

3. INSTALLATION (authorized personnel)

3.1 Reference standard

Install in accordance with local building and electrical codes.

Failure to install a gas appliance correctly and in accordance with the above norms could lead to prosecution. It is in the interest of the installer and safety that the codes are complied with.

The manufacturer's instructions form an integral part of the installation and should be left with the appliance but do not over ride in anyway statutory obligations.

Installation requirements

Please refer to local and national standards in force with the Country of destination of the product.

3.2 Unpacking

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

A. Place the packed appliance on the floor (see fig. 1) making sure that the "up" arrow is facing down. Remove the staples and open out the four flaps of the box.

B. Rotate the boiler 90° while manually supporting it from underneath

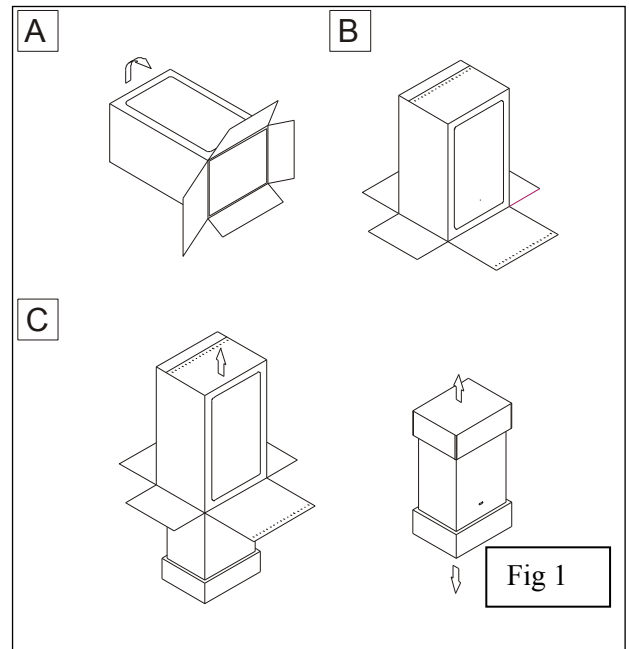
C. Lift the box and remove the protections. Lift the boiler by grasping the rear part and proceed with the installation.

STORAGE & HANDLING

Please note that prior to installation the Pensotti North

America boilers should be stored in the horizontal position with no more than three boilers to a stack;

Ensure that the boilers are stored in dry conditions and be aware that the carton is a two-man lift;



3.3 Installing the boiler.



The appliance must be installed exclusively on a vertical solid wall capable of supporting its weight.

- The boiler should be fitted within the building unless otherwise protected by a suitable enclosure i.e. garage or outhouse. (The boiler may be fitted inside a cupboard)
- If the boiler is sited in an unheated enclosure then it is recommended to leave the ON/OFF switch always in ON position to give frost protection.
- If the boiler is installed in a room containing a bath or shower reference must be made to the relevant requirements.
- Appliance is approved for installation on combustible walls.

In order to allow access to the interior of the boiler for maintenance purposes, it is important that the minimum distances indicated in figure 1 are respected. To make the installation easier, the boiler is supplied with a template to enable the pipe connections to be positioned prior to fixing the appliance to the wall.

To install the appliance, proceed as follows (see fig. 2):

- a. Use a level (of not less than 24" long) to mark a horizontal line on the wall where the appliance is to be fitted.
- b. Position the top of the template along the line drawn with the level, respecting the distances indicated. Then mark the centres of the positions of the two wall screws or anchors. Finally, mark the positions of the water and gas pipes.
- c. Remove the template and install the domestic hot and cold water pipes, the gas supply pipe and the central heating pipes using the fittings supplied with the unit.

Fix the boiler to the wall using the bracket and connect the pipes.

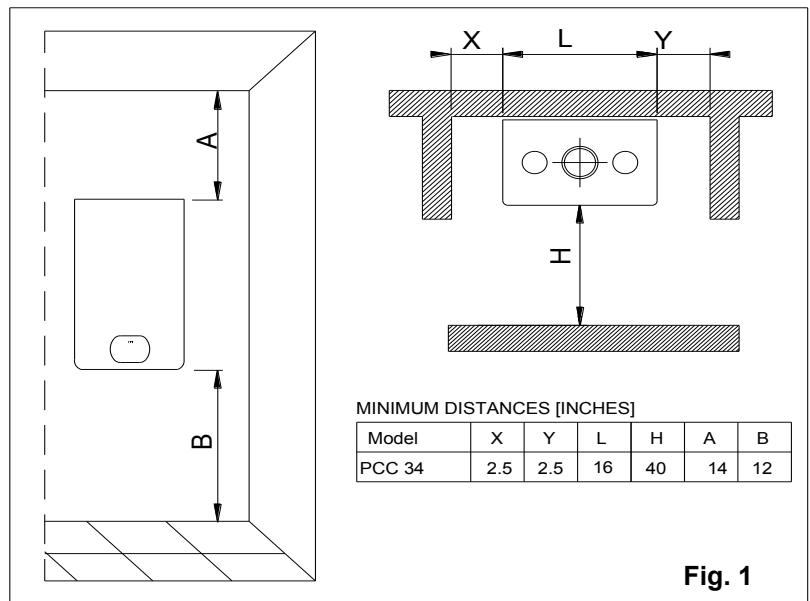


Fig. 1

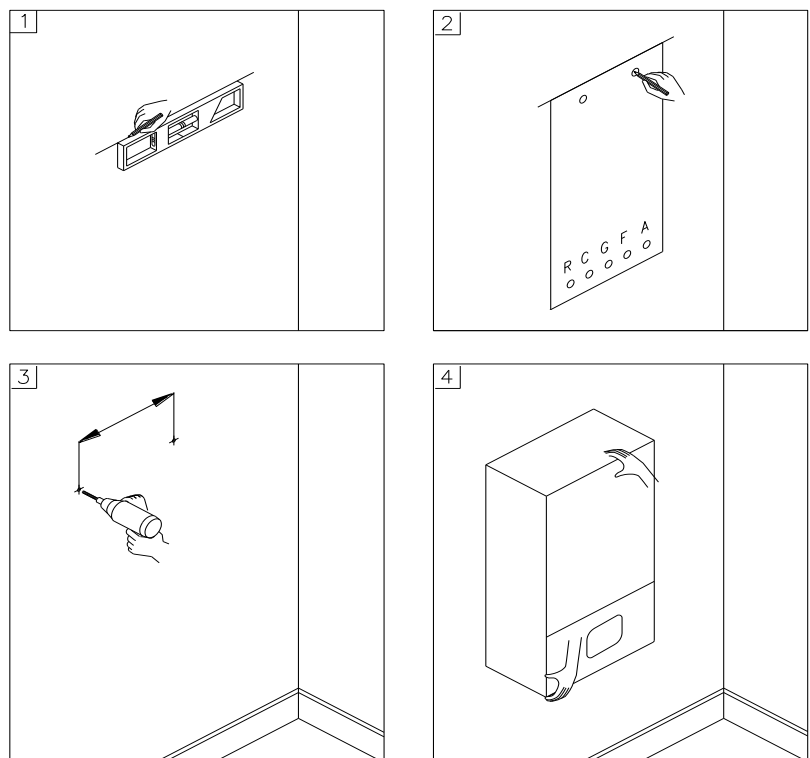


Fig. 2

3.4 Water connections

⚠ In order to safeguard the heat exchanger and circulation pump, especially in case of appliance replacement, it is recommended that the system is hot-flushed to remove any impurities (especially oil and grease) from the pipes and radiators.

⚠ In order to safeguard all waterside components the supplied Fernox Commissioning Kit Must be used in its entirety.

⚠ Make sure that the domestic water and central heating pipes are not used to earth the electrical system. The pipes are totally unsuitable for this purpose.

⚠ Isolation Valves must be installed on the heating and D.H.W circuits. This will facilitate all maintenance and service operations where the appliance needs to be drained.

- To prevent vibration and noise coming from the system, do not use pipes of reduced diameter, short radius elbows or severe reductions in the cross sections of the water passages.
- In order to guarantee the reliability of the boiler a pressure reducing valve and backflow preventer must be installed.
- To facilitate the installation, the boiler is supplied with an hydraulic connection kit (see fig.2).

A pressure relief valve is installed in this dual purpose boiler that is rated in accordance with and complying with either The Standard for relief Valves and Automatic Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22 or The ANSI/ASME Boiler and Pressure Vessel Code, Section IV (Heating Boilers). The relief valve must be

installed such that the discharge will be conducted to a suitable place for disposal when relief occurs. The discharge line must be installed to allow complete drainage of both the valve and the line. If this unit is installed with a separate storage vessel, the separate vessel must have its own temperature and pressure relief valve. This valve must also comply with The Standard for Relief Valves and Automatic Shutoff Devices for Hot Water Supply Systems. ANSI Z21.22 (in the U.S. only). A temperature relief valve is not required but if one is used, do not install the valve with the probe directly in the flow of water. This may cause unwarranted discharge of the valve.

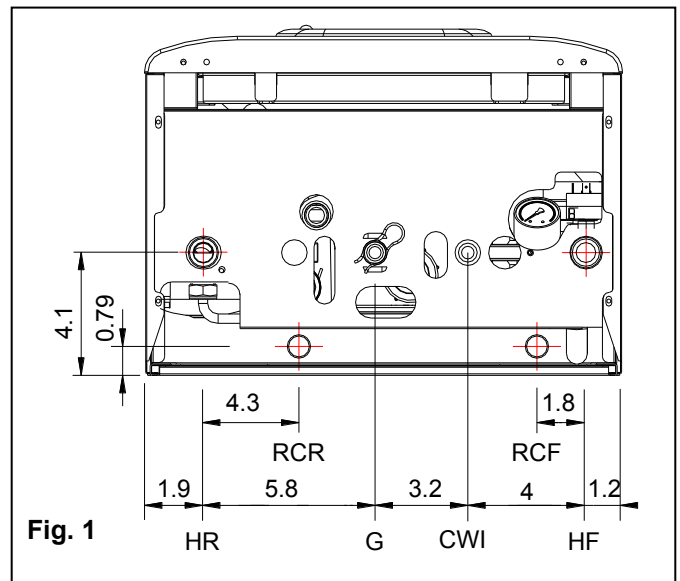


Fig. 1

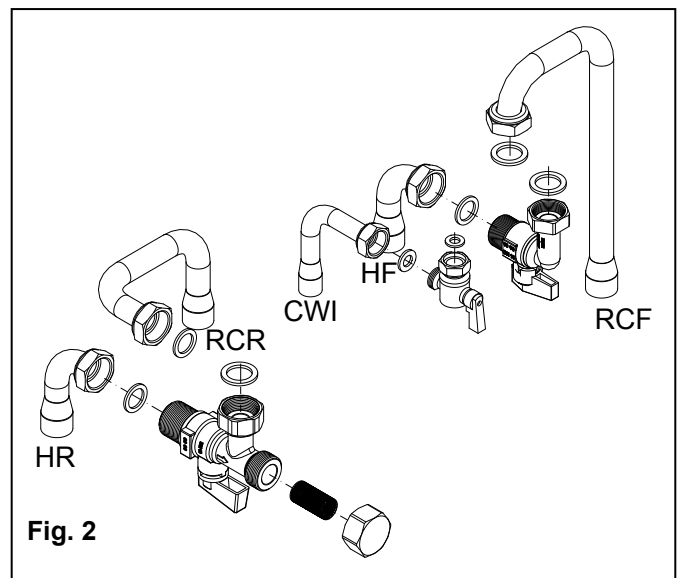


Fig. 2

LEGEND

HR	HEATING RETURN	Ø 3/4"
HF	HEATING SUPPLY	Ø 3/4"
G	GAS	Ø 1/2"
RCR	REMOTE D.H.W. CYLINDER RETURN	Ø 3/4"
RCF	REMOTE D.H.W. CYLINDER FLOW	Ø 3/4"
CWI	COLD WATER INLET	Ø 1/2"
SC	CONDENSATE DRAIN	Ø 0.98 in

3.5 Domestic Hot Water Circuit

- In order to prevent scaling and eventual damage to the D.H.W heat exchanger, the mains water supply must not have a hardness rating of more than 7 grains/gal (120 ppm). It is nevertheless advisable to check the properties of the water supply and install the appropriate treatment devices where necessary.

The cold water supply pressure at the inlet to the boiler must be between 7.25 psi (0.5 bar) and 87 psi (6 bar).

In areas with higher water inlet pressure a pressure reducing valve must be fitted before the boiler.

The frequency of the heat exchanger coil cleaning depends on the hardness of the mains water supply and the presence of residual solids or impurities, which are often present in the case of a new installation. If the characteristics of the mains water supply are such that require it to be treated, then the appropriate treatment devices must be installed, while in the case of residues, an in-line filter should be sufficient.

Central heating circuit

In order to prevent scaling or deposits in the primary heat exchanger, the mains supply water to the heating circuit must be treated according to the requirements of local standards.

This treatment is indispensable in the case where the circuit is frequently topped-up or when the system is often either partially or fully drained.

In order to safeguard all waterside components the supplied Fernox Commissioning Kit Must be used in its entirety.

Condensate drain

Refer to the city, town or municipality have jurisdiction for codes regarding the proper discharge of condensate.

The condensate drain flexible pipe supplied with the boiler must be connected to a proper condensate trap. The condensate discharge into the drainage system is allowed providing a condensate trap (siphon) is installed.

Any condensate discharge pipe work external to the building (or in an unheated part of it) must be insulated to protect against frost. Before switching the boiler On, check the correct condensate discharge.

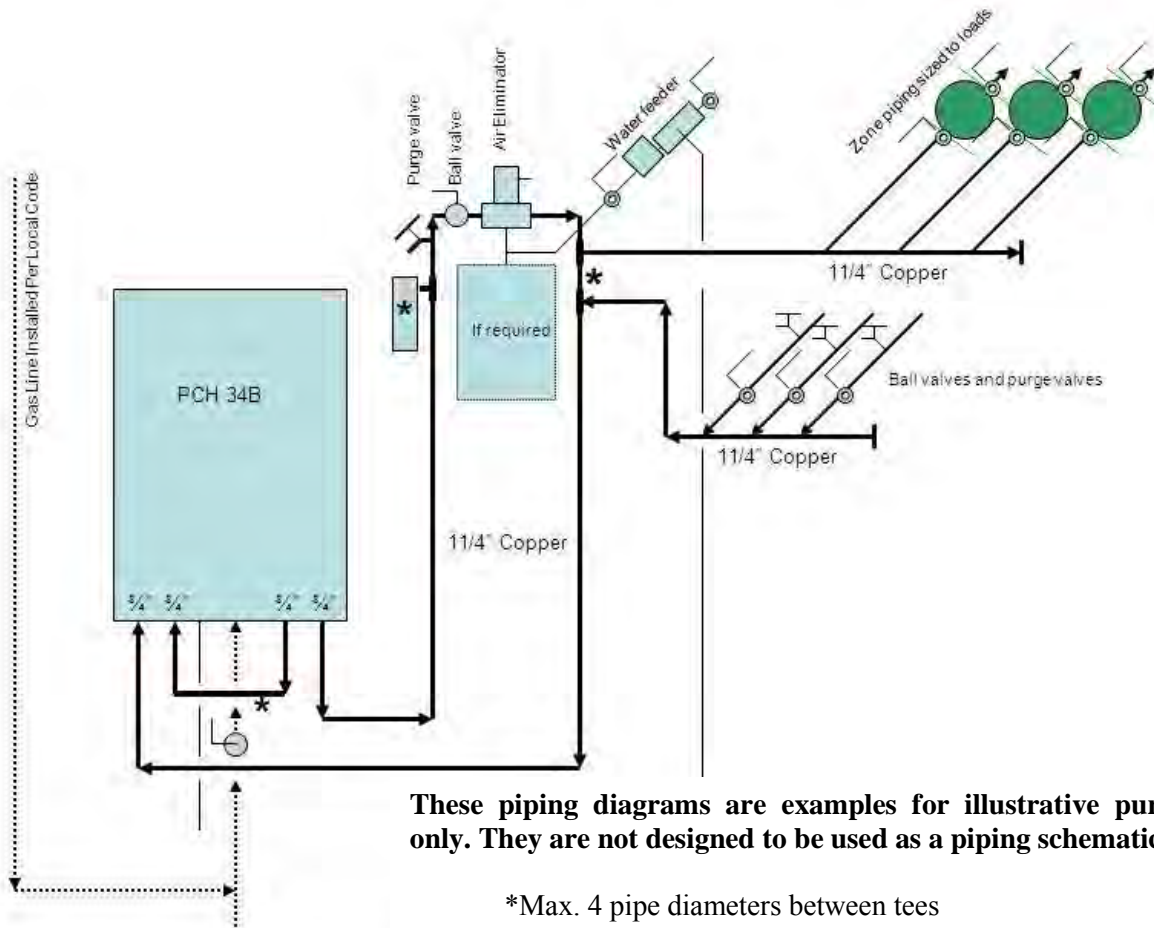
Expansion Tank Capacity

Max. System Operating Temperature (°F)	Maximum System Water Content (Gals.)*
100	114
110	85
120	65
130	52
140	43
150	36
160	30
170	26
180	24

⚠ When installing this boiler without an indirect water heater the following precautions must be taken.

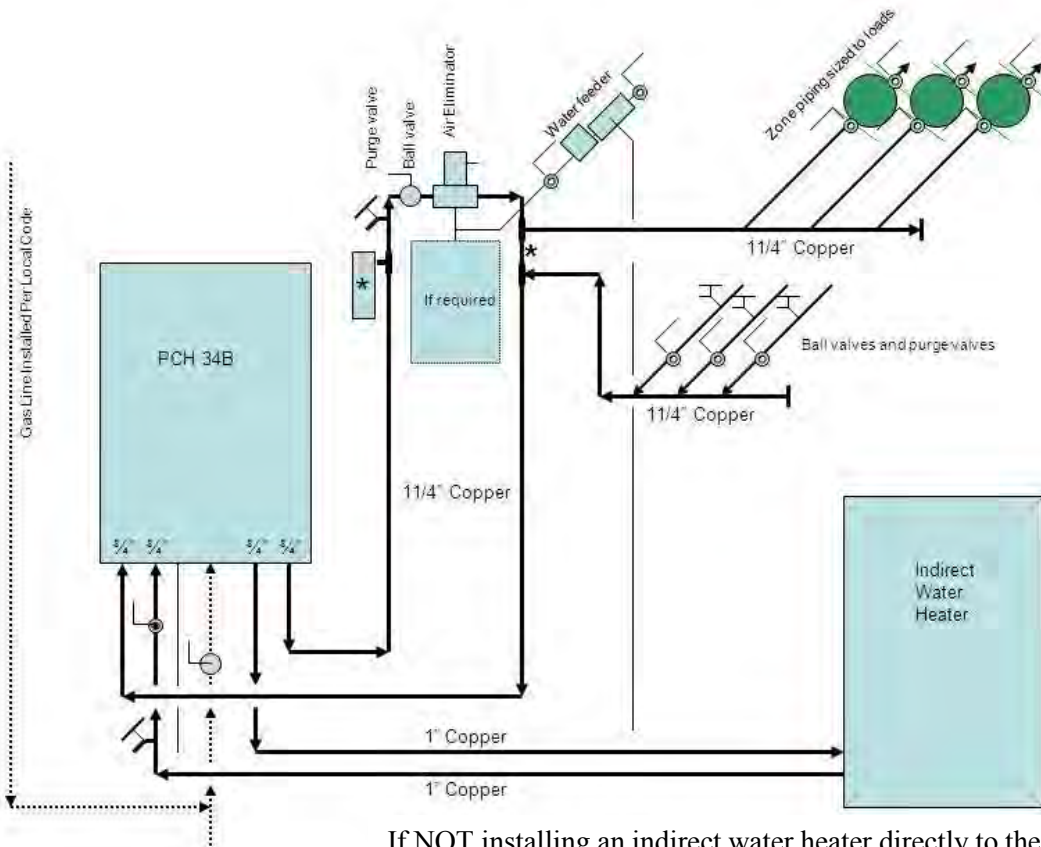
- Install the supplied piping spurs for an indirect boiler.
- Using ¾" copper pipe, connect the supply and return together. SEE drawing on next page.
- Set mode selection switch to Heat only position. SEE section 2.7
- Change parameter 01 (P01) to a value of "00"

3.6 Piping Diagrams



These piping diagrams are examples for illustrative purposes only. They are not designed to be used as a piping schematic.

- *Max. 4 pipe diameters between tees
- *External Low Water Cut-Off if required by local code
- *Tempering Valve May be Required – Consult Local Codes
- *Must leave at least 15" of straight pipe on either side of closely spaced tees



If NOT installing an indirect water heater directly to the boiler you must install a by-pass using the supplied indirect water heater connections. See page 20 for more information.

Pensotti requires the installation of a pressure reducing valve & backflow preventer with all Solenne Series boilers.



Dirt / Scale Separation

Along with the application of our Fernox commissioning kit Pensotti **highly recommends** the installation of a dirt separator in the return piping of all Solenne Series boiler models. Follow the manufacturer's instructions when installing these devices.



3.7 Condensate drain

FAILURE TO INSTALL THE CONDENSATE DISCHARGE PIPEWORK CORRECTLY WILL AFFECT THE RELIABLE OPERATION OF THE DUAL PURPOSE BOILER. The condensate discharge pipe MUST NOT RISE at any point along its length. There MUST be a fall of AT LEAST 2.5° (1" per 20") along the entire run.

1. The condensate outlet terminates in 7/8" nut and seal for the connection of 7/8" plastic overflow pipe which should generally discharge internally into the household drainage system. If this is not possible, discharge into an outside drain is acceptable.
2. Ensure condensate piping, neutralizer, and discharge of condensate complies with any and all local and national codes.
3. The discharge pipe should be run in a proprietary drain pipe material e.g. PVC, PVC-U, ABS, PVC-C or PP.
4. Metal pipe work is NOT suitable for use in condensate discharge systems.
5. The pipe should be a minimum of 7/8" diameter and must be supported using suitably spaced clips to prevent sagging.
6. Any pipe fitted externally must not exceed 10 feet.
7. Any condensate discharge pipe work external to the building (or in an unheated part of it e.g. garage) must be insulated to protect against frost. It is also recommended that the pipe diameter is increased to 1 1/4".
8. If the boiler is fitted in an unheated location the entire condensate discharge pipe should be treated as an external run.
9. In all cases discharge pipe must be installed to aid disposal of the condensate. To reduce the risk of condensate being trapped, as few bends and fittings as possible should be used.
10. When discharging condensate into a soil stack or waste pipe the effects of existing plumbing must be considered. If soil pipes or waste pipes are subjected to internal pressure fluctuations when WC's are flushed or sinks emptied then back-pressure may force water out of the boiler trap and cause appliance lockout.

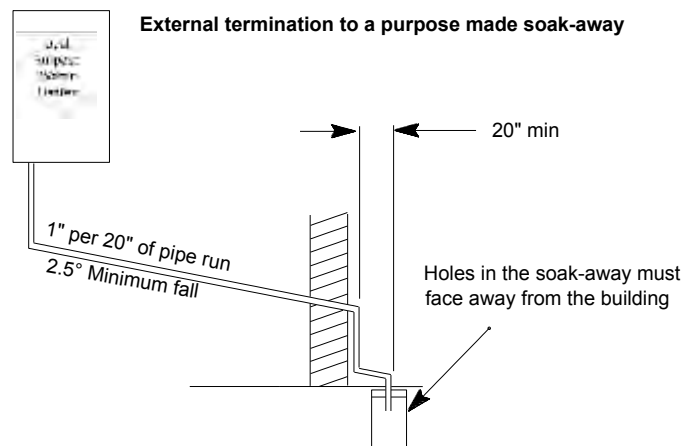
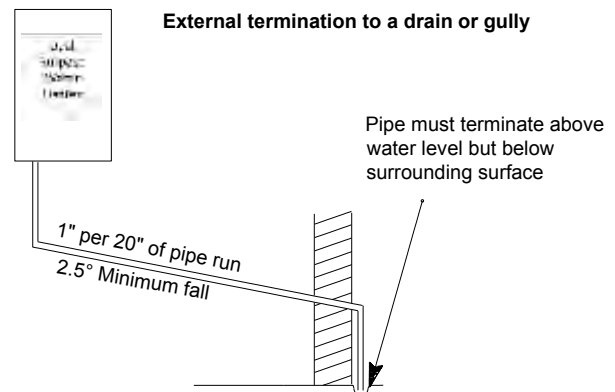
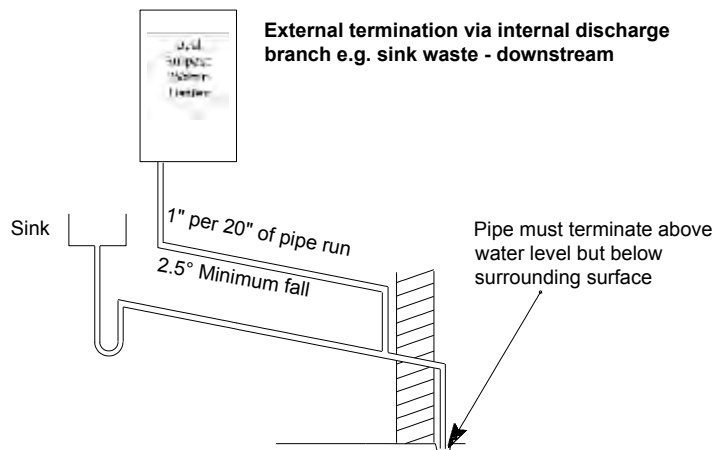
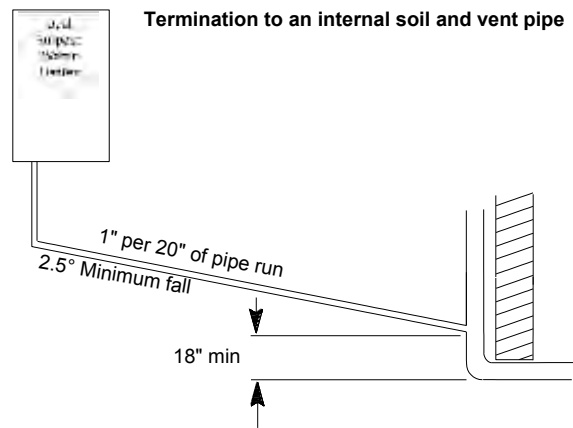
Information Only:

Examples are shown of the following methods of termination:-

- i) to an internal soil & vent pipe
- ii) via an internal discharge branch (e.g. sink waste)
- iii) to a drain or gully
- iv) to a purpose made soak away

Ensure condensate piping, neutralizer, and discharge of condensate complies with any and all local and national codes.

IF, FOR ANY REASON, THE CONDENSATE DRAINAGE SYSTEM FAILS AND CONDENSATE IS PERMITTED TO FLOW BACK INTO THE INTERNAL CONDENSATE BOTTLE INSIDE THE BOILER, THE BOILER WILL STOP AND WILL DISPLAY AN E01 ERROR. THE CONDENSATE DRAINAGE SYSTEM PROBLEM MUST THEN BE CORRECTED BEFORE THE BOILER IS PUT BACK IN OPERATION.



3.8 Gas Connection

3.8.1 Gas Piping Guidelines

Follow all local codes and/or the most recent edition of the National Fuel Gas Code (ANSI Z223.1/NFPA 54) in the USA or the Natural Gas and Propane Installation Code in Canada (CAN/CSA B149.1).

3.8.2 Gas Supply Lines Pressures

The minimum and maximum inlet gas pressures are **Natural Gas Min. 7.00"WC – Max. 14.00"WC. and Propane Gas Min. 11.00"WC – Max. 21.00"WC.**

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

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

The appliance and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 0.5 psi (3.5 kPa)..

The appliance must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at test pressures equal to or less than 0.5 psi (3.5 kPa).

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

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

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

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

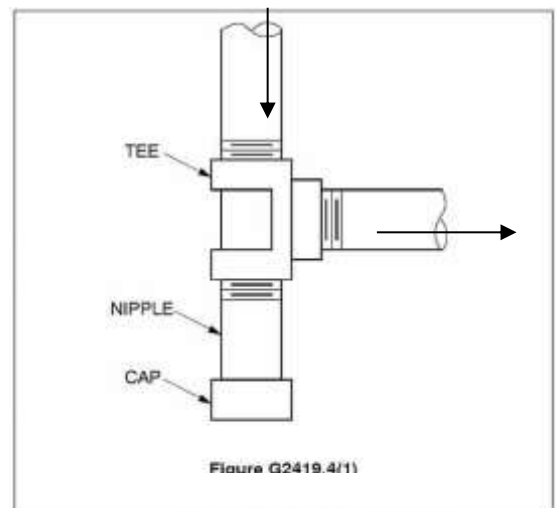
The connection to the gas supply must be carried out by professionally qualified personnel in accordance with the relevant standards.

- **Check the internal and external seals of the gas supply system.**
- A gas shut-off valve and sediment trap must be installed upstream of the appliance .
- Before starting up the boiler, make sure that the type of gas corresponds to that for which the appliance has been set-up.
- The gas supply pressure must be between the values reported on the rating plate.
- Conversion of the appliance from natural gas to LPG or vice versa must be carried out by qualified personnel.
- The power supply cable must be replaced by a qualified electrician. If the cable is damaged in any way, switch off the appliance and have the cable replaced by a suitably qualified electrician.

When using an electrical appliance, a few fundamental rules

must be observed: Do not touch the appliance with damp or wet parts of the body or when barefoot. Do not pull on the electric wires.

Do not allow the appliance to be used by children or anyone unfamiliar with its operation.



Natural Gas Pipe Sizing Chart

Length of Pipe In Feet	Size of Schd. 40 Black Iron Pipe in Inches					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
10	108	230	387	793	1237	2259
20	75	160	280	569	877	1610
30	61	129	224	471	719	1335
40	52	110	196	401	635	1143
50	46	98	177	364	560	1041
60	42	89	159	336	513	957
70	38	82	149	317	476	896
80	36	76	140	239	443	840
90	33	71	133	275	420	793
100	32	68	126	266	411	775
125	28	60	117	243	369	700

Natural Gas flow is given in thousands of BTU/hr. - One cubic foot of natural gas = 1000 BTU
Nominal pressure at the burner for Natural Gas is 3.5" of water column. (Typical machine supply 5"-7")
Pipe length must include additional length for all fittings. Add approximately 5 feet of pipe per fitting
Natural Gas Example: A machine with a burner that requires 440,000 BTU would need a 1 -1/4" pipe for a 20' long run.

Liquid Propane Gas Pipe Sizing Chart

Length of Pipe in Feet	Size of Schd. 40 Black Iron Pipe in Inches					
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
10	275	567	1071	2205	3307	6221
20	189	393	732	1496	2299	4331
30	152	315	590	1212	1858	3465
40	129	267	504	1039	1559	2992
50	114	237	448	913	1417	2646
60	103	217	409	834	1275	2394
80	89	185	346	724	1086	2047
100	78	162	307	630	976	1811
125	69	146	275	567	866	1606
150	63	132	252	511	787	1496

LP Gas flow is given in thousands of BTU/hr. - One cubic foot of LP gas - 2516 BTU
This chart refers to low pressure LP, after regulation Standard nominal pressure at the burner for Liquid Propane Gas is 11" of water column.
Pipe length must include additional length for all fittings. Add approximately 5 feet of pipe per fitting
LP Example: A machine with a burner that requires 440,000 BTU would need a 1" pipe for a 20' long run.

- Make sure the boiler is operating normally.
- Shut down the unit by pressing the ON/OFF button on the control panel.
- Remove the front panel and disconnect the flame rod sensor.
- Restart the boiler. The burner should light but shut down after a few seconds.
- If that is the case, the system is OK. If the burner does not shut down, push the ON/OFF switch to shut down the boiler and perform a troubleshooting procedure.

3.9 Electrical connections

3.9.1 General warnings

Follow the electrical code requirements of the local authority having jurisdiction. In the absence of such requirements, follow the latest edition of the National Electrical Code (NFPA 70) in the U.S. or the latest edition of CGA C22.1 Canadian Electrical Code – Part 1 in Canada.

3.9.2 Electric Wiring: Ground and Surges

All units come with factory installed 3-pronged (grounded) plug end. The boiler can be plugged into any standard electrical duplex outlet close to the unit as it requires only 4 Amps.

If the local jurisdiction requires the unit to be wired directly, remove and discard the factory installed plug. An ON/OFF switch controlling the main power between the breaker and the Boiler should be provided to facilitate end-user maintenance and servicing. This should be done by a qualified electrician.

The boiler must be electrically grounded. Ensure the electrical receptacle, in which the boiler will be plugged into, is properly grounded; if wiring directly, do not attach the ground wire to either the gas or the water piping as plastic pipe or dielectric unions may isolate the boiler electrically.

The use of a surge protector, surge capacitor, line conditioner or equivalent is recommended to protect the appliance from power surges.

If a generator is to be used as “backup” power care must be taken that a line conditioner is used to protect the appliance from erratic voltage.

If the boiler is to be installed in a structure utilizing a emergency stand-by generator, the installation of a surge capacitor, surge protector, line conditioner or equivalent is required.

If the boiler is to be installed in a structure where frequent power outages are experienced the installation of a surge capacitor, surge protector, line conditioner or equivalent is required.

Do not energize electric power to the unit until all plumbing and gas piping is complete and the boiler has been filled with water.

The electrical supply required by the boiler is 120VAC at 60Hz with a maximum 4A rating with proper grounding. Protection must be in place to prevent the Boiler from being exposed to voltage in excess of 130VAC Max or 95VAC Min.

Damage caused by excessive voltage is not covered under warranty.

DO NOT connect 220-240VAC and any other voltage to this PENSOTTI Boiler. This will damage the boiler and void the warranty.

Do not disconnect the power supply when the unit is in normal operation.

If there is a power failure in cold weather areas, the freeze prevention system in the boiler will not operate and may result in freezing of the heat exchanger; in cold weather areas where power failures are common, you must completely drain the unit to prevent damage if the power will be off for any extended period of time.

Damage caused by freezing is not covered under warranty.

CAUTION : Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

The connection to the main power supply must be carried out by professionally qualified electrical personnel, registered in accordance with current legislation and local authorities.

Always check to make sure that the appliance has an efficient ground system. This requirement is only satisfied if it has been properly connected to an efficient ground system installed in accordance with the requirements of current safety standards and carried out by professionally qualified personnel.

This basic safety measure must be checked, verified and carried out by professionally qualified personnel. Have the electrical system checked by a qualified electrician. The manufacturer will not be held liable for any damage or injury caused as a result of an inefficient or faulty ground system.

- Ensure the domestic power supply is checked by a qualified electrician to ensure that it can support the maximum power absorption of the appliance, as indicated on the rating plate. In particular, make sure that the cable sizes are adequate for the power absorbed by the appliance;
- The power supply cable must be replaced by a qualified electrician. If the cable is damaged in any way, switch off the appliance and have the cable replaced by a suitably qualified electrician;

When using an electrical appliance, a few fundamental rules must be observed:

Do not touch the appliance with damp or wet parts of the body or when barefoot. Do not pull on the electric wires.

Do not allow the appliance to be used by children or anyone unfamiliar with its operation;

If the unit fails to re-start after any fault, unplug the unit for 30 seconds, then re-plug in the unit and try to restart with the on/off switch. If the unit fails to restart, call a qualified Technician for service.

Remote control connection

Connect the power supply to the terminal board inside the control panel as follows:

- a. Switch off the power supply at service switch or breaker.
- b. Remove the front case panel of the boiler.
- c. Slacken the screws and remove plate A (see fig. 1).
- d. With the plate removed, connect the wires to the terminal board B as follows:
 - Connect the earth wire (normally coloured green/yellow) to the terminal marked with the earth symbol “ \perp ”.
 - Connect the neutral wire (normally coloured blue) to the terminal marked with the letter “N”.
 - Connect the live wire (normally coloured brown) to the terminal marked with the letter “L”.
 - Terminals identified by the letters:
 - Ta \Rightarrow Room thermostat or End Switch
 - Se \Rightarrow Outside temperature sensor

Ta terminals are 24V DC. Only a non-power robbing, battery operated thermostat or dry set of contacts can be installed on Ta terminals.

When the wires have been connected, place plate “A” back to position. Switch the power supply back on.

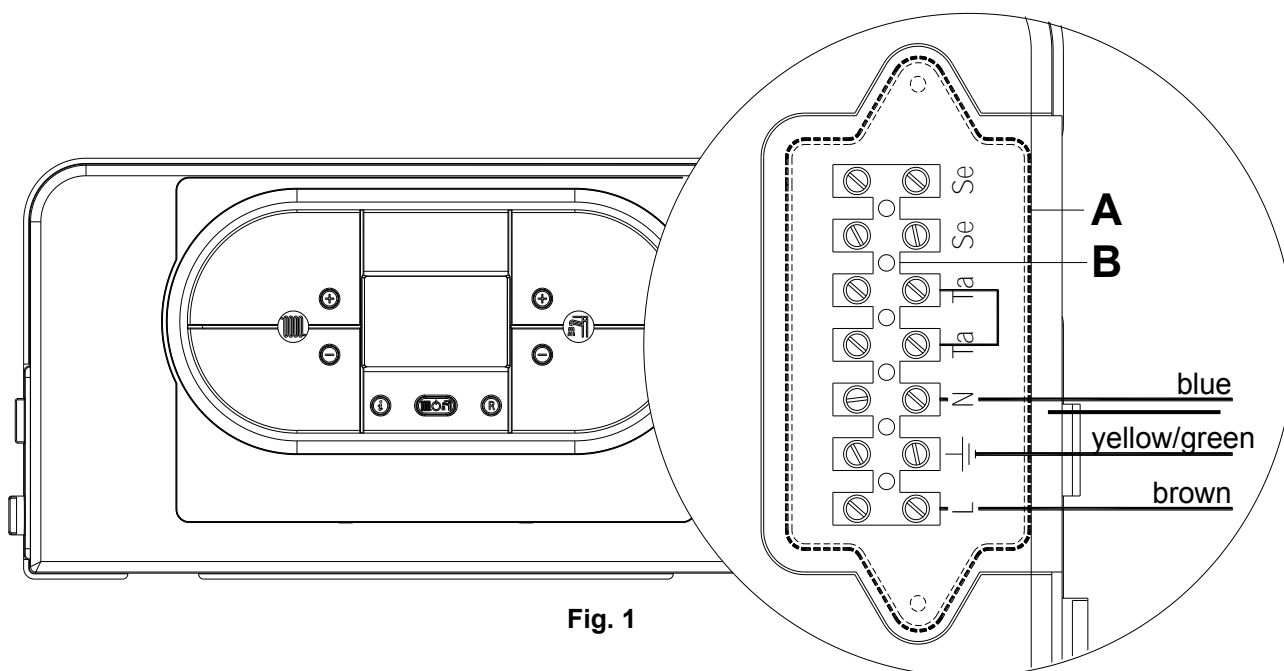


Fig. 1

3.10 Venting

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

Venting Guidelines

For best results, keep the vent system as short and straight as possible.

Locate the boiler as close as possible to the vent termination.

The boiler vent must not be common vented with any other gas appliance or vent stack.

Slope vent upwards towards the vent terminal at a rate of 1/8" per foot (1% slope).

Vent termination must be a minimum of 12" above grade or expected snowfall.

Vent and air intake pipe must be supported every 4 feet of horizontal run and every 5 feet of vertical run.

PENSOTTI and Direct Vent

All PENSOTTI boilers are prepared at the factory to be direct vent (sealed combustion) units which draw all of their required combustible air directly from outside the building.

All PENSOTTI boilers use a 3/5" concentric vent or a 2 pipes system that uses a 3" diameter exhaust and a 3" diameter air intake pipe.

Use only vent and air intake systems certified with the boiler.

The air intake vent materials can be made of ABS, CPVC, PVC materials and in accordance with all applicable local building codes.

Contaminated Make-Up Air Will Damage the Unit

We recommend not operating the boiler in an area that is or will be under construction or renovation.

The PENSOTTI warranty will not cover damage and premature wear caused to the unit due to installation in a contaminated environment.

All exhaust venting connections must be leak checked with a soap solution upon initial start up of the boiler. Any leaks must be repaired before continuing operation of the boiler.

All concentric venting must be checking for cross contamination using a combustion analyzer inserted into the makeup air test port on the venting adapter. Analyzer must NOT read anything in excess of "0 ppm" Carbon Monoxide (CO). Any leaks must be repaired before continuing operation of the boiler.

Warranty will not be available if the boiler is used for construction heat.

Venting Pictures & Illustrations



5" Painted Aluminum

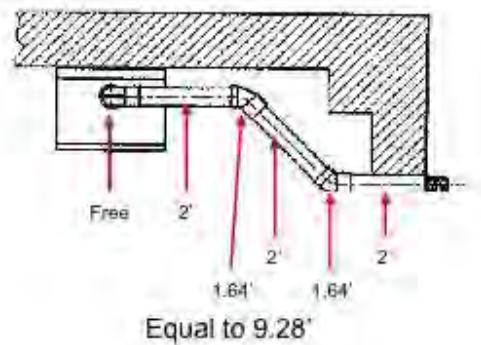
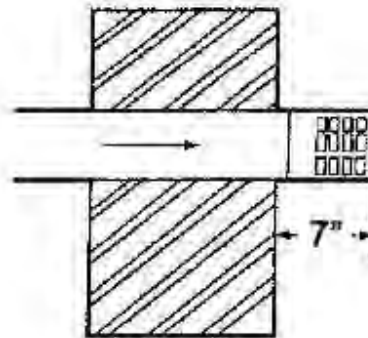
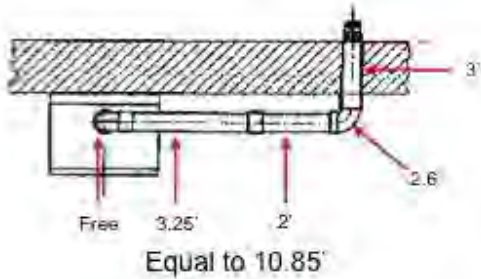
EPDM Seal

EPDM Seal

3.15" Polypropylene Pipe 240 Degree F Rating

Maximum Equivalent Vent Lengths

PC 18	29.25 Feet
PC 34	26 Feet
PC 50	16.25 Feet



Included With Each Combination Boiler Is A PAHVK Horizontal Kit
Rotate Transition To Desired Position And Secure Using Screws Provided

Combustion Air Test Port



Flue Gas Test Port

Gasket

Included With Each Boiler Is A PAHVK Horizontal Kit



Lubricate Rubber Gaskets, with Supplied Silicone Lubricant,
and Install Venting Components. Fully Seat Then Secure With
2 - No. 8 x 1/2" Zinc Coated Screws

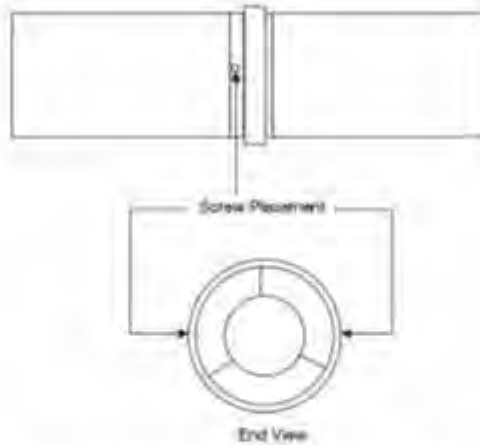
Do not over lubricate
Assemble immediately after lubrication



Pensotti Solenne Series Fastening of Venting Components

All concentric venting systems installed with Pensotti Solenne condensing wall mounted boilers must be fastened together to reduce the chance of the venting components separating.

Two screws must be fastened through the outer air intake pipe, behind the gasket, at equal distances apart. The screws must be no longer than No. 8 x 1/2" sheet metal screws and must be zinc coated or stainless steel.



Be sure not to pierce the inner poly exhaust pipe.
Failure to comply with these instructions could result in property damage, personal injury or loss of life.

12" Clearance Suggested From The Top Of The Appliance To Ceiling



3.11 2 Pipes Venting system Pictures & Illustrations

The two pipes direct vent system can be installed in one of the following configurations.

1. Air Intake & Exhaust Pipes on an outside horizontal wall (intake and vent adjacent)
2. Air Intake & Exhaust Pipes on an outside vertical wall / roof (intake and vent adjacent)

Exhaust piping material

Polypropylene Pipe (UL 1738) rated for a maximum temperature of 230°F

Combustion air piping material

Polypropylene (UL 1738)
 PVC (Schedule 40, ANSI/ASTM D2661, ULC S102.2)
 CPVC (Schedule 40, ANSI/ASTM D2661, ULC S102.2)

Installation Guidelines

- Do not allow any low points in the exhaust vent system unless a proper drain fitting is used to allow condensate to be removed.
- Install exhaust vent pipe directly as possible with as few elbows as possible.
- Condensate must drain from the exhaust pipe back to the boiler.
- Pitch the exhaust pipe approximately 5/8" per linear foot back towards the boiler.
- A hacksaw or equivalent can be used to cut the vent pipe if necessary. Once cut be sure to file the cut edges to remove all burs. Be sure not to deform the pipe.
- All piping must be securely supported. Use approved vent pipe hangers at a minimum of 48" intervals to prevent pipes from sagging. When utilizing a vertical exhaust system install the approved vent pipe hangers to support the entire weight, the boiler is not designed to support the weight of any venting system. (Contact your local vent material supplier for more specific installation information).
- Assemble all vent materials in a way that prevents the accumulation of condensate.
- Be sure not to exceed the maximum total equivalent length of the direct vent system as indicated in this manual. See table below.
- A maximum of 7 90° elbows may be installed in the complete intake air / exhaust vent system.
- When using PVC or CPVC fittings long sweep elbows are recommended.
- The venting system must be installed by a licensed, professional heating contractor who is familiar with the installation and operation of heating appliances and venting systems.
- The venting system must be installed in accordance with all local, state and national codes.
- To ensure continued safe operation of the boiler, the venting system must be accessible for inspection once a year by a qualified technician.
- The air intake and flue exhaust terminations should be located on a wall that is least affected by prevailing winds (high winds may affect boiler operations).
- Do not use adhesives of any kind with polypropylene vent materials. All venting must be secured using the manufacturer's flue pipe clamps.
- If using PVC or CPVC for combustion air piping an approved solvent and cement must be used (ANSI/ASTM D2564). Only use in well ventilated areas.

Vent Termination Requirements

- The vent system must be installed according to all local, state and national regulations. Including ANSI-Z223.1 or NFPA 54.
- The vent must not terminate less than 7 feet above a paved sidewalk or driveway located on public property. The vent pipe must not terminate within 4 feet horizontally of a gas regulator vent, electrical meter, gas meter or any relief equipment.
- The vent must not terminate less than 1 foot grade level or anticipated snow level.
- The vent must not terminate within 1 foot of any window or door which can be opened, any non-mechanical air supply inlet.
- The vent must not terminate where condensate will cause problems.
- The vent must not terminate in a location where ice formation could cause a hazard.
- The vent must not terminate so that flue gases are directed towards structures in such a manner that it may cause property damage or personal injury.

- The vent must not terminate within 3 feet of a property line (check with local authorities in your area).
- The vent pipe must terminate at least 3 feet above any forced air inlet within 10 feet.
- The vent pipe must terminate at least 3 feet from any non-mechanical air supply inlet or the combustion air inlet to any other appliance.
- The vent must not terminate within 3 feet from an inside corner on an outside wall.

See the Installation guideline diagram on the next page.

Maximum allowable equivalent vent length – Horizontal and Vertical systems.

Boiler Model Number	Vent Size	Maximum Combined Equivalent length *	Vent Size	Maximum Combined Equivalent length *
PCH 18B-H, PCI 18/8-H	2"	50' (25" air intake + 25' exhaust)	3"	190" (95" air intake + 95' exhaust)
PCH 34B-H, PCC 34-H, PCI 34/20-H	2"	40' (20' air intake + 20' exhaust)	3"	150' (75" air intake + 75' exhaust)
PCH 50B-H	2"	24' (12' air intake + 12' exhaust)	3"	150' (75" air intake + 75' exhaust)

* The vent system must be balanced (the air intake pipe and the exhaust pipe must be as close to equal in length as possible). A maximum of 7 elbows is may be installed in the entire venting system.

Fittings equivalent length table

Material	90° Elbow Long Sweep	45° Elbow	87° Elbow
Polypropylene	-	2'	3'
PVC/CPVC*	5'	3'	-

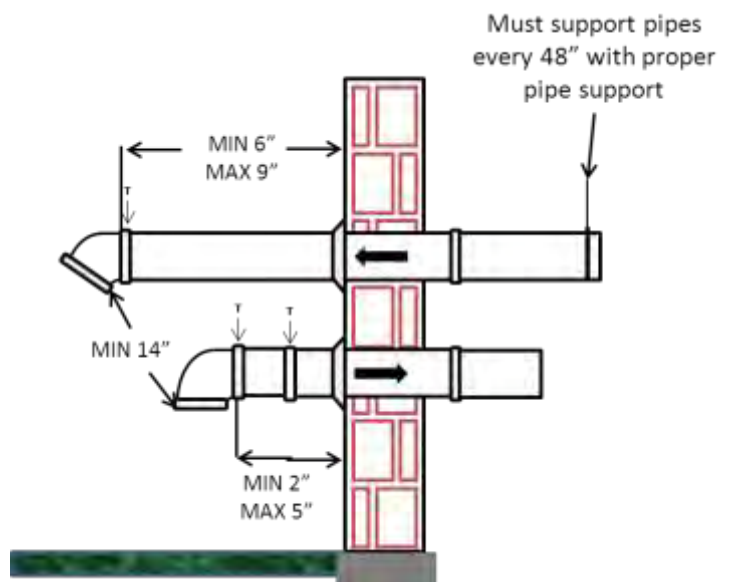
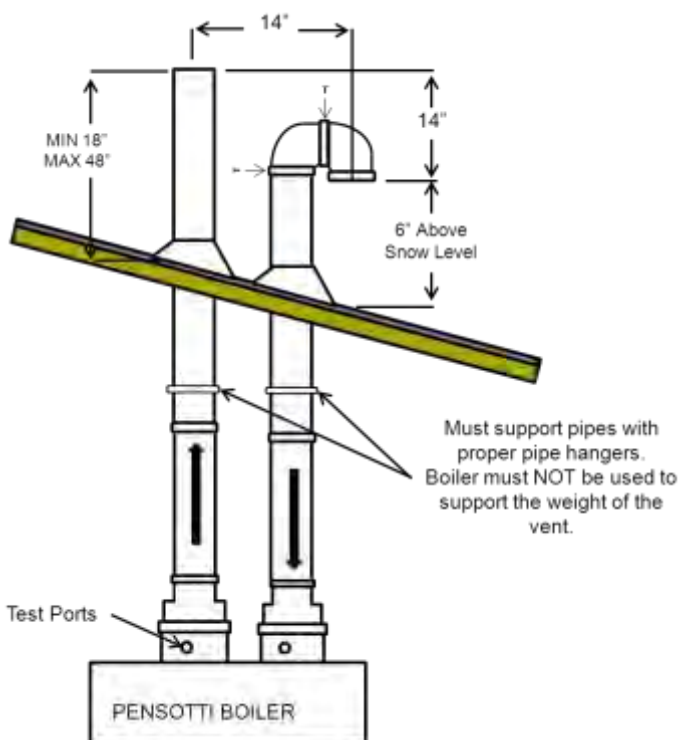
*If standard 90° PVC/CPVC elbows are used the equivalent length is 8' per 90° elbow.

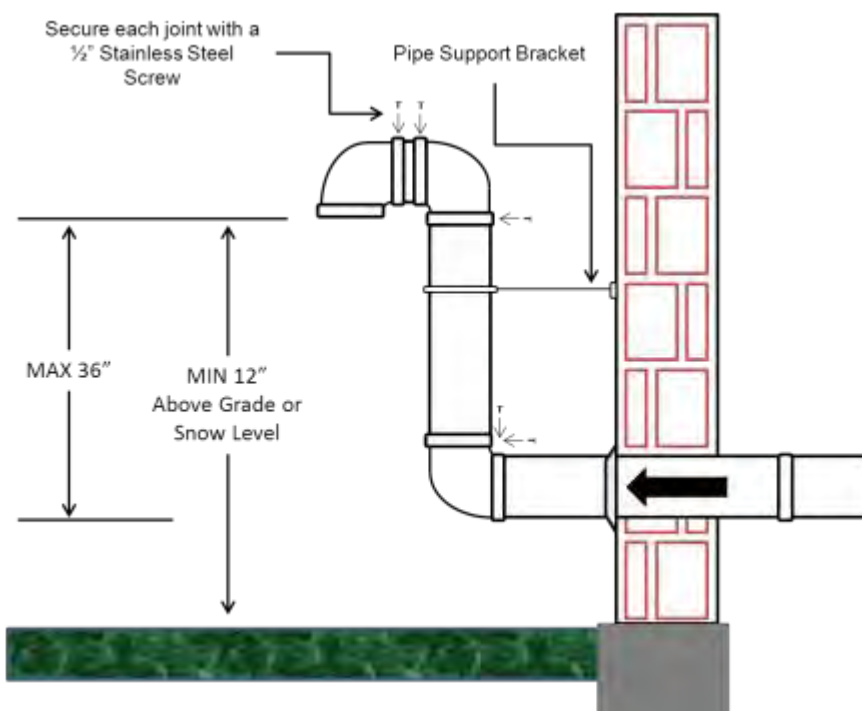
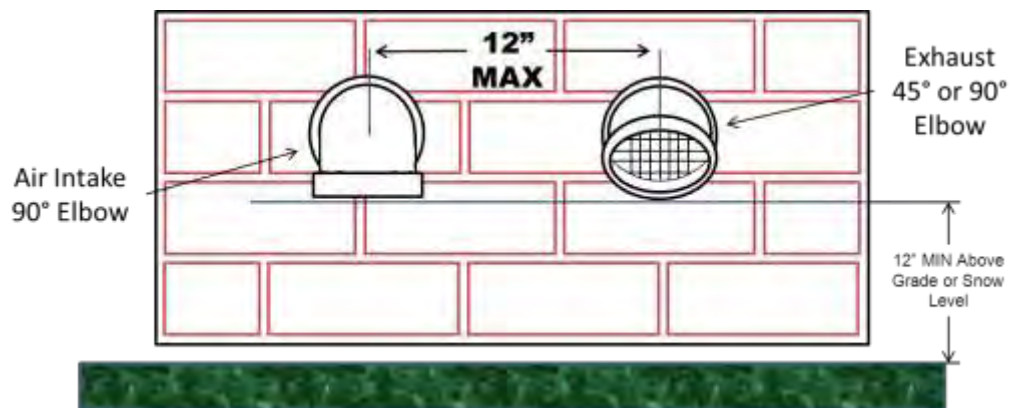
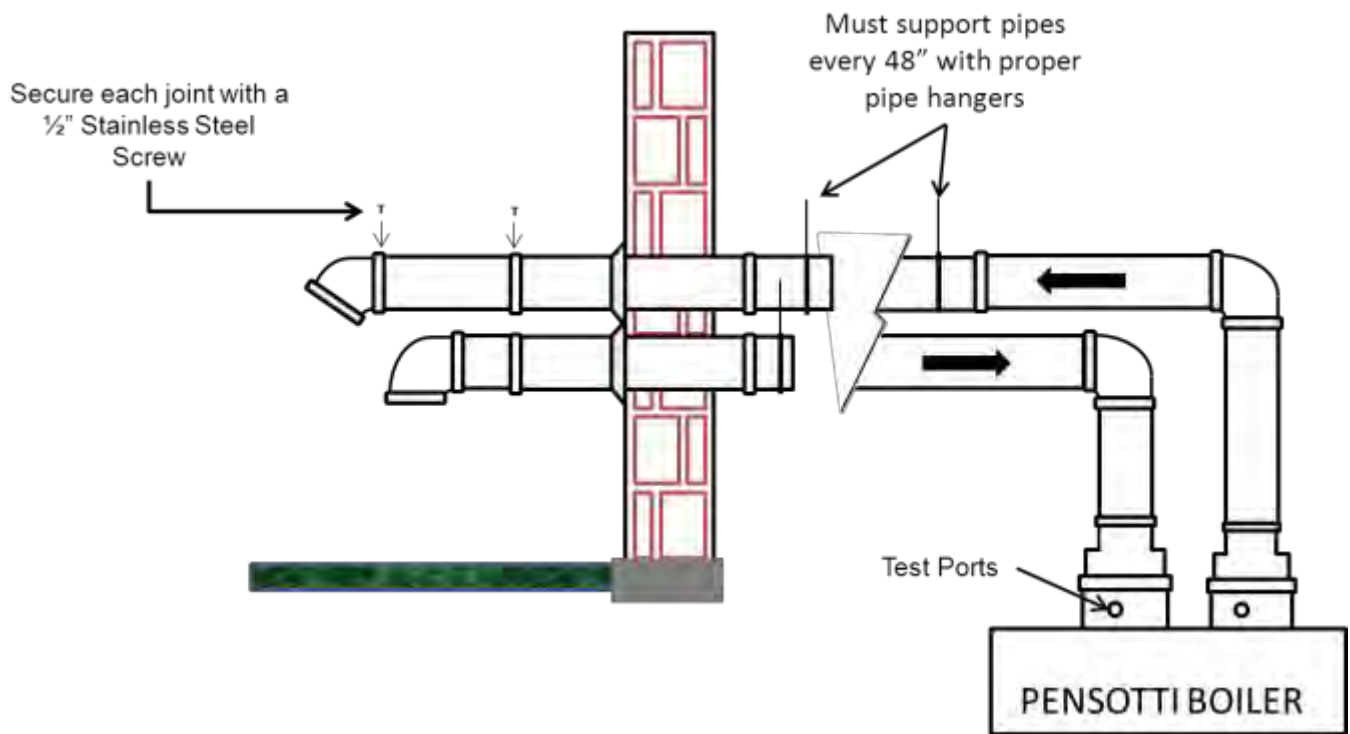
FOR EXHUAUST VENT PIPE MATERIAL: USE ONLY APPROVED POLYPROPYLENE EXHAUST PIPE. DO NOT USE GALVANIZED PIPE, PLASTIC PIPE OR CHIMNEY LINERS, RIDGED OR FLEXIBLE, OF ANY KIND.

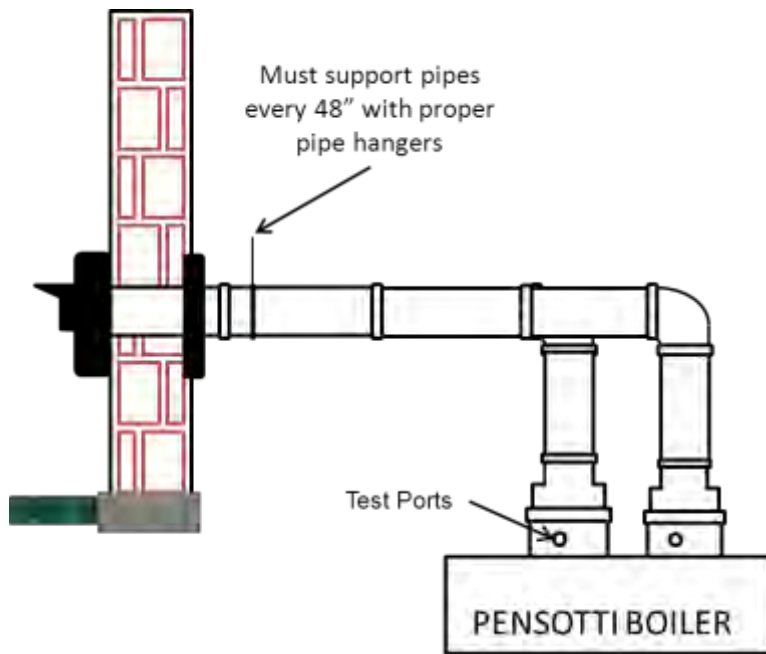
All polypropylene pipe exposed to sunlight must be UV approved pipe this includes all sidewall and vertical terminations both air intake and exhaust.

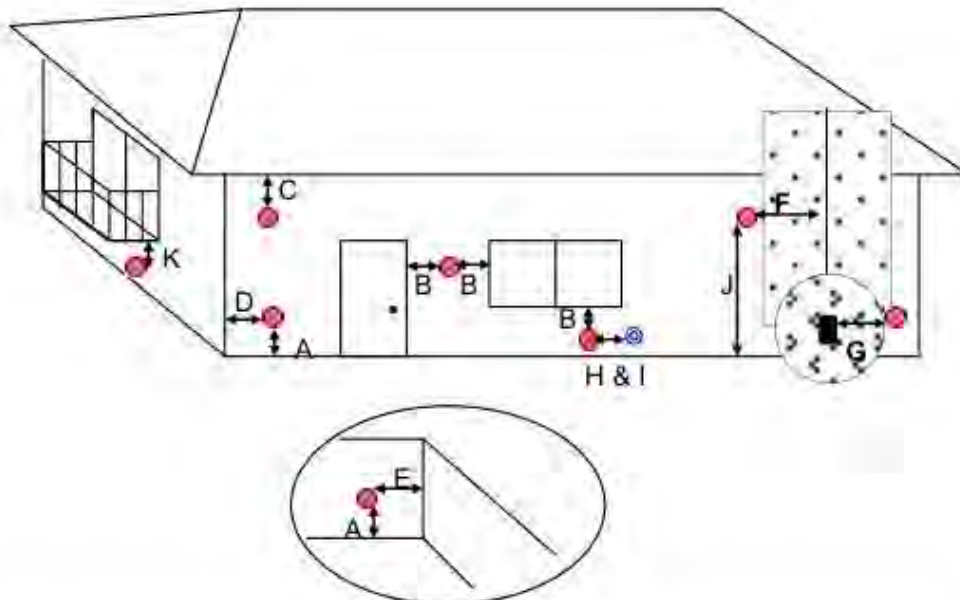
Both the exhaust and air intake vent pipes must be the same size pipe.

Clearance to combustibles on the approved polypropylene vent pipe is 0".









Direct Vent Termination Minimum Clearances	
A = 12"	Clearance above grade, snowline, deck, porch or balcony
B = 12"	Clearance to window or door that may be opened
C = 24"	Vertical clearance to ventilated and unventilated soffit within a 2' distance horizontally from center line of DV termination
D = 12"	Minimum distance to outside corner
E = 18"	Minimum distance to inside corner, included walls and fences.
F = 48"	Not to be installed above a gas meter/regulator within F from the center line of the meter/regulator
G = 48"	Minimum clearance to service regulator vent outlet, gas meter or electrical meter
H = 12"	Clearance to non-mechanical inlet air opening into the building
I = 36"	Clearance to a mechanical air inlet into the building
J = 84"	Minimum distance above a paved sidewalk or driveway located on public property. If terminal is located between two single family residences with a sidewalk or driveway between; the same 84" clearance applies.
K = 24"	Minimum clearance beneath porch, deck, veranda or balcony, only if the area below is completely open on at least two sides.

State and local codes may require different clearances, consult the local authority having jurisdiction in each area for details.

The vent hood must be installed on the leeward side of the structure. Avoid installing the vent hood on the side of the structure receiving normal prevailing winds.

The termination shall be located so that flue gasses, or condensate from the flues gasses, are not directed as to jeopardize people, building materials, building construction, siding or soffits. Flue gasses from the termination shall not be allowed to enter any type of structure.

The termination shall be located no less than 48" above or to the side of the exhaust for any other oil, gas or solid fuel appliance

4. COMMISSIONING THE APPLIANCE

4.1 General warnings

The following operations must be carried out by professionally qualified personnel, registered in accordance with current legislation.

Use of a properly calibrated electronic combustion analyzer **MUST** be used when installing, servicing or converting this Boiler from Natural Gas to LP or from LP to Natural Gas.

The boiler leaves the factory pre-set and tested for burning either Natural Gas or LPG. Nevertheless, when starting the boiler for the first time, make sure that the information on the rating plate corresponds to the type of gas being supplied to the boiler.

Once the system has been filled and the necessary adjustments made, remember to tighten the screws of the gas valve test point and make sure that there are no gas leaks from the test point and from any pipe fittings upstream of the gas valve.

■ Preliminary operations

Switching the boiler on for the first time means checking that the installation, regulation and operation of the appliance are correct:

Check that the rating on the rating plate corresponds to that of the mains supply networks (gas, electricity, water));

Check that the power supply voltage to the boiler complies with the rating plate (120 V – 60 Hz) and that the live, neutral and ground wires are connected properly. Also make sure that the ground connection is sound;

Check that the gas supply is correctly sized for the flow rate required by the boiler and that it is fitted with all the safety and control devices stipulated by current regulations;

Check that the supply of combustion air and exhaust and condensate discharge systems are functioning correctly and in line with current law and national and local standards;

Check for the presence of permanent aeration/ventilation openings as required by current law for the type of appliances installed;

Check that the exhaust vent and its connections to the termination comply with the requirements of current law and national and local standards for the type of appliances installed;

Make sure that any central heating shut-off valves are open;

Check that the condensate drain system, including outside the boiler (exhaust system condensate collection devices), allows the condensate to flow freely to the drain.

Check that there are no flammable materials or liquids in the immediate vicinity of the boiler;

Flush out both primary and domestic hot water circuits (see 4.3 "Flushing the system").

4.2 Filling the system

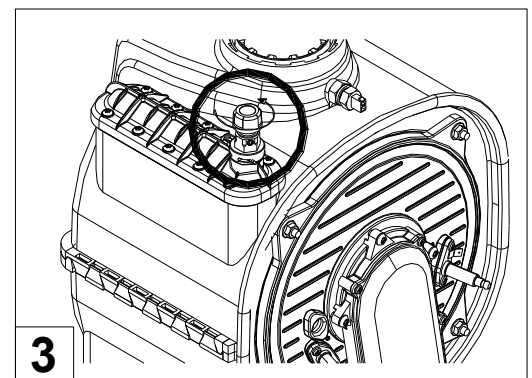
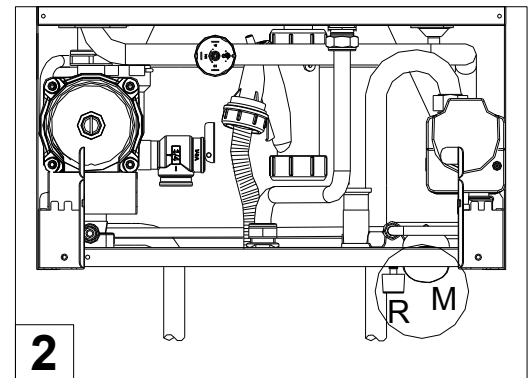
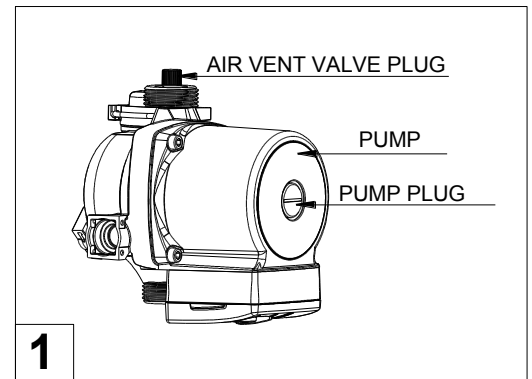
⚠ Check the properties of the water supply and install the appropriate treatment devices if the mains water has a hardness rating more than 7 grains/gal. (120 ppm) in order to prevent scaling and eventual damage to the D.H.W heat exchanger.

⚠ A pressure reducing valve and backflow preventer must be installed.

⚠ Use only clean tap water to fill the system.

Once the water pipes have been connected, close the gas feed valve and fill the system as follows:

- Check that the circulation pump runs freely;
- Check that the plug of the air vent valve has been slackened slightly to allow air to escape from the system (fig.1);
- Purge all air from primary heat exchanger using the manual air vent.
- Open the main domestic water supply valve;
- Open the filling tap **R** (fig. 2);
- Unscrew the plug on the pump to remove any trapped air, check that the pump is free then re-tighten it when water starts to flow out (fig.1);
- **Before switching on the boiler, purge air completely from the air vent valve positioned on the top of the condensing exchanger (fig. 3)**
- Open the air vents on the radiators and monitor the air evacuation process. When water starts to flow out of the radiators, close the air vents;
- Use the pressure gauge **M** (fig. 2) to check that the system pressure reaches the middle of the green section (14.5 psi = 1 bar) and that the code H2O does NOT appear on the control panel display (see 2.7 section 'Control Panel');
- **On completion, make sure that the filling tap R is perfectly closed.**



Emptying the central heating system

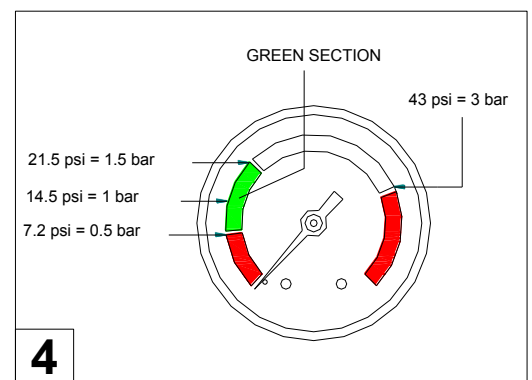
Whenever it is necessary to empty the system, proceed as follows:

- turn off the main power supply switch;
- wait for the appliance to cool down;
- turn the system drain tap RS (see fig. 2) and use a container to collect the water that runs out;

Emptying the domestic hot water system

Whenever there is danger of freezing or any other occurrence, the hot water system could be emptied in the following way:

- Shut off the water at the mains;
- Open all hot and cold water taps;
- Empty from the lowest point (where possible).



4.3 Flushing the system

Failure to flush and add inhibitor to the system will invalidate the appliance warranty.

All systems must be thoroughly drained and flushed using additives – corrosion inhibitors and flushing agents/descalers. Pensotti requires the use of the supplied Fernox Commissioning Kit or individual containers of Fernox F3 or F5 cleaner and F1 protector. Follow Fernox installation instructions. Failure to use Fernox F3 or F5 cleaner and F1 protector could void the warranty for all waterside components.

To flush out the primary side of this unit

- Fill the boiler as per the filling instructions.
- Using a drain off cock on the lowest point of the system allow the water to drain from the system and boiler.
- In order to flush the system correctly turn off all radiators open the filling loop and drain cock simultaneously and allow the water to flow through the boiler.
- Open each individual radiator allowing water to flow through then turn that radiator off and repeat for all radiators on the system.
- Turn off the filling loop and close the drain cock open all radiators and open the filling to fill the system.
- Continue to fill the system until the pressure gauge reads in the Green section of the gauge (14.5 psi = 1 bar).

To flush out domestic hot water circuit

- Open all hot water outlets.
- Turn on inlet group supply so water enters the boiler; leave to fill until water is released from the hot water outlets. Turn off all hot water outlets.
- Connect a hosepipe to the cylinder drain cock and open the drain cock.
- Allow water to flow through the boiler and out of the drain cock.
- Turn off water supply, disconnect the hosepipe, close the drain cock and refill the boiler.



4.4 Filling the condensate trap

The condensation trap must be pre-filled when starting the boiler for the first time in order to prevent flue gases from flowing back through the trap.

The filling operation is carried out as follows (see fig. 1):

- Remove plug **T** and fill the trap **S** three quarters full with water;
- Replace plug **T** and connect the drainpipe **P** into a condensate discharge trap conforming to current legislation;

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

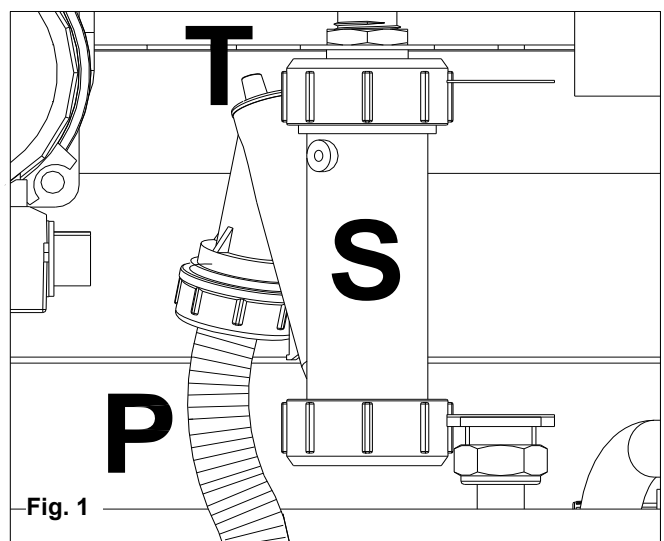



Fig. 1

4.5 Starting up the boiler

Once the system has been filled, proceed as follows:

- Check that the exhaust flue is free of obstructions and correctly connected to the boiler;
- Switch on the power supply to the appliance;
- Open the gas isolation valve;
- Place switch **1** in the **ON position** (see 2.7 “Control Panel”), after a few seconds the circulating pump will start to run;
- Use button **6** to set the D.H.W.,

HEAT or D.H.W./HEAT function. The symbols  will light up (fixed light) to indicate that the boiler is working;

- The automatic ignition system will then light the burner. This operation is repeated for 3 times. It may however be necessary to repeat the operation in order to eliminate all the air from the gas pipes. To repeat the operation, wait approximately three minutes before re-attempting to light the boiler. To reset the boiler Switch off switch **1** (see 2.7 “Control Panel”) and switch it back on again and repeat the lighting procedure;
- With the boiler ignited, if the system still emits noises, the operations must be repeated until all the air has been removed from the gas piping;
- Check the water pressure in the system. If the pressure has fallen, introduce water into the appliance until the code “H2O” **disappears on the display** and the pressure gauge reads in the Green section of the gauge (14.5 psi = 1 bar) on completion;
- Check gas pressure at gas valve inlet pressure tap. SEE Fig 2. Set gas pressure to proper level at the regulator (Refer to section 2.1 Technical Data). Gas pressure adjustments must be performed while the appliance is in “Flue Test Function” mode (maximum firing rate). Allow the boiler to fire in the heat mode. Press and hold the “S” button until “07” flashes on the screen. Do NOT make any adjustments to the gas valve itself.
- Unscrew the plug and insert an analyser in the exhaust sampling point **PF**, **SEE** Fig. 1, (air intake manifold is missing in the drawing to provide a clear view of the V screw) to check the CO₂ value. Make sure that the value complies with that reported in table 1 while the appliance is in “Flue Test Function” mode;
- If the CO₂ value does not correspond to the specified value, adjust screw **V** (see fig. 1) on the venturi clockwise to reduce the CO₂ value or counter-clockwise to increase it;

Table n°1

Gas type	CO ₂ %
Natural Gas - G20	9.18
Liquid Propane Gas - G 31	10.3

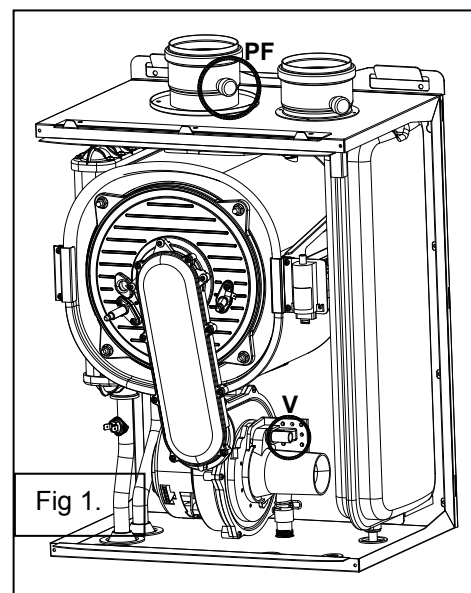


Fig 1.

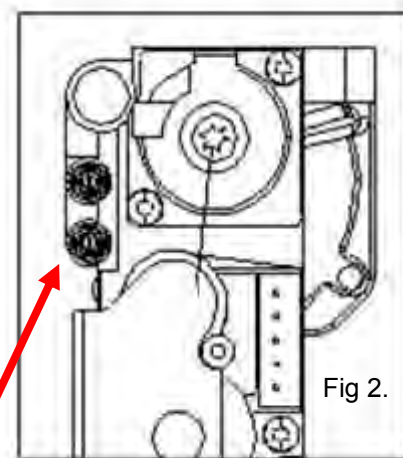


Fig 2.

Inlet Pressure Tap

5. REGULATING THE APPLIANCE

5.1 Parameters table

PARAMETER N°	TYPE OF OPERATION	PARAMETER VALUE	FUNCTION
P00	Selects the model of boiler	00-06	01 = 18 kW 04 = 34 kW 05 = 50 kW All other numbers NA
P01	Selects the type of boiler	00-05	00 = NA 01 = PCC 34 02 = PCI 18/8, PCI 34/20 03 = PCH 18/B, PCH 34/B, PCH 50/B 04 = NA 05 = Only heating boiler
P02	Selects the type of gas supply	00 01 02	Natural gas LPG NA
P03	Sets the central heating temperature	00 01	Standard (95-185°F) Reduced (77-113°F)
P04	Heating output rising time	00-04	00 = 0 seconds (Disabled) 01 = 50 seconds (Default) 02 = 100 seconds 03 = 200 seconds 04 = 400 seconds
P05	Water hammer prevention function	00 01	Off (default) On
P06	D.H.W priority function	00 01	Off On
P07	Central heating timer	00 - 90	Displayed in multiples of 5 seconds (default value 36 x 5 = 180")
P08	Central heating pump overrun timer	00 - 90	Displayed in multiples of 5 seconds (default value 36 x 5 = 180")
P09	D.H.W/Storage cylinder pump overrun timer	00 - 90	Displayed in multiples of 5 seconds (default value 18 x 5 = 90")
P10	Minimum fan speed – DHW	60 Hz (Nat Gas) 60 Hz (Propane)	Displayed in hertz (1Hz = 30 rpm)
P11	Maximum fan speed - DHW	155 Hz (Nat Gas) 143 Hz (Propane)	Displayed in hertz (1Hz = 30 rpm)
P12	Minimum fan speed – Heating	60 Hz (Nat Gas) 60 Hz (Propane)	Displayed in hertz (1Hz = 30 rpm)
P13	Maximum fan speed – Heating	155 Hz (Nat Gas) 143 Hz (Propane)	Displayed in hertz (1Hz = 30 rpm)
P14	Sets the ignition sequence	110 Hz (Nat Gas) 130 Hz (Propane)	Displayed in hertz (1Hz = 30 rpm)
P15	Legionella prevention function (for storage boilers only)	00 01	Off On (default)
P16	Outdoor reset curve (w/outdoor temperature sensor only installation)	00-30	See the graph in the parameter setting explanation
P17	Sets the temperature measurement unit	00 01	°C °F

PARAMETER N°	TYPE OF OPERATION	PARAMETER VALUE	FUNCTION
P18	Sets the 0-10V industrial bus piloting	00-02	00 = Disabled (default) 01 = Flow temperature control mode 02 = Burner output control mode
P19	Central heating minimum set point	20 - 40	Displayed in °C
P20	Central heating maximum set point	40 - 90	Displayed in °C
P21	D.H.W maximum set point	45 - 75	Displayed in °C
P22	ΔT set point T° flow / T° return (w/modulating pump and return temperature sensor connected only)	00 10 - 40	00 = Disabled (default) Displayed in °C
P23	Modulating pump minimum speed (w/modulating pump and return temperature sensor connected only)	50 - 70	Displayed in percentage
P24	Modulating pump maximum speed (w/modulating pump and return temperature sensor connected only)	70 - 100	Displayed in percentage
P25	ΔT timing T° flow / T° return (w/modulating pump and return temperature sensor connected only)	20 - 100	Displayed in seconds

NOTES:

P04 - This parameter allows to modify the time the boiler takes (in heating mode) to reach the maximum power set.

P10, P11, P12 - These parameters are automatically set according to the output value set in Parameter P00.

P13 - The maximum boiler power, in heating mode, can be set according to the paragraph 5.5 "Heating output (Kw) – Fan frequency (Hz) diagram".