW Mode 1-Indirect storage tank with sensor. The control monitors whether the unit achieves the maximum control temperature at least once every 168 hours (7 days). If not the unit will fire (and initiate the pump) to raise the unit temperature over the control temperature. When the Anti-Legionella function is active, the test 'ALEg' is displayed, along with the DHW sensor temperature. The faucet icon blinks because the DHW Anti-Legionella demand is being handled.

System Test

The system test can be used by an installer to fine tune the appliance. To access the System Test the password must be entered in to CodE Sub menu; see Section 11.6 Installer Menu on how to enter the password. The system test can be activated by exiting from the Installer Menu and entering the User menu (0.000), and selecting the now visible parameter 0.200.

When the system test is active it is displayed on the Main screen with the text 'tEST' alternating with the currently active test in the small digit section. The system test can be quickly changed by pressing the buttons CH ^, CH v, DHW ^ or DHW v. The quick set points are not available when the system test is active.

Test (Text)	Description
'OFF'	System Test is disabled
'FAN'	Test fan (fixed speed)
'Lo'	Test burner on low (minimum) power
'Ign'	Test burner on ignition power
'Hi'	Test burner on high (maximum) power
'REg'	Test burner on high (maximum) power but regulated/limited based on the supply temperature
'Stb'	Test maximal thermostat. Installer access level only
'LCO1'	Test Low Water Cut-off 1. Installer access level only
'LCO2'	N/A

Table 11.8: System Tests

! WARNING

The de-air sequence is designed to remove air from the system. Failure to adequately remove air from the system can damage the heat exchanger and pump which will void the warranty, and may lead to property damage and personal injury.

! NOTICE

The system test will automatically shut down after a predefined period.

! WARNING

When running the unit in system test mode, the unit is locked in CH mode and a heat load must be present and available to dissipate the hot water energy.

! NOTICE

When an error is present the back light will blink to draw attention to the appliance. The blink frequency is based on the severity of the error.

Error Type	Blink Frequency
Lockout	0.5 sec interval
Blocking	1 sec interval
Warning	1.5 sec interval

! WARNING

This Boiler must be serviced by a licensed, certified and trained heating technician or the Warranty is Void. Failure to properly service this unit may result in property damage, serious injury to occupants, or possibly death.

! WARNING

When servicing or replacing any components of this boiler be certain that:

- The gas is off.
- All electrical power is disconnected

! WARNING

When servicing or replacing components that are in direct contact with the boiler water, be certain that:

- There is no pressure in the boiler. (Pull the release on the relief valve. Do not depend on the pressure gauge reading).
- The boiler water is not hot.
- The electrical power is off.

12. Lockout, Blocking Errors & Warnings

12.1 Lockout Error

A lockout is indicated when “Loc” is displayed at the top-left of the screen; the specific lockout code/number is displayed in large text to the right, (Fig. 12.1). Some lockouts (e.g. Loc 1 and 2) are considered “hard lockouts”, meaning the lockout cannot be cleared by cycling the power supply ON/OFF; the lockout can only be cleared by pressing and holding the RESET button on the display console. While the boiler is in lockout, the User and Installer Menus are still accessible as before, and may be accessed to identify boiler sensor readings and settings.

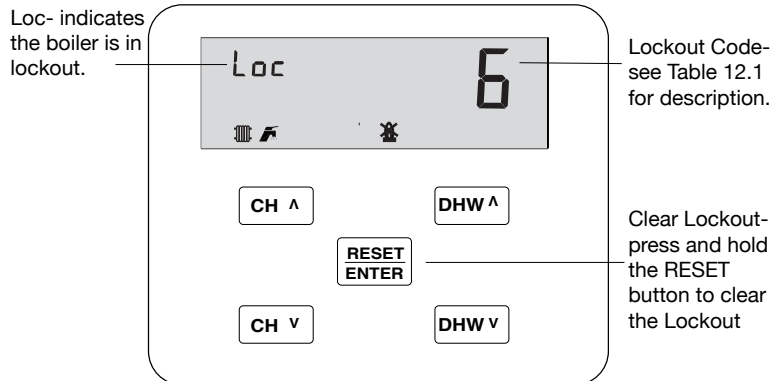


Figure 12.1: Lockout Display Screen

Code	Description
Loc 0	Internal software error a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board (if error persist)
Loc 1	Ignition Error – Three consecutive unsuccessful ignition attempts. Perform the following checks: 1. If a new installation, and the burner ignites but immediately goes out, then check polarity of the 120VAC power supply. 2. Check venting for blockages. 3. Ensure the gas regulator is a minimum of 6' upstream of the boiler's gas valve. 4. Check condensate trap from proper draining. 5. Static gas pressure – if insufficient check gas supply-lines and regulator. 6. Gas pressure during ignition – if the static gas pressure is sufficient, check pressure during ignition sequence, i.e. when gas valve opens. a. If pressure drops below minimum of 3.5" check gas supply-line and regulator. b. If pressure does not move, verify 120V at valve during ignition; • if no power, check wiring– replace control; • if power is present – replace gas valve. c. If pressure drops slightly – proceed to next step 7. Burner ignites but immediately goes out • check ionization electrode and cable to ensure ionization current reads more than 1.5 µA (param 1.008) -clean or replace if required • clean combustion chamber. With a combustion analyzer connected, adjust throttle screw till CO ₂ levels are within specified tolerances. (Section 9-Table 9.1) 8. Burner fails to ignite • check ignition electrode and cable (replace if necessary). Verify the ignition electrode is arcing. WARNING!! – maintain clearance from ignition components while the power is on to avoid risk of severe electrical shock. • check ignition electrode gap – gap between electrodes should be 4.5mm. 9. Replace ICB controller. 10. Unit ignites and runs • confirm combustion CO ₂ within range at minimum and maximum fire rate. (Section 10-Table 10.1)

Table 12.1: Lockout Codes & Description

! WARNING

Do not use this appliance if any part has been under water. Improper or dangerous operation may result. Contact a qualified service technician immediately to inspect the boiler and to repair or replace any part of the boiler which has been under water.

! CAUTION

If overheating occurs or the gas supply fails to shut off, do not turn off electrical power to the circulating pump. This may aggravate the problem and increase the likelihood of boiler damage. Instead, shut off the gas supply to the boiler at the gas service valve.

Code	Description
Loc 2	Failure detected in the GV relay -control has sensed a fault in the gas valve electrical circuit a. Check for a loose connection in the gas valve wiring harness. b. Check for poor line, neutral and ground connections in the wiring leading to the boiler. Check the internal ground connections within the boiler. c. Eliminate sources of electrical noise, i.e. welders, large pump inverters, etc. d. If source of problem cannot be located, replace ICB controller.
Loc 3	Failure detected in safety relay - a. Check for poor line, neutral and ground connections in the wiring leading to the boiler. Check the internal ground connections within the boiler. b. Ensure sensor are firmly secured and connect to the correct terminal c. Eliminate sources of electrical noise, i.e. welders, large pump inverters. d. If source of problem cannot be located, replace ICB controller.
Loc 4	Control had a blocking error for more than 20 hours - a blocking error (Err) has lasted for 20 consecutive hours (See parameter 1.052 to identify the last Blocking error). a. Press the RESET button on main display and on back of ICB.
Loc 5	Fan is not running for more than 60 seconds- measured fan speed is not reaching target fan speed within 60 seconds a. Check for poor line, neutral and ground connections in the wiring leading to the boiler. Check the internal ground connections within the boiler. b. Check the wire connections to the fan and ICB control. c. Replace harness. d. Replace fan.
Loc 6	Fan runs too slow for more than 60 seconds- measured fan speed is not reaching target fan speed within 60 seconds a. Check for poor line, neutral and ground connections in the wiring leading to the boiler. Check the internal ground connections within the boiler. b. Check the wire connections to the fan and ICB control. c. Replace harness. d. Replace fan.
Loc 7	Fan runs too fast for more than 60 seconds- measured fan speed is not reaching target fan speed within 60 seconds a. Check for poor line, neutral and ground connections in the wiring leading to the boiler. Check the internal ground connections within the boiler. b. Check the wire connections to the fan and ICB control. c. Replace harness. d. Replace fan.
Loc 8	Internal software error a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 9	Contents of E2prom is not up to date a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 10	Wrong safety parameters in E2prom a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 11	Internal software error a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 12	Internal software error a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 15	High Temperature Limit Exceeded (Set Temperature 203°F/95°C) 1. Check CH, DHW, Primary Pump Operation 2. Assure that there is adequate flow through the boiler. 3. Check the High Limit switch for correct contact and continuity. 4. Check the Supply Temperature and Return Temperature sensors while unit is running. 5. Ensure system pressure exceeds 10 psi. 6. Check heat exchanger microfuse for continuity. If microfuse is open, heat exchanger temperature exceeded 336°F/169°C. Replace the heat exchanger. 7. Check storage tank sensor or aquastat connection, wiring and function (if applicable). 8. Check secondary pump is operational and turning in the correct manner (if applicable).

Table12.1: Lockout Codes & Description (continued)

Code	Description
Loc 16	<p>Flue temperature exceeds 149°F (65°C) if PVC used or 194°F(90°C) if CPVC is used</p> <ol style="list-style-type: none"> 1. Check the flue exhaust and combustion intake vents for blockage. 2. Ensure air entering combustion air intake is free from dust, lint and oil particles 3. The combustion chamber needs to be cleaned or the primary heat exchanger needs to be descaled. Perform a combustion analysis. 4. Check storage tank piping is correct (if applicable). 5. Check storage tank sensor or aquastat connection, wiring and function (if applicable). 6. Check secondary pump is operational and turning in the correct manner (if applicable).
Loc 17	<p>Internal software error</p> <ol style="list-style-type: none"> a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 18	<p>Internal software error</p> <ol style="list-style-type: none"> a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 19	<p>Internal software error</p> <ol style="list-style-type: none"> a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 20	<p>Flame still present 10 seconds after closing the gas valve</p> <ol style="list-style-type: none"> a. Verify flame is going out immediately following the end of a burner demand. b. Check ionization electrode is not shorted to ground (replace if necessary). c. Check ignition electrode is not shorted to ground (replace if necessary). d. Check condensate drain and trap for blockages. e. This could also indicate that the gas valve doesn't close completely.
Loc 21	<p>Flame is detected before ignition</p> <ol style="list-style-type: none"> a. Check ionization electrode is not shorted to ground b. Check ignition electrode is not shorted to ground c. Check condensate drain and trap for blockages
Loc 22	<p>Three consecutive flame failures during one demand.</p> <ol style="list-style-type: none"> 1. If the unit locks out on flame failure during normal operation: <ol style="list-style-type: none"> a. Check gas pressure at the inlet to the gas valve while the boiler is operating. b. Check the ionization current in the Information Menu under parameter 1.008. If the ionization current reads less than 1.5 µA, clean the ionization and ignition electrodes. Parameter 1.053 will also show the total number of flame failures. Be sure that the wiring harness is fully seated at the control. c. If the ionization signal is consistently low replace the ionization electrode. 2. Check venting for blockage.
Loc 23	<p>Error code RAM byte was corrupted to an unknown error code.</p> <ol style="list-style-type: none"> a. Press the RESET button on main display and on back of ICB. b. Replace ICB and display board
Loc 33	<p>LWCO_1_ERROR- LWCO is open</p> <ol style="list-style-type: none"> 1. Check the connection at the terminal strip. Factory supplied jumper or a LWCO switch must be installed. see Fig. 9.1.
Loc 38	<p>More than 3 blocked flue switch errors in 24 hrs.</p> <ol style="list-style-type: none"> 1. Check venting for blockages. 2. Check for moisture/condensate in silicone tubing leading from flue switch (Fig. 15.5). 3. Check for continuity between the blocked flue switch terminals. <ul style="list-style-type: none"> • If no continuity replace the blocked flue switch and press RESET. 4. If there is continuity between the blocked flue switch terminals then check for continuity in wiring harness. <ul style="list-style-type: none"> • No continuity replace wiring harness and press RESET

Table12.1: Lockout Codes & Description (continued)

12.2 Blocking Errors

A blocking error is indicated when “Err” is displayed at the top-left of the screen; the specific error code/number is displayed in large text to the right (Fig.12.2) Blocking errors are only displayed while a problem exists; during which time the burner is not permitted to operate. To clear a blocking error the problem must be corrected, i.e. the blocking error will not be cleared by cycling the power off and on, or by pressing the RESET button. While the blocking error is display, the User and Installer Menus are still accessible as before, and may be accessed to identify boiler sensor readings and settings.

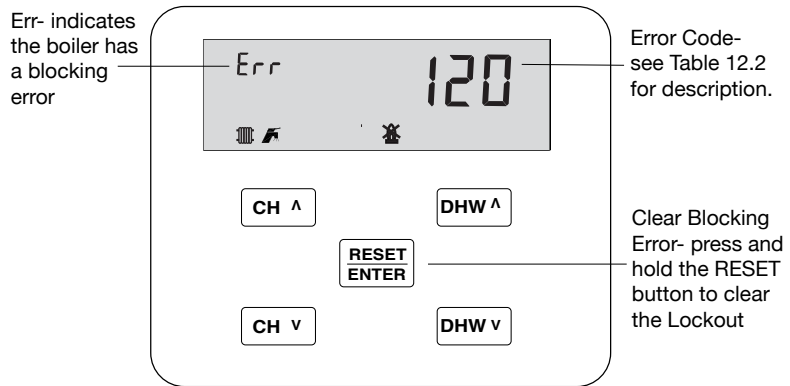


Figure 12.2: Blocking Error Display Screen

Code	Description
Err 100 Err 101 Err 102 Err 103 Err 104	Internal software error - If persistent blocking errors, Err 100 through Err 104, occur; 1. Cycle the power and press RESET. 2. Replace ICB and display board.
Err 105	CH Supply sensor measures over 180°F (82°C) - 1. Check CH, DHW, Primary Pump Operation 2. Assure that there is adequate flow through the boiler. 3. Check the Supply Temperature and Return Temperature sensors while unit is running. 4. Ensure system pressure exceeds 10 psi.
Err 106 Err 107 Err 108 Err 109 Err 110 Err 111 Err 112 Err 113	Internal software error - If persistent blocking errors, Err 106 through Err 113, occur; 1. Cycle the power and press RESET. 2. Replace ICB and display board.
Err 114	False flame is detected - 1. Verify no flame in observation window of primary heat exchanger once demand is satisfied. 2. Check ionization sensor. Replace if necessary 3. Check ionization cable; Replace if necessary. 4. Check ignition sensor. Replace if necessary 5. Check ignition cable; Replace if necessary. 6. Check condensate drain for blockages 7. Replace ICB controller.
Err 116 FILL	Low water pressure - generated when the water pressure drops below Minimal Pressure, or when the water pressure drops below 4 psi (0.3 bar). 1. Increase system water pressure to a minimum of 16 psi (1.1 bar). Cycle power to unit OFF and ON. 2. If water pressure reading at the external pressure gauge exceeds 20 psi a. inspect water pressure sensor and wiring harness • if water pressure sensor is dirty, gently clean with a calcium/rust remover b. replace water pressure sensor

Table12.2: Blocking Error Codes & Description

Code	Description
Err 119	CH Return Temperature sensor open- 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 120	CH Supply Temperature sensor open - 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 122	DHW Temperature sensor open - 1. If no tank sensor is being used, set DHW Mode (Installer Menu setting 2.035) to the appropriate setting. 2. If DHW Mode 1 selected, check wiring complies with Section 11.7. 3. Check sensor resistance reading (10,000Ω at 77°F/25°C). 4. If resistance reading is correct, check wiring to sensor. 5. Replace sensor.
Err 123	Flue Temperature sensor open - 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 126	CH Return Temperature sensor shorted - 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 127	CH Supply Temperature sensor shorted - 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 129	DHW Temperature sensor shorted - 1. If no tank sensor is being used, set DHW Mode (Installer Menu setting 2.035) to the appropriate setting. 2. If DHW Mode 1 or 2 selected, check wiring complies with Section 11.7. 3. Check sensor resistance reading (10,000Ω at 77°F/25°C). 4. If resistance reading is correct, check wiring to sensor. 5. Replace sensor.
Err 130	Flue Temperature sensor shorted - 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.
Err 134	Too Many resets in a short time period - 1. Cycle power to unit ON and OFF
Err 156	Blocked Flue switch is open- 1. Check for blocked vent termination. Check pressure at exhaust vent port. 2. Check for blocked heat exchanger. 3. Ensure tubing to blocked flue switch is not obstructed. 4. Check wiring harness to blocked flue switch. 5. Check blocked flue switch between terminals 1 & 2 for continuity (normally closed).
Err 162 FILL	Low water pressure - error is generated immediately when the pressure drops below 10 psi (0.7 bar) 1. Increase system water pressure to a minimum of 16 psi (1.1 bar). Cycle power to unit OFF and ON. 2. If water pressure reading at the external pressure gauge exceeds 20 PSI a. inspect water pressure sensor and cable • if water pressure sensor is dirty, gently clean with a calcium/rust remover b. replace water pressure sensor

Table12.2: Blocking Error Codes & Description (continued)

12.3 Warnings

A warning is indicated when “AttE” is displayed at the top-left of the screen; the specific error code/number is displayed in large text to the right (Fig.12.3) Warnings are only displayed while a problem exists; during which time the burner is permitted to operate. The appliance is not blocked, but might have reduced functionality (depending on the warning). The warning can be cleared by cycling the power off and on, or by pressing the RESET button.

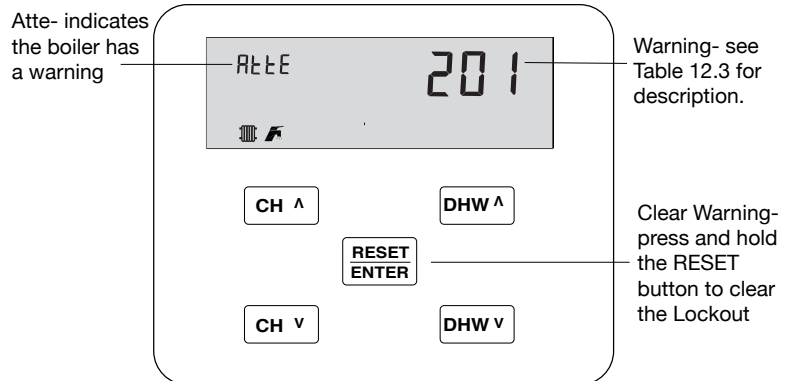


Figure 12.3: Warning Display Screen

Code	Description
AttE 202	Unknown Appliance Model Selected-
AttE 204	Outdoor Temperature Sensor Open/Shorted- 1. Check sensor resistance reading (10,000Ω at 77°F/25°C). 2. If resistance reading is correct, check wiring to sensor. 3. Replace sensor.

Table12.3: Warning Codes & Description

12.3 Sensor Resistance

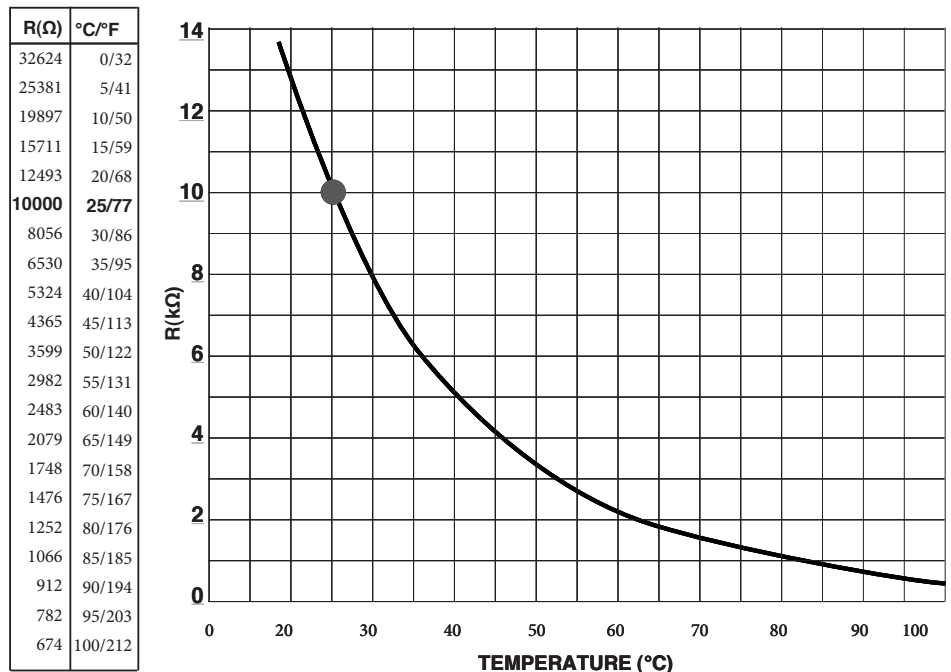


Table 12.3: Sensor Resistance Value Versus Temperature

 **WARNING**

Observe the following precautions when servicing the boiler. Failure to comply with these may result in fire, property damage, serious injury or death.

13. Troubleshooting

13.1 Servicing the Boiler

1. Disconnect or shutoff all energy sources to the boiler: 120VAC power, water and gas.
2. Identify and mark wires before disconnecting or removing them.
3. Never bypass electrical fuses or limit devices except temporarily for testing.
4. Use proper personal protective equipment (PPE) i.e. eye protection, safety footwear.

These procedures should only be performed by a qualified service personnel, when abnormal operation of the boiler is suspected. The boiler incorporates a sophisticated microprocessor based control which normally responds appropriately to varying conditions. If the boiler operation appears to be incorrect, or it is not responding to a demand, the following is suggested to determine and correct the problem.

13.2 Diagnosing an Inoperative Boiler

13.2.1 Blank Display

Perform the following steps:

1. Ensure the unit is powered connected to appropriate power source.
2. Ensure the ICB Controller LED light is illuminated. If LED is not illuminated;
 - a. Ensure the circuit breaker in the electrical panel supplying power to the boiler is ON.
 - b. Check fuse located in the ICB boiler controller.
3. If LED is illuminated, check the wiring connection from the ICB controller to the display.

13.2.2 Display Normal but no heat to space heaters

Perform the following steps:

- a. Ensure there is a heat call from the thermostat (radiator symbol on the display will flash during a thermostat demand). If uncertain about thermostat operation, place a jumper between the boiler's Thermostat terminals. If the radiator symbol does not display, check outdoor sensor temperature reading (Information Menu reading 1.004), and compare to the warm weather shutdown setting (Installer Menu setting 2.025); central heat call will not activate if the outdoor temperature is above the warm weather shutdown setting.
- b. If the radiator symbol is flashing, but the boiler is not firing, compare the boiler supply temperature (temperature displayed on the main screen) with the CH setpoint (User Menu reading 0.003). Boiler will not fire until the outlet temperature drops below the CH setpoint by the CH setpoint default differential.
 - Ensure the central heating pump is running – if not, ensure the pump is wired to field wiring terminals 7 & 8. (See Figure:9.1)
 - If CH setpoint is insufficient, increase CH setpoint (Installer Menu settings 2.003).
- c. If the radiator symbol is on but not flashing, and the faucet symbol is flashing, then the boiler is actively servicing a DHW demand. At which time no hot water will go to the heating loop. If condition continues, consider increasing the DHW setpoint (Installer Menu setting 2.048), or decreasing the DHW priority time (Installer Menu setting 2.043).

 **WARNING**

Only replace ICB controller fuse with identical part (B-221) 5A 250V. Failure to follow this warning may result in component failure or property damage.

 **WARNING**

Any DHW temperature setting exceeding 120°F shall have a thermostatic mixing valve installed.

13.2.3 Display Normal but no DHW

Perform the following steps:

a. Indirect Storage Tank with Sensor:

- Verify DHW Mode is set to 1 (Installer Menu setting 2.035).
- Verify a tank sensor is wired as per Figure 11.12.
- Storage tank sensor temperature is viewed from Information Menu parameter 1.002.
- Compare DHW temperature (User Menu reading 0.048) with the DHW tank temperature setpoint (Installer Menu reading 2.115). DHW tank demand is generated when the DHW tank temperature drops 9°F below the DHW tank temperature setpoint. If necessary increase DHW setpoint (Installer Menu setting 2.115). **The default DHW tank temperature setpoint is 140°F.**
- If the radiator symbol is flashing on the display, the DHW priority time may have expired. Cycle power and consider increasing the DHW priority time (Installer Menu setting 2.043) and/or DHW setpoint (Installer Menu setting 2.115).
- If the faucet symbol is flashing on the display, verify the DHW circulator is operating – DHW circulator should be wired to terminals 15 and 16. See Figure 9.1.
- Verify plumbing is in accordance with Figure 6.4.

13.2.4 Display Errors

Display indicates an error (Err), lockout (Loc) or warning (Att); reference Section 12.0.

! WARNING

This unit must be inspected annually by a Qualified, certified and trained Technician.

! WARNING

This boiler must be serviced by a licensed, certified and trained heating technician annually or the warranty is void. Failure to properly service this unit may result in property damage, serious injury to occupants, or possibly death.

! DANGER

When servicing or replacing components, be absolutely certain that the following conditions are met:

- Water, gas and electricity are off.
- The boiler is at room temperature.
- There is no pressure in the boiler.

14. Maintenance

14.1 General Maintenance & Inspection

General boiler observation can be performed by the owner. If any potential problems are found, a qualified, certified and trained technician must be notified.

1. Smell around the appliance area for gas. If you smell gas, follow the procedure listed in the Lighting Operating Instructions to shut down appliance in Section 1: General Information Part B.
2. Remove any combustible materials, gasoline and other flammable liquids and substances that generate flammable vapors from the area where the boiler is contained.
3. Examine all venting for evidence of leaks. Ensure vent screens are cleaned and clear of debris.
4. Observe general boiler conditions (unusual noises, vibrations, etc.)
5. Observe operating temperature and pressure on Main Display. Boiler pressure should be 5 psi below the rating shown on the safety relief valve (25 psig maximum for a 30 psig rating). Boiler temperature should never be higher than 171°F (77°C).
6. Check for water leaks in boiler and system piping.

14.2 Annual Maintenance & Inspection

1. Check boiler room floor drains for proper function.
2. Keep boiler area clear/free from combustible materials, gasoline, and other flammable vapors and liquids.
3. Check function of the safety relief valve by performing the following test:
 - a. Check valve piping to determine that it is properly installed and supported.
 - b. Check boiler operating pressure.
 - c. Lift the try lever on the safety relief valve to the full open position and hold it for at least five seconds or until clean water is discharged.
 - d. Release the try lever and allow the valve to close. If the valve leaks, operate the lever two or three times to clear the valve seat of foreign matter. It may take some time to determine if the valve has shut completely.
 - e. If the valve continues to leak, it must be replaced before the boiler is returned to operation.
 - f. Check that operating pressure has returned to normal.
 - g. Check again to confirm that valve has closed completely and is not leaking.
4. Test low-water cut-off.
5. Test function of ignition safety shut-off features.
6. Remove the front door panel and inspect for any foreign debris that may have entered through combustion air intake.
7. Examine all venting for evidence of leaks. Ensure vent screens are cleaned and clear of debris.
8. Inspect burner for deterioration. Replace if necessary.
9. The heat exchanger combustion chamber must be inspected and cleaned if necessary (see Section 14.4).
10. With boiler in operation, check that condensate is dripping from condensate tubing. Check for any restriction in the condensate drain line.
11. Ensure there is nothing obstructing the flow of combustion and ventilation air.
12. Listen for water flow noises indicating a drop in boiler water flow rate.

WARNING

It is extremely important to make sure there is no blockage in the flue exhaust vent. Failure to do so may result in serious personal injury or death.

14.3 Condensate Cleaning Instructions

1. Removal of Condensate Trap.
 - a. Close manual gas shutoff valve to boiler and remove power to the unit.
 - b. Remove the front door panel.
 - c. Remove the flue gas inlet plug (T) from the condensate trap (S).
NOTE: Special care must be taken when removing the flue gas inlet plug. Do not pull hoses downward and away from their upper connections to the blocked flue switch and flue adapter. Ensure the silicone hose remains secured to the flue gas inlet plug.
 - d. Unthread the retaining nut from the condensate trap outlet. Separate the corrugated condensate hose (P) from the condensate trap (S).
 - e. Unthread the inlet cap from the condensate Trap (S).
 - f. Remove the trap from the unit.
 - g. Clean condensate trap (S) and hose (P) with water and inspect for sediment in the lower connection port. The float can be removed for cleaning if required.
 - h. After cleaning, replace condensate trap and re-install corrugated condensate hose (P) into trap outlet. Thread inlet cap and retaining nut respectively.
 - i. Fill the condensate trap three quarters full with water via the flue gas inlet (T) and check for any leaks at connections. Replace flue gas inlet plug onto trap.
 - j. Replace the front door panel.
2. Before re-starting the Glow Boiler follow the steps below:
 - a. Open the manual gas shutoff valve and power the unit.
 - b. Adjust temperature on main display to initiate boiler activity.
 - c. Observe the boiler function to make sure you see a condensate flow.
 - d. If you do not observe a condensate flow, repeat the above procedure.
3. If the problem is not corrected at this point, it is possible that there is a material deposit problem. Follow the Cleaning the Heat Exchanger Instructions (Section 14.4) below to dissolve deposits and clean the heat exchanger.

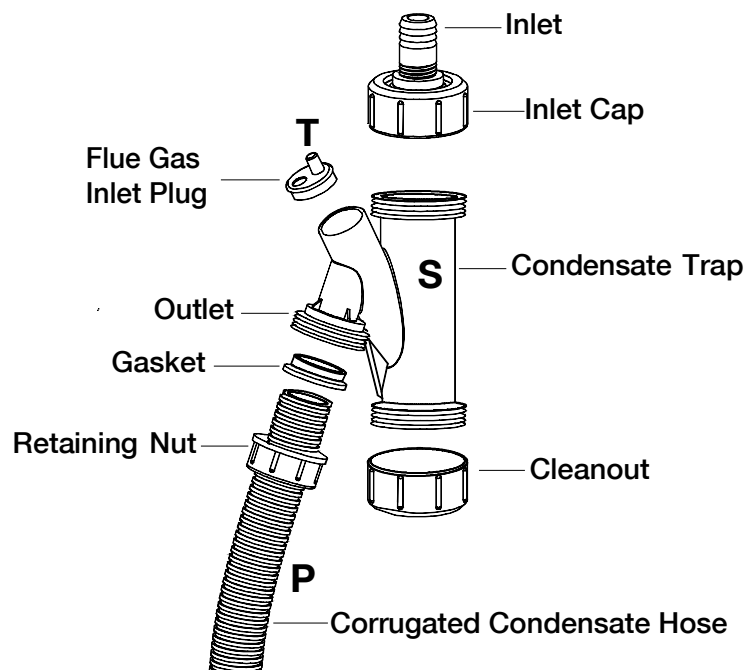


Figure 14.1: Condensate Drain

Important Product Safety Information **Refractory Ceramic Fiber Product**

Warning:

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures above 1805°F, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
 2. Long sleeved, loose fitting clothing
 3. Gloves
 4. Eye Protection
- Take steps to assure adequate ventilation.
 - Wash all exposed body areas gently with soap and water after contact.
 - Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
 - Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

Figure 14.2: Refractory Warning

! NOTICE

The boiler is equipped with a microfuse that may open if the boiler is operated with a dirty heat exchanger chamber. If the microfuse opens **THE HEAT EXCHANGER WARRANTY IS VOID**, and the heat exchanger must be replaced.

! CAUTION

Crystalline Silica - Read warnings and handling instructions pertaining to **Refractory Ceramic Fibers** before commencing service work in the heat exchange chamber. Take all necessary precautions and use recommended personal protective equipment as required.

! WARNING

Crystalline Silica - Certain components confined in the combustion chamber may contain this potential carcinogen. Improper installation, adjustment, alteration, service or maintenance can cause **property damage, serious injury (exposure to hazardous materials) or death**. Refer to Fig. 14.2 for handling instruction and recommended personal protective equipment. Installation and service must be performed by a qualified, certified and trained installer, (who must read and follow the supplied instructions before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

14.4 Cleaning Primary Heat Exchanger

The combustion chamber must be cleaned after the first year of operation, with subsequent cleanings scheduled based on the condition of the combustion chamber at the time of the first cleaning and annually at a minimum. Units operating in an industrial environment may require more frequent cleanings.

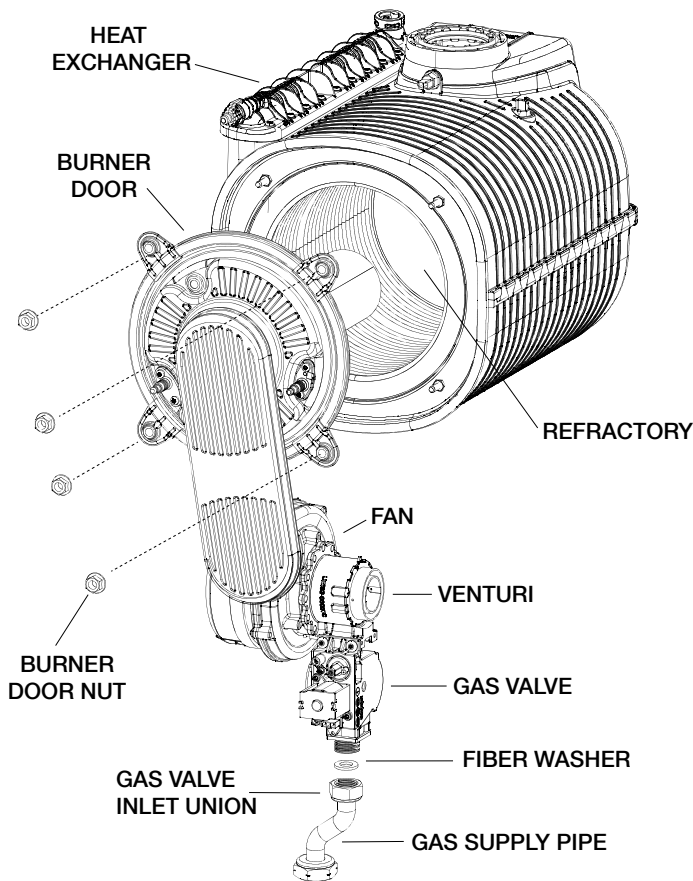


Figure 14.3: Exploded view of Heat Exchanger & Burner Assembly

1. Remove the demand for heat, allow the post-purge cycle to finish, turn gas OFF and remove power to the unit.
2. Working inside the cabinet, swing the control panel out of the way, disconnect the cabling to the fan, gas valve, ignition and ionization electrode. Then disconnect the stainless steel gas supply pipe from the gas valve inlet by unthreading the gas valve inlet union - be careful not to lose the fiberwasher.
3. Once the combustion chamber has cooled, remove the four (4) nuts securing the burner assembly to the heat exchanger. Remove the assembly (burner door, fan and gas valve) – be careful not to damage the refractory disc located behind the burner door. Replace refractory if it is damaged. (Fig. 14.5)
4. Inspect the condition of the ignition and ionization electrodes (Fig 14.4). Clean if necessary with a mild abrasive such as steel wool.

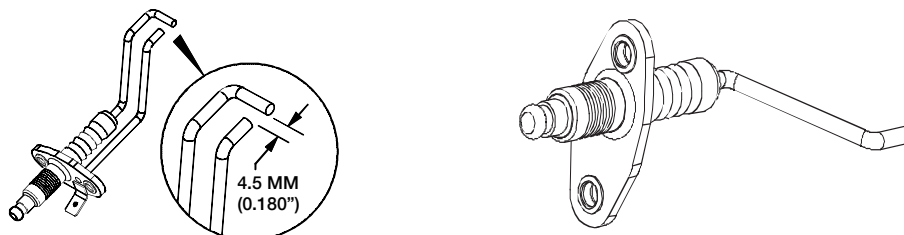


Figure 14.4: Ignition Electrode showing gap (left) & Ionization Electrode (right)

! WARNING

Potential Carcinogen - Use of Refractory Ceramic Fibers in high temperature applications (above 1000°C) can result in the formation of Crystalline Silica (cristobalite), a respirable silica dust. Repeated airborne exposure to crystalline silica dust may result in chronic lung infections, acute respiratory illness, or death. Crystalline silica is listed as a (potential) occupational carcinogen by the following regulatory organizations: International Agency for Research on Cancer (IARC), Canadian Centre for Occupational Health and Safety (CCOHS), Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH). Failure to comply with handling instructions in Fig. 14.2 may result in serious injury or death.

! WARNING

Replace any gaskets or insulation discs that show any signs of damage and do not re-use. Failure to follow these instructions may result in fire, property damage or death.

! NOTICE

Heat Exchanger Gasket- If at any point the silicon burner door gasket shows signs of damage or after two years of operation it needs to be replaced.

5. Inspect the condition of the refractory at the back of the chamber; cover it to protect it from becoming wet during the cleaning process. If the refractory is damaged, remove it and install a new refractory once the heat exchanger cleaning is complete.
6. Use a vacuum with a high efficiency filter to remove any loose debris or dust.
7. Remove the condensate trap from the bottom of the boiler and place a drain under the boiler condensate drain.
8. Wet the inside of the combustion chamber with warm water (do not use any chemicals). Use a garden hose with a trigger nozzle to direct pressurized water between the heat exchanger tubes; the water will exit via the condensate drain on the bottom. Continue process until the gaps between the tubes are clear and the water runs clean. Use dry rags or plastic to protect electrical components from being damaged by dripping or spraying water.
9. Disassemble the condensate trap and thoroughly clean it; then reassemble and securely connect it to the boiler condensate drain (Section 14.3)
10. Reassemble the boiler in the reverse order of disassembly.

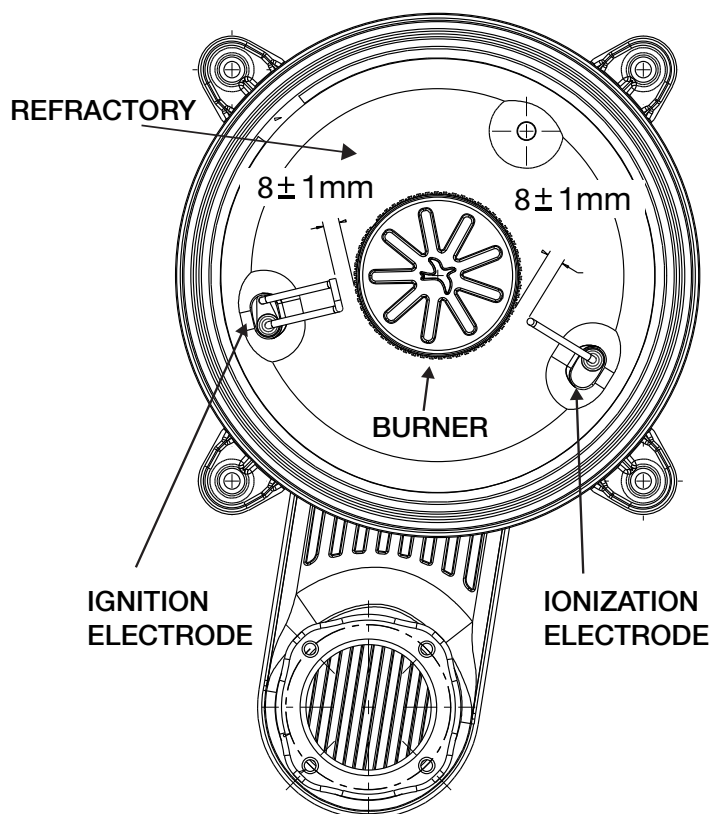


Figure 14.5: Burner Assembly Specifications

14.5 Replacing the Gas Valve

1. Remove the demand for heat, allow the post-purge cycle to finish, turn gas OFF and remove power to the unit.
2. Working inside the cabinet, swing the control panel out of the way, disconnect the cabling to gas valve. Disconnect the stainless steel gas supply pipe from the gas valve inlet by unthreading the gas valve inlet union - be careful not to lose the fiberwasher).
3. Remove the two (2) torx screws (T25) that secure the gas valve to the venturi.
4. Pull down on the gas valve to separate it from the venturi - be careful not to damage or lose the rubber coupling. Inspect the rubber coupling for signs of wear, cracking or tearing. Replace if necessary.

! WARNING

It is extremely important to check for leaks when reconnecting the gas valve. Failure to do so may result in severe personal injury, death or major property damage.

! WARNING

It is extremely important to perform a combustion calibration after replacing the gas valve. Failure to do so may result in major property damage, severe personal injury, and death.

5. Replace the gas valve and re-assemble the components in the reverse order of disassembly.
6. Check for gas leaks.
7. Perform a combustion analysis (see Section 10.2.2 - Combustion Analysis) to ensure CO₂ levels comply with Table 10.1: CO₂ Percentages.

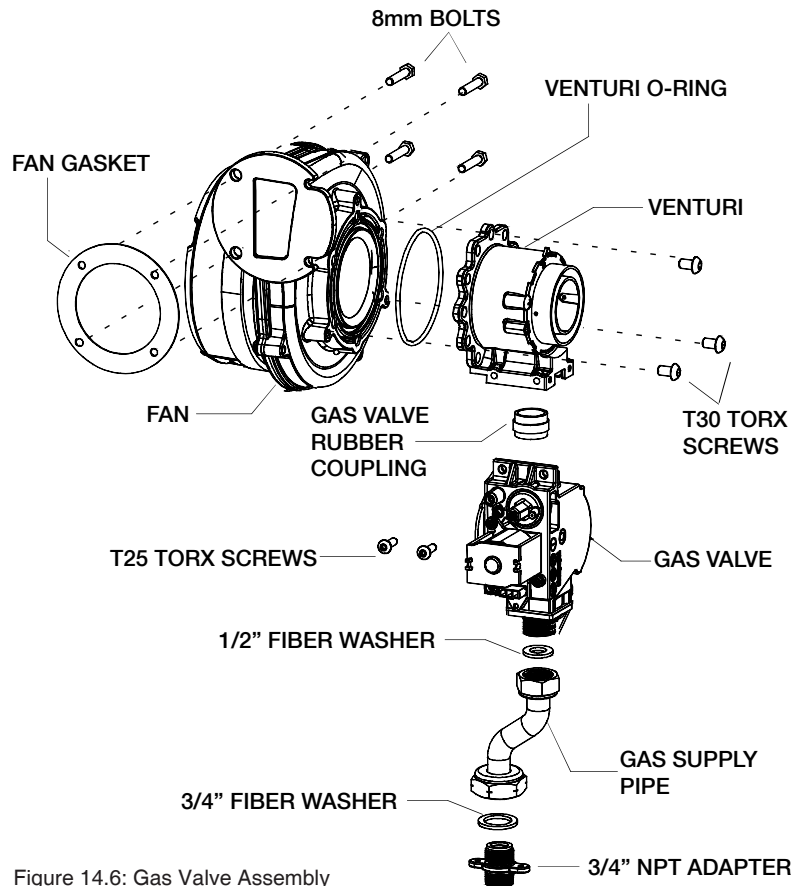


Figure 14.6: Gas Valve Assembly

14.6 Replacing the Fan

1. Remove the demand for heat, allow the post-purge cycle to finish, turn gas OFF and remove power to the unit.
2. Working inside the cabinet, swing the control panel out of the way, disconnect the cabling to the fan, gas valve, ignition and ionization electrode. Disconnect the stainless steel gas supply pipe from the gas valve inlet by unthreading the gas valve inlet union - be careful not to lose the fiberwasher.
3. Once the combustion chamber has cooled, remove the four (4) nuts securing the burner assembly to the heat exchanger. Remove the assembly (burner door, fan and gas valve) – be careful not to damage the refractory disc located behind the burner door. Lay the burner assembly face down onto a firm surface.
4. Using an eight (8) mm wrench or socket remove the four (4) bolts securing the fan to the heat exchanger manifold.- be careful not to damage the gasket between the heat exchanger manifold and the fan.
5. Remove the three (3) torx screws (T30) securing the venturi to the fan- careful not to damage the o-ring between the venturi and fan.
6. Replace the fan and reassemble the components in the reverse order of disassembly.
7. Check for gas leaks.

15. Part List

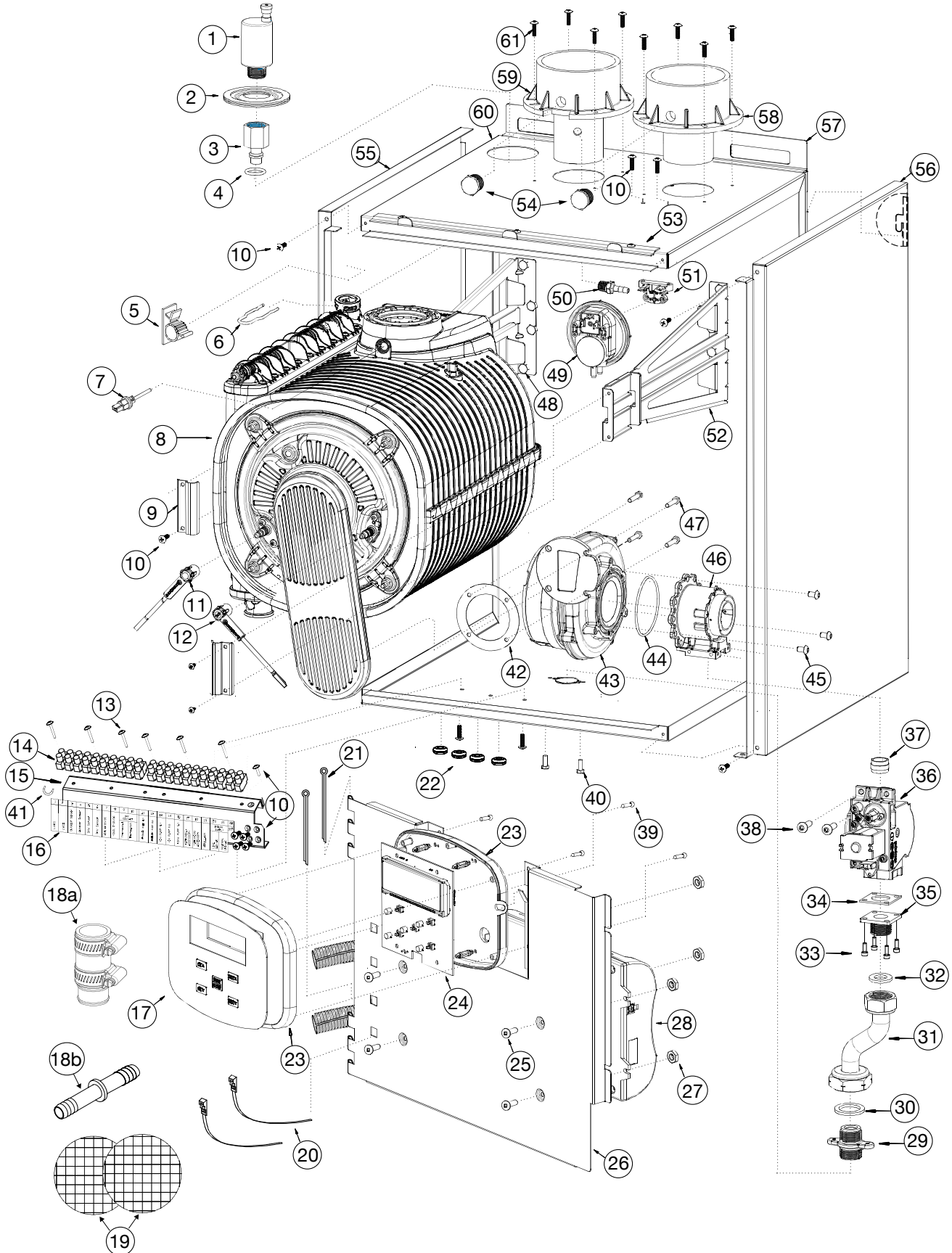


Figure 15.1: Cabinet Interior Electrical and Gas Parts

15.1 Part List & Diagrams

ITEM	PART NUMBER	DESCRIPTION
1	CB-111	HIGH CAPACITY AIR VENT (150psi)
2	CB-126	AIR VENT GROMMET
3	CB-131	AIR VENT FITTING
4	CB-161	O-RING FOR AUTO AIR VENT
5	GLO-67	WIRE HARNESS CLIP
6	CB-250	AIR VENT CLIP
7	GLO-42	FLUE SENSOR
8	CB-112	ISOTHERMIC ASME "H" HEAT EXCHANGER ASSEMBLY (B85)
	CB-113	ISOTHERMIC ASME "H" HEAT EXCHANGER ASSEMBLY (B120/B160)
9	GLO-60	HEAT EXCHANGER HOLDING CLAMP
10	GLO-180-103	8-32 X 3/8 STEEL PAN PHILLIP T/SCREWS TYPE F
11	GLO-44	IONIZATION ELECTRODE CABLE (585mm)
12	CB-109	IGNITION ELECTRODE CABLE (1095MM)
13	CB-137	TERMINAL STRIP SCREW
14	CB-116	ELECTRICAL CONTROL TERMINAL STRIP
15	B-194-S	FIELD WIRING STRIP BRACKET
16	B-240	FIELD WIRING TERMINAL STRIP LABEL
17	CB-119	DISPLAY BOARD DECAL
18a	GLO-180-200	3/4"-1/2" CONDENSATE HOSE CONNECTOR
18b	GLO-180-77	1/2"-1/2" PLASTIC CONDENSATE FITTING
19	SCREEN	GALVANIZED SCREEN
20	CB-115	ZIP TIES
21	CB-148	COTTER PIN 1/8"X3-1/2"
22	CB-127	SILICONE CABLE WIRE GROMMET
23	CB-123	DISPLAY BOARD ENCLOSURE
24	CB-122	DISPLAY BOARD
25	GLO-180-107	10-32x1/2" PAN SQ/SI MS ZP SCREW
26	CB-193-S	HINGE DOOR
27	GLO-180-108	10-32K- LOCK NUT
28	B-221	IGNITION CONTROL BOARD
29	GLO-180-50	3/4" NPT BRASS FITTING
30	GLO-172	3/4" FIBERWASHER FOR GAS PIPE
31	CB-103	GAS SUPPLY TUBE
32	GLO-173	1/2" FIBERWASHER FOR GAS PIPE
33	GLO-563	M4 X 12 HEX GV SCREW
34	GLO-170	GV CORK GASKET
35	CB-130	BRASS BOILER GV FITTING
36	GLO-541	GAS VALVE
37	GLO-547	GAS VALVE RUBBER COUPLING
38	GLO-180-110	GAS VALVE MOUNTING SCREWS

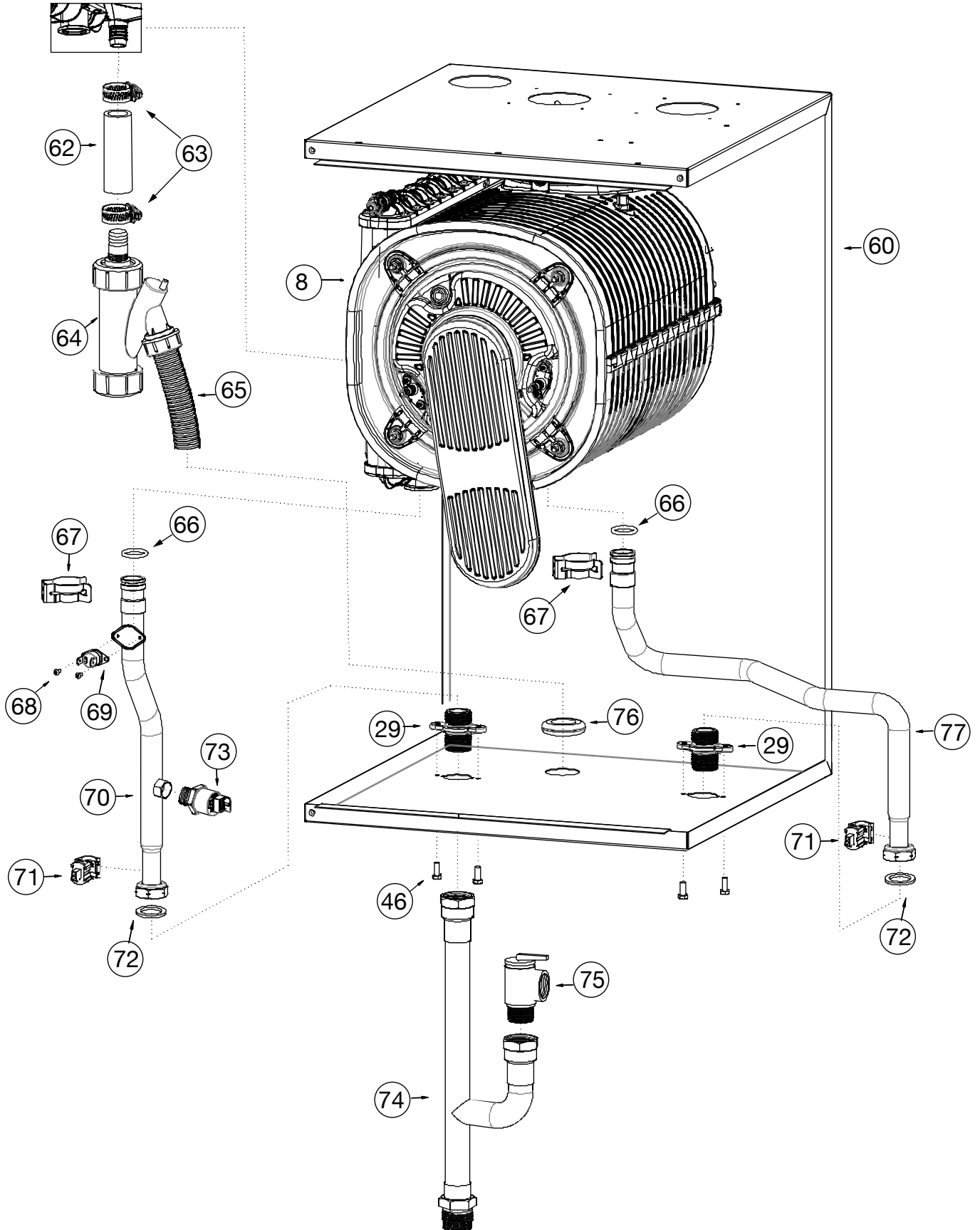


Figure 15.2: Cabinet Interior Wet Side Parts

ITEM	PART NUMBER	DESCRIPTION
39	CB-182	DISPLAY BOARD ENCLOSURE SCREWS
40	GLO-180-105	10-32 X 1/2" SCREWS
41		LWCO JUMPER (FACTORY INSTALLED)
42	GLO-50	FAN/BURNER GASKET
43	GLO-543	FAN
44	GLO-544	FAN/VENTURI O-RING
45	GLO-180-109	VENTURI MOUNTING HEX SCREW
46	CB-183	VENTURI 20 mm (B85)
	CB-184	VENTURI 24 mm (B120/B160)
47	GLO-180-106	M5 X 12 DIN933-8.8 HEX SCREW
48	GLO-180-104	10-24 X 1/2 HWH THREAD CUTTING SCREWS
49	GLO-180-150	BLOCKED FLUE SWITCH
50	GLO-51	HOSE BARB (3/16" NYLON)
51	GLO-180-21	BLOCKED FLUE SWITCH MOUNTING BRACKET
52	CB-114	HEAT EXCHANGER SUPPORT CLAMPS (B85x2)
	GLO-59	HEAT EXCHANGER SUPPORT CLAMPS (B120/B160x2)
53	GLO-180-S-09	FRONT DOOR MOUNTING BRACKET
54	GLO-02-PLUG	PVC VENT PLUG
55	CB-202-S	LEFT PANEL - PAINTED (B85)
	CB-203-S	LEFT PANEL - PAINTED (B120/B160)
56	CB-201-S	RIGHT PANEL - PAINTED (B85)
	CB-204-S	RIGHT PANEL - PAINTED (B120/B160)
57	CB-192-S	WRAP REAR SUPPORT MOUNTING BRACKET
58	GLO-01	PVC COMBUSTION AIR INLET ADAPTER
59	GLO-03	CPVC EXHAUST FLUE ADAPTER
60	B-190-S	BOILER WRAP - UNPAINTED (B85x1)
	B-191-S	BOILER WRAP - UNPAINTED (B120x1/B160X1)
61	GLO-180-114	VENT ADAPTER SCREW - (x8)
62	GLO-180-111	HEAT EXCHANGER CONDENSATE TUBE
63	GLO-180-41	GEAR CLAMP
64	GLO-48	CONDENSING TRAP
65	GLO-47	CONDENSATE DRAIN TUBE
66	CB-149	O-RING
67	GLO-70	S.S HEAT EXCHANGER CLIP
68	GLO-180-100	SCREW HIGH LIMIT SWITCH
69	EKA-323-39	HIGH LIMIT SWITCH (95 DEG)
70	B-111	CH SUPPLY COPPER TUBE
71	GLO-41	TEMPERATURE CLIP SENSOR
72	GLO-40	3/4" RUBBER WASHER
73	B-150	PRESSURE SENSOR
74	B-117	BOILER PRESSURE GAUGE FIXTURE

ITEM	PART NUMBER	DESCRIPTION
75	CB-136	SAFETY PRESSURE RELIEF VALVE (30 PSI)
76	GRO-001	CONDENSATE HOSE GROMMET
77	B-110	CH RETURN COPPER TUBE
78	GLO-65	BLACK POLYPRO BARBED TEE, 3/16"
79	GLO-180-22	SILICONE CONDENSATE HOSE
80	GLO-180-S-13	WALL MOUNT SUPPORT BRACKET
81	CB-200-S	BOILER FRONT DOOR PAINTED
82	CB-150	S.S. HEAT EXCHANGER (B85)
	CB-151	S.S. HEAT EXCHANGER (B120/B160)

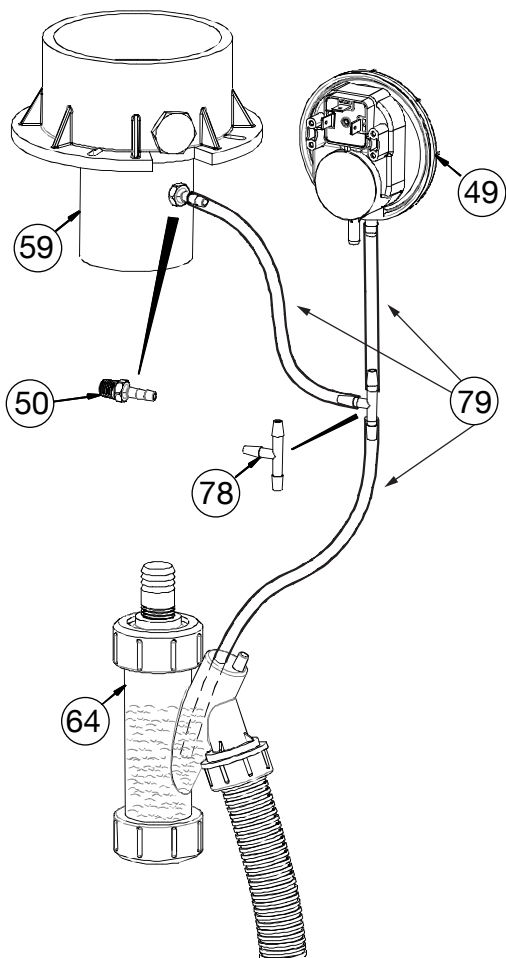


Figure 15.3: Blocked Flue Switch Loop

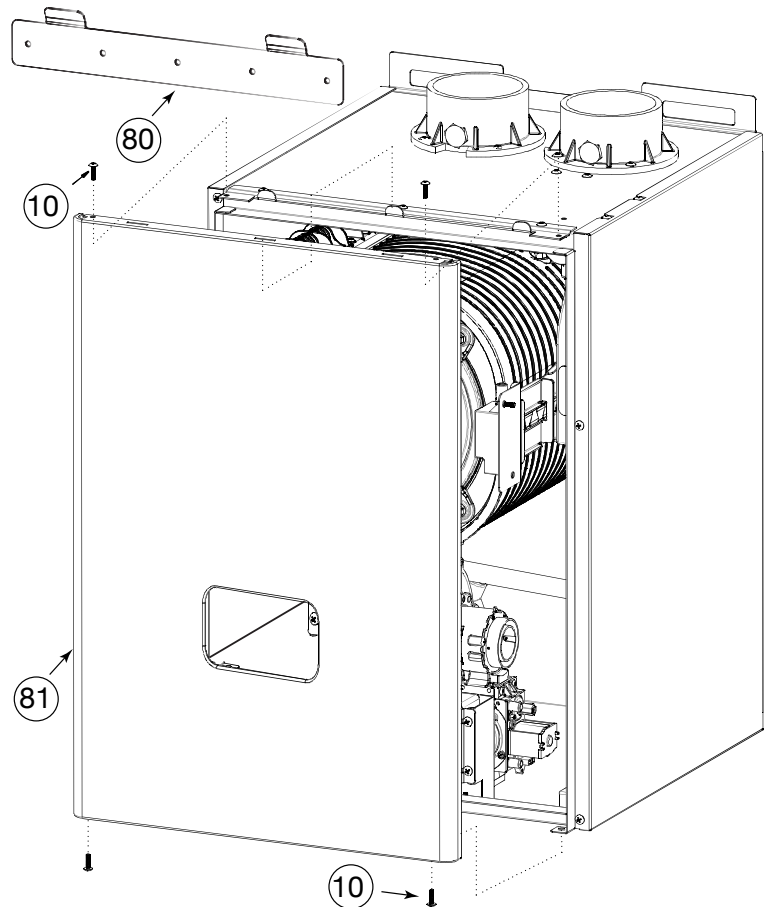


Figure 15.4: Front door Assembly

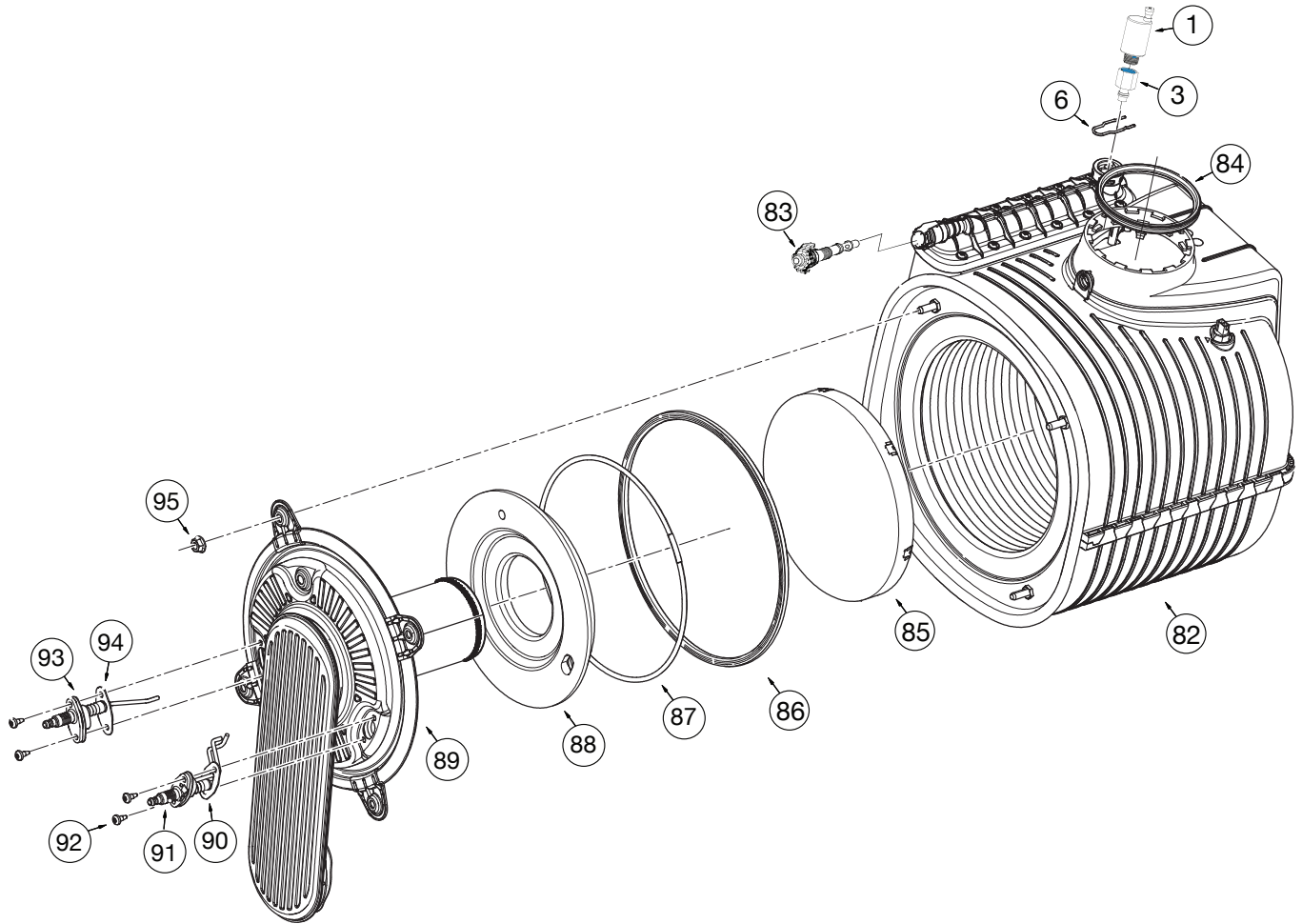


Figure 15.5: Heat Exchanger Parts

ITEM	PART NUMBER	DESCRIPTION
83	CB-156	MANUAL AIR VENT
84	GLO-62	FLUE OUTLET ADAPTER (60mm)
85	GLO-180-75	HEAT EXCHANGER REFRACTORY INSULATION
86	CB-159	CORK HEAT EXCHANGER
87	GLO-585	GASKET BURNER PLATE GASKET
88	GLO-180-74	BURNER PLATE REFRACTORY INSULATION
89	CB-152	BURNER & PLATE (C85)
	CB-153	BURNER & PLATE (C120)
90	GLO-586	IGNITION ELECTRODE GASKET
91	GLO-582-1	IGNITION ELECTRODE
92	GLO-588	ELECTRODE MOUNTING SCREWS
93	GLO-583	IONIZATION ELECTRODE
94	GLO-587	IONIZATION ELECTRODE GASKET
95	GLO-589	BURNER MOUNTING NUTS

15.2 Optional Accessories

ITEM	PART NUMBER	DESCRIPTION
	CB-170	LWCO SWITCH
	CB-168	OUTDOOR TEMPERATURE SENSOR & CONDUIT ADAPTER KIT
	CB-173	TANK SENSOR WITH 8FT LEAD (10K OHM)
	CB-260	RELAY (120 Vac SPDT 10 AMP)
	F1-EXP	FERNOX (Rust Inhibitor)
	CB-140-203	B85 & B140 PRIMARY LOOP PUMP
	96806141	1/2 SWEAT CONNECTION KIT W/ CHECK VALVE (FOR USE WITH CB-140-203)
	96806143	3/4 SWEAT CONNECTION KIT W/ CHECK VALVE (FOR USE WITH CB-140-203)
	CB-140-303	B160 PRIMARY LOOP PUMP
	519601	3/4" NPT CAST IRON FLANGE SET (FOR USE WITH CB-140-303)
	519602	1" NPT CAST IRON FLANGE SET (FOR USE WITH CB-140-303)

Warranty

Glow Brand warrants this product against failure due to defect in materials or workmanship under normal use and maintenance for a period of 60 months (5 years) or 65 months if the date of installation cannot be determined, and commences on the date of installation or commissioning of the appliance. Should any part fail during the applicable warranty period, **Glow Brand** will provide a new or remanufactured part to replace the defective part. Proof of purchase and installation date will be required in order to facilitate the warranty requirements.

All parts claimed under warranty are to be returned to **Glow Brand** for testing and verification. The customer's account will be credited only after the defective part has been examined by **Glow Brand** or the vendor and determined to be defective. The cost of returning the goods to **Glow Brand** is by others. All warranty parts are to be prepaid by the customer. Warranty will not be offered until the equipment is paid for in full. Warranty on all equipment sold to customers may be suspended, at **Glow Brand's** discretion, until the customer's account is in good standing. Warranty covers defective components only. Normal wear and abuse is not covered. This warranty does not cover costs incurred for diagnosing, repairing, removing, installing, shipping, servicing, or handling of either failed parts, or replacement parts, or new units.

SECOND THROUGH THE TENTH YEAR

Limited Warranty for the Stainless-Steel Tube Heat Exchanger

Glow Brand warrants its stainless-steel heat exchanger against failure due to defect in materials or workmanship under normal use and maintenance from the date of installation for the second through the tenth year to the original purchaser only. If during such time, any part of the stainless-steel tube heat exchanger is found to be defective, Glow Brand will provide replacement for the original heat exchanger.

FIRST YEAR (Labor)

Labor Warranty for **Glow Brand Combination Boiler**

Glow Brand will provide a predetermined fixed labor amount for the replacement of defective parts for 1 year (12 months) and commences on the initial date of installation or commissioning of the appliance.

Application	Tube Heat Exchanger	Parts	Labor
Residential	10 years	5 years	1 year
Commercial	5 years	3 years	1 year

Product Improvements – As Glow Brand Technologies maintains a continuous improvement policy, specifications are subject to change without notice.

Limitations on Liability

This Warranty Does Not Cover

1. Installations by other than licensed plumber, gas installer or heating contractor.
2. Commissioning other than by a **Glow Brand** certified contractor.
3. Installations of equipment for other purposes than those intended by the instructions supplied with this equipment.
4. Installations of equipment for purposes other than domestic hot water production and central heating needs if installed.
5. Any product which is improperly installed or moved from its original place of installation.
6. Any product which has been repaired or replaced with other than **Glow Brand** factory parts.
7. Any product modified in any way, misused or damaged or which has been used contrary to the warrantor's written instructions.
8. Introduction of liquids other than potable water into this product.
9. Any damage to the product caused by failure to maintain the unit properly, improper voltage, improper gas pressure, improper water pressure, flood, freezing, electrical surges, fire, lightning, or Acts of God.
10. Nicks, scratches or discoloration of decorative finishes.
11. Installation, plumbing, gas piping and wiring not integral to the product.
12. Any **Glow Brand** product installed in an improper environment (e.g. Corrosive, dusty, and or chemically contaminated).
13. Condensate damage due to improperly installed or lack of a condensate trap (drain).
14. Damages due to accidents, abuse, misuse, improper installations, misapplication or incorrect sizing and lack of regular recommended maintenance.
15. The water heater is installed outdoors.
16. Failures resulting in the **Glow Brand** unit not being properly maintained as per the recommended maintenance.
17. Failures not reported to **Glow Brand** within the time period specified above.
18. Products damaged in shipment or storage or otherwise without fault of **Glow Brand**.
19. The water heater has not been installed in accordance with all applicable local plumbing and/or building code and/or regulations or in their absence with the latest edition of the natural gas and propane installation code and/or the National Electrical Code or Canadian Electrical code.
20. This warranty does not cover any expenses related to the removal or re-installation process. The homeowner will be responsible for the cost of removing and re-installing the alleged defective part or its replacement and all labor and material connected therewith, and transportation to and from **Glow Brand**.
21. The warranty cannot be considered as a guarantee of workmanship of an installer connected with the installation of the condensing water heater or as imposing a liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation, which liability is expressly disclaimed.

Exclusion of Incidental and Consequential Damages/ Disclaimers

Glow Brand Technologies Inc. will not pay in contract or in tort, consequential or incidental damages under this warranty, both of which are specifically excluded. This means we shall not be responsible for any loss, expense or damage caused by any defect in the water heater, other than the water heater itself. The maximum liability of **Glow Brand** in connection with this limited warranty shall not in any case exceed price of the part claimed to be defective, or price of the water heater if the entire water heater is claimed to be defective. "Incidental" damages include expenses of inspection, obtaining substitute goods, transportation, etc. "Consequential" damages include injury to persons or property inconvenience or other consequential damage resulting from a breach of warranty.

Owner Responsibilities

This Warranty is issued to the original purchaser only. This product must be used and cared for in accordance with the instruction manual. You are responsible for required periodic maintenance or service. See your instruction manual for details. You must be able to verify the installation date of the product against which you make and warranty claim. The original bill of sale, installer's invoice or other similar document is required to verify warranty. If you cannot show evidence of the actual date of installation, warranty coverage shall be extended to a total of 65 months from when the unit was manufactured. The attached Warranty Registration Form must be filled out completely and returned to **Glow Brand**. Failure to do so will prevent or delay our being able to contact you (or the person residing at this address) in case of a recall or important product safety alert. Your warranty information will be held strictly confidential.



Homeowner Registration Form
info@glowbrand.ca

PLEASE COMPLETE THE FOLLOWING INFORMATION
RETURN WITHIN 30 DAYS OF COMMISSIONING THE APPLIANCE

Please Print Clearly

User Information:

Homeowner's Name: _____

Address: _____ Unit #: _____

City: _____ Province: _____ Postal Code: _____

Phone No. _____ Fax: _____

Email Address: _____

Unit Purchased:

Unit Model: _____ Serial No. _____

Date of Purchase: _____ Date of Startup: _____

Purchased From:

Installing Contractor's Name: _____

Address: _____ Unit #: _____

City: _____ Province: _____ Postal Code: _____

Phone No. _____ Fax: _____

Email Address: _____

Signature: _____ Date: _____

Please complete and return this form to Glow Brand.
ATTENTION: Product Registration.



Warranty Part Form
info@glowbrand.ca

Please complete the following information and return it with the part request

Contractor / Distributor / Rental Provider Name: _____ **Date:** _____

Address: _____ Unit # _____

City: _____ Prov. _____ Postal Code: _____

Phone # _____ Other # _____

Email: _____

Homeowner Name: _____

Address: _____ Unit # _____

City: _____ Prov. _____ Postal Code: _____

Phone # _____ Other # _____

Email: _____

Model Number: _____ **Serial number:** _____

Date installed: _____ **Date Failed:** _____ **Date Serviced:** _____

Failed Part Number: _____ **Replacement Part Number:** _____

Failed Part Description: _____

Reason for Failure: _____

**“FAILED, NOT WORKING, DEFECTIVE” etc.,
is not acceptable and will be considered incomplete.
Incomplete warranty forms will not be accepted or considered. Only a
detailed explanation will be considered for warranty.
All parts returned must be accompanied with a completed warranty tag.**



BOILER COMMISSIONING SHEET

Model #:

Serial #:

INSTALLATION DATE:

BUILDER/SITE NAME:		DATE:	
HOMEOWNER NAME:		BLK / LOT #	
ADDRESS:		TEL:	
CITY:	POSTAL CODE:	CELL:	
		OTH:	

CONTRACTOR NAME:		TEL:	
ADDRESS:		CELL:	
CITY:	POSTAL CODE:	FAX:	
Technician:		EMAIL:	

Prior to commencing any commissioning, Hydro, Gas and Water must be available at the appliance.

PROCEDURE	READING	REMARKS
Verify that the unit being installed matches the work order		
Ensure the venting complies with the installation manual & local codes		
Ensure a minimum 24" clearance from the appliance front is maintained		
Check for correct voltage & polarity		
Verify that all gas and water connections are tight and leak free		
Check the gas pressure at the appliance (min. 3.5" w.c Nat / 8" w.c Lp)		
Ensure the pressure relief is installed and operating properly		
Ensure the drain tube and condensate hose are properly installed		
Check that the condensate trap has been primed and is not obstructed		
Inspect and verify the safety components are operating as intended		
Bleed all the air from the heating loop / recirculation line if equipped		
Perform the necessary commissioning steps and record findings below		
Ensure the parameters are configured to reflect the appliance application		
Ensure the installation manual is left with the appliance		
Check the Glow Brand Boilers' CO ₂ % complies with values listed in the installation manual	NATURAL GAS, (CO ₂ %) LIQUID PROPANE (CO ₂ %)	%
Record the CO measured		PPM

Check that there is no flammable material or liquids in the immediate vicinity of the appliance

ADDITIONAL COMMENTS

I confirm that the information listed on this commissioning sheet is a true and accurate account of what has been completed.

TECHNICIAN SIGNATURE: _____



Glow

Brand™

Getting Service

When you contact Technical Support, please have the following information at hand.

1. Model Number
2. Serial Number
3. Date Purchased
4. Installation location and type
5. Error code, if any appears on the front display.

This appliance may be used for construction heat provided the unit has been commissioned by a certified and licensed technician and/or installer.

GLOW BRAND

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Concord, ON

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Fax: (905) 264-1147

Email: info@glowbrand.ca

Website: www.glowbrand.ca

