

## Eco-King high efficiency wall boiler

### Installation Manual 2023

**For Model numbers:**    **C99, C100, C140, C200**  
                                  **H100, H140, H200**

Installation  
Service and maintenance  
Start up  
Parts

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

#### WHAT TO DO IF YOU SMELL GAS:

- Switch off the appliance.
- Shut off the gas supply.
- Open the windows.
- Do not try to light any appliance.
- Do not touch any electric switch.
- Do not use any phone in your building.
- Leave the house.
- 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.

#### WHAT TO DO IF YOU SMELL FLUE GASSES:

- Switch off the appliance.
- Open the windows.
- Shut off the gas supply.
- Leave the house.
- Contact a registered installer or a registered service center.



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## Part 1 – Introduction

### Hazard definitions

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



Indicates presence of hazards that can cause severe personal **Warning** injury, death or substantial property damage.



Indicates presence of hazards that will or can cause minor or **Caution** moderate personal injury or property damage.



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

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Throughout this manual units of measure are often expressed in both imperial and metric units of measure. Note that for absolute temperature indications degrees Fahrenheit (°F) and degrees Celsius (°C) have been used. To convert a certain temperature from °C to °F the following formula has been used: °F = °C × 1.8 + 32.

Temperature differences (delta) in this manual have been expressed in degrees Celsius (°C)

For your convenience conversion tables for temperature, pressure and volume are listed below.

Pressure	
Bar	Psi
0.7	10.1
1.0	14.5
1.5	21.8
2.0	29.0
2.8	40.6
3.0	43.5

Temperature	
°C	F
-15	5
-10	14
0	32
20	68
50	122
60	140
70	158
80	176

Volume	
Litre	Gallon
1	0.26
5	1.32
10	2.64
20	5.28
100	26.4
200	52.8
300	79.3

## Part 1 – Introduction

# FOR YOUR SAFETY, READ BEFORE OPERATING



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

**A.** This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

**B. BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

### WHAT TO DO IF YOU SMELL GAS

Switch off the appliance.  
Shut off the gas supply.  
Open the windows.

Do not try to light any appliance.

Do not touch any electric switch.

Do not use any phone in your building.

Leave the house. 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.

### WHAT TO DO IF YOU SMELL FLUE GASSES

Switch off the appliance

Open the windows

Shut off the gas supply

Leave the house

Contact a registered installer or a registered service center.

**C.** Use only your hand to turn the gas switch. Never use tools. If the switch will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.


**D.** Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

## OPERATING INSTRUCTIONS

1. STOP! Read the safety information above very carefully.
2. Turn off all electric power to the appliance.
3. Set the thermostat to lowest setting.
4. Do not try to light the burner by hand.
5. Make sure the CH system is filled with water and de-aired. Make sure the gas line is de-aired. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
6. The main gas switch is situated directly underneath the boiler in the gas supply line and below the gas pressure regulator. Turn the main gas switch clockwise to close the gas supply.




Turn clockwise  
to close valve

7. Wait five (5) minutes to clear out any gas. Then smell for gas including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this page. If you don't smell gas, go to the next step.
8. Turn the main gas switch counter clockwise to open.  

9. Turn on all electric power to the appliance and start the calibration procedure of the boiler (at first start-up).
10. Set thermostat to desired setting.
11. If the appliance will not operate turn off gas to appliance and call your service technician or gas supplier.

## TO TURN OF GAS TO THE APPLIANCE

1. Turn off all electric power to the appliance if service is to be performed.
2. Set the thermostat to lowest setting.

3. The main gas switch is situated directly underneath the boiler in the gas supply line and below the gas pressure regulator.
4. Turn the valve clockwise to close the gas supply  


## Part 1 – Introduction



### 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 12 for information on handling instructions and recommended personal protective equipment.

Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this appliance. This appliance contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).



### Warning

**Void Warranty** - This appliance 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.



### Warning

Compliance of this boiler with CSA B51 has not been verified due to an exemption provided in a provincial pressure vessel code. The installation of the Eco-King gas appliance must conform to the requirements of this manual, your local authority and the 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.



### Caution

Not taking into account the specified maximum calcium and chloride levels for the DHW and CH circuits will void the warranty.

Commissioning new systems should include flushing the complete system with water.

For application of frost protection only tested and approved antifreeze, compatible with all metals and plastics, can be used. For continued protection we recommend regular control of concentration level and pH, at least once a year.

## Part 1 – Introduction

### User responsibilities

This manual is for use only by a qualified heating installer / service technician. Only a registered installer / service technician is allowed to perform the installation of the appliance and the first start-up of the system. Ask the installer to explain the system to you. Refer to user's Information manual for user reference. Have this boiler and its vent system serviced / inspected by a qualified service technician.



### Warning

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



### Warning

### Boiler operation

Should overheating occur or gas supply fail to shut off, do not turn off or disconnect electrical supply to circulator. Instead, shut off the gas supply at a location external to the appliance.

Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system and any gas control that has been under water.

### Manufacturer conditions

The manufacturer does not accept any liability for damage caused by non-observance of the installation instructions. Service activities must exclusively be carried out by qualified installers using original parts.

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

### Installer responsibilities

A qualified installer is a licensed person who has appropriate training and a working knowledge of the applicable codes, regulations, tools, equipment and methods necessary to install a boiler or water heater. The Installer assumes all responsibility for a safe installation and that it meets the requirements of the Eco-King instruction manual, as well as National and local 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.

This manual contains information of the Eco-King Heating Only H100, H140, H200 and Combination C99, C100, C140, and C200 boilers. Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given. Store the manual in the transparent envelope adjacent to the boiler.

The installer is liable for the installation and the first start-up of the appliance. The installer must observe the following instructions:

Read the instructions of the appliance in the manuals delivered and observe these.

Install the appliance in compliance with the applicable law and standards: compliance of this boiler with CSA B51 has not been verified due to an exemption provided in a provincial pressure vessel code.

The installation of the Eco-King gas appliance must conform to the requirements of this manual, your local authority, and the 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.

Perform the first start-up and all checks that are required. See section 10 for manual / automatic calibration.

Explain system functioning to the user.

Hand over all manuals to the user and inform the user about the storage location.

The Eco-King is a "Direct Vent", Class IV appliance requiring a "Special Venting System". Vent and Combustion

### When servicing boiler

To avoid electric shock, disconnect electrical supply before performing Service/Maintenance.

### When pressure testing boiler

The boiler and its individual gas pressure valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 6.5 kPa (0.95 psi). The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 6.5 kPa (0.95 psi).

## Part 1 – Introduction

The Eco-King is a high efficiency gas wall boiler and is designed for heating a central heating (CH) system and producing domestic hot water (DHW).

The main functions of the Eco-King boiler are:

- 1.) Heating the house: Central Heating (CH)
- 2.) Producing Domestic Hot Water (DHW)

The total system for CH and DHW-production consists of:

- The boiler;
- Central heating and vent piping;
- Radiators; baseboard; in floor heating and/or hydronic air handlers
- Hot water taps.

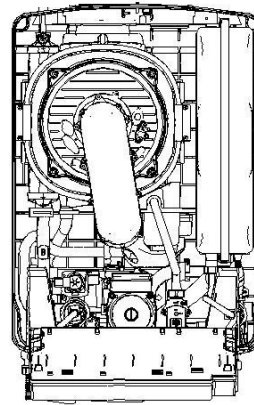


Figure 1.1

### Main parts

The Eco-King boiler consists of the following main parts:

#### CH Heat exchanger

The heat exchanger located in the middle of the boiler makes sure that the heat that becomes available during the gas burning process is transferred to the CH circuit.

#### DHW heat exchanger (only Cxxx types)

The heat exchanger located in the back of the boiler makes sure that the heat that becomes available during the gas burning process is transferred to the DHW circuit.

#### Fan

The air necessary for gas burning is propelled by a fan. To save electrical energy the Eco-King boiler has been equipped with a high efficiency fan.

#### Burner

The fan brings forward the gas / air blend necessary for the burning process. The ignition electrode ignites the blend to drive the burning process.

#### Gas valve

The gas valve makes sure the exact amount of gas necessary for burning is supplied.

#### 3-way valve and circulation pump

The heat generated by the burning process is used within the CH or DHW circuit. The 3-way valve makes sure the correct circuit is driven depending on the demand. The pump makes sure the correct amount of water is delivered through the cold water intake.

#### Burner control

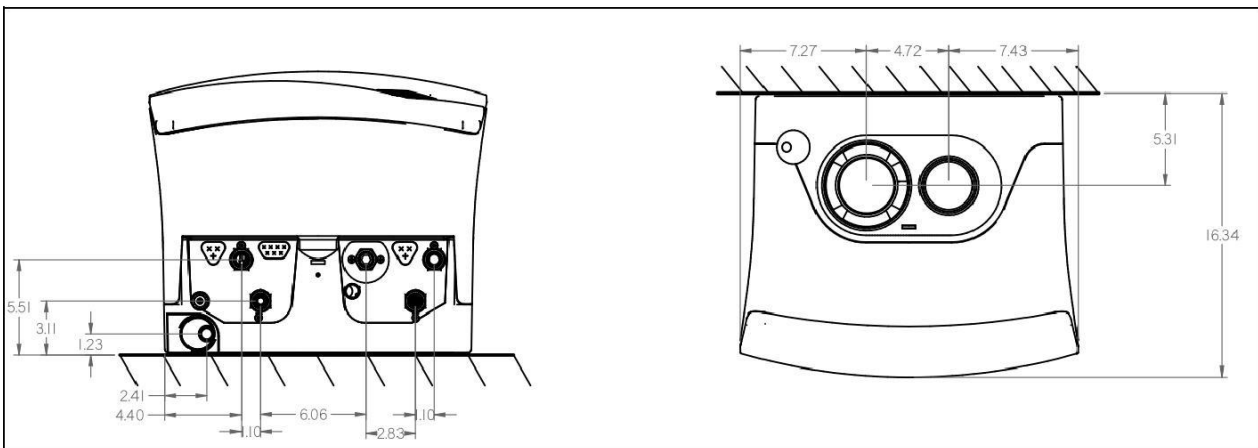
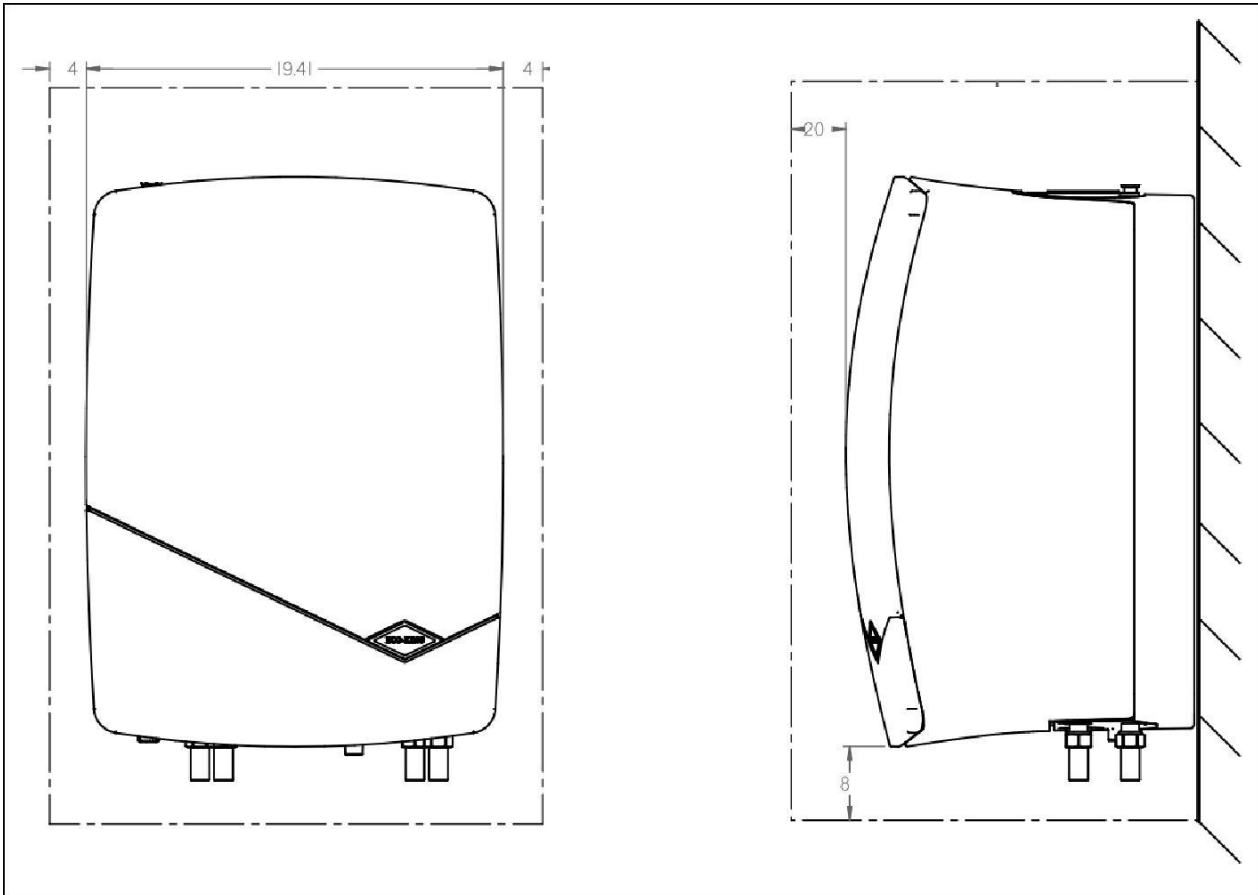
The burner control drives the general steering and safety system of the boiler



# Part 1 – Introduction

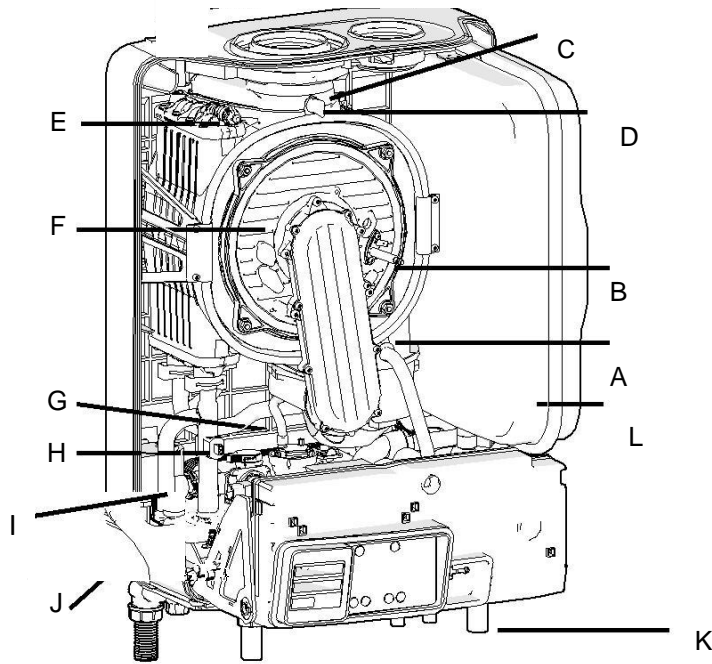
## Boiler dimensions

All dimensions mentioned in the figures below are in inches.



## Part 1 – Introduction

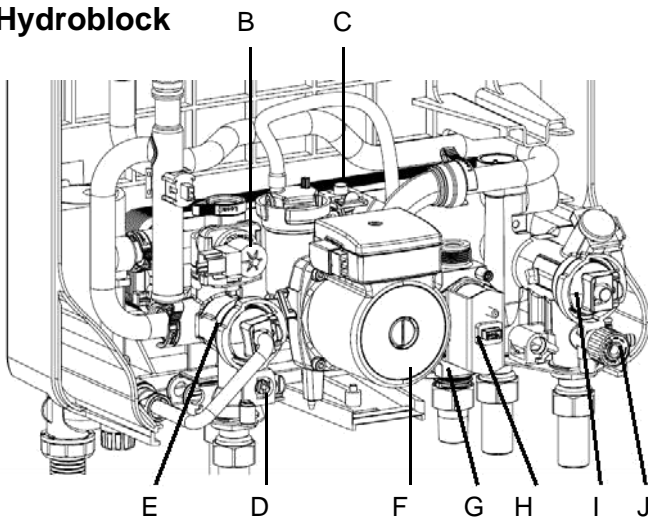
### Main parts



- A:** Fan
- B:** ignition / flame rectification electrode
- C:** Flue gas temperature limiter (NTC)
- D:** Maximum temperature fuse (TF)
- E:** Manual vent (must open to bleed air before first ignition. Attach hose and open until smooth water flows)
- F:** Burner and heat exchanger
- G:** Pump vent
- H:** CH Supply sensor
- I:** Magnetite filter
- J:** Hydroblock
- K:** Connections
- L:** Internal expansion tank

Figure 1.2

### Hydroblock



- B:** 3-way valve
- C:** Domestic hot water Heat exchanger
- D:** Adjustable by-pass
- E:** Flow sensor and hot water temperature sensor
- F:** Pump
- G:** Water pressure sensor and return Sensor (located behind gas valve)
- H:** Gas valve
- I:** Filter
- J:** Drain valve

Figure 1.3

## Part 1 – Introduction

### Functionality of main parts

#### Control

The Eco-King boiler can be controlled by an on/off thermostat. The heat delivery is continuously variable between approx. 14% and 100% of the power of the appliance to obtain a constant temperature in the house.

#### Variable speed fan

To save energy, a high efficiency fan (A, figure 1.2) has been applied. The fan has a variable speed and energy absorption. If less heat is needed, the fan rotates slower and uses less energy.

#### Pump

The Eco-King has an integrated pump (F, Figure 1.3) that is controlled by the burner control and has a variable pump speed. The speed of the pump may vary between 50 and 100%. The burner control determines the speed of the pump by means of the temperature difference between the supply sensor (H, figure 1.2) and the return sensor (G, figure 1.3).

#### Domestic hot water production (Cxxx types)

This appliance has a built-in plate heat exchanger (C, figure 1.3) with limited tap water storage. All connections are internal. While a flow limiter takes care of the maximum hot water quantity, the tap water is heated up to about 61 °C (142 °F). The Eco-King boiler starts preparing tap water at a flow of 2.5 l / min (0.66 gal. / min.) and stops when the flow drops below 1.8 l / min (0.48 gal. / min).

#### Automatic flue gas temperature limiter

The appliance has been equipped with a built-in protection against too high flue gas temperatures. This protection closes the gas supply as soon as the flue gas temperature becomes too high, after which the unit is locked, displaying a fault code.

#### (Separate) supply and discharge pipes

The optimum connection for air supply and flue gas discharge pipe is obtained by using the flue gas systems as described in this manual.

#### CH and DHW circuit



#### Warning

If no diffusion-tight plastic pipes for supply and return are applied for radiators or floor heating, place a partition between the CH water of the boiler and the water in the system. For example, use a plate heat exchanger. This prevents contamination of the heat exchanger by, among others, magnetite. When such a partition is not placed, the guarantee for all parts in the supply and return of the unit will be null and void.

#### Drain valve

The appliance has a drain valve (J figure 1.3), allowing simple draining of the water.

#### Pressure relief valve

The supplied PRV appliance needs to be placed directly on the return pipe of the boiler.

#### Pump vent

The pump vent (G, figure 1.2) has been connected to the vent drain (E, figure 1.4), making visible any leakage from the vent on the outside of the appliance.

#### Adjustable by-pass

The appliance also has an internal, permanently adjustable by-pass (D, figure 1.3). The single purpose of this internal by-pass is to achieve circulation

#### Option for solar boiler combination

If the boiler is used in combination with a solar tank, the boiler must remain switched on in summer in order to prevent Legionella bacteria infection. Make sure that the maximum DHW temperature does not exceed 65 °C (149 °F). This may cause a risk of burning for the user. Install a mixing valve in the hot water pipe between the boiler and the hot water supply to avoid this problem.

#### Frost protection

The appliance has a built-in frost protection that starts the boiler when the CH water temperature drops below 6 °C (43 °F).

## Part 2 – Specifications / Technical data

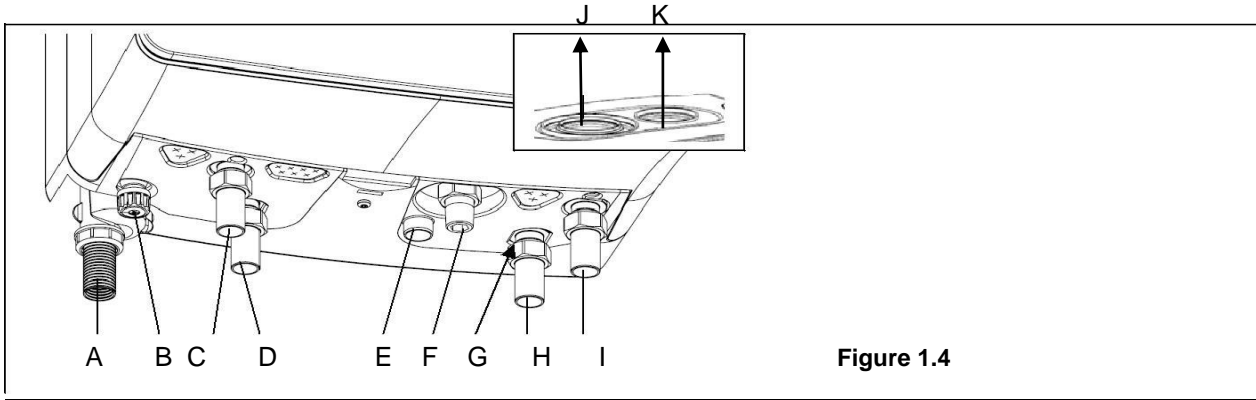


Figure 1.4

Table 1.1 Tech Specifications

Character	Description	Connection size (SI, Metric)	Connection size (Imperial)
A	Connection for condensate trap	25 mm	0.98 inch
B	Filling valve	-	-
C	CH supply	22.22 mm	3/4" CPS (7/8" outer diameter)
D	-DHW outlet (C models) -Mains water supply for filling loop (H models)	22.22 mm	3/4" CPS, (7/8" outer diameter)
E	Vent drain for pump air vent	-	-
F	Connection for gas line	-	1/2" NPT outer pipe thread
G	Flow limiter (C models only)	C models only	Located inside the boiler at outlet H
H	-Cold tap water (C models) -Tank supply hot (H models)	22.22 mm	3/4" CPS, (7/8" inch outer diameter)
I	-CH return (C model boilers) -CH return and Tank Return (H Model boilers)	22.22 mm	3/4" CPS, (7/8" inch outer diameter)
J	Concentric vent connection OR 2 pipe exhaust connections	Concentric 80/125mm 80 mm	Concentric 3" / 5" 3" (need adapter if using (C)PVC
K	Air intake (when using a 2 pipe syst)	80mm	3" (need adapter if using (C)PVC

General	Metric / Imperial	Eco-King C99,C100, H100	Eco-King C140, H140	Eco-King C200, H200
Dimensions (h x w x d)	mm / inch	695x480x410 / 27.4x18.9x16.1	695x480x410 / 27.4x18.9x16.1	695x480x410 / 27.4x18.9x16.1
Weight (empty)	kg / lb	31 / 68	34 / 75	37 / 82

DHW operation		C99 Eco-King	C100 Eco-King	Eco-King C140	Eco-King C200
Nominal load	Btu/h	16-99,000	16-105,000	19,800-135,000	26,900-185,000
DHW Output 120°F (dT=50°F)	gal/min	3.5	3.6	4.5	6.3
DHW Output 140°F (dT=77°F)	gal/min	2.3	2.3	3	4.1
AFUE	%	94%	94%	94%	94%
Hot water temperature	°C / °F	61– 142	61-142	61 - 142	61– 142

DHW Max/Minimum BTU range		Eco-King H100	Eco-King H140	Eco-King H200
Input (0-2000ft)	BTU/h	16,000-105,000	19,800-135,000	26,900-185,000

CH Max/Minimum BTU range		Eco-King C99 / C100 and H100	Eco-King C140 and H140	Eco-King C200 and H200
Nominal input (0-2000 ft)	Btu/h	16,000-89,000 / 16,000-90,800	19,800-113,600	26,900-159,000
Max Output (0-2000 ft) at 50/30 °C**	Btu/h	85,000	106,500	150,000

\* MAX DHW Input levels listed occur in both C (combi) & H model boilers when producing hot water. H-model connected to an external hot water tank.

\*\* Output in condensing mode

## Part 2 – Specifications / Technical data

Other technical data		Eco-King C99 & C100 / H100	Eco-King C140 / H140	Eco-King C200 / H200
Allowed resistance of flue gas system	Pa / Psi	200 / 0.029	200 / 0.029	200 / 0.029
PH value of the condensed water		4 - 5.5	4 - 5.5	4 - 5.5
Available CH pump pressure at $\Delta T 20\text{ }^{\circ}\text{C}$	mH <sub>2</sub> O / kPa	2.1 / 21	1.9 / 19	1.5 / 15
Max resistance DHW	kPa	50	70	100
Maximum supply temperature	$^{\circ}\text{C} / ^{\circ}\text{F}$	85 / 185	85 / 185	85 / 185
Filling pressure CH part min./ max.	bar (kPa) / Psi	1.5 - 2.5 (150 - 250) / 21.8 - 36.3	1.5 - 2.5 (150 - 250) / 21.8 - 36.3	1.5 - 2.5 (150 - 250) / 21.8 - 36.3
Connection pressure Potable water min./max.	bar (kPa) / Psi	0.2 - 10 (20 - 1000) / 2.9 - 145	0.2 - 10 (20 - 1000) / 2.9 - 145	0.2 - 10 (20 - 1000) / 2.9 - 145
Volume of tap water heat exchanger	liter / gal	0.3 / 0.08	0.5 / 0.13	0.5 / 0.13
Max. Calcium level (CaCO <sub>3</sub> ) DHW at 60 $^{\circ}\text{C}$ *	Ppm / mg/l	50	50	50
Water Hardness range ( CaCO <sub>3</sub> ) CH / DHW	Gpg	2 - 9	2 - 9	2 - 9
Max. chloride level DHW	Ppm / mg/l	200	150	150
Allowed pH value water	pH	6.5-8.5	7 - 8.5	7 - 8.5
CO <sub>2</sub> content of flue gas	%	9.0 +/- 0.3	9.0 +/- 0.3	9.0 +/- 0.3
Temperature flue gas at 176 / 140 $^{\circ}\text{F}$ (80/60 $^{\circ}\text{C}$ ) (at an ambient temperature of 68 $^{\circ}\text{F}$ (20 $^{\circ}\text{C}$ ))	$^{\circ}\text{C} / ^{\circ}\text{F}$	85 / 185	85 / 185	85 / 185

### High Altitude Operation

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

Elevations	610 m (2000 ft)	914 m (3000 ft)	1219 m (4000 ft)	1372 m (4500 ft)
	De-rate by 3.6%	De-rate by 5.4%	De-rate by 7.2%	De-rate by 8.1%

De-rating is performed automatically by the Eco-King appliance via the electronic gas-air ratio controller.



### Warning

**Combustion** – At elevations above 610 m (2000 feet), the combustion of the appliance must be checked with a calibrated (altitude corrected) combustion analyzer to ensure safe and reliable operation. **It is the Installers responsibility to check the combustion of the appliance.** Failure to follow these instructions may result in property damage, serious injury, or death.

Table 1.1 Technical specifications (continued)

## Part 3 - Appliance location

In all cases, the Eco-King must be installed indoors in a dry location where the ambient temperature must be maintained above freezing and below 38°C (100°F). Gas components must be protected from dripping, spraying water, or rain during operation and servicing. Consider the proximity of system piping, gas and electrical supply, condensate drain, and proximity to vent termination when determining the best appliance location.



### Warning

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

### Location checks

The wall must be strong enough to carry the weight of the Eco-King boiler. The boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during boiler operation and service (circulator replacement, condensate trap, control replacement, etc.). Select a place where possible noise production by the boiler is not inconvenient. Both the air supply and the flue gas discharge pipe (concentric system) must be connected to the exterior wall or to the roof surface (use parts specified in section 4). Furthermore, in case of Cxx types, install the boiler as close as possible to the most regularly used tap points, to make sure that the DHW pipes are not unnecessary long. This reduces the waiting time for hot water and unnecessary waste of water.



### Warning

Check the availability of the following provisions:

- Water supply;
- Venting connection;
- Gas supply;
- Electrical power (grounded);
- A connection for a condensate trap;
- A wall able to carry the appliance's weight.

Remove any combustible materials, gasoline and other flammable liquids from the installation area.

If the Eco-King boiler is to replace an existing boiler, check for and correct any existing system problems such as system leaks.

### Appliance Area Ventilation Air Openings

If appliance area clearances are less than the recommended clearances specified in Table 3-1, the appliance area must be ventilated (Figure 3.1). Each ventilation air opening must meet the minimum requirements of 22 cm<sup>2</sup> per kW (1 in<sup>2</sup> per 1000 Btu/hr) but not less than 645 cm<sup>2</sup> (100 in<sup>2</sup>). The lower ventilation opening must be located within 6" of the floor while the upper opening must be located 6" from the top of the space.



### Notice

If the "Appliance Area" does not meet all of the recommended clearances listed in Table 3-1, it is considered a Closet or Alcove. In Canada all venting components must comply with system 636 regulations.

Table 3-1 Minimum clearances for installation and service

Model no.	Clearances	Dimensions – mm (inches)					
		Bottom	Front	Top	Left Side	Right Side	Rear
<b>Eco-King C99,C100/H100</b>	Minimum mm / inch.	280 (11")	457 (18") <sup>1</sup>	152 (6")	13 (0.5")	13 (0.5")	0 (0")
	Recommended	457 (18")	457 (18") <sup>1</sup> or more	152 (6") or more	305 (12") or more	305 (12") or more	0 (0")
<b>Eco-King C140/H140</b>	Minimum	280 (11")	457 (18") <sup>1</sup>	152 (6")	13 (0.5")	13 (0.5")	0 (0")
	Recommended	457 (18")	457 (18") <sup>1</sup> or more	152 (6") or more	305 (12") or more	305 (12") or more	0 (0")
<b>Eco-King C200/H200</b>	Minimum	280 (11")	457 (18") <sup>1</sup>	152 (6")	13 (0.5")	13 (0.5")	0 (0")
	Recommended	457 (18")	457 (18") <sup>1</sup>	152 (6") or more	305 (12") or more	305 (12") or more	0 (0")

<sup>1</sup> 152 (6") if front surface is removable allowing 457mm (18") clearance (i.e. closet installation). See ventilation air opening dimensions in figure 3-1

<sup>2</sup> Surrounding.

## Part 3 - Appliance location

### Closet Installations

For closet installations, it is necessary to provide two ventilation air openings as shown in Figure 3-1 each providing a minimum area equal to  $22 \text{ cm}^2$  per kW ( $1 \text{ in}^2$  per 1000 Btu/hr), but not less than  $645 \text{ cm}^2$  ( $100 \text{ in}^2$ ) and within 152 mm (6") of the top and bottom of the closet door. See Table 3-1 for minimum recommended clearances.

### Alcove Installations

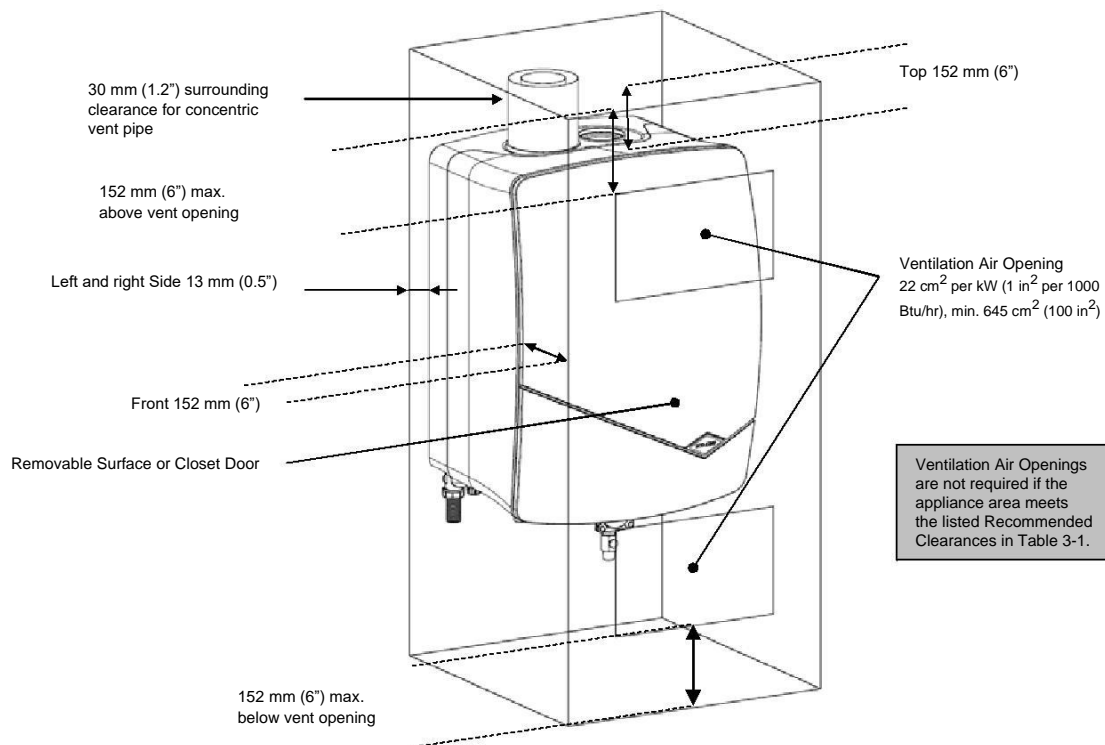
Alcove installations have the same minimum clearances as closet installations, except the front must be completely open to the room at a distance no greater than 457 mm (18") from the front of the appliance and the room is at least three (3) times the size of the alcove. Provided these conditions are met, the appliance requires no extra ventilation air openings to the space. See Table 3-1 for minimum recommended clearances.

### Residential Garage Installations

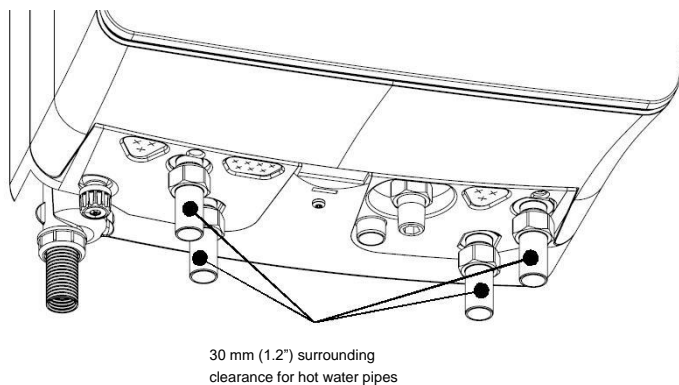
When installed in a residential garage, mount the appliance a minimum of 457 mm (18") above the floor. Locate or protect the appliance so it cannot be damaged by a moving vehicle. Check with your local codes for proper install practices.

Figure 3.1 Closet installation minimum clearances

Top view



Bottom view



Warning

Closet/alcove installations in Canada require approved system 636 venting components. Failure to comply may result in damage or serious injury.

## Part 3 - Appliance location

### Prior to wall mounting

Care must be taken to place the boiler in a safe location prior to installation on the wall to prevent damage to the mechanical connections.

The delivery contains:

- The boiler; Installation manual for the installer; User manual for the homeowner;
- A wall support bracket;
- A condensate trap with swivel nut;
- A pressure relief valve.
- An (internal) expansion tank



Caution

### Cold weather handling

If the boiler has been stored in a cold location below -18 °C (0°F) before installation, handle with extra care until the plastic components come to room temperature.

### Wall mounting

Determine and mark the location for the CH supply and discharge pipes. Secure the wall mounting bracket to a solid wall using field supplied lag screws (anchors when mounting on a concrete wall), adequate to support the weight of the appliance.

Ensure the bracket is mounted in level position. Refer to Table 1.1 for the appliance weight.

Mount the appliance to the bracket by aligning the slot in the back of the appliance with the hook protruding from the wall bracket. The top of the slot must rest at the bottom of the groove in the lower hooked part of the wall mounting bracket.



In unusually dirty or dusty conditions, care must be taken to keep heater cabinet door in place at all times. Failure to do so VOIDS WARRANTY!

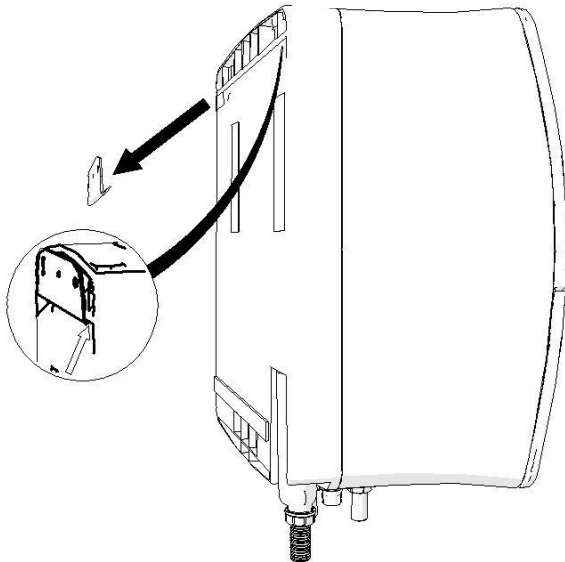


Figure 3.2 wall mounting



## Part 4 - General venting

The Eco-King boiler is a direct vent, category IV, appliance with sealed combustion requiring certain venting systems. All combustion air is drawn directly from outdoors, with some specific exceptions. The housing closes the appliance on the rear plate air-tightly. All products of combustion are vented directly outdoors. Both the Vent and Air-Intake piping should be piped to the outdoors, using the vent material and rules outlined in this section. Under no conditions may this appliance vent gases into a masonry chimney. Safety provisions with regard to (too) high flue gas temperatures to protect synthetic intake / discharge piping have been provided within the Eco-King boiler. The safety system shuts down the gas supply in case the temperature of the flue gasses becomes too high, after which the appliance will not run until re-started. Installations must comply with CSA B149.1 and local requirements.



### Warning

The Eco-King boiler cannot share a common vent or air-intake with multiple appliances. Failure to comply will result in serious injury or death.

The Eco-King appliance does not use air (Oxygen) from the installation room, except with specific exceptions as noted later in this manual. The front cover closes the housing air-tight making sure air is only supplied by the vent air intake. Therefore make sure the front cover always has been placed in its position during operation of the appliance. Shown graph describes the relationship between system power (BTU/hr) and resistance (Psi) of the supply and discharge. Till a pressure of 200 Pa (0.030 Psi), power will remain the same. Bigger resistance causes power decrease.

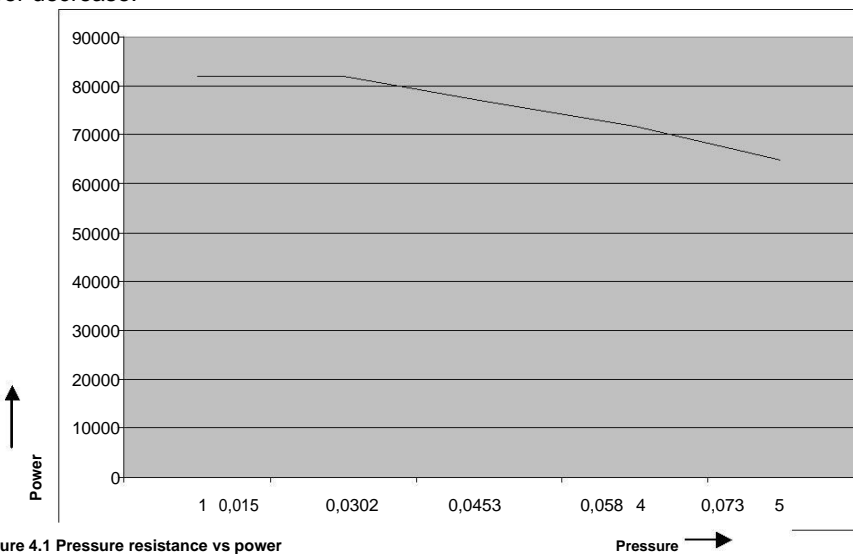


Figure 4.1 Pressure resistance vs power

Have horizontal runs sloping backwards to the boiler based on Vent pipe Manufacturer specifications from the terminal to the boiler preventing condensate moisture from running into the air intake piping.

### Combustion Air-Intake Contamination

Be careful not to locate the Air-Intake termination in an area where contaminants can be drawn in and used for combustion. 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. See Table 4-1 for a list of areas to avoid when terminating air-intake piping. These same conditions should be avoided when drawing intake air from boiler room.

Table 4-1 - Corrosive Products and Contaminant Sources

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 gas	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, fibreglass, 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, fibre based insulation	Concrete plant or construction site

## Part 4 - General venting



### 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.



### Warning

Only use vent and air systems as specified in this manual.



### Notice

**Venting Options** - Due to potential moisture loading (build-up) along the exterior wall, sidewall venting may not be the preferred venting option. Be aware of this possibility when choosing sidewall or roof termination

## Installation instruction for concentric vent and air system - General

Examine all components for possible shipping damage prior to installation;  
Proper joint assembly is essential for a safe installation. Read all instructions before beginning the installation and follow these instructions exactly as written;

Check the integrity of joints upon completion of assembly;

This venting system must be free to expand and contract under normal operation;

This venting system must be supported in accordance with these instructions;

Assure unrestricted vent movement where required through walls, ceilings and roof penetrations; Do not mix pipe, fittings or joining methods from different vent system manufacturers.

Do not use any type of glue material to join parts with this venting system.



### Caution

Always use genuine roof or wall terminations for concentric installs. Terminating the vent pipe or air inlet with elbow or tee for termination is prohibited when using concentric venting. Single pipe terminations permit elbow or tee as termination as explained later in the manual. Always refer to the installation manual(s) delivered with the Parts. Instructions included with vent terminal materials contain more detailed instructions.

These systems are intended for residential and commercial installations. They may be used in combination with ANSI category II and IV gas-burning appliances. The maximum positive pressure is 8 inches w.c.

## Part 4 - General venting - Concentric

### **Concentric installation**

These instructions must be followed together with the instructions in the manual that is supplied with the roof or wall terminal. That manual gives special instructions for applications, pressure drops, maintenance and mounting of the complete vent system. Before installing the Concentric Vent & Air System, read and follow the instructions of the manual that is supplied with the terminal

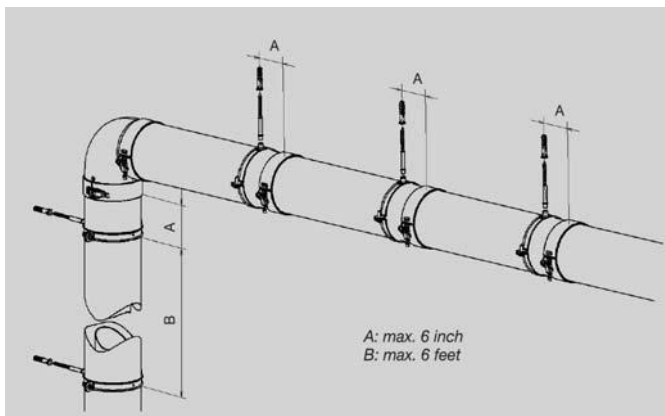


### **Caution**

Do not use grease or other lubricant on the vent seals. Only water may be used for this purpose. Grease or other lubricant can make the seal brittle or it can result in tears in the surface of the seal, this will result in flue gas leakage.

### **Installation:**

1. Start at the appliance flue connector, install the system with the female ends (with the integral seal) pointing away from the appliance. Fasten the flue gas system as soon as possible to the wall so that a tight connection of the flue gas system to the boiler is guaranteed, this is to ensure that there is no chance of flue gasses leaking into the home.
2. Check that the seal is retained correctly in the groove section as described in 6b.
3. Take precautions with horizontal installation, the slope must be at least 5 cm/mtr (0.60 inch/feet) towards the boiler.
4. Shortening this type of concentric is not allowed, use when necessary a telescopic or special Cut-able Concentric Vent & air section, these sections are telescopic over a length of 330 till 400 mm (13 till 17.3 inch).
5. First, mount the brackets on a fixed part of the building. (i.e. wall).
6. Brackets must be fixed as follows, see figure 4.2:
  - 6a. Straight vent sections that are installed vertical must be supported with brackets every 6 feet (2 m) or less, see figure 4.2, dimension B.
  - 6b. Straight vent sections installed with a slope must be supported with at least one bracket per section, this brackets must be installed at a maximum distance of 15 cm (6 inch) from the female end, see figure 4.2, dimension A.
  - 6c. Bends and T pieces are sufficiently supported when a bracket is fixed at the female end of the connected straight length of pipe.



**Figure 4.2 Bracket supporting**

7. Mount the vent elements in the brackets.
8. It is recommended to rotate the joints slightly when assembling them. Only use water for easier assembling.
9. Take care that the load of the flue system is not supported on the appliance.
10. The outer vents must be secured with the 2 provided self-tapping screws. See figure 4.3. Use a low torque setting to drill the screws into the vent system.
11. Fix the clamp around the flue.

## Part 4 - General venting - Concentric

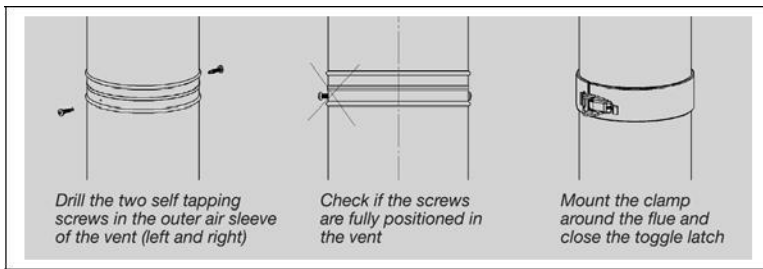


Figure 4.3 Bracket securing



### Warning

Use only the provided self tapping screws, these screws have the correct length. Using screws with a longer length will damage the actual PP vent.

**Cut-able installation** These instructions must be followed together with the instructions in the manual that is supplied with the roof or wall terminal. That manual gives special instructions for applications, pressure drops, maintenance and mounting of the complete vent system. This product is a cut-able concentric vent & air section that must be installed as part of the concentric vent and air system. It's not allowed to build a complete system with cut-able sections only. Before installing the cut-able concentric vent section, read and follow the instructions of the manuals that are supplied with the terminal and the (concentric) vent air system.

### Installation

1. Measure the gap between the two parts between which the cut-able concentric vent section must be installed.
2. Cut the concentric vent section with regard to the instructions on the adhesive on the product see also figure 4.4.

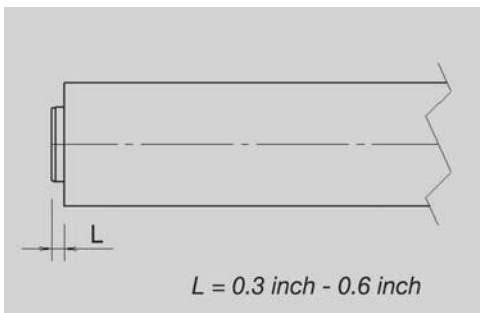
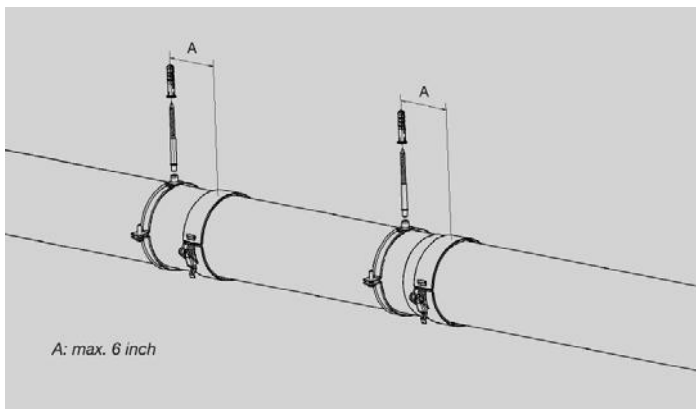


Figure 4.4 Vent section cutting

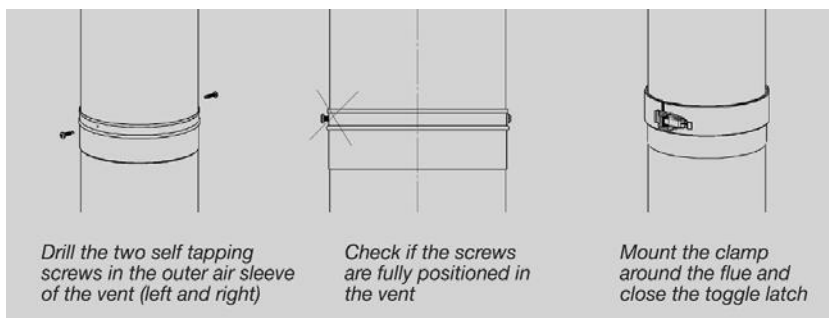
## Part 4 - General venting - Concentric

3. Check that the seal is retained correctly in the groove.
4. Take precautions with horizontal installation, the slope must be 5 cm per meter (0.60 inch/feet) towards the boiler.
5. Fix a bracket on a fixed part of building (i.e. wall) if necessary.
6. A bracket must be fixed as follows, see also figure 4.5:
  - 6a. If the section is installed in vertical part of the system then brackets must be fixed every 2m (6 feet) or less.
  - 6b. If the section is installed in a non vertical part of the system, a bracket must be fixed at a maximum distance of 15 cm (6 inch) from the female end, see figure 4.5, dimension A.



**Figure 4.5 Bracket fixing**

7. Mount the vent section in the system and fix the brackets if necessary.
8. It is recommended to rotate the joints slightly when assembling them. Only use water for easier assembling.
9. Take care that the load of the flue system is not supported on the appliance.
10. The outer vents must be secured with the 2 provided self-tapping screws. See figure 4.6. Use a low torque setting to drill the screws into the vent system.
11. Fix the clamp around the flue.



**Figure 4.6 Securing**



Warning

Use only the provided self-tapping screws, these screws have the correct length. Using screws with a longer length will damage the actual PP vent.

## Part 4 - General venting - Concentric

### Installation of a vent system configuration with wall terminal

Before installation, consult the authority having jurisdiction (such as gas inspection authority, municipal building department, fire department, fire prevention bureau, etc) to determine the need to obtain a permit or for applicable local or national codes.

A venting system that extends through any area above the one where the vented appliance is located shall be provided with an enclosure which has a fire resistance rating equal to or greater than the fire resistance rating of the floor or roof assemblies through which it passes. This requirement does not apply to one or two family dwellings.



Warning

Have the venting system checked regularly by a qualified technician, special attention should be paid to the presence of debris and for signs of leakage.

Normal operation of the Eco-King appliance does not result in deposits of combustible soot in venting systems. However, a poorly adjusted or malfunctioning appliance can deposit soot and other debris which can enter the vent system. Any such accumulation should be removed and the appliance adjusted to eliminate future accumulation. Use only a soft brush for cleaning the sections and fittings. If any leakage is found at joints the Eco-King appliance should be turned off and the leaks repaired.

The general venting system must not be routed into, through, or within any other vent, such as an existing masonry or factory-built chimney flue.

Plastic venting systems shall not pass through rated fire separations.

The distance between the point of termination of a concentric vent system shall be:

1.8 m (6 feet) or more from combustion air inlet of any appliance;

More than 0.91m (3 feet) from any other building opening, gas utility meter, service regulator, and the like.

Contact the local building or fire officials about restrictions and installation inspection in your area.



Warning

Proper installation of venting system and appliance is dependent on the use of all parts specified by the manufacturer for use in particular installations and the performance of system may be affected if the proper assembly of all required parts is not accomplished. Acceptance of venting system requires full compliance with these installation instructions.

### Ensure the following for each installation:

Pipe, fittings & termination must be used for the entire length of the vent. These products are supplied with specific instructions; these instructions must also be followed.

The maximum Deflection is 87°, or a min. pitch of 5 cm/m (0.6 inch/feet), so that condensate does not collect in any part of the venting system.

Common venting of more than one appliance is not allowed.

The maximum length, the correct diameter and number of fittings must be in conformance with the specifications within this instruction manual.

The venting systems must be installed with correct distance to combustible material. Check the proper joint construction.



Warning

The instructions with regard to installation of condensate drain must be followed (section 6). If not, the flue gases can be blown out under a locked vent condition before the appliance's blocked vent detection system can function.

## Part 4 - General venting - Concentric

### Additional instructions for termination through a wall with a wall terminal.

The concentric wall terminals can be installed through a wall made of combustible material, no extra parts are necessary. The venting system shall terminate in accordance with the requirements of CAN/CGA-B149., Natural Gas Installation Code.

The venting system that exits the structure through sidewall or the like shall terminate not less than 12 inches above the ground. The termination of venting system shall be located above the snow line in geographical areas where snow accumulates (See section 5) .

The termination of the venting system shall not be located in traffic areas, such as walkways, unless the venting system is at least 2.13m (7 feet) above the ground (See section 5). In accordance with B149.1

### Fire stops

Whenever the venting system penetrates a floor or ceiling and is not running in a fire-rated shaft, a fire-stop is required. Nail the fire stop to the structure and pass the venting sections through the hole. See figure 4.7.

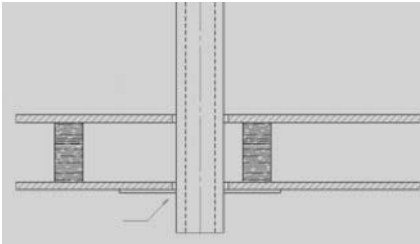


Figure 4.7 Fire stop

### Mounting instructions for wall terminal Installation

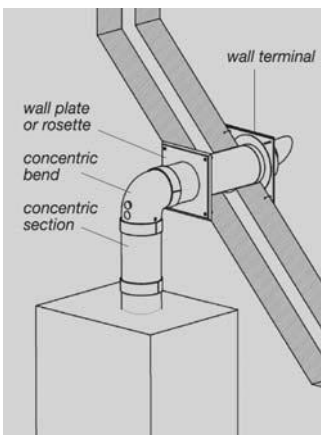


Figure 4.8 Wall terminal overview

1. Check the flue terminal for possible damage before installation. If damage is evident replace the flue terminal with one that is free from damage.
2. Determine the appropriate location of flue terminal. See figure 4.9.

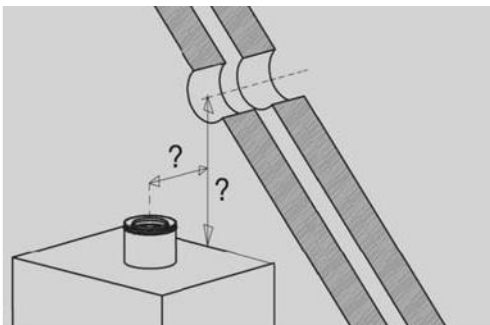
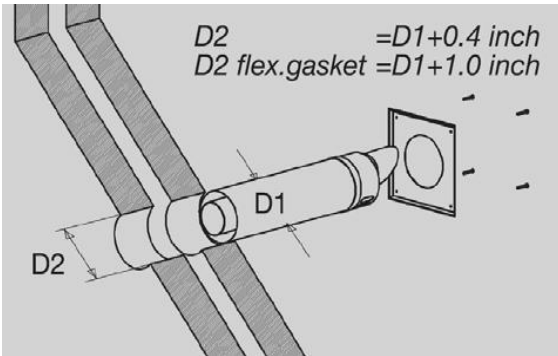


Figure 4.9 Flue terminal location determination

3. Cut a hole with a diameter 10 mm (0.4 inch) larger than the flue terminal. Horizontal flue terminals with flexible exterior gaskets can be installed inside out. In this case, the hole through the wall must have a diameter 25 mm (1 inch) more than the terminal. Be sure to protect the air inlet and flue outlet connections of the appliance from wood shavings, dust or dirt while cutting. See figure 4.10.

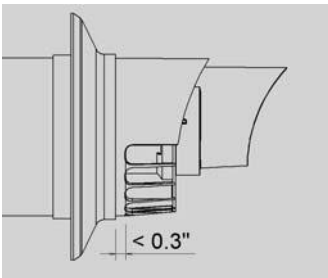
## Part 4 - General venting - Concentric



**Figure 4.10 Flue terminal hole cutting**

4. Determine the wall thickness and, if necessary, cut the wall terminal to the desired length. Remove all burrs from the cut terminal.

NOTE: The length of the flue terminal is correct if outer wall plate, or rosette, is flush with the outside wall. NOTE: When the flexible wall seal (rosette) is used, it is to be installed as shown in figure 4.11.

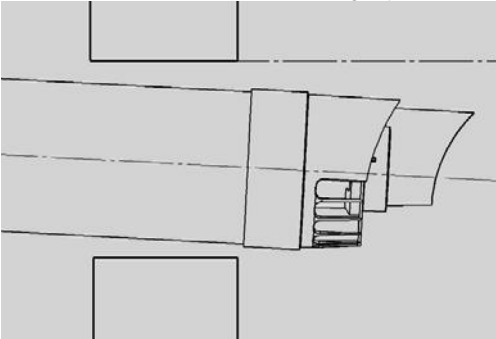


**Figure 4.11 Correct position wall seal**

5. To prevent rainwater from collecting in the inlet air system:

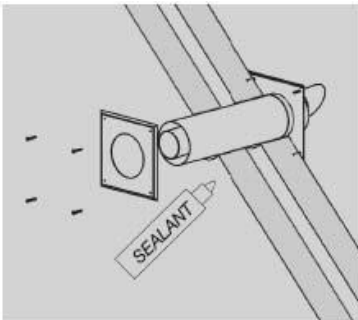
Ensure that the flue terminal is not installed upside down. See figure 4.12.

Insert the flue terminal into the drilled hole. The air supply pipe for the flue terminal is to be installed either level or pitched slightly toward the outside; 10 mm per meter (0.1 inch per feet) max.



**Figure 4.12 Correct slope**

6. Seal the gap around the flue terminal with water resistant sealant or caulk. Install the wall seals around the flue terminal and attach them with the screws provided. See figure 4.13.



**Figure 4.13 Sealing gap**



## Part 4 - General venting - Concentric

7. Connect the flue terminal to the appliance with appropriate flue pipe and fittings instructions: Install the concentric vent in accordance with the installation instructions supplied with the straight vent sections. See figure 4.14.

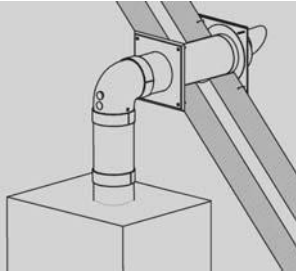


Figure 4.14 Concentric connection

### Installation of a vent system configuration with roof terminal

Before installation, consult the authority having jurisdiction (such as gas inspection authority, municipal building department, fire department, fire prevention bureau, etc) to determine the need to obtain a permit or for applicable local or national codes.

A venting system that extends through any area above the one where the vented appliance is located shall be provided with an enclosure which has a fire resistance rating equal to or greater than the fire resistance rating of the floor or roof assemblies through which it passes. This requirement does not apply to one or two family dwellings.



Warning

Have the venting system checked once a year by a qualified technician, special attention should be paid to the presence of debris and for signs of leakage.

Normal operation of the Eco-King appliance does not result in deposits of combustible soot in venting systems. However, a poorly adjusted or malfunctioning appliance can deposit soot and other debris which can enter the vent system. Any such accumulation should be removed and the appliance adjusted to eliminate future accumulation. Use only a soft brush for cleaning the sections and fittings. If any leakage is found at joints the Eco-King appliance should be turned off and the leaks repaired.

A venting system must not be routed into, thru, or within any other vent, such as an existing masonry or factory-built chimney flue.

Plastic venting systems shall not pass through rated fire separations.

The distance between the point of termination of system shall be

- 1.8 m (6 feet) or more from combustion air inlet of any appliance;
- more than 0.91m (3 feet) from any other building opening, gas utility meter, service regulator and the like.

Contact the local building or fire officials about restrictions and installation inspection in your area.



Warning

Proper installation of venting system and appliance is dependent on the use of all parts specified by the manufacturer for use in particular installations, and the performance of system may be affected if the proper assembly of all required parts is not accomplished. Acceptance of venting system requires full compliance with these installation instructions.

### Ensure the following for each installation:


Pipe, fittings & termination must be used for the entire length of the vent. These products are supplied with specific instructions; these instructions must also be followed.

The maximum Deflection is 87°, or a min. pitch of 5 cm/m (0.6 inch/feet ), so that condensate does not collect in any part of the venting system.

Common venting of more than one appliance is not allowed.

The maximum length, the correct diameter and number of fittings must be in conformance with the specifications within this instruction manual.

The venting systems must be installed with correct distance to combustible material, see section 3.

 **Warning**

The instructions of the appliance manufacturer with regard to the minimum trap height of condensate drain must be followed. If the height is not enough the flue gases can be blown out under a blocked vent condition before the appliance's blocked vent detection system can function.

**Additional instructions for termination through a roof with a roof terminal:**

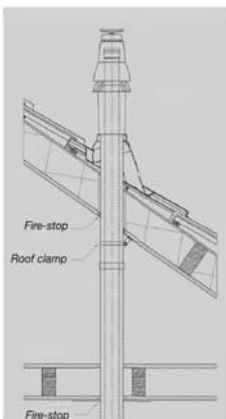
The vent system must terminate at least 2 feet above the roof line or any wall or vertical structure within 10 feet.

Always secure the roof terminal with its support clamp.

Do not install an extra rain cap on the terminals. The terminals are specially designed for high efficiency boilers which produce large quantities of combustion gases. The design allows rain to enter the terminals which also serves to dilute acidic condensate. However, a drain must be incorporated to allow condensation and rainwater to escape from the venting system. The drain must include a trap to prevent combustion gases from entering the living space.

**Fire stops**

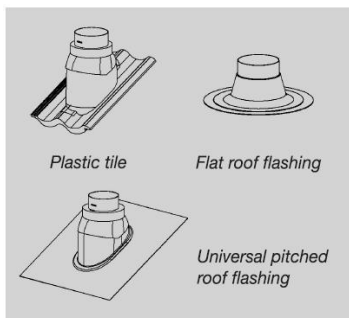
Whenever the venting system penetrates a floor or ceiling and is not running in a fire-rated shaft, a fire-stop is required. Nail the fire stop to the structure and pass the venting sections through the hole. See figure 4.16.



**Figure 4.16 Fire stop**

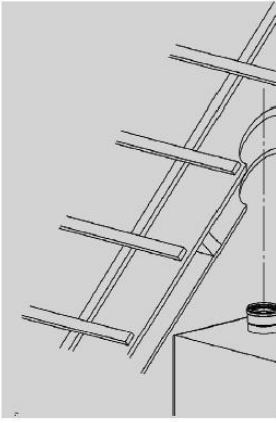
**Mounting instructions for roof terminal Installation:**

1. Check the flue terminal for possible damage before installation. If damage is evident replace the flue terminal with one that is free from damage.
2. Choose the appropriate weather collar in accordance with the roofing. For pitched roofs choose synthetic tile, universal pitched roof flashing. For flat roofs choose aluminium flat roof flashing. See figure 4.17.



**Figure 4.17 Fire stop Weather collar**

3. Determine the location of the roof penetration. See figure 4.18.
4. Cut a hole from the exterior of the roof. Assure that no wood shavings, dust or dirt drop into the boiler exhaust or air intake piping. See figure 4.18.



**Figure 4.18 Location**

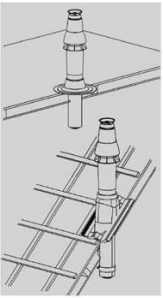
5. Place the weather collar into position. See figure 4.19.
6. Carefully insert the flue terminal through the weather collar from outside the roof.



### Notice

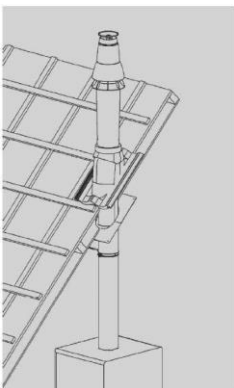
Do not turn cap. See figure 4.19.

7. Assure that the flue terminal is plumb using a level or similar device. See figure 4.19.
8. Fix the wall clamp (supplied) around the flue terminal. Do not tighten the clamp. See figure 4.19.



**Figure 4.19 Positioning of roof terminal**

9. Connect the flue terminal to the appliance with appropriate flue pipe and fittings. Install the concentric vent in accordance with the installation instructions supplied with the straight vent sections. See figure 4.20.



**Figure 4.20 Connecting concentric system**

10. Finally secure the roof clamp.

## Part 4 - General venting



### Warning

The concentric vent pipe should extend **fully into** the appliance flue outlet adapter / air intake adapter. Make sure the concentric vent pipe extends in the appliance on the adapter location as shown in the figure underneath. Ensure that the venting system does not apply a load or strain on the appliance flue outlet adapter.

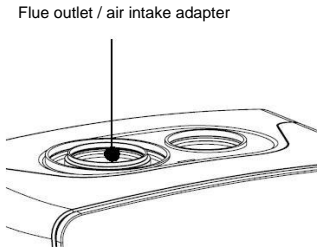


Figure 4.22 Full extension into the adapter



### Warning

In Canada, the first **piece** of vent piping must be readily accessible for inspection.



### Warning

Exhaust venting must be supported to reduce strain on piping joints. Failure to follow these instructions may result in damage, serious injury or death.

### Mandatory venting Installation Practices



### Warning

- 1) Working with the power turned off to the appliance, completely install the concentric vent and air intake system.
- 2) Maintain the appliance gas supply shut-off valve in the off position.
- 3) Disconnect electrical leads. Ensure the cables are placed in a fashion where they will not arc to ground or other conductor.

### Vent/Air-Intake Pipe Length Determination

Use table 4.3 to determine the maximum pipe length that can be used. The table calculates pipe length with regards to use of 90° elbows, and 45° elbows. Allowable pipe lengths for vent and air-intake pipes are shown for the boiler.

Connection type	Length	Number of Elbows and Equivalent Feet [Meters]									
		1	2	3	4	5	6	7	8	9	10
Concentric 60/100 (2.4"/3.9")	20m (65 ft)	18.5m (60 ft)	17m (55 ft)	15,5m (50 ft)	14m (45 ft)	12.5m (41 ft)	11m (36 ft)	9,5m (31 ft)	8m (26 ft)	6,5m (21 ft)	5m (16 ft)
Concentric 80/125 (3.2"/4.9")	25m (82ft)	23,5m (77 ft)	22m (72 ft)	20,5m (67 ft)	19m (62 ft)	17,5m (57 ft)	16m (52 ft)	14,5m (47,6 ft)	13m (42 ft)	11,5m (37 ft)	10m (32 ft)

Table 4.3 Max. Concentric Pipe length determination



### Notice

**PVC In Canada** - Safety authorities in some jurisdictions are not allowing PVC venting materials with appliances of any kind, even if System 636 certified. Check with the local safety inspector to verify compliance.

## Part 4 - General venting

### Venting Rules and Guidelines

- 1. Prevailing Winds:** Ensure the vent is located where it will not be exposed to abnormal prevailing winds.
- 2. Combustion Air-Intake Contamination:** Air for combustion must be drawn from outdoors from an area free of dust and contaminants. Combustion air containing chemicals such as chloride, fluoride, bromine or iodine or dust and debris will cause corrosion damage of the heat exchanger voiding your Eco-King warranty. Refer to table 4.1 for a list of corrosive products and contaminants sources to avoid.
- 3. Vertical Separation:** The air inlet must always be a minimum of 305 mm (12") plus snow allowance above any surface that will support snow. (Two feet plus snow allowance is highly recommended). Consult your weather office, for the maximum typical snowfall for your region.
- 4. Wall Flashing:** Under normal operating conditions this appliance will produce a vapour plume, and should be taken into consideration when selecting an adequate location.
- 5. Flue Gas Hazard:** Position the vent termination where vapors cannot make accidental contact and damage nearby surfaces, shrubs and plants.
- 6. Vent Sloping:** All indoor exhaust piping must Follow vent manufacturers specification
- 7. Vent Supports:** Required Vent and Air-intake piping shall be secured per vent manufacturers certified installation instructions.
- 9. Roof Exhaust:** In all roof applications the discharge must point away from the pitch of the roof.
- 10. Roof Flashing:** Install adequate flashing where the pipe enters the roof, to prevent water leakage.
- 11. Condensate Hazard:** Avoid venting over public walkways, driveways or parking lots. Condensate could drip and freeze resulting in a slip hazard or damage to vehicles and machinery.
- 12. Wall Thickness:** Vent terminations are designed to work with any standard wall thickness. Installation guidelines for min/max wall thickness are as follows: Min.= 25mm (1"), Max.= 1.52m (60")

## Part 5 - Vent /air - intake termination clearances

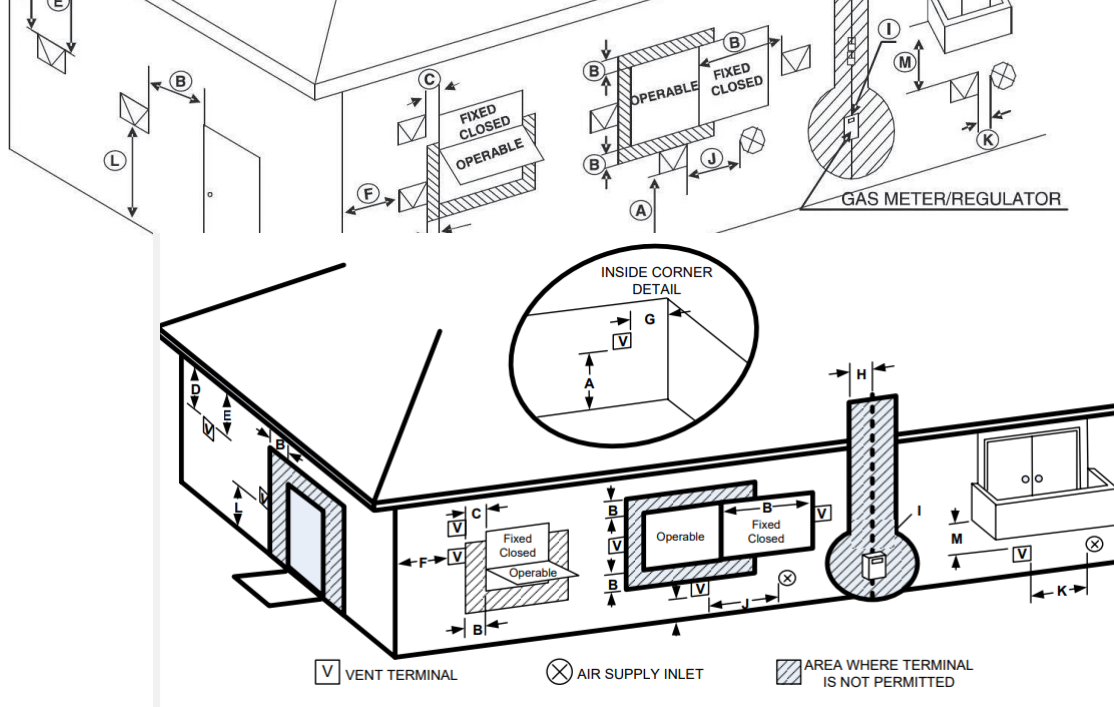


### Warning

The boiler uses a 2 in or 3 in diameter exhaust and a 2 in or 3 in diameter air intake ducts. To ensure the draw of air directly from and exhaust of air directly to the outside of the building, create an airtight seal from the boiler collar to the vent termination.

Intake materials can be made of ABS, PVC, CPVC, PP, galvanized or stainless steel, corrugated aluminum or any other such materials. If you use a corrugated material, ensure that there is not inadvertent crimping of, or damage to, the intake air pipe.

When using direct venting, maintain the following venting clearances, as required by ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CGA B149.1 Natural Gas and Propane Installation Code:



Vent Termination Minimum Clearances			
		US Installations	Canadian Installations
<b>A =</b>	Clearance above grade, veranda, porch, deck, or balcony	12" (305mm)	12" (305mm)
<b>B =</b>	Clearance to window or door that may be opened	12" (305mm)	3 ft. (0.9m) *Except for C99=12"
<b>C =</b>	Clearance to permanently closed window	*12" (305mm)	*12" (305mm)
<b>D =</b>	Vertical Clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (610 mm) from the center line of the terminal	18" (457mm)	18" (457mm)
<b>E =</b>	Clearance to unventilated soffit	18" (457mm)	18" (457mm)
<b>F =</b>	Clearance to outside corner	9" (229mm)	9" (229mm)
<b>G =</b>	Clearance to inside corner	6" (152mm)	6" (152mm)
<b>H =</b>	Clearance to each side of center line extended above meter/regulator assembly	3 ft. (0.9m) within a height of 15 ft. (4.5m) above the meter/ regulator assembly	3 ft. (0.9m) within a height of 15 ft (4.5m) above the meter/ regulator assembly
<b>I =</b>	Clearance to service regulator vent outlet	3 ft. (0.9m)	3 ft. (0.9m)
<b>J =</b>	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance	12" (305mm)	3 ft (0.9m)*Except for C99=12"
<b>K =</b>	Clearance to mechanical air supply inlet	*3 ft. (0.9m)	6 ft. (1.8m)
<b>L =</b>	Clearance above paved sidewalk or paved driveway located on public property	*7 ft. (2.1m)	7 ft. (2.1m) †
<b>M =</b>	Clearance under veranda, porch, deck or balcony	*12" (305mm) ‡	12" (305mm)‡
†A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.		*For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearance will be in accordance with local installation codes and the requirements of the gas supplier and these installation instructions.	
‡Permitted only if veranda, porch, deck or balcony is fully open on a minimum of one side beneath the floor.			

**Note:** Local Codes or Regulations may require different clearances. The flue terminal must be exposed to the external air and the position must always allow the free passage of air across it. In certain weather conditions the terminal may emit a plume of steam. Avoid positioning the terminal where this may cause a nuisance.



## Warning

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



## Warning

Under no circumstances may an existing chimney be used to vent the Eco-King boiler. A chimney may be used as a chase with approved venting material. Failure to follow these instructions will result in fire, property damage, serious injury or death.



## Warning

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



## Warning

### **Removal of an existing boiler from a common venting system**

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 appliances 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.

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation.

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. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous conditions of use.
6. Any improper operation of common venting system should be corrected so the installation conforms with with CSA B149.1.

## Part 5.5 Further Venting Options: PVC/CPVC/Polypro

### REQUIREMENTS FOR INSTALLATION OF SINGLE PIPE VENTING ON ECO-KING BOILERS IN CANADA

**Venting PART 5.51** Installations must be made with ANY vent pipe system certified to ULC-S636. Examples are, M&G Duravent, Cox Geelen (Z-Flex), Ecco Group and Centrotherm polypropylene. Royal Pipe systems GVS65-GVS90 and IPEX 636 PVC/CPVC. These are approved vent manufacturers in Canada supplying vent material listed to ULC-S636, but are not exclusive. Any PP manufacturer approved to ULC S-636 can be used. Please see Table 1 below for an outline

**Table 1 Approved exhaust vent material on Eco-King Boilers**

Material	Standards for installation in:	
	United States	Canada
CPVC / PVC Schedule 40 / 80	ANSI / ASTM F441	ULC-S636
Polypropylene	UL Listed	ULC-S636
Concentric venting	UL Listed	ULC-S636

**NOTE 1: Adapters are outline in section 5.55**

**NOTE 2: Eco-King Boilers have a high temp flue gas protection switch**

**NOTE 3: For installations using PVC exhaust vent, the first seven (7) equivalent feet of vent must be CPVC.**

**Venting PART 2** Air intake must be brought into the boiler from outside, with one exception outlined in part 4 of this addendum, see page 34. Approved materials for air intake are listed in Table 2 below:

**Table 2 Approved air intake material for Eco-King Boilers**

Material	Standards for installation in:	
	United States	Canada
Sheet Metal	Approved but no applicable standard exists	Approved but no applicable standard exists
ABS	UL Listed	Approved but no applicable standard exists
PVC Cellular Foam Core	UL Listed	Approved but no applicable standard exists
PVC DWV	ANSI / ASTM D2665	Approved but no applicable standard exists
PVC Schedule 40 / 80	ANSI / ASTM D1785	ULC-S636
CPVC Schedule 40 / 80	ANSI / ASTM F441	ULC-S636
Polypropylene	UL Listed	ULC-S636
Concentric venting	UL Listed	ULC-S636

### Max Vent length runs with PP, CPVC, PVC single pipe

**Table 1.2 Maximum Pipe lengths**

Connection type	Max vent run with no elbows (ft)	Gas Type	Each 45° elbow equivalent to:*	Each 90° elbow equivalent to:*
2" exhaust vent length	100**	NG or LP	2.5'	5'
2" intake vent length	100**	NG or LP	2.5'	5'
3" exhaust vent length	110**	NG or LP	2.5'	5'
3" intake vent length	110**	NG or LP	2.5'	5'

\*: each elbow reduces vent length distance by 2.5' for each 45° elbow and 5' for each 90° elbow

#### \*\*Power reduction:

There is an output power reduction when using longer vent lengths. Using 2" venting there is a power reduction of 2% starting at a combined vent length of 90ft. That reduction increases to 7% at max combined vent length of 150ft. Using 3" venting there is a power reduction of 2% starting at 160ft combined vent length which increases to 7% at max combined vent length of 200ft.

**Notes:** 2" venting with exhaust vent lengths between 45 and 75ft and 3" venting with exhaust vent lengths between 60 and 100ft an installer must adhere to the following:

- 1) Manually calibrate boiler upon commissioning with a combustion analyzer. See Manual calibration section in installation manual for instructions.
- 2) Maximum 6 elbows permitted on all vent applications. This limit on elbows used is only when at least one side of 2" vent length exceeds 45ft and 3" vent lengths exceed 75'.

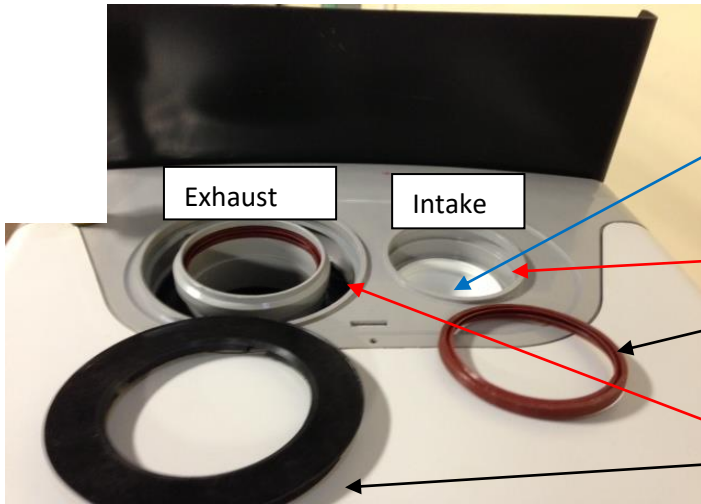
**Venting PART 5.53** The use of any polypropylene venting rated to ULC S-636 is now available to be used with Eco-King Boilers. No special adapter needed. Please review the following instructions:

It is possible though to use a two pipe system (one for intake and one for exhaust) by following these steps:

- 1) A black O-ring seal (see figure 1) on the concentric air intake portion must be used to block air intake (see figure 3). This black O ring is supplied with boiler. It is placed with the installation manuals in a plastic bag
- 2) Then the white cap on the separate single pipe air intake must be removed from the boiler (see figure 1)
- 3) Add the supplied O-Ring seal, which comes in a plastic bag with the install manuals (see figure 2)
- 4) Now the boiler is ready to be used in a two pipe system. Just connect any two 3" (80mm) polypropylene fittings to the exhaust and intake. Look at Figure 4 to see how the two pipes system will appear.



**Figure 1**



Remove white cap to open air intake inlet

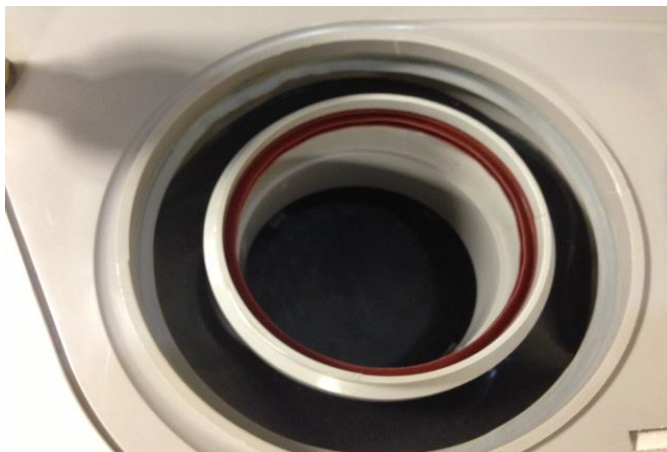
O ring seal for air intake when using two pipes. To be placed where red arrow points (see figure 2)

O-Ring seal to cover air intake on concentric opening. Insert where red arrow points (see figure 3)



**Figure 2**

Air intake of a two pipe system after white cap is removed. It is on the right side of boiler



**Figure 3**

Using black o-ring to block air intake of concentric connection. Only use exhaust connection shown here. It is on left side of the boiler



**Figure 4**

After O-rings are installed, connect polypropylene venting as pictured. Use 3" or if short vent length, reduce to 2" as seen in picture. See vent chart below for max vent lengths.

**Max Vent length runs with Eco-King PP single pipe**

Eco-King recommends using 3" polypropylene venting, however 2" venting is permitted. In Table 1.2 the Eco-King max vent lengths are outlined. Each elbow, whether it is a 45° or 90° elbow, are the equivalent of 5ft straight length pipe. We recommend no more than five elbows total on exhaust pipe..

**General Install Note for single wall venting on Eco-King boilers:**

You must use only authorized ULC S-63 vent parts, solvents or adhesives approved by vent manufacturers. For horizontal runs follow vent manufacturer instructions to maintain slope back to the boiler. This prevents collection of condensate or build-up of heat in the vent. It is recommended to use a bird screen on roof or sidewall single wall terminations.

**Venting Part 5.54** If all contaminants listed in Table 2.1 below are STRICTLY AVOIDED, combustion room can be used as a source of air intake. This table is shown again below (page 17).

Note: In new home installs it is mandatory to bring air in from outside the home while the home is being built. This is in done to prevent dust and any other contaminants from entering the boiler housing and affecting operation.

**Table 2-1 - Corrosive Products and Contaminant Sources**

<b>Products to Avoid</b>	<b>Contaminated Sources to Avoid</b>
Antistatic fabric softeners, bleaches, detergents, cleaners	Laundry facilities
Perchloroethylene (PCE), hydrocarbon based cleaners	Dry cleaning facilities
Chemical fertilizer, herbicides/pesticides, dust, methane gas	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, fibreglass, 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, fibre based insulation	Concrete plant or construction site

**Venting PART 5.55** The use of ULC S-636 approved PVC/CPVC venting for exhaust is permitted. Below outlines how to adapt from boiler connection to PVC/CPVC for exhaust and/or ABC, PVC, etc for air intake.

**Adapters**

Eco King Boilers are designed and shipped with multiple vent options. For use with 80mm connections single pipe 3” PP pipe can be used directly off the boiler. The provided black O-ring seal on the concentric air intake portion must be used to block air intake. Then the white cap on the separate single pipe air intake must be removed from the boiler and an o-ring seal added. This process is shown in Figure 1-4 above. Now the boiler is ready to be used in a two pipe system. Once these rules are followed, an adapter from 80mm PP to PVC/CPVC (for example: Eco King part number EK PP-3PVC, M&G Duravent 3PPSAD-PVC, ECCO 3PPSSAD or thru IPEX 7134770) can be used to connect immediately onto the boiler. Pipe size can be reduced to 2” CPVC / PVC using a 3” to 2” adapter. This reducer part number via Duravent is 3PPS-R2L, Z-Flex is 2ZDR32, ECCO is 302PRED and via Centrotherm it is ISRD0302. Then connect an adapter on air intake side and use ABS, PVC or CPVC for air intake vent run.

## Venting Part 5.56: Vent Terminations for All two Pipe Applications

Intake and exhaust pipes should terminate at a rooftop or side wall location. Keep exhaust plumes well away from all building air intakes including those of neighbouring properties.

Single pipe straight, 45 or 90 and concentric terminations are permitted with two pipe systems. Examples below.

All venting must be installed in accordance with the requirements of the jurisdiction having authority: in Canada, Part 8, *Venting Systems* of the B149.1-10 Code and any other local building codes are to be followed. In the USA the National Fuel Gas Code, ANSI 223.1, latest edition, prevails. Where there is a discrepancy between the installation instructions below, and the code requirements, the more stringent shall apply.

## Venting Part 5.57 Rooftop Two Pipe Vent Termination

Rooftop vents must terminate as follows:

- The exhaust pipe can terminate in an open vertical orientation without concern about rain infiltration because this will drain away through a properly configured condensate trap.
- **If used** in a vertical application the intake air pipe is not typically drained, so it must be terminated with a down-turned elbow to prevent rain ingress thru the air intake (see **Figure 5.57.1**). The intake pipe does not need to penetrate the roof at the same elevation as the exhaust; lower down the roof is OK. To promote the projection of exhaust away from the building and from the intake pipe, minimum distance between intake and exhaust outlet should be 12". Optional bird screen may be placed in a termination fitting.
- Inlet & exhaust can be piped to the roof and terminated with a concentric termination as seen in **Figure 5.57.2**.
- The mechanical room can be used for boiler intake with a single side wall or roof termination for exhaust. See Figure 5.57.3. This can be done only with strict adherence to Table 2-1 on page 34.
- **DO NOT exhaust vent into a common venting system.**

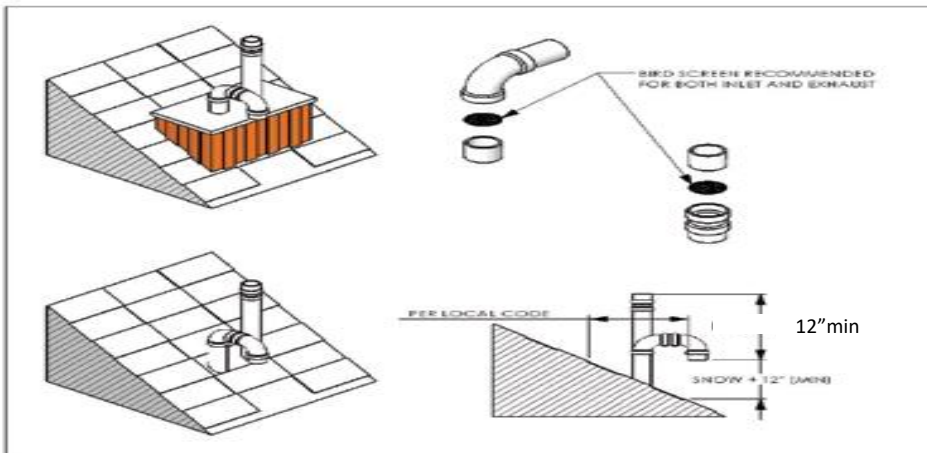
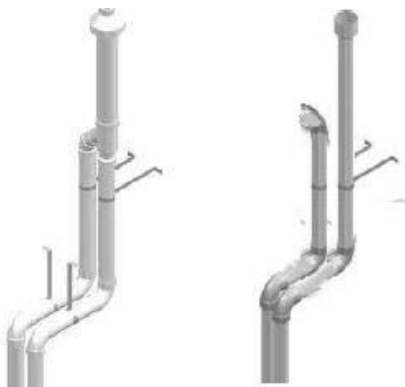


Figure 5.57.1



Two pipe venting with concentric (C)PVC termination

Figure 5.57.2

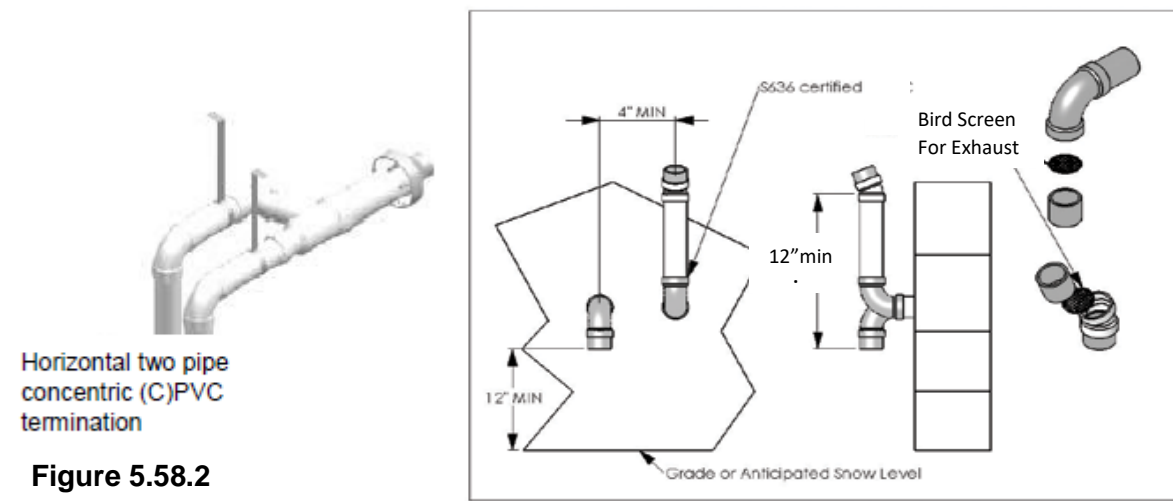
Single Pipe exhaust venting with straight pipe (C)PVC or PP termination.

Figure 5.57.3

**Sidewall Direct Vent- Separate Piping Terminations**

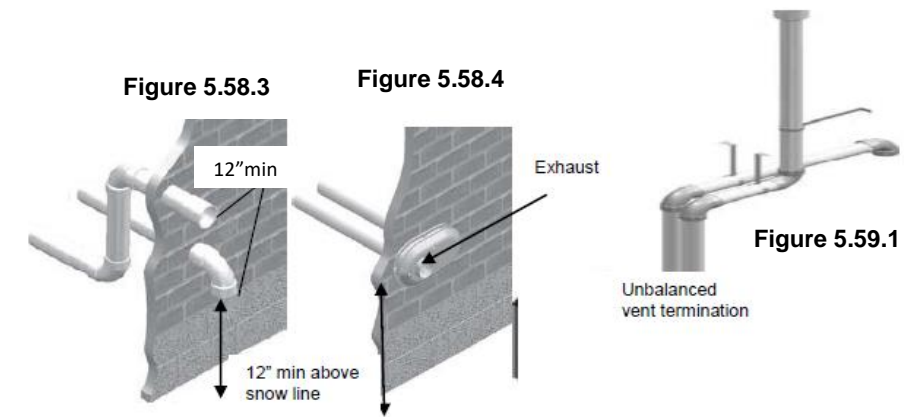
Sidewall direct vent applications shall be vented as follows:

- Both the inlet and exhaust terminations should 12" minimum away from the down-turned intake - to avoid re-circulation. The elevation of both pipes can be raised in "periscope style" after passing through the wall, then configured as in **Figure 5.58.1** or **Figure 5.58.3**, to gain required clearance. Ideally use a 45° elbow on the exhaust termination to launch the plume up and off the sidewall, for protection of wall. A bird screen is useful to guard against foreign objects.
- Both inlet and exhaust can be piped to the side wall and terminated with a concentric termination as seen in **Figure 5.58.2**. Adhere to normal clearance restrictions as seen in Table 5-1 on page 30.
- Straight pipe exhaust termination is permitted when intake pipe is minimum 12" away from intake pipe to avoid re-circulation. See **Figure 5.58.3**
- Two pipe "pancake" vent termination as pictured in **Figure 5.58.4** is permitted. Clearance restrictions from Table 5-1 on page 30 apply.



**Figure 5.58.1**

**Figure 5.58.2**



**Unbalanced Terminations (Figure 5.59.1)**

Eco-King also permits unbalanced flue terminations where exhaust is terminated at the roof of building and intake is piped directly to the boiler from building side wall. Follow guidelines for each as noted above in roof and wall termination sections. For example, in the roof termination section it states a straight pipe can be used as a vent termination at the roof as rain filtration into the boiler is not an issue. For air intake on the side wall, ideally, a 90 elbow is used to prevent rain ingress.

## Part 6 - Condensate Drain

This appliance produces liquid condensate in the heat exchanger and venting system as a product of combustion. Provisions must be taken to ensure that condensate does not collect in the venting system; therefore, all exhaust piping must slope back to the appliance a minimum of 5 cm per mtr (0.60 inch / feet). Condensate must be drained from the appliance into a household drain.



### Notice

Check with your municipality, or local gas company to determine if the disposal of combustion condensate is permitted in your area.

The following are important notes that must be taken into consideration when constructing the condensate drain system (See figure 6.1 for further details):

**DO NOT** install condensate lines outside. A frozen or blocked drain will cause the condensate to fill the combustion chamber.

**NEVER** use copper, steel, or galvanized piping in the construction of the condensate system (condensate is very corrosive and will corrode most metals). Use synthetic material only.



### Warning

If the combustion chamber has been flooded due to the condensate drain backing up, or for any other reason, the combustion chamber door must be removed and the inside of the appliance must be inspected for component damage by a certified technician, e.g. the internal insulation at the front and back of the chamber. Failure to follow these instructions may result in fire, property damage, serious injury or death.

The condensate collector is situated at the left lower side of the boiler. The collector has been equipped with a single condensate hose. The supplied dirt filter / water lock must be assembled to the condensate hose. The collector is mounted into the boiler by a turning movement.

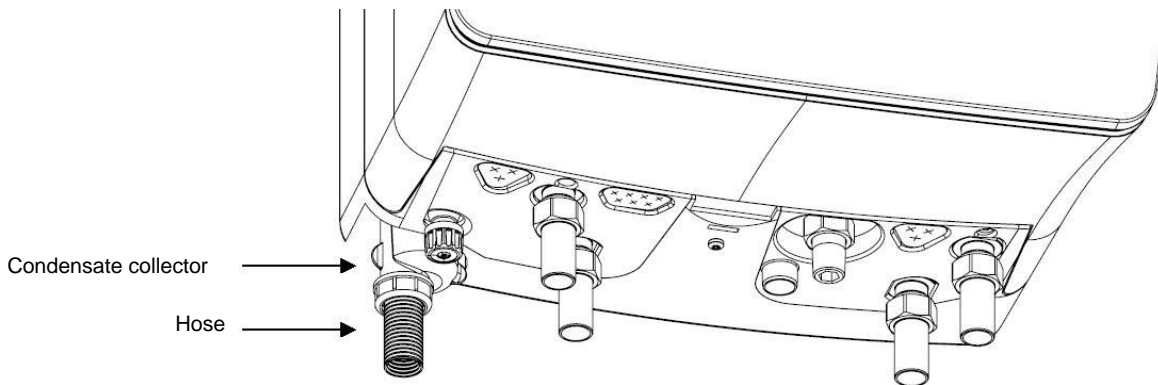


Figure 6.1 Condensate collector and hose location

Connect the condensate collector with a flexible hose to the sewer. Use an open connection. Make sure that the condensate collector will be accessible for maintenance. Take care of a minimum space below of minimal 270 mm (11"). All piping must be below the level where the condensate leaves the boiler.



### Warning

Blocking the condensate drain can cause damage to the boiler. The boiler has been constructed in such a way that in the situation of a blocked siphon / air trap the boiler will shut down.



### Notice

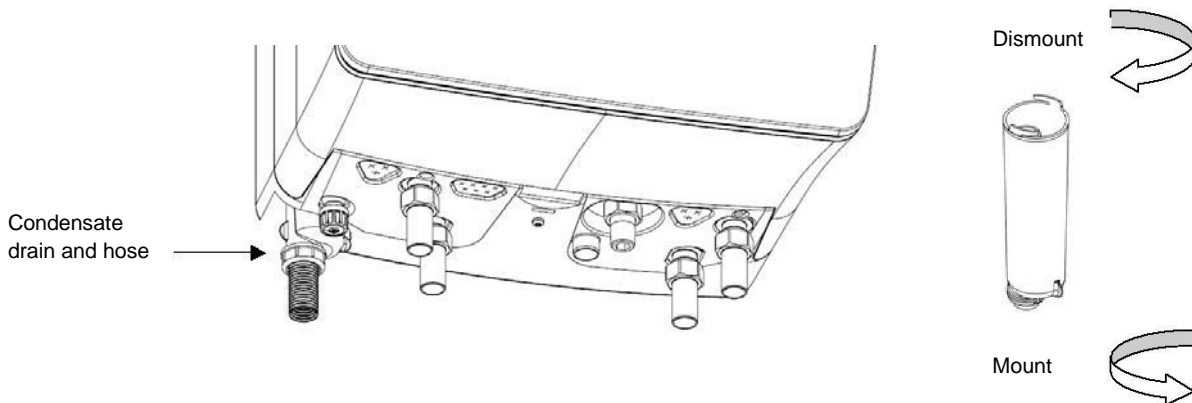
Check with your local authorities regarding disposal of condensate (regulations may require the use of a neutralizer).

## Part 6 - Condensate Drain

### Cleaning

It is recommended to clean the condensate drain once a year by rinsing / washing it with tap water:

- 1.) Shut off power to the appliance.
- 2.) Disconnect the condensate hose by turning the connection screw.
- 3.) Dismount the drain from the boiler by a turning movement (to the left).
- 4.) Clean the drain by rinsing / washing it with tap water.
- 5.) Refill the drain (water lock) with clean tap water.
- 6.) Reinstall the drain by turning the drain into the boiler (turn to the right).
- 7.) Reconnect the hose.
- 8.) Put power to the appliance.



**Figure 6.2 Condensate drain (dis)mounting**

The internal and external flexible condensate hose can be inspected and cleaned using a plumbing spring.

## Part 7 - Central heating (CH) and Domestic Hot Water (DHW) circuit



### Warning

If no diffusion-tight pipes for supply and return (CH circuit) are applied for radiators or floor heating, place a partition between the CH water of the boiler and the water in the system. E.g. use a plate heat exchanger. A plate heat exchanger prevents contamination of the heat exchanger by, among others, magnetite. When such a partition is not placed, the guarantee for all parts in the supply and return of the unit will be null and void.

The appliance has been equipped with a drain valve allowing simple draining of the water. The appliance has a pressure relief valve that needs to be installed directly outside the boiler in the return pipe. The pump vent has been connected through the overflow valve connection making visible any leakage from the vent on the outside of the appliance. The appliance also has an internal adjustable by-pass to achieve circulation. If necessary, place an external by-pass a minimum of 6 meters (20') away from the boiler. Flush the system with clean tap water before the first start-up to prevent contamination of the heat exchanger of the CH boiler.

### Frost protection

The unit has a built-in frost protection system that starts up the CH pump and the burner in case the boiler water temperature drops below 6 °C (43 °F).

### Prevent corrosion

To prevent the CH system from corroding, pay attention to the following: Only use pure filling water (no additives). The pH-value must be neutral (7 – 8.5). If not, contact the supplier. Thoroughly flush the CH system before putting it into operation. Any synthetic pipes used must be oxygen diffusion tight. If not, place a partition (e.g. a heat exchanger) between the boiler circuit and the circuit with the plastic pipes. Check for leaks in the circuit to prevent oxygen penetrating.

### Vent

Vent the system after filling and before putting the system into operation (section 10).

### Pressure relief valve

The appliance has a pressure relief valve (figure 7.1) that needs to be installed directly outside the boiler in the return pipe (A, figure 7.2) and, if installed, downstream of the external expansion tank. Connect discharge piping to a safe disposal location.



Figure 7.1 PR Valve



### Warning

To avoid water damage or scalding due to relief valve operation, take the following into account when installing the valve:

Discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line in a manner that will prevent possibility of severe burns or property damage in case the valve discharges.

Provide piping that is the same size as the safety relief valve outlet.

Discharge line must pitch downward from the valve and terminate at least 152 mm (6") above the floor drain where any discharge will be clearly visible.

The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 190 °C (375 °F) or greater.

Do not pipe the discharge to any place where freezing could occur. Do not plug or place any obstruction in the discharge line.

Never block the outlet of the safety relief valve.

Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of severe personal injury, death or substantial property damage.

## Part 7 - Central heating (CH) and Domestic Hot Water (DHW) circuit

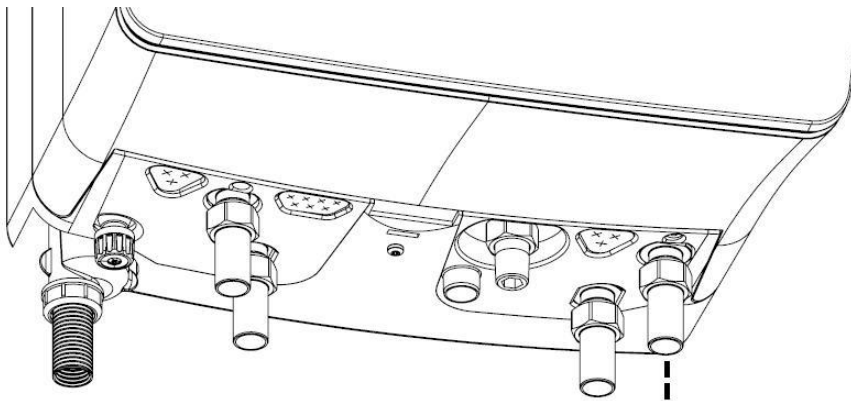
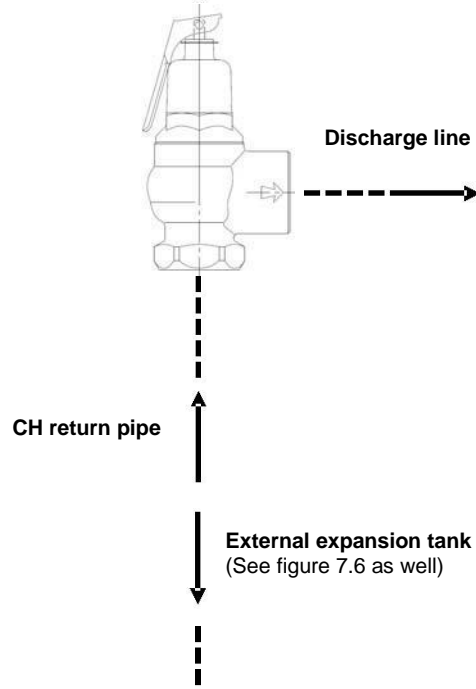


Figure 7.2 Pressure relief valve installation location



### Control module

The Eco-King Boiler control module uses temperature sensors to provide both high limit protection and modulating temperature control. The control module also provides low water protection by sensing the water pressure of the CH system. Some codes / jurisdictions or insurance companies may require additional external controls for high limit and / or low water cutoff protection. Especially when the boiler is installed above radiation level. Follow low water cutoff manufacturer's instructions.

### Backflow preventer

A backflow preventer should be installed on the cold water fill supply line per local codes. Also make sure that the maximum cold water inlet pressure into the boiler cannot exceed 8 bar (116 Psi).



### Warning

To prevent residue, build up in the boiler when used in older systems, possible containing dirt it is highly recommended to take the following actions.

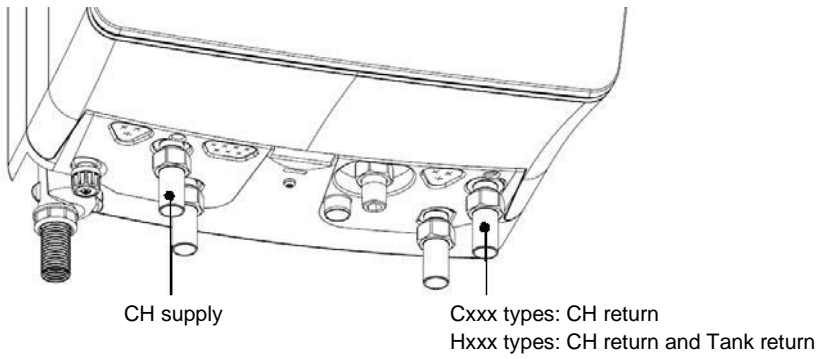
Flush and clean the CH circuit before commissioning the boiler  
install an external basket strainer in the CH return pipe

When these actions are not executed, residue from the CH system might cause the boiler to clog and overheat.



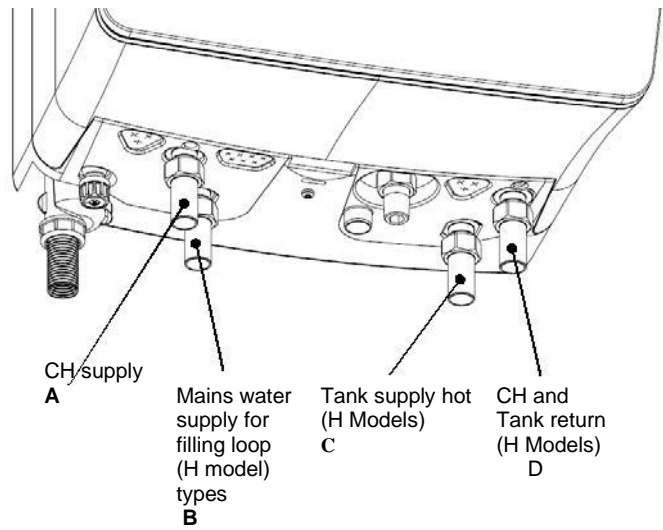
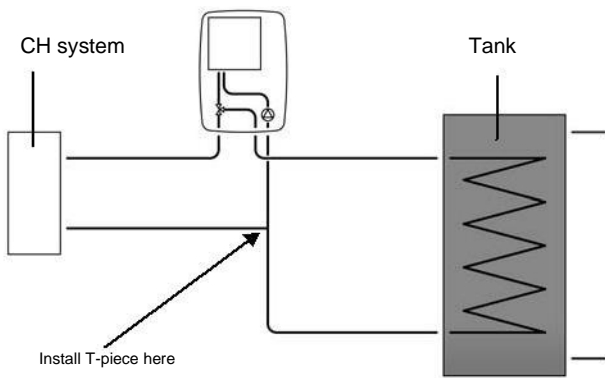
**Connect the supply and return piping of the CH circuit: FOR H MODEL BOILERS**

Connect the CH supply and the return pipes using hot water couplings (Fig. 7.3)



**Figure 7.3 Central Heating (CH) supply and return connectors**

**Connect the tank: H MODEL BOILERS**



**Figure 7.5 Connect the tank**

Hydraulic:

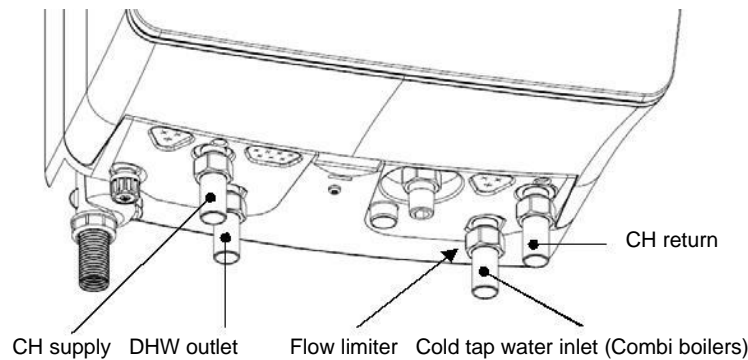
- Connect cold water supply to the mains water in connection on behalf of operation of the filling loop (B)
- Connect the (hot) tank supply to the hot water coil connection of the tank (C)
- Connect the CH supply to the CH system in accordance with the (local) regulations. (A)
- Connect the CH return and the tank return to the T-piece as shown in the figure above (D)
- Connect the other end of the T-piece to the return connection of the boiler.

Electric:

- Disconnect the power to the appliance.
- Connect the 10k Ohm NTC sensor in the tank to the tank connector on the Print Circuit Board (fig.9.3).
- In case no 10K Ohm NTC tank sensor came with the tank contact the supplier.
- Reconnect the power supply.

**Connect the tap (DHW) water circuit: FOR C (COMBI) MODELS**

The supply pipe for cold tap water (Fig. 7.4) is provided with a flow limiter depending on the type of Eco-King boiler (e.g. Eco-King C100: 8litres/min. (2.1 gal/min) of 60 °C (140 °F)). Connect the supply and return pipe in accordance with the (local) regulations.

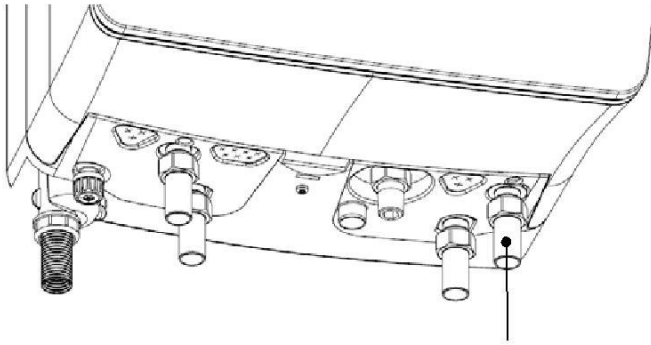


**Figure 7.4 DHW connectors, flow limiter location**

## Part 7 - Central heating (CH) and Domestic Hot Water (DHW) circuit

### Connect an external expansion tank

The boiler comes standard with a 11 liter (2,9 US Gallon) internal expansion tank. In case the total size of the installation configuration requires this, an extra expansion tank needs to be selected with regard to the total installation size and static pressure. Install the external expansion tank in the CH return pipe (figure 7.6). Make sure there is always an open line in the CH system and expansion tank.



#### Installation volume using internal expansion vessel

If the installation operates at 194/158 F (90/70 °C) and 29 PSI (2 Bar) installation pressure the volume of the installation is maximized to 17 Gallon (63 liters)

If the installation operates at 194/158 F (90/70 °C) and 22 PSI (1,5 Bar) installation pressure the volume of the installation is maximized to 30 Gallon (115 liters)

If the installation operates at 176/140 F (80/60 °C) and 22 PSI (1,5 Bar) installation pressure the volume of the installation is maximized to 40 Gallon (150 liters)

Figure 7.6 External expansion tank to be located in the CH return pipe

### Use of pumps and maximum remaining pump head of internal pump at CH supply connection

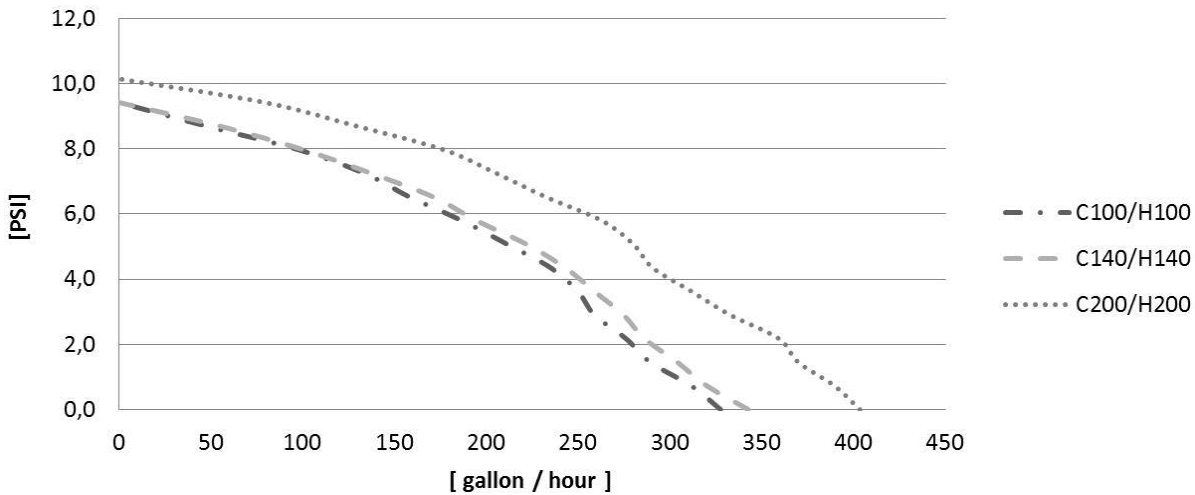
The boiler is equipped with an internal pump. This pump is to be used as the only pump in the installation or as the only pump in the primary circuit.



#### Warning

Installing a pump in series with the internal pump is not permitted. It will cause unwanted effects on the boiler control. This might result in noise or delta T irregularities.

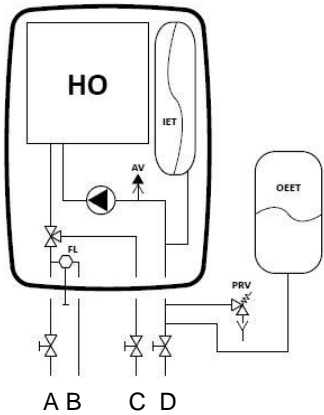
In the graph below the maximum remaining head at the boilers CH supply is depicted. Installations with a higher internal resistance should be supplied via low loss headers and zone pumps (see examples).



## Part 7 - Central heating (CH) and Domestic Hot Water (DHW) circuit

### Installation examples

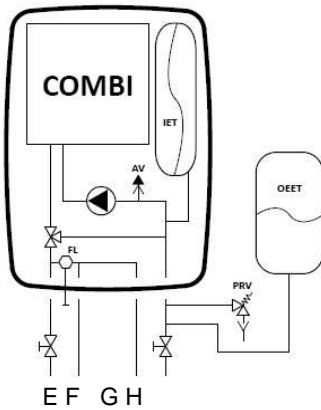
The schematics on the following pages are to be seen as guidelines only. They do not display all system varieties, safety devices or concepts possible. Layouts number 1 and 2 give information on how to connect the boiler to the CH and/or DHW system. Layouts number 3 till 10 give examples on how to position the boiler in several system configurations.



#### Legend

HO	Heating Only appliance
IET	Internal Expansion Tank
OEET	Optional External Expansion Tank
AV	Air Vent (Automatic)
FL	Filling Loop
PRV	Pressure Relief Valve
A	CH supply
B	Not used / capped
C	Tank supply hot (Hxxx types)
D	CH and Tank return (Hxxx types)

### 1) Boiler layout : Eco-King Heating only appliance



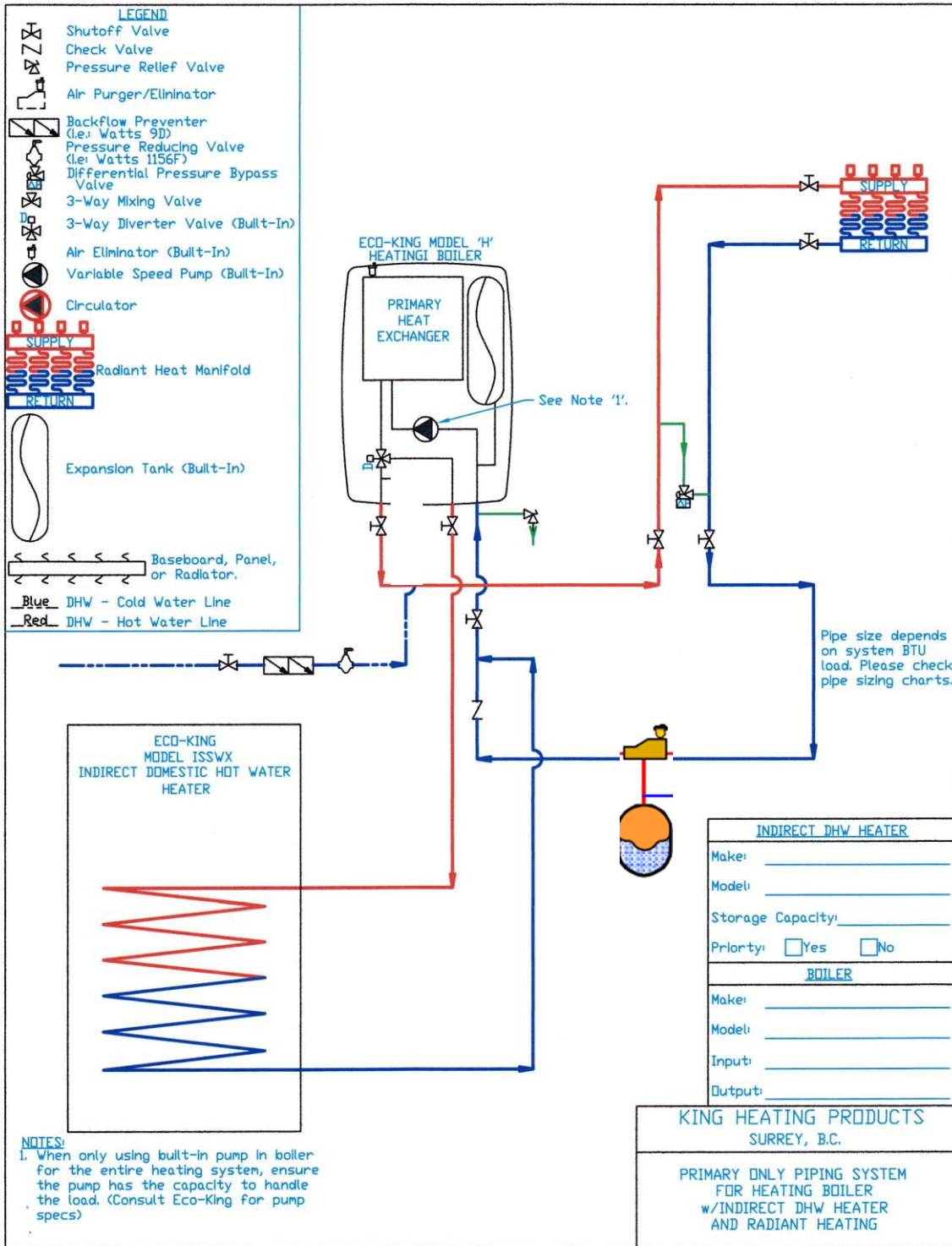
#### Legend

Combi	Combi appliance
IET	Internal Expansion Tank
OEET	Optional External Expansion Tank
AV	Air Vent (Automatic)
FL	Filling Loop
PRV	Pressure Relief Valve
E	CH supply
F	DHW outlet
G	Cold tap water inlet (Cxxx types)
H	CH return (Cxxx types)

### 2) Boiler Layout: Eco-King Combi appliance

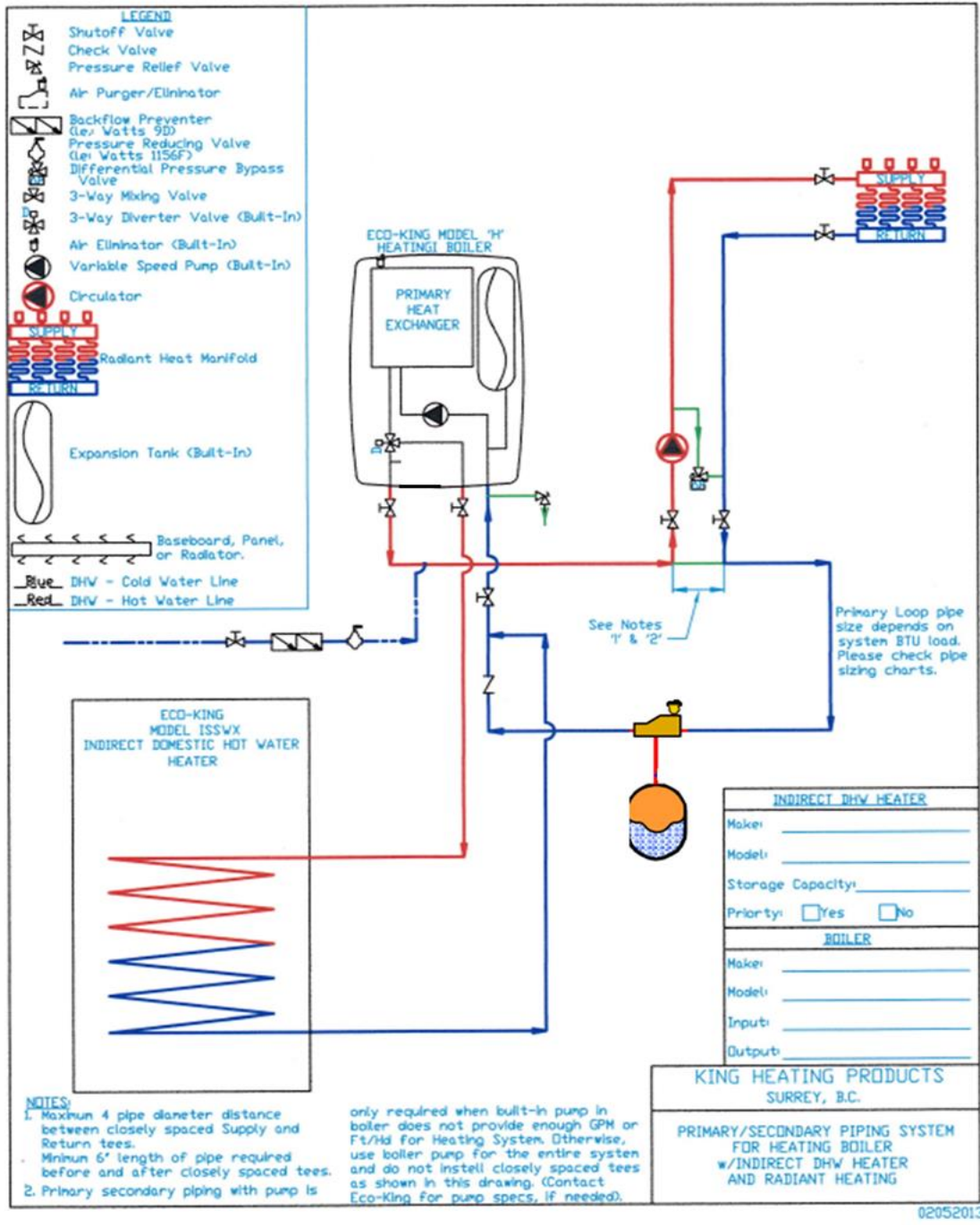
## Part 7 - Central heating (CH) and Domestic Hot Water (DHW) circuit

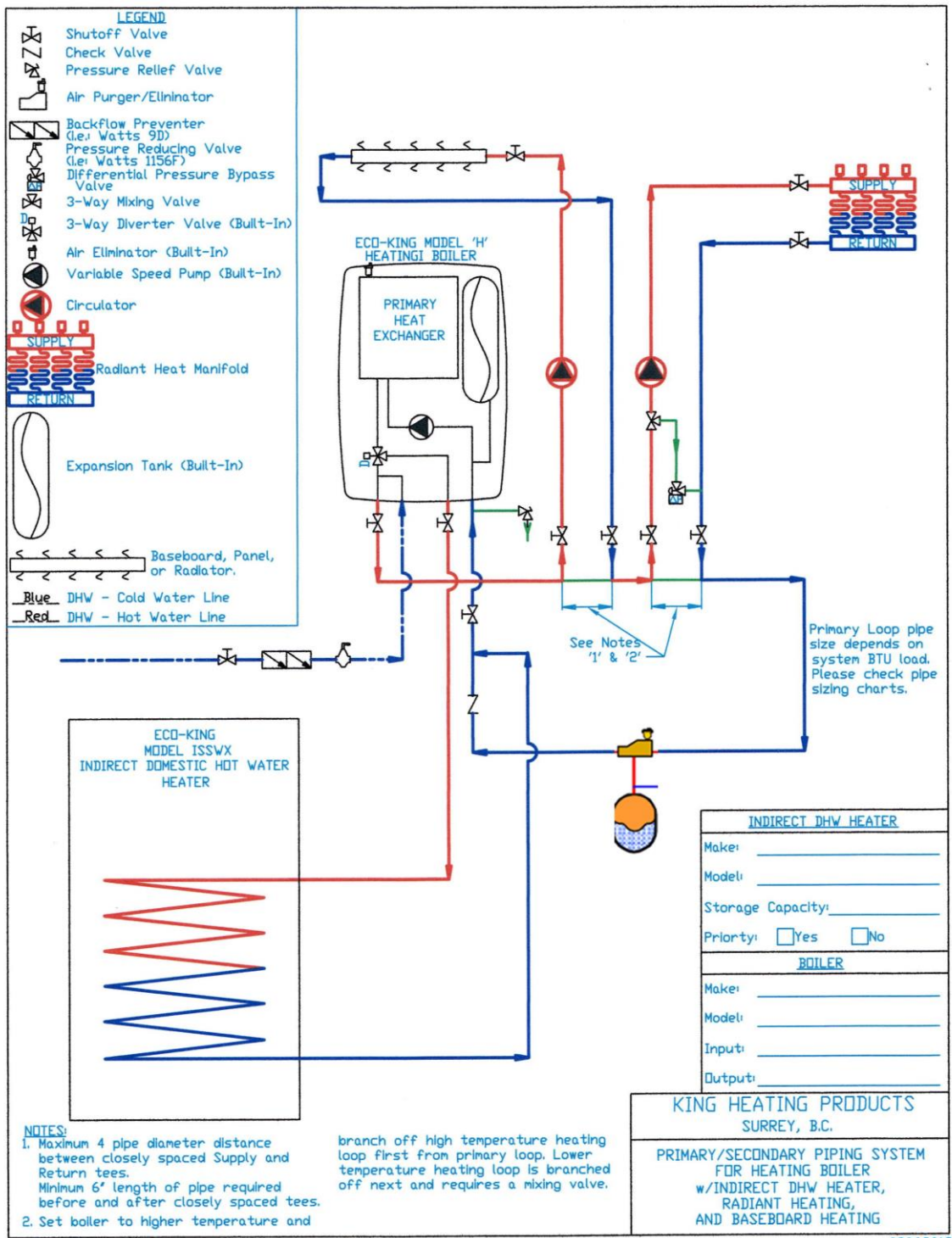
**H Model System layout 1: H model boiler using internal pump for central heating and optional connection with an indirect tank for DHW. Only use this option if heat system heat loss is less than 50,000 BTU and consists of one zone of heating. If not, please use system layout 2. External expansion maybe required, see , location in piping shown in System layout 2 and page 42: expansion tank**



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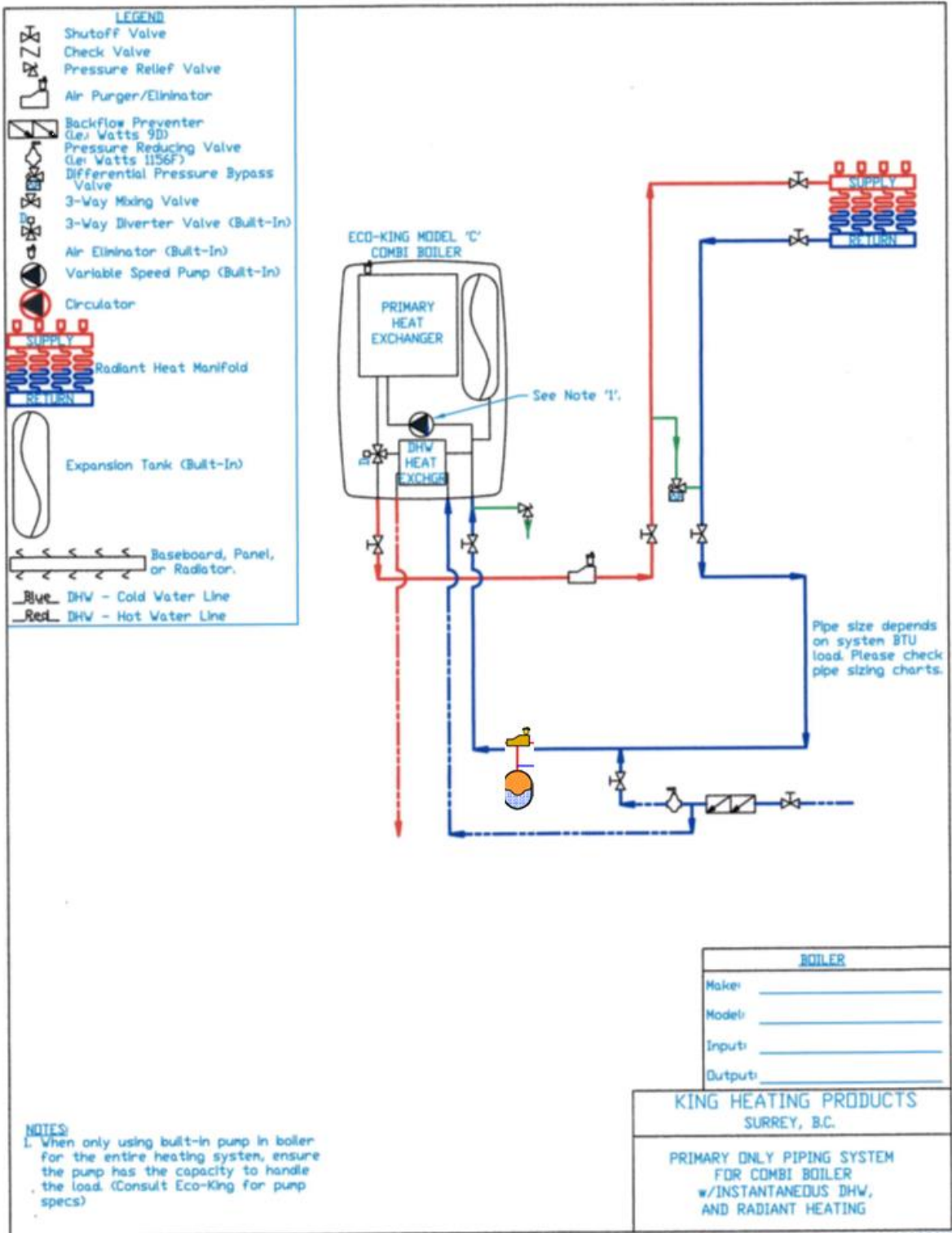
H Model System layout 2: H model boiler using Primary Secondary piping via closely spaced T's or a Low Loss Header (LLH). Can also be connected to an indirect tank for DHW. Recommended piping schematic.



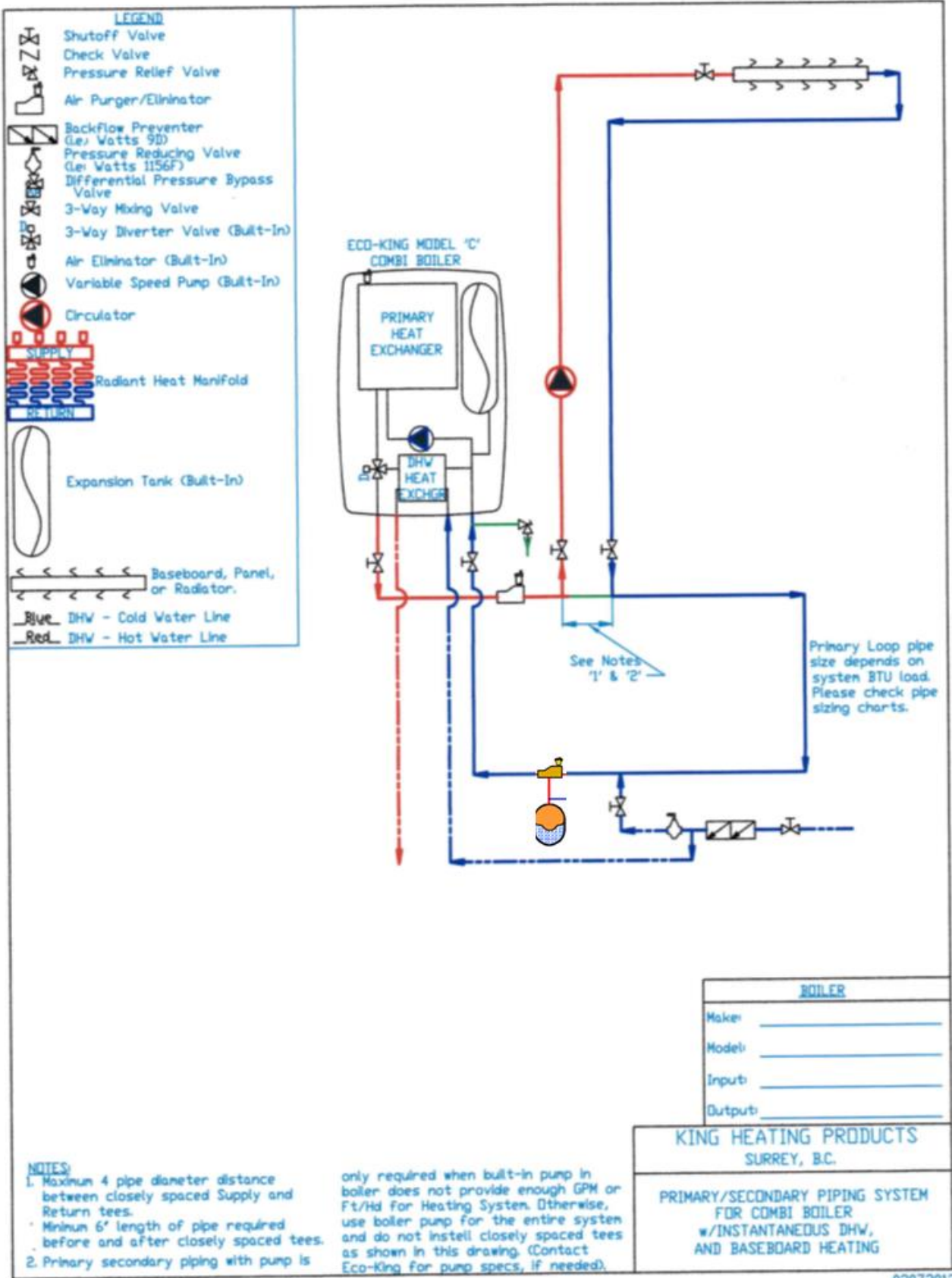


**H Model System layout 3: H Model boiler with two temperature zones for heating; one high temp heating and one low temp heating zone. Also can be used with an indirect tank for DHW.**

**C Model System layout 4: Combi Model boiler using internal pump for central heating and on demand DHW. Only use this option if heat system heat loss is less than 50,000 BTU and consists of one zone of heating. If not, please use system layout 2. External expansion may be required. Sizing of expansion tank on page 42**



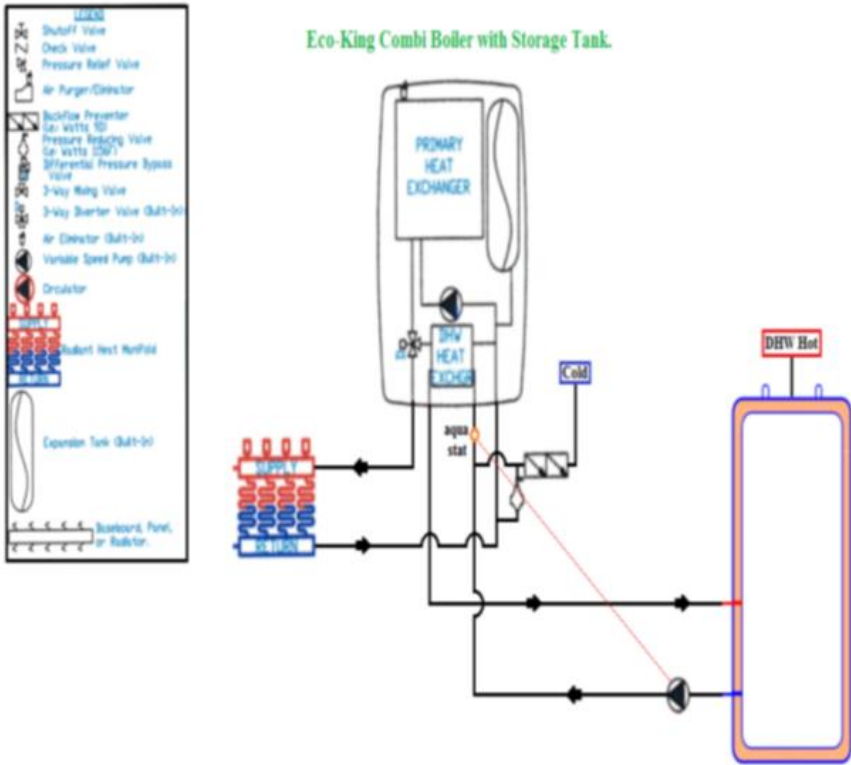
**C Model System layout 5: Combi model boiler using Primary Secondary piping via closely spaced T's or a Low Loss Header (LLH). On Demand DHW. Recommended piping schematic.**



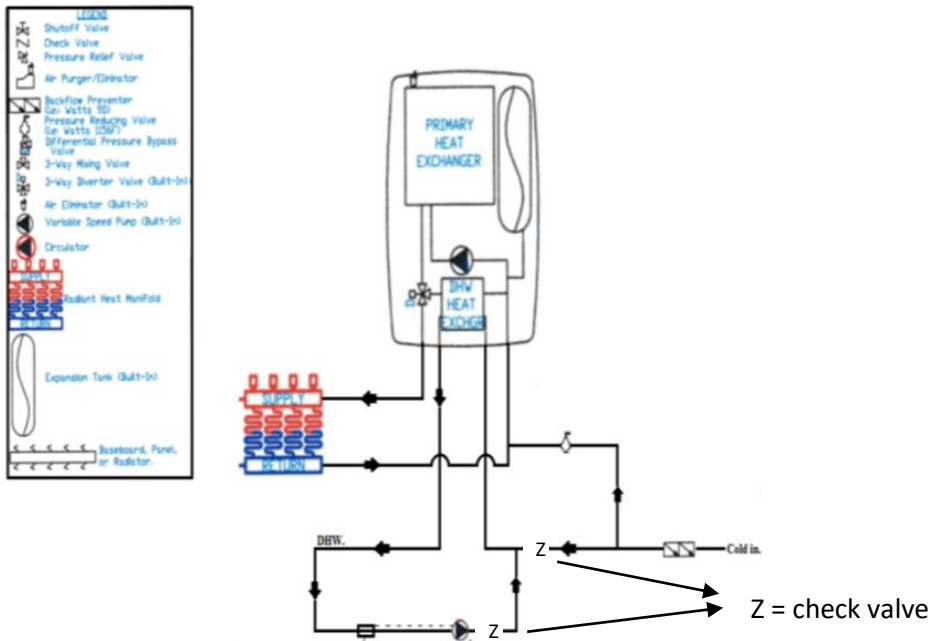
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**C Model System layout 6: Combi model boiler using direct supply piping via for heating and on demand hot water WITH storage tank for DHW.**

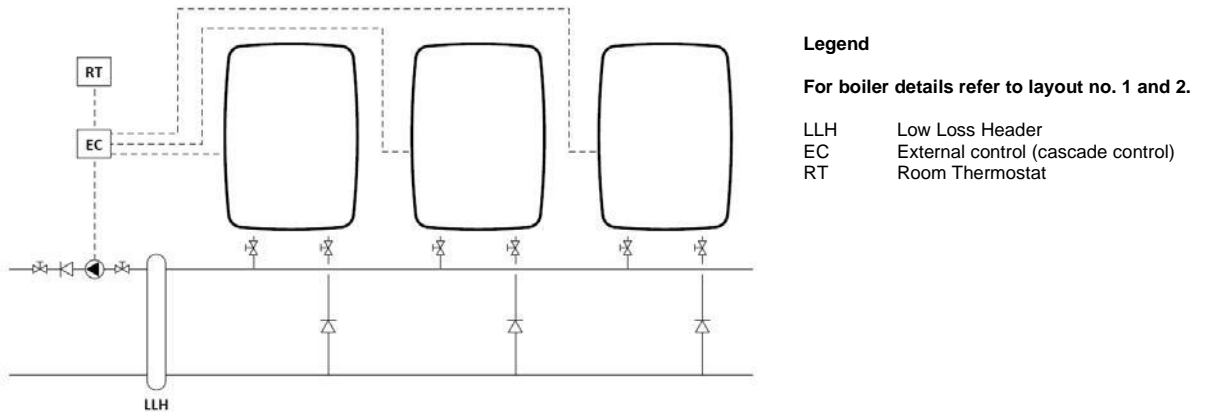


**C Model System layout 7: Combi model boiler using direct supply piping via for heating and on demand hot water WITH re-circulation pump for DHW.**



Use al temp sensor to turn on pump.  
or run a pump on a timer  
(recommend Grundfos 15-10)

**Boiler System layout 8: Cascade boiler configuration. Only heating shown here. DHW is possible also. External control (ie. Tekmar 261) required to cascade boilers.**



**11) System layout: Combi or Heating only appliance in cascade configuration with: Heating circuit with low loss header**

Further piping diagrams are available upon request. Email us at [sales@ecokingheating.com](mailto:sales@ecokingheating.com)

## Part 8 - Installing gas piping

### Installation

Refer to CAN/CGA B149.1 installation codes, and local codes for gas piping requirements and sizing. Pipe size running to the appliance depends on:

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

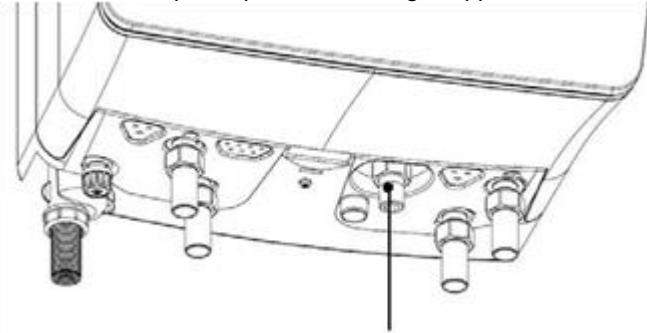


Figure 8.1 Gas line connection location

### Connecting the gas line

The gas connection tube diameter is not indicative of the gas pipe that should be connected to it. For example the connection on boiler is 1/2", but the larger Eco-King boilers at 187,000BTU require a larger gas pipe to be piped to the boiler. Consult, for this purpose, the gas code to determine gas pipe size. It is necessary to install a manual shutoff gas valve in front of the gas pressure regulator to make sure that the gas line can be closed in case of maintenance. The entire piping system, gas meter and regulator must be sized properly to prevent pressure drop greater than 1"wc as stated in the National Fuel Gas Code. **If you experience a pressure drop of greater than 1" the meter, regulator or gas line is undersized.**

Ideally 7" to 10" wc of gas pressure when using Natural gas and 11 to 13" wc when using LPG, will be available to the boiler gas valve inlet at maximum boiler operation. Minimum gas pressure required is 3.5"wc and maximum is 14"wc during static and dynamic testing.

**When an in-line regulator is used to drop gas pressure from 2psi to 0.5psi, it must be located a minimum of 6ft from the Eco-King boiler.**

**Eco-King recommends minimum 3/4" diameter flex hose if flex gas hose is going to be used.**

### Ensure that:

The gas line connection to the appliance does not apply any weight to the gas valve.

Create an installation layout such that the piping does not interfere with the vent pipe, or any other serviceable components.

The appliance shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain etc.) during installation and servicing.

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. Use common gas line sizing practices. Make sure the gas pressure is within specification during all conditions.

Always use a pipe-threading compound. Apply sparingly to all male threads, starting at two threads from the end. Over doping or applying dope to the female end, can result in a blocked gas line.

### **DO NOT TIGHTEN FITTINGS WITHOUT SUPPORTING THE GAS VALVE**

Install a manual "Equipment Shut-Off Valve". Valve must be listed by a nationally recognized testing lab. Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve.

The gas line piping can safely be removed from the appliance for servicing.

Leak test the gas pipe and clamp off the gas pipe up to the gas pressure regulator.

Carefully vent the gas pipe (outside in open air) before putting appliance into operation for the 1<sup>st</sup> time;



### 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. When performing a pressure test on the gas line piping, be sure the appliance is disconnected or isolated if the test pressure is expected to exceed 3.5 kPa (0.5 PSI), as damage to the valve could occur resulting in fire, 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.

### Propane usage:

C100, H100, C140 & H140 boiler models only require setting 15 to be changed to 02. See table 10.1 page 61  
C200 and H200 models require setting 15 to be changed to 02 AND gas pipe to be changed. You must order separately a propane gas tube (part number 202-1231) for an H200 or C200 boiler to be used on propane. All other size do not need this pipe.

## Part 9 - Electrical connections

### Opening the front cover

Remove the safety screw at the top side of the hood. Use a screw driver to push back the safety latches at the bottom and top side of the appliance to be able to release the hood by pulling it forward. To put the hood back in place, push it back over the safety latches and put back the safety screw.

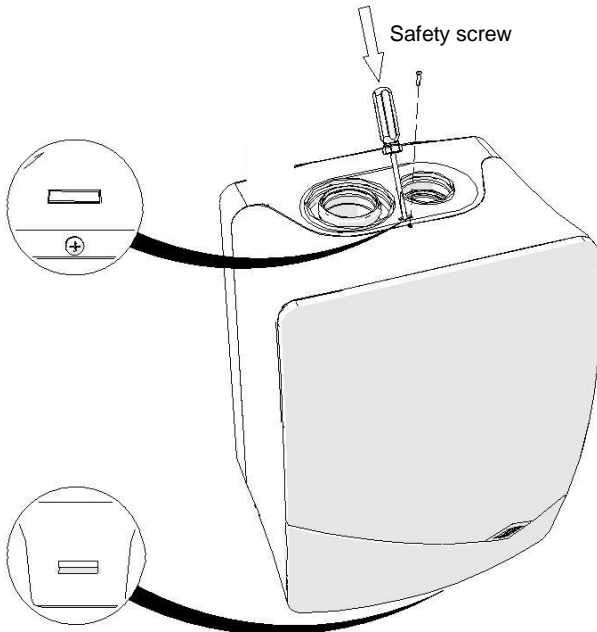
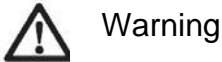


Figure 9.1 Safety screw location

### Power connection

The appliance has been equipped with a grounded line cord. Therefore the Eco-King boiler must be connected to a grounded wall socket, in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.



In case the line cord gets damaged it must be fully replaced with an official Eco-King line cord (See section 13 for part numbers). The line cord and wall socket must be at any time reachable with regard to service purposes. Failure to follow these instructions may result in serious injury or death.

### Connect the room thermostat

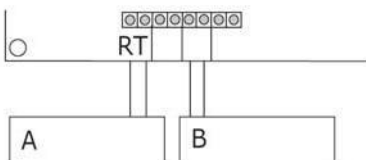


Figure 9.2 Room thermostat and outside sensor connection

After removing the front cover of the Eco-King boiler, get access to the print circuit board by manually pushing the plastic clips at the sides of the plastic print housing and subsequently pulling forward the drop down box.

#### Connect:

**A:** Room thermostat (on/off end switch/dry contact connection ONLY. Do NOT supply 24v to this connection)

**B:** Outside sensor (optional)

Connect the room thermostat (A) and, if present, the outside sensor (B) to the terminal strip (see figures 9.2 and 9.3). Outdoor sensor is optional, does NOT have to be installed for the Eco-King to function.

# Part 9 - Electrical connections

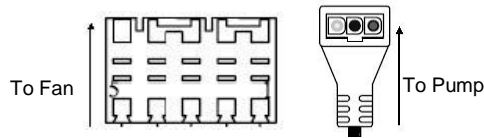
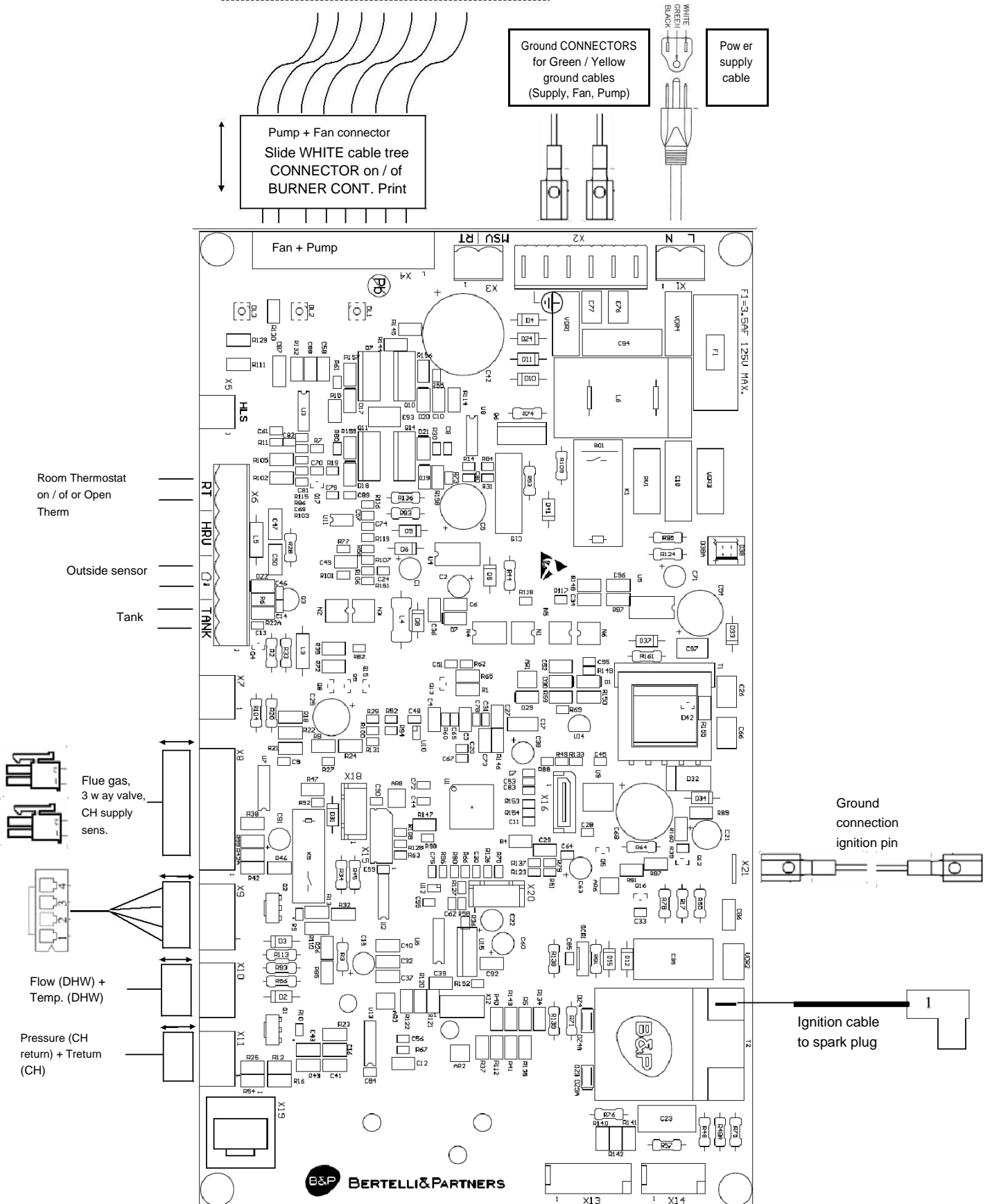


Figure 9.3 Print circuit board main connections



## Part 10 - Lighting the appliance / First start-up



Warning

Use of electrical connections to the boiler other than described might result in unpredictable behaviour, or malfunction of the boiler. **DO NOT WIRE ANY VOLTAGE, ONLY DRY CONTACTS TO CONTROL BOARD.**



Warning

The boiler must be manually bled of air using the manual air bleed on top of the heat exchanger. Before commission turn the manual air bleed until water pours out. **Make sure to perform this action before boiler is turned on in order to prevent hot water scalding.**



Warning

Before Start-up refer to **Mandatory Pre-commissioning Procedure for Plastic Venting** in Section 4.0. Failure to follow these instructions can result in explosions, injury or death.



Warning

Prior to turning the gas supply on and lighting the appliance, ensure all aspects of the installation are complete and in conformance with the instructions provided in this manual, including the Vent/Air-Intake sections and the manuals delivered with the vent system, 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

Do not store or use gasoline or other flammable vapours & 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.



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 control valve to the appliance. Failure to follow instructions could result in explosion causing property damage, serious injury or death.

## Part 10 - Lighting the appliance / First start-up

### FOR YOUR SAFETY, READ BEFORE OPERATING



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

**A.** This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

**B. BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

#### WHAT TO DO IF YOU SMELL GAS

Switch off the appliance.  
Shut off the gas supply.  
Open the windows.

Do not try to light any appliance.

Do not touch any electric switch.

Do not use any phone in your building. **D.** Do not use this appliance if any part has been

Leave the house.

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.

#### WHAT TO DO IF YOU SMELL FLUE GASSES

Switch off the appliance

Open the windows

Shut off the gas supply

Leave the house

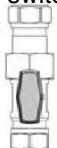
Contact a registered installer or a registered service center.

**C.** Use only your hand to turn the gas switch. Never use tools. If the switch will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

**D.** Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

### OPERATING INSTRUCTIONS

1. STOP! Read the safety information above very carefully.
2. Turn off all electric power to the appliance.
3. Set the thermostat to lowest setting.
4. Do not try to light the burner by hand.
5. Make sure the CH system is filled with water and de-aired. Make sure the gas line is de-aired. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
6. Make sure that heat can be transferred into the CH system.
7. The main gas switch is situated directly underneath the boiler in the gas supply line and below the gas pressure regulator. Turn the main gas switch clockwise to close the gas supply.



Turn clockwise  
to close valve

8. Wait five (5) minutes to clear out any gas. Then smell for gas including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this page. If you don't smell gas, go to the next step.
9. Turn the main gas switch counter clockwise to open.



10. Turn on all electric power to the appliance and start the calibration procedure of the boiler (at first start-up).
11. Set thermostat to desired setting.
12. If the appliance will not operate turn off gas to appliance and call your service technician or gas supplier.

### TO TURN OF GAS TO THE APPLIANCE

1. Turn off all electric power to the appliance if service is to be performed.
2. Set the thermostat to lowest setting.

3. The main gas switch is situated directly underneath the boiler in the gas supply line and below the gas pressure regulator.
4. Turn the valve clockwise to close the gas supply.



## Part 10 - Lighting the appliance / First start-up



### Warning

The initial lighting of the appliance must be performed by a licensed Gas Technician. Failure to follow these instructions may result in property damage, serious injury or death. As soon as the appliance has been fully installed (with regard to hydraulics, de-air of installation, gas, flue gas, air intake, wiring etc.) according to the preliminary installation instructions, it's allowed to put the power plug into a grounded wall socket. The grounded line cord and grounded wall socket must be reachable for service purposes at any time.



### Warning

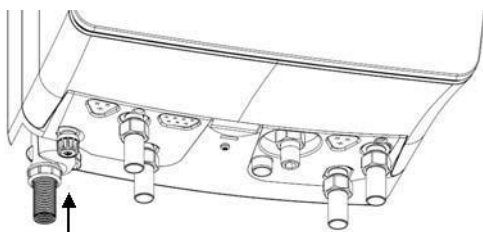
Ensure the appliance is wired in accordance with this manual (section 9).

**Ensure the system is completely filled with water, and that ALL the air is purged out. The automatic air vent cycle takes approximately 6 minutes (see "Fill and refill" in this section).**

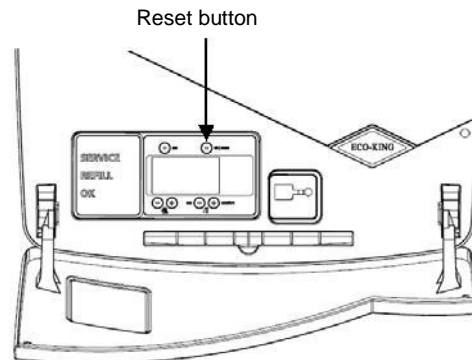
Ensure the gas shut-off valve is turned on (only after ALL air is purged out), and that the gas system has been fully tested for leaks.

## Fill and refill of the CH section

The appliance continuously checks the CH-pressure. In case the pressure is too low (below 0.8 bar / 10 psi) the refill notification on the front side of the boiler lights up in orange. The display shows the system pressure. The Eco-King boiler is provided with a special filling system. By opening the filling valve the CH-system will be filled.



Filling valve



**Figure 10.1 Filling valve location**

By opening the filling valve (turn) the system pressure will increase in a C model boiler. This will be shown on the display. As soon as the system pressure has reached the correct value (1.5 bar (22 psi)), 'reset' will light up in the display. Close the filling valve when the water pressure is 1.5 bar (22 psi). By subsequently pushing the reset button the system is ready for the next step in the first start-up process. With an H model boiler the pressure must be increased with an external fill valve such as a Watts 1156F pressure reducing valve.



### Notice

The LED 'REFILL' lights up when the water pressure is too low (below 0.8 bar (10 Psi)). If the pressure is below 0.7 bar (10 Psi), the unit stops functioning.



### Caution

The display shows the water pressure. Make sure that the water pressure is always between 1 and 2.0 bar (14.5 and 29 Psi). In case the system needs filling up more than 3 times a year, contact a registered installer or a registered service centre.



### Caution

Use the filling valve integrated in the boiler to (re)fill the appliance. Automatic fill valve may be used when required.



### Warning



## Part 10 - Lighting the appliance / First start-up

### Step 1: Turn power on and de-air cycle



#### Warning

Be careful when venting. The water can be hot. Use a cloth to collect spilled water.

Make sure that the system is properly vented. This will avoid noise and comfort problems. The CH pump has an automatic vent and does not need venting.

To vent the system sufficiently, both the automatic air vent cycle of the appliance and separate venting of the radiators must be performed using the following three steps.

1: Ensure all zones have been fully purged of air. Then plug in the Eco-King boiler to start the automatic air vent cycle. It is 5 minutes long and the LCD screen will start a countdown from 5 minutes. During this time you will hear the pump moving and the three way valve moving position in order to get as much air out of the boiler as possible.

**The boiler must be manually bled of air using the manual air bleed on top of the heat exchanger.** Before commissioning and during the 5 minute air vent cycle, connect a silicone tube to the manual air bleed at front of the heat exchanger. Lead it into a bucket and turn it until water pours out (3-4 full turns). Then flush the system with the air bleed open for about 2 minutes, you will need to simultaneously be adding water to the system to account for the water and air being deleted via the air vent. The automatic air vent cycle can be activated by unplugging, wait 30 seconds, and plugging back in the supply cable.

After approximately 5 minutes the air vent cycle is finished. Disconnect your tube and close the manual air vent.

To be sure all air is purged out of the total system subsequently bleed air in all zones in the system separately.

2: Repeat the automatic air vent cycle as described in step 1 if lots of air remains in the system.



#### Warning

Always vent the system after installation or maintenance activities on the CH system!



#### Caution

In case an air handler is installed in the CH system, installation of a secondary air vent between the air handler and the appliance is strongly recommended.



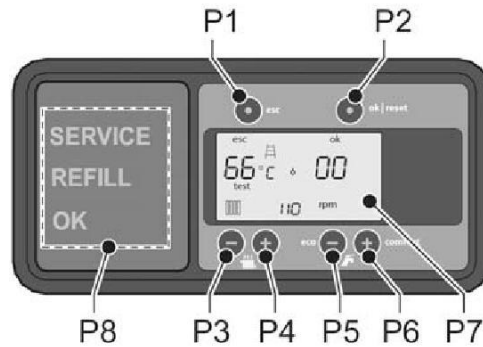
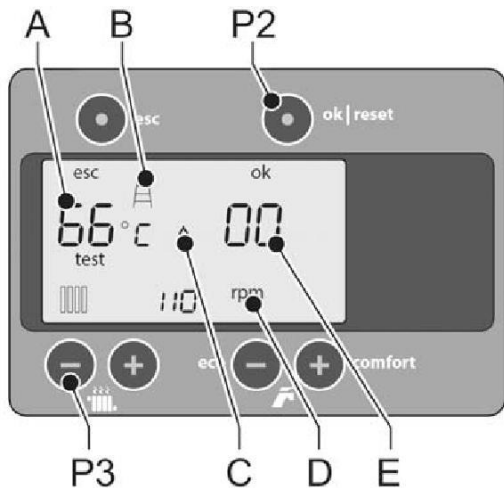
#### Notice

Check the water pressure in the appliance after venting.  
Refill the system when the water pressure is below 1 bar (14.5 psi).

### Step 2: Perform calibration on the boiler via Auto or Manual Calibration

#### Calibration

Before the first start up of the appliance (before calibration) check the gas type setting is set correctly (parameter 15, Table 10.1 Setting parameters). The Eco-King boiler is gas-adaptive, which means that the combination ionisation electrode and the burner pneumatically and electronically control the CO<sub>2</sub> percentage. During calibration, the start current and the correct settings for the CO<sub>2</sub> percentage are determined. During the manual calibration the percentage can be adjusted if necessary. If at high altitude, above 2000ft elevation, we recommend manual calibration. Otherwise auto calibration should suffice. If you want 100% accuracy, do manual calibration. Both options are detailed below.



- A:** Flame impedance and temperature value
- B:** Ladder symbol: calibration menu
- C:** Flame symbol: ignition. The unit burns.
- D:** Speed (rpm/10)
- E:** Boiler capacity (%)
- P2:** ok | reset
- P3:** CH temperature down

**i** Notice

The start current calibration starts automatically when the calibration is started.

**Manual calibration**

1. Start the system.
2. Connect the flue gas analyzer to the appliance. Two options for connection are available:
  - It is preferred to measure the flue gases with mounted front cover. To enable that, use an external sampling point in the vent system, just above the appliance.
  - Or in case this point would not be available; Connection point for thermal fuse flue gas sensor. See figure 1.2 (D) for exact location. Remove the thermal fuse sensor to obtain flue gas analyzer access.

**!** Warning

Make sure the flue gas analyzer connection point is closed after performance of the calibration procedure. Failure to do so may result in serious injury or death.

**Important NOTE:** Before starting calibration make sure the boiler can transport the produced energy into the system. For an H model boiler it will perform calibration ONLY in heating circuit so you must turn on all thermostats and open all zones/pumps before performing auto or manual calibration. In a C model you can do the same OR run dhw demand showing at MINIMUM 8L flow on the screen of the boiler before starting calibration.

3. Simultaneously press [P2] and [P3] until the text 'test' appears in the display.
  - The 'ladder' symbol flashes in the display.
  - The fan speed (rpm) increases until the start speed is reached. The display shows the speed of the fan.
  - The capacity of 100% flashes on the right in the display. 1 and 00 appear alternately in the display.
  - The starter current is determined and the boiler ignites. The 'flame' symbol and the text 'ok' appear when the flame is stable.

4. Check the CO<sub>2</sub> percentage on the flue gas analyzer. The percentage must be 9.0% (+/- 0.3%) for natural gas. For LPG it must be set to 10.0% (+/-0.3%)
  - a.) In case the CO<sub>2</sub> value is not within tolerance, the value must be adjusted. By pressing [P3] or [P4] the flame impedance is shown. Use [P3] for increasing the CO<sub>2</sub> value. Use [P4] for decreasing the CO<sub>2</sub> value.
  - b.) When the CO<sub>2</sub> value is within tolerance confirm with [P2].
5. The fan adjusts to start speed.
  - CO<sub>2</sub> setting natural gas 9.0% (+/- 0.3%)
  - CO<sub>2</sub> setting LPG 10.5% (+/-0.3%)
    - a.) repeat step 4.
6. The appliance goes to the third and last step (Modulation is 0%).
  - CO<sub>2</sub> setting natural gas 9.0% (+/- 0.3%)
  - CO<sub>2</sub> setting LPG 10.0% (+/-0.3%)
    - a.) repeat step 4.
7. After accepting the third and last calibration step, the fan of the boiler will continue to run for 10 minutes without firing. This is the final step of the calibration process. During this time the boiler will not respond to any heat request, but parameters and settings can be changed. When "test" leaves the screen, calibration is finished.
 

\*Note: if 10 minutes fan calibration period is disrupted by disconnection of main power supply, the 10 minutes calibration time will continue as soon as power is restored.

### Automatic calibration

The automatic calibration function enables you to calibrate the boiler without analyser to make sure that the Eco-King burns safely without producing CO. This function performs the same procedure as the manual calibration, but here the flame impedance values go to pre-set values from the data key.

**Important NOTE:** Before starting calibration make sure the boiler can transport the produced energy into the system. For an H model boiler it will perform calibration ONLY in heating circuit so you must turn on all thermostats and open all zones/pumps before performing auto or manual calibration. In a C model you can do the same OR run dhw demand showing at MINIMUM 8L flow on the screen of the boiler before starting calibration.

1. Simultaneously press [P1] and [P3] for 5 seconds until the text 'test' appears in the display.

- The 'ladder' symbol flashes in the display.
- The fan speed (rpm) increases until the start speed is reached. The display shows the speed of the fan.
- The capacity of 100% flashes on the right in the display. 1 and 00 appear alternately in the display.
- The starter current is determined and the boiler ignites. The 'flame' symbol and the text 'ok' appear when the flame is stable.
- When the speed and the CO<sub>2</sub> percentage for the starter capacity of 100% is stable, the boiler will set the CO<sub>2</sub> percentages at the fan capacities for ignition and 0%.
- During this part of calibration a flame will be flashing in middle of the screen and its size will depend on boiler power.

2. After the last calibration step the fan of the boiler will continue to run for 10 minutes without firing the boiler. During this time the boiler will not respond to any heat or domestic hot water requests. Installer settings can be adjusted during this time. When this procedure is completed, "test" leaves the screen and the boiler goes to the default menu and is ready for use.

\*Note: if 10 minutes fan calibration period is disrupted by disconnection of main power supply, the 10 minutes calibration time will continue as soon as power is restored



Warning

### Recalibrate after a software update

When the appliance has been provided with updated software, always:

- 1 Recalibrate the start current.
- 2 Check the flame impedance values.
- 3 Perform the Manual or Automatic calibration procedure.

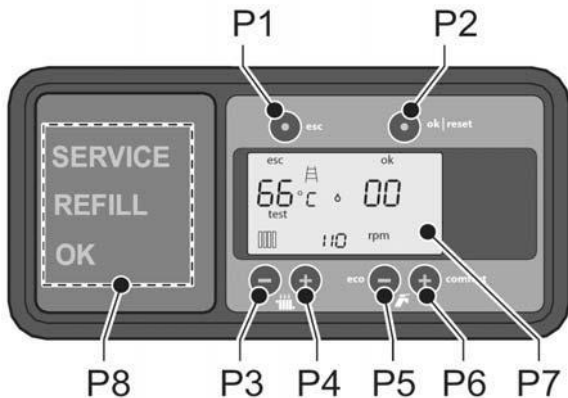
### Service operation

1. Press [P1] and [P2] simultaneously to access the service menu at installer level.
2. Put the figure on the left side of the display to '08' with [P3] or [P4].
3. Confirm with [P2].
4. Press [P1] and [P2] simultaneously for 5 seconds. The boiler starts in service mode. 'Test' appears on the display at the left down corner.
5. Use [P3] to set the appliance to minimum power.
6. Use [P4] to set the appliance to maximum power.

## Part 10 - Lighting the appliance / First start-up

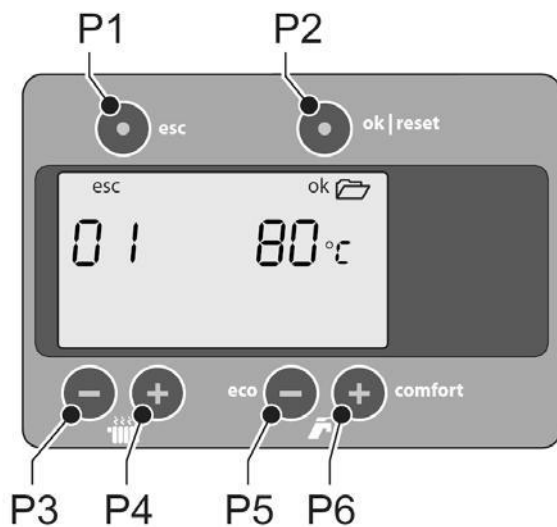
### Step 3: Adjusting settings

#### General use of the control panel



- P1:** esc: escape / cancel
- P2:** ok (confirm) | reset
- P3:** CH temperature down
- P4:** CH temperature up
- P5:** eco (tap symbol).
- P6:** comfort up (tap symbol)
- P7:** Display
- P8:** LEDs: Displays the general status of the appliance.

#### Setting of parameters



1. Go to the installer level:
  - a. Simultaneously press [P1] and [P2] for 5 seconds.
  - b. Put the number on the left side of the display to '08' with [P3] or [P4].
  - c. Press [P2] to confirm. You have accessed the installer level.
2. Press [P3] or [P4] to select the required parameter (index number). The index number is shown on the left side in the display (see the list below). The set value is shown on the right side in the display.
3. Press [P5] and [P6] to adjust the value.
4. Press [P2] to confirm. (moving to the next parameter without confirmation will not store the change made)

The table below contains the parameters that can be set via the display or using a hand terminal (palm).

## Part 10 - Lighting the appliance / First start-up

Parameter no.	Description	Unit Imperial (SI)	Default	Min.	Max.	Note
0	Maximum CH temperature setting	°C (°F)	80 (176)	20 (68)	85 (185)	
1	Maximum CH power	%	100	0	100	
2	Maximum time for modulation to full power	Minutes	10	0	60	
3	Pump overrun time CH	Minutes	1	0,5	C (continues)	Time max. 30 min. C=Pump continuously
4	Maximum flow pump for CH operation	%	100	50	100	
5	Minimum flow pump for CH operation	%	50	40	100	
6	dT Supply/Return CH operation	°C/°F	15/28	5/9	30/54	K=displayed on old boilers AQM17.. °F=shown on new boilers serial AQM20..and later
7	Outside sensor present		0	0	1	0=no outside sensor 1=outside sensor present / weather dependent control activated
8	K factor for weather-dependent control		4	0.5	6	
9	K factor for weather-dependent control night mode		2	0.5	6	
10	Offset outside sensor set point	°C/ °F	0 / 0	-15 / -27	+15 / 27	K=displayed on old boilers AQM17.. °F=shown on new boilers serial AQM20..and later
11	Tap water configuration		0/1	0	2	0= Hxx default (No DHW) 1= Cxx default (Combi) 2= Hxx storage tank operation
12	Required tap water temperature	°C (°F)	61 (142)	40 (101)	70 (158)	
14	Flue gas sensor type		2	0	2	0= High limit switch 1=NTC 2=High limit switch and NTC
15*	Gas type		1	1	2	1 = Natural gas G20 2 = LPG*
16	Option print configuration		0	0	99	
17	Anti fast-cycle time	Minutes	2,5	0	10	
18	Maximum power DHW	%	100	0	100	
19			0	0	1	Not used. Do not change.
20	Pressure sensor de-activated		0	0	1	0 = activated 1 = deactivated
21	Reset to default values		0	0	255	111 = reset to factory defaults (requires manual calibration)
22**	°F & PSI Setting		1	1	2	1=LCD screen displays PSI and °F

**Table 10.1** Setting parameters

- \*FOR PROPANE usage. On C99, C100, C140, H100 and H140 units, the Eco-King does not require a gas pipe changed, only a setting change on 15 from 1 to 2. When using propane on a H200 or C200 the Gas pipe in the boiler MUST BE CHANGED. It is a separate part NOT included in the box and needs to be ordered from your supplier. Part number EK 202-1331
- \*\*All boilers with serial numbers AQM19....., AQM20....., and higher will display PSI and °F by default and do not have capability to switch to °C and Bar. The °F and PSI boilers will have an LCD screen sticker on the back that show CP37.03. Old ones with °C and Bar will show CP37.02

## Part 10 - Lighting the appliance / First start-up

### Weather dependent control (outdoor sensor set up)

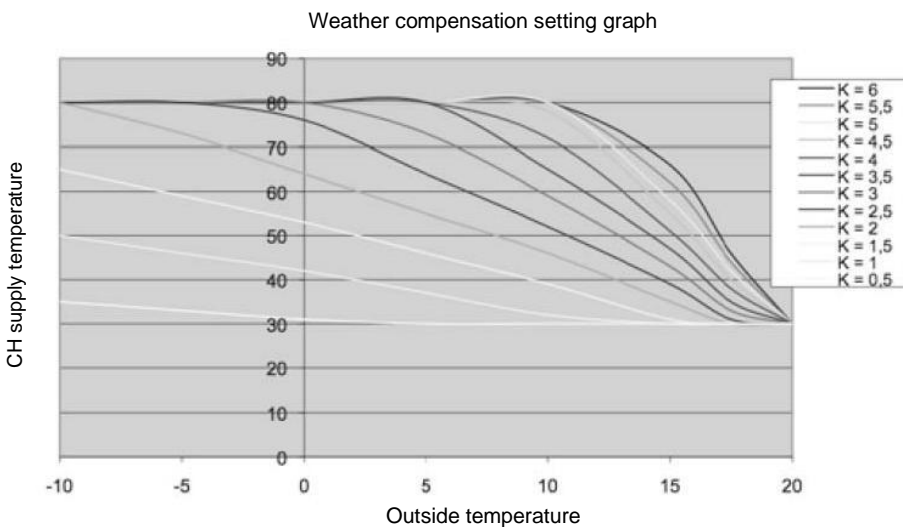
In weather dependent control operation with an outside sensor, the boiler CH set point depends on the outside temperature and a pre-set weather compensation setting. Must still have a thermostat or end switch connected to RT on the boiler.

In case an outside sensor and an on/off thermostat have been installed, the next steps need to be performed to pre-set weather dependent control:

- a) Select 1 for parameter no. 7 in the installers menu for presence of the outside sensor;
- b) Connect the 'RT' contact on the burner control PCB for weather dependent control in day mode;
- c) Connect the 'RT' and the 'HRU' contact on the burner control PCB for weather dependent control in night mode;

The lower the outside temperature, the higher the CH temperature must be. When it becomes warmer outside, the CH temperature must decrease. The relationship between the outside temperature and the CH temperature can be visualized with a weather compensation setting graph. The graph shows the relationship between the desired CH supply temperature at a certain outside temperature.

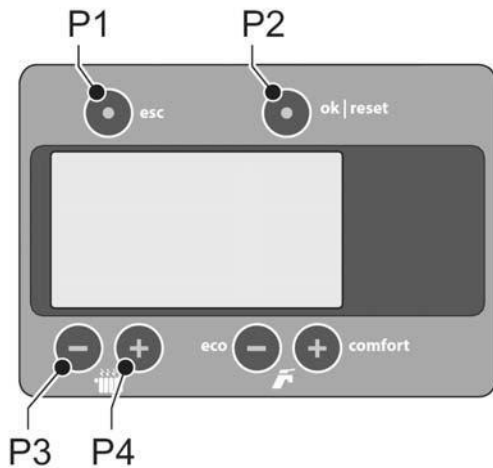
- d) When needed adapt the weather compensation setting for day mode via parameter 8 in the installers menu.
- e) When needed adapt the weather compensation setting for night mode via parameter 9 in the installers menu.
- f) When needed shift the weather compensation setting via parameter 10 in the installers menu.



## Part 10 - Lighting the appliance / First start-up

### Step 4: Set the comfort level

#### Set the central heating temperature



1. Press [P3] or [P4]. The maximum CH temperature is shown. The 'radiator' symbol is flashing.
2. To change the CH temperature:
  - a. Decrease the maximum CH temperature using [P3].
  - b. Increase the maximum CH temperature using [P4].
3. Press [P2] within 30 seconds to confirm the change.



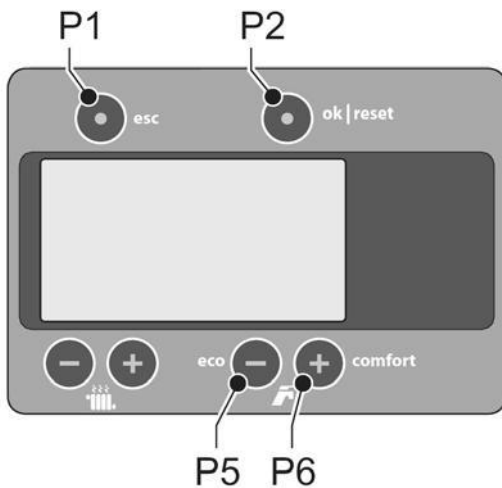
#### Notice

In case you wait longer than 30 seconds or in case you press [P1], the adjusted setting will be cancelled.

#### Set the hot water comfort

The hot water can be set to three comfort types:

- Eco: The hot water is only heated when there is a hot water demand. The temperature of the DHW heat exchanger is not maintained. This saves energy.
- Comfort: the temperature is maintained 24 hours a day, and is checked every hour.
- 



1. Press [P5] or [P6] to open the comfort menu. The 'tap' symbol in the display is flashing.
2. Select the hot water comfort:
  - Press [P5] to select 'eco'.
  - Press [P5] twice to select 'ecomfort' (only with OpenTherm® room thermostat).
  - Press [P6] to select 'comfort'.
  - Press [P2] within 30 seconds to confirm the change.



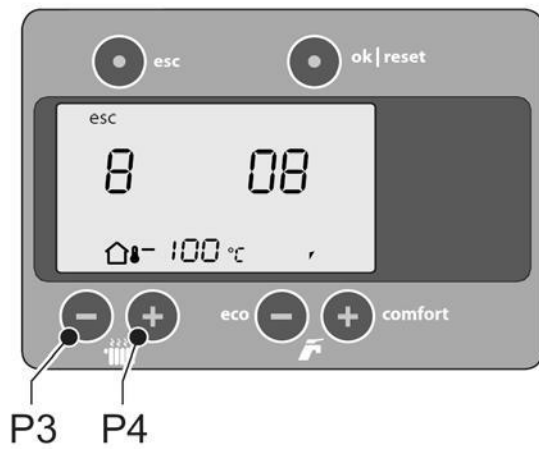
#### Notice

In case you wait longer than 30 seconds or in case you press [P1], the adjusted setting will be cancelled.

## Part 10 - Lighting the appliance / First start-up

Diagnosis menu – For read out of the boiler operation, not to change settings which is done via the table on page 61

Read out measured values



1. Simultaneously press [P3] and [P4] for 5 seconds. The first value is displayed.
2. Scroll with [P3] and [P4] through the values (left on the display). The values are shown right in the display. These values cannot be changed. For an overview of the measured values refer to table 10.2.



## Part 10 - Lighting the appliance / First start-up

Left	Mean value of		Extra information (on the right)
0	Software version	-	So
1			Heat exchanger mode: 0 rest 2 start fan 3 pre ventilation 4 ignition 5 CH operation 6 DHW operation 7 heat up tap exchanger 8 anti-swing waiting time
2	Modulation level flame + %	Flame + %	-
3	CH pressure	Bar / PSI	P1
4	CH supply temperature	°C / °F	t1
5	Set point supply temperature CH	°C / °F	t1 < > SP
6	CH return temperature	°C / °F	t2
7	DHW flow sensor	l / minute	F1
8	DHW temperature	°C / °F	t3
9	Setpoint DHW temperature	°C / °F	t3 < > SP
10	Flue gas temperature	°C / °F	t4
11	Outside temperature	°C / °F	t5
12	Temperature Tank	°C / °F	t6
21	Room temperature (of OpenTherm® thermostat)	°C / °F	rt
22	Setpoint room temperature (of OpenTherm® thermostat)	°C / °F	rt < > SP
24	Modulation pump	%	bP
29	Gasvalve modulation current	mA	I = current
30	Flame resistance (actual value)	kOhm	FL = flame
31	Fan speed	rpm	-
32	Calibration done	-	CAL = calibration Completed --- = calibration not completed, Do Calibration
33	Flame resistance setpoint 0%	kOhm	FL
34	Flame resistance setpoint ignition speed	kOhm	FL
35	Flame resistance setpoint 100%	kOhm	FL

°C / °F = °C is for older boilers that have LCD screen with SKU sticker CP37.02  
°F is for new boilers that have LCD screen with SKU sticker CP37.03

**Table 10.2 Diagnostic menu**



## Part 11 - Installation check list

### Installation

Locate the appliance in accordance with Section 3 of this manual.

Install the Vent/Air-Intake piping in accordance with Sections 4 and 5 of this manual. Ensure all joints are secured properly. The concentric Vent and Air-Intake piping must terminate outdoors. Perform the 'Mandatory Pre-commissioning Procedure for Plastic Venting' in Section 4.

Connect the condensate drain in accordance with Section 6 of this manual. Connect the water supply according to Section 7 of this manual.

Connect the gas supply in accordance with Section 8 of this manual. Flush/clean the internals of the heating system.

Connect field wiring in accordance with Section 9 of this manual.

Advise home/building owner of their responsibilities with respect to using and maintaining the appliance.



### Warning

The building owner is responsible for keeping the Vent/Air-Intake termination free of snow, ice, or other potential blockages and for scheduling routine maintenance on the appliance (see Section 12). Failure to properly maintain the appliance may result in serious injury or death.

### Start-up

Turn gas shut-off valve to the ON position. Turn Power on to appliance.

Set Controller to the desired settings (and start calibration if not done yet) Turn thermostat up, Ignition will occur.

### Operational Review

System is free of gas leaks.

System is free of water leaks.

Water pressure is maintained above 1 bar (14.5 Psi).

All air is purged from the heating system piping.

Ensure proper water flow rate; unit must not kettle, bang, hiss.

Ensure gas line pressure is in accordance with section 8.

System is free of combustion leaks. Unit must operate smoothly.

Ensure the flue gas combustion readings are within the tolerances. System is calibrated.

Each ignition must be smooth.

Verify that all condensate lines are clean and drain freely.

Flow for combustion and ventilation air is not obstructed and the user is informed.

Water quality with regard to calcium and cl levels must meet the requirements.

### Before Leaving

Gas pressure regulator test gauge connection must be closed and sealed.

Flue gas analyzer access points must be closed after calibration (Thermal fuse placed back / sampling point M&G vent system closed).

Always verify proper operation after servicing.

All air must be purged out of the system using the vent cycle (section 10)

Allow the appliance to complete at least one heating cycle, or to operate for at least 15 minutes.

Check cover is attached properly: blocked by latches and secured with screw at the top side.

### Instructions to Installing Contractor

Ensure that the customer receives the documentation with regard to installation / use.

Leave the manual with the customer so it's known to the customer when to call for Periodic maintenance and inspection.



### Warning

This appliance must have water flowing through it whenever the burner is firing. Failure to comply may damage the unit, void the warranty, and cause serious injury or death.



### Warning

Allowing the appliance to operate with a dirty combustion chamber will adversely affect its operation and void the warranty. Failure to clean the heat exchanger on a frequency that matches the need of the application may result in fire, property damage, or death.

## Part 12 - Perodic maintenance and inspection



### Warning

This appliance must be inspected:

At the beginning of every heating season, and at least every 12 months, by a Qualified Technician. When the appliance generates a series of similar faults.

### Annual Inspection Review

Ask the user if there are any problems with the CH appliance or any other remarks. The remarks or complaints of the customer about the operation of the CH boiler may indicate hidden defects and problems.

Check the water pressure of the system. It must be between 1 and 1.5 bar (14.5 and 22 Psi). Bring the pressure of the installation between 1 and 1.5 bar (14.5 and 22 Psi), find any leaks in the installation and have this repaired by a registered installer or service centre if necessary.

Remove the housing from the appliance and check all pipes and connections for traces of water and/or water leakage. Any leaks must be repaired. Check the top side of the housing and/or the top side of the appliance for water leakage or traces of water from the air supply pipe or the vent. Find the cause when water is leaking from the air supply pipe. This may be found in the roof surface.

Open the condensate trap and remove any dirt present. Flush if the condensed water coming from the condensate trap is heavily contaminated. If the burner has already been removed, let water flow into the heat exchanger through a filling hose. This will reach the condensate trap.

Let the appliance burn at maximum power and measure the load and the CO<sub>2</sub> percentage. If necessary, adjust the gas setting for the maximum load at the gas valve.

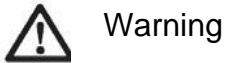
Let the appliance burn at minimum power and measure the load and the CO<sub>2</sub> percentage. If necessary, adjust the gas setting for the minimum load at the gas valve.

Listen to the sound of the CH pump and the fan. If the CH pump or fan makes noise, it is recommended to replace the part preventatively.

In case of a too small tap water quantity (Cxxx types), check the water quantity limiter for dirt. If it is clean, descale or replace the heat exchanger for the tap water.

Check if the supply to the CH installation does not get warm when heating the tap water. If the temperature of the supply water increases while tapping, this means that the 3-way valve on the inside has been contaminated and needs cleaning or replacement.

## Part 12 - Periodic maintenance and inspection



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

Make sure any gas is cleared from the combustion chamber. Turn the gas valve of.

Remove the burner:

- 1 Remove the four M6 nuts at the front plate of the combustion chamber.
- 2 Remove the ignition cable.
- 3 Disconnect the gas pipe of the gas valve.
- 4 Pull forward the burner unit including the fan.



Pull the burner forward halfway the furnace and remove the fan cable plug from the fan.

Never clean the burner yourself. If the inside of the heat exchanger / combustion chamber has been contaminated and/or there is some deposit on the inside of the stainless steel tubes, remove the latter with a vacuum with a high efficiency filter followed by cleaning with hard nylon brush or citric acid. Then once again remove loose debris or dust with a vacuum cleaner. If necessary repeat this cleaning cycle until the heat exchanger / combustion chamber is clean. If necessary use some plastic to protect electrical components from being damaged by liquid dripping. Inspect the insulation disc located at the back side of the combustion chamber. Replace if damaged. Do the same with the insulation disc around the burner. Take into account handling instructions pertaining to Refractory Ceramic Fibers.



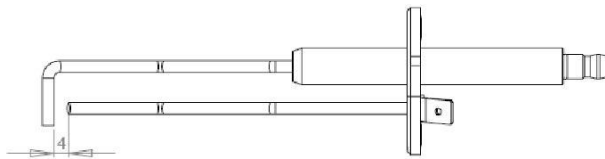
Do not use a wire brush for cleaning.

Check the inside of the heat exchanger.

Dismount the plastic air suction box on the suction side of the fan. Check the blades of the fan. If the blades of the fan are covered with dirt, carefully clean every blade. If this is not done regularly, the fan will not evenly rotate and get out of balance.

Check the distance between the electrode and the burner. This must run parallel with the burner at a distance of approximately 5.5 mm (0.22 Inch).

Use a ignition/ionisation pin to measure the flame impedance to the burner. See below.



The distance between the ignition pin and the earth pin must not exceed 4 mm (0.16"). If so, carefully bend back the pin to a distance of 4 mm (0.16").

Re-install the ignition pin, ignition cable, gas pipe and the burner door. Check for gas leaks.



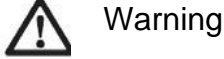
Replace any gaskets or insulation discs that show any signs of damage and do not re-use. Failure to follow these instructions may result in fire, property damage or death.

## Part 12 – Periodic maintenance and inspection

Check whether relief valve and air vents are not weeping. Low water cut off is flushed (if applicable).

Examine all venting for evidence of leaks. Ensure vent screens are cleaned and clear of debris. Check the burner plate for signs of leaking.

Listen for water flow noises indicating a drop in appliance water flow rate.



Warning

**Boiler Only** - Boiler system cleansers and corrosion inhibitors must not be used to flush contaminants from water heaters or potable water systems.

Perform the operational checklist detailed in section 11.

### Refractory Ceramic Fibers (RFC)



Warning

**Personal Protective Equipment Recommended** - Read the following warnings and handling instructions carefully before commencing any service work in the combustion chamber. The insulating material on the inside of the burner door and at the back of the combustion chamber can contain *Refractory Ceramic Fibers* and should not be handled without personal protective equipment.



Warning

**Potential Carcinogen** - Use of Refractory Ceramic Fibers in high temperature applications (above 1000 °C / 1832 °F) 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 the table below may result in serious injury or death.



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 the table below for handling instruction and recommended personal protective equipment. Installation and service must be performed by a qualified installer, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this appliance. This appliance contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

**Table 12.1 Handling Instructions for Refractory Ceramic Fibers (RFC)**

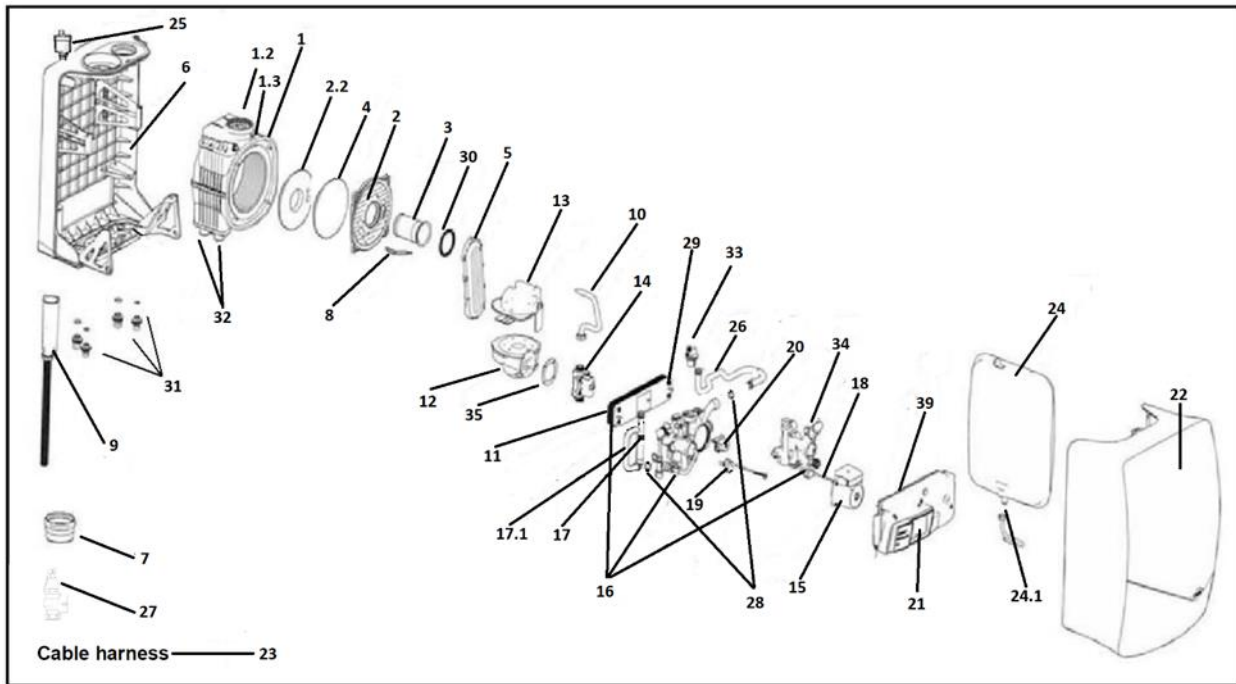
Reduce the Risk of Exposure	Precautions and Recommended Personal Protective Equipment
Avoid contact with skin and eyes	Wear long-sleeved clothing, gloves, and safety goggles or glasses.
Avoid breathing in silica dust	Wear a respirator with a N95-rated filter efficiency or better. <sup>1</sup> Use water to reduce airborne dust levels when cleaning the combustion chamber. Do not dry sweep silica dust. Pre-wet or use a vacuum with a high efficiency filter.
Avoid transferring contamination	When installing or removing RFCs, place the material in a sealable plastic bag. Remove contaminated clothing after use. Store in sealable container until cleaned. Wash contaminated clothing separately from other laundry.
First Aid Measures	If irritation persists after implementing first aid measures consult a physician. <b>Skin</b> - Wash with soap and water. <b>Eyes</b> - Do not rub eyes; flush with water immediately. <b>Inhalation</b> – Breathe in fresh air; drink water, sneeze or cough to clear irritated passage ways.
<b>Notes:</b> <sup>1</sup> Respirator recommendations based on CCOHS and OSHA requirements at the time this document was written. Consult your local regulatory authority regarding current requirements for respirators, personal protective equipment, handling, and disposal of RFCs.	

## **Part 12 - Periodic maintenance and inspection**

For more information on Refractory Ceramic Fibers, the risks, recommended handling procedures and acceptable disposal practices contact the organization below:

**Canada (CCOHS):** Telephone directory listing under Government Blue Pages Canada—Health and Safety—Canadian Centre for Occupational Health and Safety; or website <http://www.ccohs.ca>.

## Part 13 - Parts list



For a list of parts that corresponds to the item numbers, refer to Table 13.1.

Exploded view no.	Category	Part name	Part Number
1	Heat exchanger	Heat Exchanger HE ISO 3+1 C/H100	106-1028
1	Heat exchanger	Heat Exchanger HE ISO 4+1 C/H140,	106-1029
1	Heat exchanger	Heat Exchanger HE ISO 5+2 C/H200	106-1031
1.2	Heat exchanger	Bayonet Clixon (green sensor)	106-1150
1.3	Heat exchanger	NTC SENSOR FOR ISOTHERMIC HE (blue sensor)	106-1241
2	Burner Door	Burner Door Iso	106-1033
2.2	Burner Door	Insulation Burner Door Iso	106-1162
3	Burner	Burner C/H100	106-1035
3	Burner	Burner C/H140	106-1163
3	Burner	Burner C/H200	106-1036
4	Burner	Burner door Gasket	106-1091
5	Burner	Inlet Pipe	106-1002
6	Backplate	Backplate Uni	106-1010
7	Exhaust Pipe	Exhaust Pipe	106-1011
8	Combustion	Spark Ignitor	106-1039
9	Condensate hose	Condensate Hose	106-1067
9	Condensate Cup	Condensate Cup	
9	Condensate O-ring	Rubber Sealing Siphon	
9	Condensate nut	Nut for condensate cup	
10	Gas Pipe Adapter	C/H 100	202-1227
10	Gas Pipe Adapter	C/H 140	202-1228
10	Gas Pipe Adapter	C/H 200	202-1343
10	Gas Pipe Adapter	C/H 200 LP	202-1331
11	Plate Exchanger	C100	106-1045
11	Plate Exchanger	C140/200	106-1046
12	Fan	Fan	106-1242
13	Fan	Sealing Gas Mixer-C/H100	106-1056
13	Fan	Sealing Gas Mixer-C/H140	106-1057
13	Fan	Sealing Gas Mixer-C/H200	106-1058
14	Gas Valve	Gas Valve	106-1040
15	Pump	Boiler Pump	106-1260
16	Hydro Block	C/H 100-140	106-1272
16	Hydro Block	C/H 200	106-1273
17	Sensor	CH Supply Sensor	106-0435



17.1	CH Supply	Magnetite Filter C/H100 C/H140	202-1023	106-1278
17.1	CH Supply	Magnetite Filter C/H200	202-1179	106-1279
18	Pressure sensor	Pressure sensor	202-1135	106-1061
19	Flow Sensor	Flow Sensor	206-0432	109-1062
20		3-WAY VALVE MOTOR	206-0431	109-1059
21	Burner control	HAG-C04-IT02 Canada SERIGRAFIA	202-1233	106-1243
21	Burner control	CABLE FOR HAGC04 TO DISPLAY	202-1044	106-1048
21	Burner control	DISPLAY ECO-KING	202-1045	
22	Exterior Housing	Front Housing		
23	Cable tree	Cable tree 1 sensor & stepper Motor		
23	Cable tree	Cable tree 2 Gas Valve	202-1214	
23	Cable tree	Cable tree 4 Sensor Flue Temp	202-1225	
23	Cable tree	Cable tree 6 Spark plug	202-1216	106-1244
23	Cable tree	Cable tree 8 Ignition ground Cable		
23	Cable tree	Cable tree 5 Fan & Pump	202-1216	
23	Cable tree	Cable tree 9 Ground Plumbing		
23	Cable tree	POWER Cable		
24	Expansion tank	Internal expansion tank	202-1012	106-1069
24.1	Expansion tank	Fiber washer		106-1102
25	Automatic air vent	AUTOMATIC AIR VENT	206-0434	106-1065
25	Automatic air vent	Plug		EK HXPLG
26	Pipe	Copper Return Pipe		106-1257
27	Valve	¾"pressure relief 45lbs		106-1240
28	HEX pipe connector clips	Clips for HEX		106-1098
29	Seal Hydro connection adaptor	Large O-ring for Plate heat exchanger		106-1103
30	O-Ring	Burner Oring		106-1090
31	Connectors	Gasket	202-0135	
31	Connectors	Transition	202-1274	
31	Connectors	NUT	202-1156	
32	Clip	Metal Clip For Copper Pipe to HEX	202-1027	
33	Pump	Air Vent		106-1065
34	Clip	Metal clip, D10 for expansion tank connection		106-1097
35	Gasket	Gasket For Fan	202-1128	
39	PCB	Main PCB		106-1243

**Table 13.1. Parts list Eco-King**

## Part 14 - Troubleshooting



### Warning

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

#### Servicing the Appliance

Disconnect or shut off all energy sources to the appliance: 120VAC power, water and gas.

Identify and mark wires before disconnecting or removing them. Wiring errors can cause improper and dangerous operation.

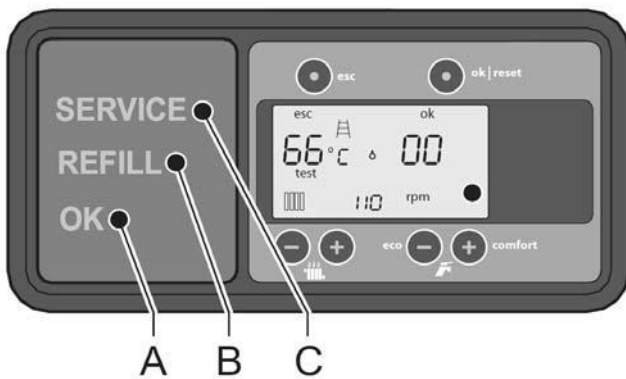
Never bypass electrical fuses or limit devices.

Use proper personal protective equipment (PPE) i.e. eye protection, safety footwear. Verify proper operation after servicing.

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

#### Displaying faults

LED indicators show the main operational status of the appliance.



**A:** OK: the system is functioning properly.

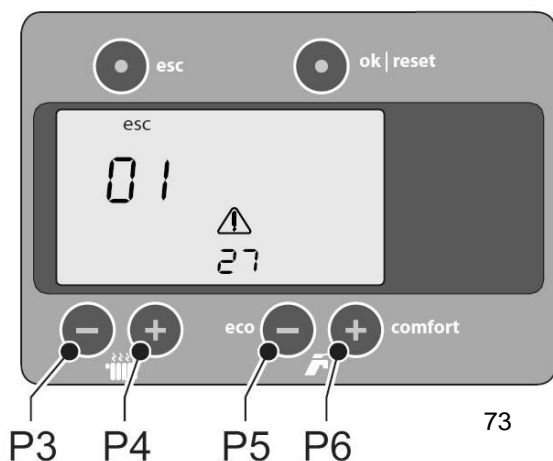
**B:** REFILL: the CH pressure is low and the system needs to be filled.

**C:** SERVICE: a fault has occurred. See table 14.1 Fault codes.

#### Fault history

To view the 8 most recent faults simultaneously press [P5] and [P6] to read out the 8 most recent fault codes. Subsequently Press [P3] or [P4] to go through the list. Refer to table 14.1 for description of the fault belonging to the code and the proper corrective action that needs to be performed.

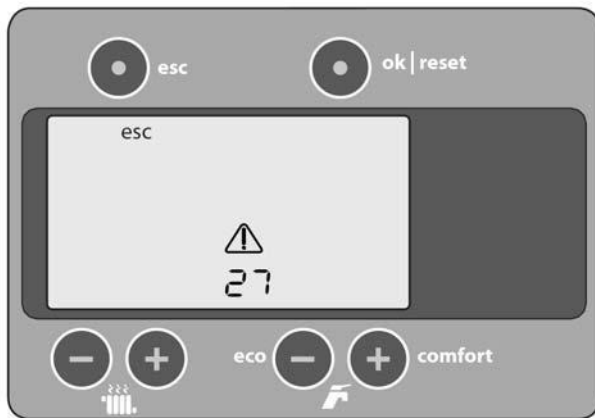
To erase these 8 errors, you must first enter the installer menu of the boiler system: see Step 3: adjust settings. Then return to main menu, enter the fault history and “reset” will be on the LCD screen below the ok/reset button. Press the “reset” button firmly and let go. The error codes will now be erased and any new error code will be stored.



## Part 14 - Troubleshooting

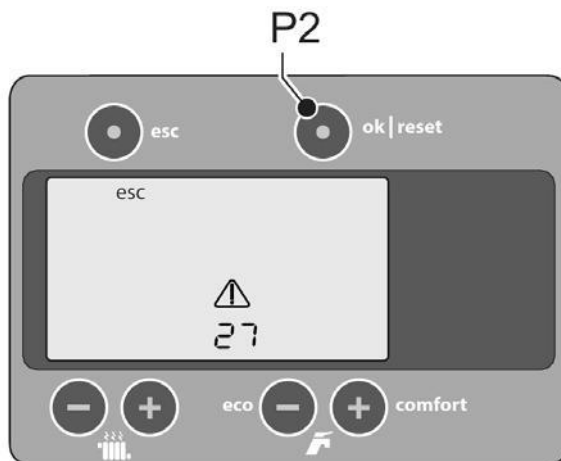
### Fault codes

Locking faults that block system operation appear in the display with a fault code. A warning symbol is placed above each fault code. Besides, the led 'SERVICE' lights up. To erase



### Reset fault

In a number of occasions in which a fault has occurred, the user can reset the fault and restart the system. In those cases, the text 'reset' is shown in the display. In case a fault occurs the system can be restarted by pressing firmly and let go of [P2]. In case this would not solve the problem, a registered installer must be contacted.



## Part 14 – Troubleshooting

Code	Description	Cause / Solution
01	Lock-out no ignition	9, 10, 11, 26, 27, 28, 29, 30, 32, 44, 47, 76,77
02	Lock-out ionization problem - parasitic flame	29, 31, 32
03	Lock-out high limit temperature protection	5, 6, 8, 16, 17, 18, 19, 33, 34, 35, 39, 42, 43, 72, 73
05	Lock-out Primary temperature too high (>95 °C)	5, 6, 8, 16, 17, 18, 19, 35, 39, 40, 42, 43, 72, 73
06	40min Lock - Insufficient temp. gradient on supply sensor	5, 6, 8, 16, 39, 41, 42, 43, 51, 54
07	Too long in Legionella mode	45
08	Lock-out Flame lost for 6 times	9, 11, 28, 29, 44, 47, 74, 76
09	Lock-out Gas valve fault	46, 47, 77
15	Lock out Gas valve does not close	46, 47, 77
16	Gas pressure too low	47, 74, 76
20	Water pressure too low	17, 48, 61, 75
21	Water pressure too high	40, 49, 50, 61, 75
25	Supply sensor fault	41, 43
26	Flue gas temperature too high	5, 6, 8, 16, 17, 18, 19, 33, 34, 35, 39, 41, 42, 43
27	Flue gas sensor fault	33, 41, 51, 77
28	DHW sensor fault	23, 41, 77
29	Outdoor sensor fault	41, 52, 53
30	Return temperature sensor fault	41, 54
31	Expansion fault	40, 49, 50, 61
32	Supply temperature too high during DHW operation	5, 8, 16, 17, 18, 19, 34, 35, 39, 41, 42, 43
37	Supply voltage too low	55, 56
40	Fan feedback signal fault	41, 57, 58, 59, 60, 77
41	CH pressure sensor deactivated	75
42	CH pressure sensor fault	41, 61, 75
43	DHW flow sensor fault	41, 62, 63
44	Tank sensor fault	41, 64, 65
46	Code key fault	66, 67
50	Fault during calibration (cause of fault is shown in display of boiler as well)	8, 39, 68
53	Flue gas blockage	59, 69, 70, 71

**Table 14.1** Fault codes seen on screen under a warning triangle

Comfort complaints	
Problem	Solution
The house is not sufficiently heated although the unit burns.	1, 2, 3, 4, 5, 6, 7, 8
The ignition makes a lot of noise.	9, 10,11
The room thermostat demands heating, but the burner does not go on.	7, 12, 13, 78
The unit burns continuously, and the house is heated too much.	7, 12, 14, 15
During CH operation the boiler makes a lot of noise.	5, 8, 16, 17, 72, 73
The top of the radiators is insufficiently heated	8
On hot water demand, the water is cold.	18, 19, 78
On hot water demand, the hot water temperature does not reach 60 °C.	16, 18, 19, 24, 25, 26
The hot water temperature is too high.	20, 21, 22, 23
During hot water demand, the boiler makes a lot of noise.	5, 8, 16, 17, 26

**Table 14.2** Trouble shooting list

## Part 14 - Troubleshooting Fault Codes

Code	Possible cause	Solution
01	Supply and return switched at installation	Check CH connections
02	CH set point adjusted too low	Check parameter 0
03	Max CH modulation set too low	Check parameter 1
04	Max modulation time too long	Check parameter 2
05	Pump speed too low	Check speed in diagnose menu (24) and check parameter 4 and 5
06	Boiler is not able to distribute generated heat	Check installation for sufficient flow
07	Outdoor sensor used	Check heating curve parameters 7,8,9,10
08	Air in CH circuit	Vent the CH circuit
09	Calibration not completed correctly	Perform calibration
10	Distance / gap electrode not correct	Check electrode gap and distance to burner
11	Ignition electrode damaged	Replace ignition electrode
12	Room thermostat connected incorrectly	Check cabling and connection to room thermostat
13	Opentherm thermostat connected	Set point thermostat (CH temperature) is lower than actual CH temperature. Check item 4 and 5 in diagnose menu.
14	Thermostat does not switch off	Replace thermostat
15	Opentherm thermostat connected	Set point thermostat (CH temperature) is higher than actual CH temperature. Check item 4 and 5 in diagnose menu.
16	Main heat exchanger cluttered	Clean heat exchanger
17	CH pressure too low	Re-fill installation
18	3-way valve cluttered	Check and clean 3-way valve when required
19	3-way valve does not change position	Check valve actuator and cables. Replace when required
20	Readout flow sensor incorrect	Check flow sensor in diagnose menu (07)
21	Solar tank used to feed boiler	Check availability and setting mixing valve
22	Setting DHW set point too high	Check parameter 12
23	DHW sensor damaged	Check DHW temperature via diagnose menu (8) and replace sensor when required
24	Too high DHW flow over boiler	Check use of correct (and undamaged) flow restrictor
25	Plate heat exchanger cluttered at CH side	Check plate heat exchanger
26	Gas valve closed	Open gas valve
27	No gas supply	Gas pressure regulator stuck or broken, gas valve closed, check grid pressure
28	Ignition cable broken or not connected	Check ignition cable
29	Ignition cable cap damaged	Check for cracks. Replace when required
30	Ignition transformer damaged	Check if the unit sparks and check the distance and gap of the electrode. If all OK replace burner controller.
31	Water in ionisation circuit	Check for water (humidity), dry and check operation. Replace when required
32	Dirt in gas valve	Check if valve fully closes when power is unplugged
33	Flue gas sensor damaged	Exchange sensor and check parameter 14
34	Wrong setting of temperature limit configuration	Check parameter 14
35	Maximum power too high	Check boiler power and adjust parameter 1 when required
39	Pump does not run is stuck	Replace pump or try to turn pump shaft.
40	Refill valve is open	Close refill valve
41	Cable damaged	Check cables for damage and friction free routing
42	Sensors switched	Check sensor positions and connections
43	Supple sensor broken	Check sensor in diagnose menu (4) and replace when required
44	Siphon cluttered (condensate cup)	Clean siphon
45	Too high circulation losses or demand	Boiler is not able to heat tank to a temperature above 70C within 3 hours. Check recirculation losses and heat exchanger tank
46	Gas valve cables damaged	Check cables and replace when required.
47	Gas valve broken	Check gas valve and replace when required.
48	Leakage in CH circuit	Exchange leaking installation part s and refill
49	CH pressure too high	Decrease pressure using the drain valve
50	Expansion vessel broken	Check expansion vessel
51	No temperature rise detected within 1 minute after ignition or sensor broken	Check position of supply sensor and flue gas sensor. Check sensor readings via diagnose menu and replace sensor(s) when required
52	No outdoor sensor connected	Check parameter 7
53	Outdoor sensor broken	Check reading via diagnose menu (11) and replace sensor when required
54	CH return sensor broken	Check reading via diagnose menu (6) and replace sensor when required
55	Supply voltage too low	Check supply voltage in standby and operation
56	Supply cable damaged	Replace supply cable
57	Fan not connected	Check fan connection to burner control
58	Too much dust/dirt in fan	Check and clean fan
59	Fan broken	Replace fan
60	Water on fan connection	Check fan and connection and make dry when required
61	CH pressure sensor broken	Check reading via diagnose menu (3) and replace when required
62	DHW sensor broken	Check reading via diagnose menu (7) and replace when required
63	Incorrect connection to earth	Check earth in supply cable and supply cable connections
64	No tank nor tank sensor present	Check parameter 11
65	Tank sensor broken	Check reading via diagnose menu (12) and replace when required
66	No code key or faulty connection	Install code key and or check connections
67	Code key broken	Replace code key
68	Boiler cannot distribute heat due to high system temperatures	Perform calibration with DHW demand to be able to distribute generated heat
69	Calibration not successfully completed	Perform calibration and check diagnose menu (32)
70	Blocked flue	Check flue pipe for blockages
71	Change in flue system after calibration	Perform calibration
72	Magnetite filter cluttered	Check and clean filter
73	CH return restrainer cluttered	Clean hydro block CH return connection
74	Resistance in gas supply pipe too high	Check pressure drop over gas supply system too boiler. Contact grid owner when required
75	CH pressure sensor broken	Replace sensor. When required sensor can be deactivated temporarily. Parameter 20.
76	Gas / air mixture incorrect	Check fan air intake for cracks and secure placement of the air intake sticker.
77	Burner control broken	Replace
78	Fan calibration time is running	Fan calibration has not completed during calibration process. Wait 10 minutes to finalize calibration.

**Table 14.3 Fault- Possible causes and solutions**

## Part 15 Start Up Review

Light Up Activities			Date Completed			
1)Verify piping	Verify all piping and gas connections are secure and tight	completed _____				
2) Pressurize boiler and system	Use manual fill valve (white knob at bottom left of boiler) by turning it open (clockwise turn) or if relying on PRV to pressurize system, open it until boiler pressure reaches 1.5 bar	completed _____				
3)Check gas pipe	Leak test using approved local methods					
	Check incoming gas pressure. Ideal pressure is 8 to 10"	In. wc _____	Static			
	What is the "drop" on light off (no more than 1"wc)	In. wc _____	Dynamic			
4)Condensate cup	Fill condensate cup half way with water and ensure it is inserted fully and twisted to secure fully	completed _____				
5)Propane (if using)	See page 53 and 54 to change boiler setting from NG to LP. If using H200 or C200, must change gas pipe on these models ONLY	completed _____				
5)Calibrate the boiler **THIS STEP IS ESSENTIAL**	See page 60 and 61 of manual for instructions. If done manually, note flame ionization number used to get 9% CO2	% CO2 _____	High Fire	%CO2 _____	Low Fire	
6)Record System settings	See page 53 and 54 to change boiler settings. Record changed settings					
6.5)Change domestic hot water setting	If using an indirect tank with H model boiler, setting 11 must be changed to "02" to let boiler know tank is present	completed _____				
7)Confirm system operation	Turn up thermostat to verify wiring connections. Ensure boiler fires upon thermostat call for heat	completed _____				
8)Warranty registration	Mail in warranty registration form or register online at <a href="http://www.Eco-Kingheating.com">www.Eco-Kingheating.com</a> . Navigate to boiler page and follow links					

**Table 15.1 Start Up Review**

## PART 16 Maintenance Review



### WARNING

Allowing the heater to operate with a dirty combustion chamber will hurt operation. Failure to clean the heat exchanger as needed by the installation location could result in heater failure, property damage, personal injury, or death. Such product failures ARE NOT covered under warranty

Periodic maintenance should be performed once a year by a qualified service technician to assure that all the equipment is operating safely and efficiently. The owner should make necessary arrangements with a qualified heating contractor for periodic maintenance of the heater. Installer must also inform the owner that the lack of proper care and maintenance

Inspection Activities		Date Last Completed			
		1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year
Near heater piping	Check system and boiler piping for any sign of leakage. Take off boiler cover and inspect connections in boiler for any leaks or corrosion				
Vent	Check condition of all vent pipe and joints				
Gas	Check gas piping, test for leaks and signs of aging. Confirm gas pressure and note pressure drop upon start-up. Confirm CO2 at high and low fire (ideal 9%)				
Visual and Temperature	Do visual inspection of all system components and verify programmed temperature settings				
Connections	Check wire connections and make sure they are tight				
Combustion chamber	Check burner tube and combustion chamber coils. Clean with nylon brush and vacuum. Avoid touching white ceramic fiber. Also see maintenance section of manual				
Spark igniter	Ensure spacing of igniter prongs are aligned properly. Also see page 64.				
Condensate Cup	Disconnect condensate hose and cup. Ensure no blockage, rinse and clean out. Fill half way again with fresh water and re-install				
Relief Valve	Check to make sure it is not weeping				
Pump and Fan	Listen to sound of the pump and fan. If either makes noise during operation, it is recommended to replace the part preventatively.				
Domestic HW in COMBI models	In cases where homeowner complains of too little water supply, check the water filter on cold water inlet for dirt. If it is clean, descale the DHW plate heat exchanger. If still have complaints, replace the DHW heat exchanger.				
Homeowner	Question homeowner before maintenance if they have any issues and after done, confirm activities you performed during maintenance visit				

of the heater may result in a hazardous condition.

### Maintenance Table

Table 16.1 Maintenance Review

Supplier and Manufacturer:  
Eco-King Heating Products Inc.  
Unit 103, 2567-192nd Street  
Surrey, BC Canada  
V3Z 3X1

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