

Slant/Fin® VSL Boiler

This manual must be left with owner and should be hung on or adjacent to the boiler for reference.

**DIRECT-VENT SEALED COMBUSTION CONDENSING BOILER
HOT WATER MODEL VSL-160B & VSL-160C (COMBI BOILER)
GAS-FIRED BOILER FOR NATURAL AND L.P. PROPANE GASES**

INSTALLATION INSTRUCTIONS



Heating Contractor

Address

Phone Number

Boiler Model Number

Boiler Serial Number

Installation Date

SAFETY INSTRUCTIONS

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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

AVERTISSEMENT: Assurez vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort

- Ne pas entreposer ni utiliser d'essence ou ni d'autres vapeurs ou liquides inflammables à proximité de cette appareil ou de tout autre appareil.
- **QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:**
 - Ne pas tenter d'allumer l'appareil.
 - Ne touchez à aucun interrupteur, ne pas vous servir des téléphones se trouvant dans le bâtiment
 - Appelez immédiatement votre fournisseur de gaz de puis un voisin. Suivez les instructions du fournisseur.
 - Si vous ne pouvez rejoindre le fournisseur, appelez le service des incendies
- L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.



Water temperature over 125°F can cause severe burns instantly or death from scalds.

Children, disabled and elderly are at highest risk of being scalded.

See instruction manual before setting temperature of water heater.

Feel water before bathing or showering.

Temperature limiting valves are available, see manual.

SAFETY INSTRUCTIONS

FOR YOUR SAFETY READ BEFORE OPERATING

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

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

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

WHAT TO DO IF YOU SMELL GAS

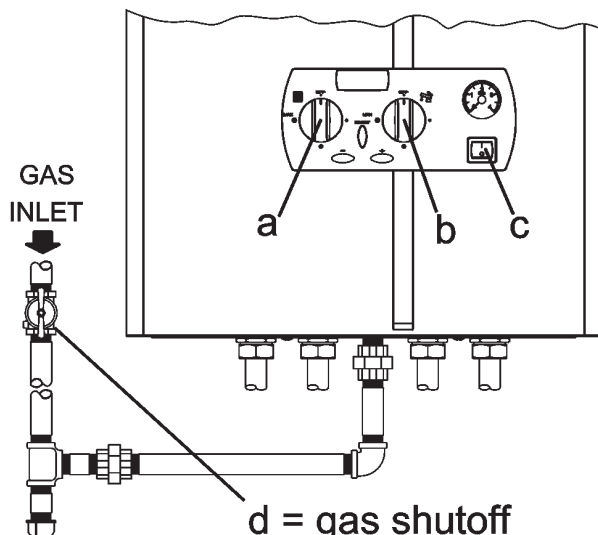
- Do not try to light any appliance.
- Do not touch any electric switch;
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or 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



d = gas shutoff valve, shown in open position


- a) Central heating regulation knob
- b) D.H.W. regulation knob
- c) Main electrical switch
- d) Gas control knob

1. STOP! Read the safety information above on this label.
2. Turn off all electric power to the appliance.
3. Set the main switch "C" to zero and turn the two knobs "a" and "b" to their OFF position.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Close the manual gas shutoff valve "d" turning the knob "d" clockwise. Do not force.
6. 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 label. If you don't smell gas, go to next step.
7. Open the manual gas shutoff valve turning the knob "d" counterclockwise.
8. Turn on all electric power to the appliance, and set the main switch "c" to the "one" position.
9. Set knobs "a" and "b" to desired setting.
10. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the appliance if service is to be performed.
2. Set the main switch "c" to zero and turn the two knobs "a" and "b" to their OFF position.
3. Close the manual gas shutoff valve turning the knob "d" counterclockwise. Do not force.

SAFETY INSTRUCTIONS

 **WARNING!!!** These instructions must be read prior to installation. If the information in these instructions is not followed exactly, a fire or explosion may result, causing property damage, personal injury, or death.

- ☞ **Installer:** Read all instructions, including this manual, before installing. Perform steps in the order given.
- ☞ **User:** Refer to the User's Information Section for your reference.
- ☞ **Qualified installer:** Qualified installer is an individual with specific, technical training in space heating systems, domestic hot water systems, fuel gas systems and electrical systems. This individual must have the legally required qualifications.
- ☞ **Installation and Alterations:** Only a Qualified installer must carry out the installation and calibration of the boiler. Never modify the boiler or its flue gas carrying components in any way. This boiler must be properly vented. Failure to follow these instructions could result in personal injury or death!
- ☞ **Flue gas/air intake:** You are only permitted to operate the condensing gas boiler with the combustion air/flue gas system that has been specifically designed and approved for this type of boiler.
- ☞ **Flue gas/air intake:** If boiler installation is provided as replacement heater, DO NOT connect new boiler venting to an existing vent system, if it is shared with other appliances.
- ☞ **Local approval:** of the flue system and the condensate connection to the public sewer system may be required.

- ☞ **Local approval:** The local building regulations stipulating the installation rules at the time of installation.
- ☞ **Installation location:** The boiler must be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the boiler or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the boiler. The pan must not restrict combustion air flow.
- ☞ **Installation location:** The boiler must not be installed on carpeting.
- ☞ **Air intake and outlets:** Do not restrict or seal any air intake or outlet openings.
- ☞ **Hazards and Your Safety - Hot Water Can Scald!** Water temperature over **125°F (52°C)** can cause severe burns instantly, or death from scalds. Children, the disabled, and the elderly are at highest risk of being scalded; see instruction manual before setting temperature at boiler! Feel water before bathing or showering.
- ☞ **Defects:** If you find any defects, you must inform the owner of the system of the defect and the associated hazard in writing.
- ☞ **Maintenance:** at least once a year the user must call a Qualified installer for routine maintenance.
- ☞ **In the event of a breakdown and/or malfunction of the boiler,** turn off the unit and do not make any attempt to repair it. The boiler must be serviced exclusively by a Qualified installer using original spare parts. Failure to comply with this requirement may compromise the safety of the unit and void its warranty.
- ☞ **When servicing boiler, to avoid electric shock,** disconnect electrical supply before performing maintenance.

SAFETY INSTRUCTIONS

- ☞ **When servicing boiler, to avoid severe burns**, allow boiler to cool before performing maintenance.
- ☞ **Electrical:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.
- ☞ **ATTENTION:** *Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. Des erreurs de câblage peuvent entraîner un fonctionnement inadéquat et dangereux. S'assurer que l'appareil fonctionne adéquatement une fois l'entretien terminé.*
- ☞ **Correct Use:** This boiler must only be used for the purpose for which it has been expressly designed: heating of water for closed circuit systems for central heating and the production of domestic hot water.
- ☞ **Should overheating occur or the gas supply fail to shut off**, do not turn off or disconnect the electrical supply to the pump. Instead, turn off the manual gas shut-off valve external to the appliance.
- ☞ **En cas de surchauffe ou si l'alimentation de gaz ne peut être coupée**, ne pas couper ni débrancher l'alimentation électrique de la pompe. Fermer plutôt le robinet d'admission de gaz à l'extérieur de l'appareil
- ☞ **Do not use this appliance if any part has been under water.** Immediately call a licensed authorized technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.
- ☞ **N'utilisez pas cet appareil s'il a été plongé dans l'eau, même partiellement.** Faites inspecter l'appareil par un technicien qualifié et remplacez toute partie du système de contrôle et toute commande qui ont été plongés dans l'eau.
- ☞ **Ensure the boiler and its controls are protected from dripping or spraying water** during normal operation or service.
- ☞ **Do not obstruct the air intake or vent pipe terminals.** Failure to take proper precautions can result in excessive levels of carbon monoxide which can cause severe personal injury or death!
- ☞ **When calling or writing about the boiler** – Please have the boiler model and serial number from the boiler rating plate.
- ☞ **Any claims for damage or shortage in shipment** must be filed immediately against the transportation company by the consignee.
- ☞ **Factory warranty (shipped with unit) does not apply** to units improperly installed or improperly operated.
- ☞ **Only use the boiler in the combinations and with the accessories and spares listed in this manual.**
- ☞ **For safety and environmental reasons**, the packing materials must be properly disposed of. Any replaced part or packaging should never be left within the reach of children. Failure to follow these instructions could result in severe personal injury
- ☞ **Liability:** The manufacturer declines all liability, contractual or otherwise, for damages resulting from the incorrect installation of this boiler. This includes the failure to comply with the instructions provided by the manufacturer or from a failure to comply with the applicable local and national regulations in force. The manufacturer declines all liability, contractual or otherwise, for any damage to people, animals or property caused by the incorrect use of this boiler or inadequate or incorrect service or maintenance.

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1 - INSTALLATION - CODE REQUIREMENTS

1.1 - Regulations and guidelines

- The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to:

- the latest edition of the **National Fuel Gas Code, ANSI Z223.1/NFPA 54** and or **CAN/CSA B149.1, Natural Gas and Propane Installation Code;**

- the latest edition of the **National Electric Code ANSI/NFPA 70** and or **Canadian Electrical Code Part 1 CSA C22.1.**


- Where required by the authority having jurisdiction, the installation must conform to the Standard for **Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1**

NOTICE! Install CO detectors per local regulations.

NOTICE! This boiler meet the safe and other performance requirements as specified in ANSI Z21.13 standard.

1.2- Commonwealth of Massachusetts Installation Requirements

In the Commonwealth of Massachusetts, the installation must be performed by a licensed plumber or gas fitter.

 **WARNING!!!** Improper venting can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

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

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the

installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, **"GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS"**.

4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a)1 through 4.

(b) Exemptions

The following equipment is exempt from 248 CMR 5.08(2)(a) 1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT - VENTING SYSTEM PROVIDED.

When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and
2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS - GAS EQUIPMENT - VENTING SYSTEM NOT PROVIDED.

When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

2 - GENERAL INFORMATION

2.1 - Key to symbols used

⚠ WARNING!!! Failure to follow these indications can causing an explosion, extensive property damage, severe personal injury or death!

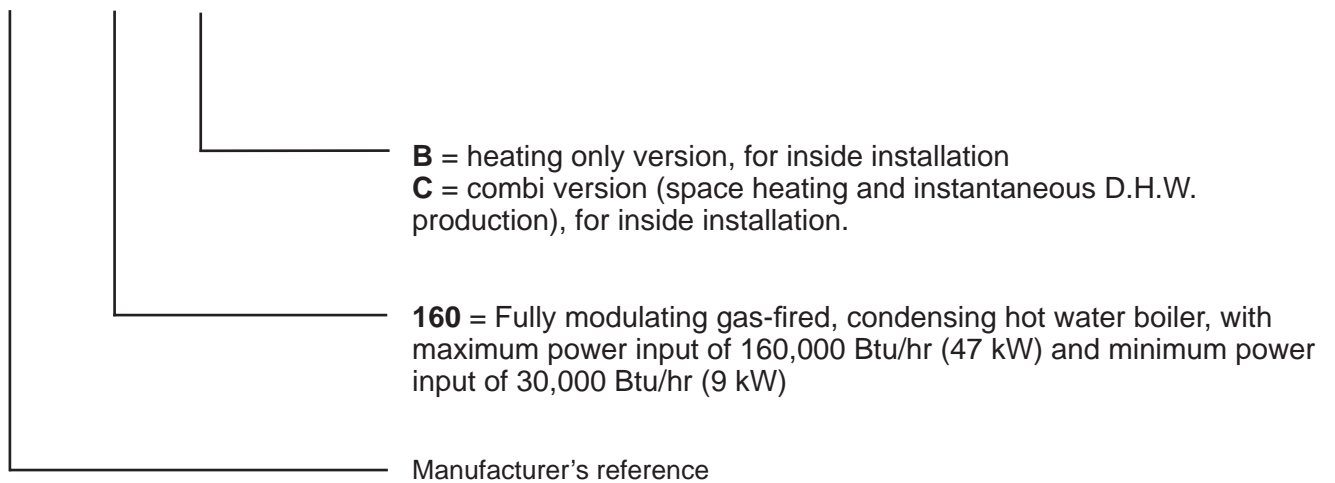
CAUTION!!! Failure to observe this indication may compromise the smooth running of the appliance or cause serious damage to individuals, animals or property.

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

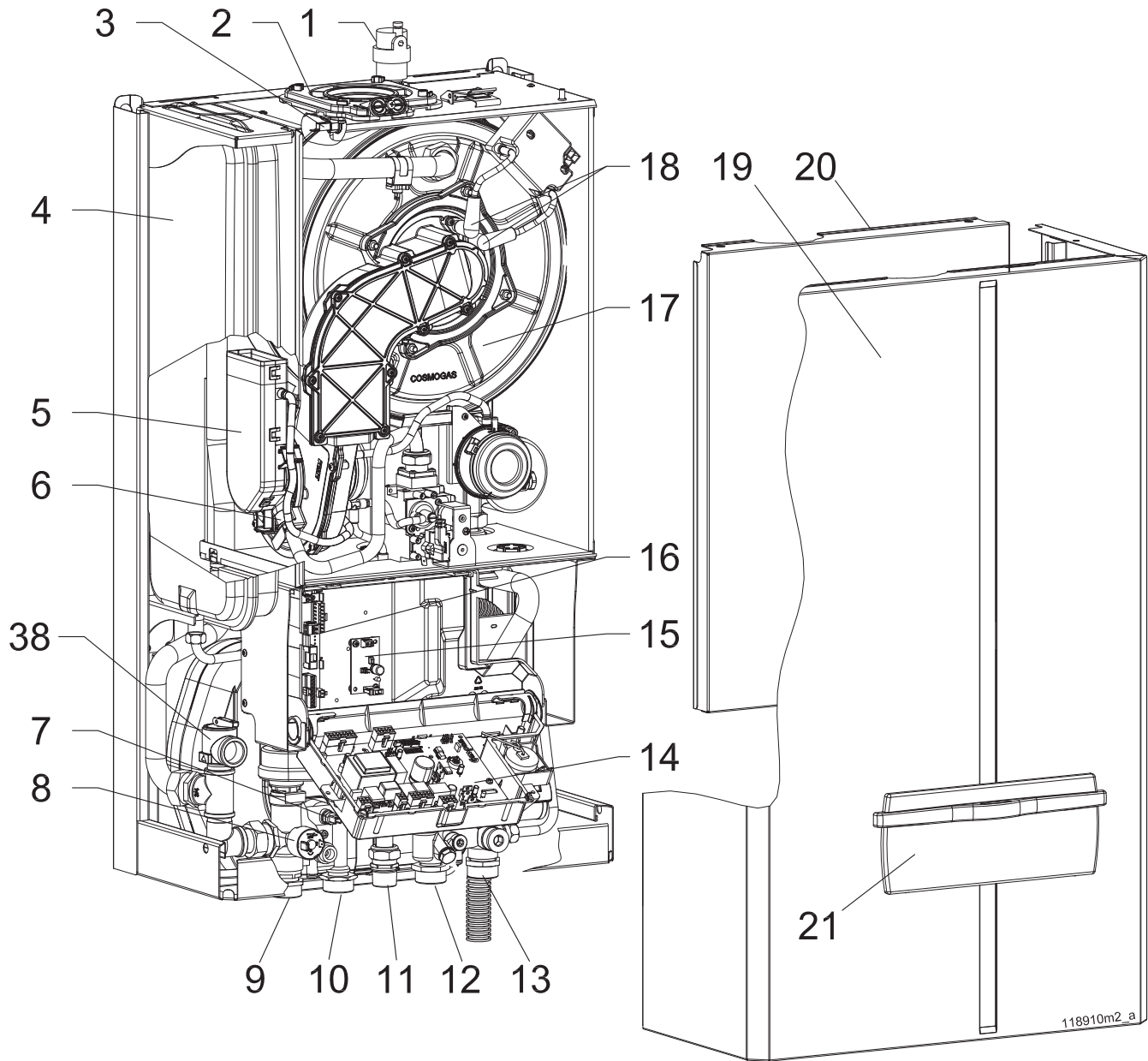
☞ Important indication symbol

2.2 - Description of model:

XX - 160 - X



3 - MAIN COMPONENTS

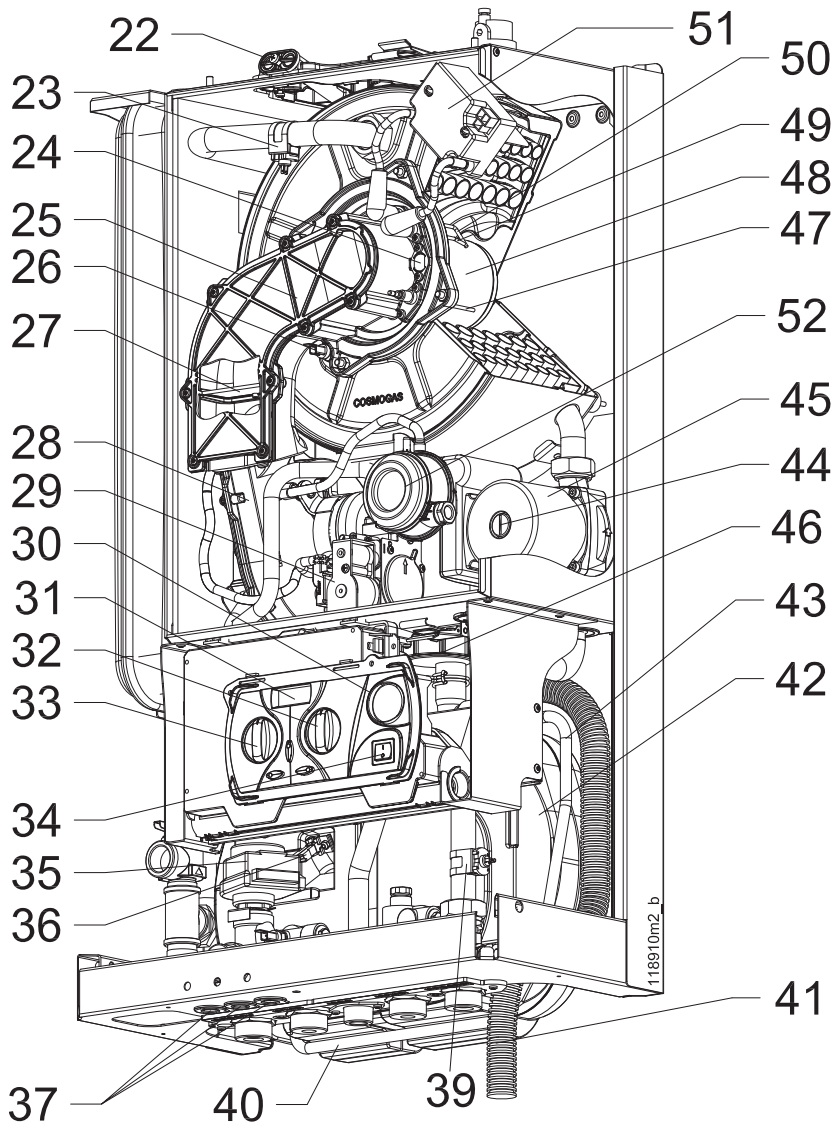


- 1 - Automatic air vent
- 2 - Air intake and flue gas discharge fitting (venting system)
- 3 - U7 flue gas temp. sensor and flue safety switch
- 4 - Expansion tank (not present on 160-B model)
- 5 - Inlet air plenum
- 6 - Air/gas mixer device
- 7 - U2 d.h.w. temp. sensor (not present on 160-B model)
- 8 - Heating pressure switch (low water cut-off)
- 9 - Heating supply connection
- 10 - DHW connection (not present on 160-B model)
- 11 - Gas inlet connection
- 12 - Cold water connection (not present on 160-B model)
- 13 - Heating return connection
- 14 - Power Control Board

- 15 - Openterm interface board (optional)
- 16 - Connection board
- 17 - Primary heat exchanger
- 18 - Spark cable
- 19 - External jacket
- 20 - Combustion chamber door
- 21 - Instrument panel door (in some customized models may be not present)

Figure 3-1 Main components (continued)

3 - MAIN COMPONENTS



- 22 - Combustion analysis tap
- 23 - U1 supply temperature sensor
- 24 - Burner window
- 25 - Air/gas manifold
- 26 - U6 high temperature limit sensor
- 27 - Flue gas back flow preventer
- 28 - Fan
- 29 - Gas valve
- 30 - Heating pressure gauge
- 31 - Display
- 32 - Domestic hot water temperature control
- 33 - Heating temperature control
- 34 - On/off power switch
- 35 - Three way valve (not present on 160-B model)
- 36 - U3 domestic cold water temp. sensor (not present on 160-B model)

- 37 - Cable clamp
- 38 - ASME Safety relief valve
- 39 - U8 return temperature sensor
- 40 - By-pass pipe (not present on 160-B model)
- 41 - Condensation discharge pipe
- 42 - Secondary heat exchanger for domestic hot water production (not present on 160-B model) (For P/N see Section 15)
- 43 - Expansion tank connection pipe (not present on 160-B model)
- 44 - Circulator pump screw (not present on 160-B model)
- 45 - Circulator pump (not present on 160-B model)
- 46 - Condensation discharge trap
- 47 - Flame-proving electrode
- 48 - Burner
- 49 - Right ignition electrode
- 50 - Left ignition electrode
- 51 - Spark generator
- 52 - Flue pressure switch

Figure 3-1 Main components

4 - FUNCTION OVERVIEW

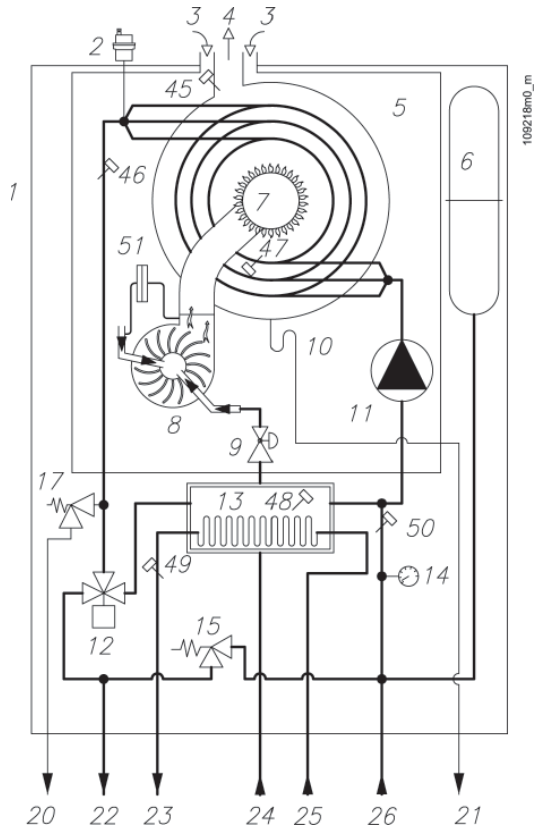


Figure 4-1 160-B Hydronic functional schematic

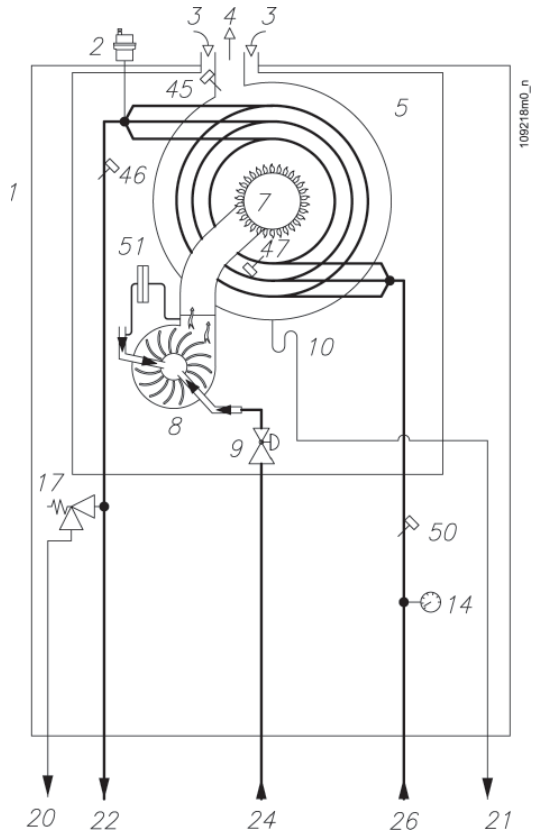


Figure 4-2 - 160-C Hydronic functional schematic

Key to figures 4-1 and 4-2:

- 1 = boiler
- 2 = automatic air vent
- 3 = air intake
- 4 = flue gases discharge
- 5 = sealed combustion chamber
- 6 = expansion tank
- 7 = burner
- 8 = fan
- 9 = gas valve
- 10 = condensate discharge trap
- 11 = circulator pump
- 12 = 3-way valve
- 13 = secondary heat exchanger for d.h.w.
- 14 = pressure gauge
- 15 = by-pass valve
- 17 = safety relief valve
- 21 = condensate discharge pipe
- 22 = heating supply pipe
- 23 = domestic hot water outlet
- 24 = gas inlet
- 25 = cold water inlet
- 26 = heating return pipe
- 45 = U7 = flue gas temperature sensor
- 46 = U1 = boiler temperature sensor
- 47 = U6 = high limit temperature sensor
- 48 = U3 = domestic cold water sensor/ storage tank sensor
- 49 = U2 = domestic hot water temperature sensor
- 50 = U8 = return temperature sensor
- 51 = flue pressure switch

4 - FUNCTION OVERVIEW

4.1 - Intended use and functions of the boiler

This gas-fired condensing boiler, is designed to be used for central heating and producing domestic hot water. The maximum output heat is always guaranteed for the production of domestic hot water since it is given priority over space heating demands. Follow the specific procedure in section 13.7 for the adjustment of the domestic hot water temperature.

This boiler can be installed with a Direct Venting system or with a one pipe vent system and getting combustion air from room.

The quality of the system water is very important. Poor water quality can damage heating systems due to scale formation and corrosion.

This boiler can be connected to an indirect storage tank for the production of domestic hot water (Section 9).

Depending on the model chosen, the following system types can be created:

160-C. Using this boiler model, you can create a system for the production of instantaneous domestic hot water and

a heating system with heating elements functioning at temperatures ranging between 68°F (20°C) and 176°F (80°C). The boiler can also function directly with a radiant floor panel, see section 7.2. When connecting the boiler to the heating system the installer must consider the head loss of the heating system to verify that the boiler pump is adequate. Pump curve is shown in Figure 7-3. The same verification must be done for the domestic installation, see Figure 7-5.

160-B. Using this boiler model, you can create a system with heating elements functioning at temperatures ranging between 68°F (20°C) and 176°F (80°C) can be configured. The boiler can also function directly with a radiant floor panel, see section 7.2. The 160-B model is not equipped with the components required for the production of domestic hot water. Also not included is the expansion tank and circulator pump, see Figure 4.2. To connect the boiler to the heating system, the installer must consider the loss of pressure generated by the boiler (see Figure 7-4), and choose a pump capable of overcoming the head loss of both the boiler and the heating system.

160-C and 160-B models can be connected to a room thermostat, Section 8.1.3.

An outdoor air temperature sensor can also be connected to the boiler for an outdoor reset supply temperature control for maximum fuel efficiency and comfort (see Section 8.1.4). In this configuration the room thermostat will compensate by adjusting the room temperature. The room temperature compensation can be of an ON / OFF type or two-stage. For further information on the outdoor-air reset, refer to Section 13.10.

☞ The boiler must be connected to a heating system and a domestic hot water supply with compatible specifications, performance and power rating.

4.2 - Efficiency up to 98%

When the outdoor reset is activated (an outside sensor is connected), this boiler is designed to always work at the maximum efficiency (see Section 13.10). It will automatically change the supply temperature in relation with the outdoor temperature (Outdoor reset). The graph in Figure 4-3 shows an example on how it can work. This graph represents an installation where the supply and return temperatures are 139°F and 115°F respectively, and the outside temperature is 23°F. The outdoor reset drives the boiler, to progressively reduce the supply temperature and thereby optimize the efficiency. It changes from 87% when outside is -10°F, to 94.8% when outside is 23°F and up to 98% when the outside temperature rises up to 67°F.

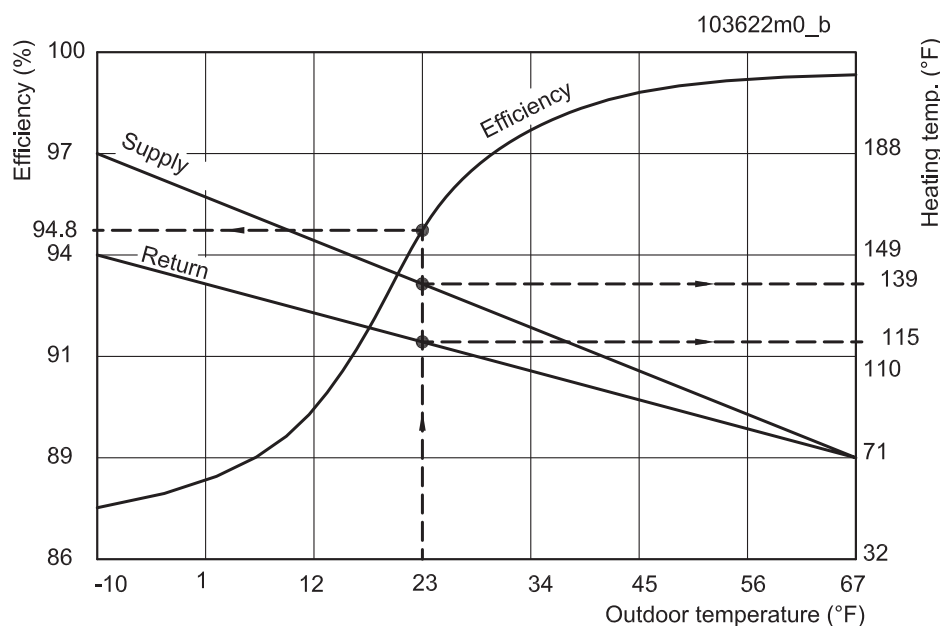


Figure 4-3 Outdoor reset control to optimize the efficiency

5 - INSTALLATION - Location

5.1 - Choosing the installation location

! WARNING!!! Do not store any flammable materials or liquids in the immediate vicinity of the boiler. A fire or explosion can result, causing severe personal injury, death, or substantial property damage.

! WARNING!!! If the boiler is installed on a wall, this must be vertical and constructed to bear the boiler's weight or the boiler and building may be damaged causing severe personal injury, death, or substantial property damage.

! WARNING!!! Do not install the boiler on carpeting. Fire can result, causing severe personal injury, death, or substantial property damage.

! WARNING!!! Do not install the boiler in an attic. Failure to comply with this provision could result in severe personal injury, death, or substantial property damage.

! WARNING!!! Provisions for combustion air and ventilation of the boiler room are always required, regardless whether the combustion air is taken from the outside (Direct Vent, sealed combustion) or inside (room air for combustion). Insufficient ventilation of the boiler room can lead to high air temperatures. Make sure that intake and exhaust openings are sufficiently sized and no reduction or closure of openings takes place. When the problem is not resolved, do not operate the boiler. Please note these restrictions and its dangers to the operator of the boiler. Failure to comply with this provisions could result in severe personal injury, death, or substantial property damage.

! WARNING!!! LIQUEFIED PETROLEUM (L.P.) PROPANE GAS-FIRED BOILER LOCATION REQUIRES SPECIAL ATTENTION: 1994 UNIFORM MECHANICAL CODE, section 304.6: "LPG Appliances. Liquefied petroleum gas-burning appliances shall not be installed in a pit, basement or similar location where heavier-than-air-gas might collect. Appliances so fueled shall not be installed in an abovegrade under-floor space or basement unless such location is provided with an approved means for removal of unburned gas." Failure to comply with this provision could result in severe personal injury, death, or substantial property damage.

CAUTION!!! This boiler is not designed for direct outdoor installation. If installed outside of the structure, it must be sheltered so it is protected from rain, wind, sun and frost. NEVER place this boiler in a location that would subject it to temperatures at or near freezing or temperature that exceed 100°F (38°C). Failure to properly locate this boiler can result in premature failure voiding the warranty.

CAUTION!!! This boiler should be installed in a location so that any water leaking from the boiler or piping connections or relief valve openings will not cause damage to the area surrounding the unit or any lower floors in the structure.

CAUTION!!! When installed in a room with thin walls or a thin floor, resonating noise may occur. Install noise reducing parts if required.

CAUTION!!! Do not allow too much dust to collect on the boiler.

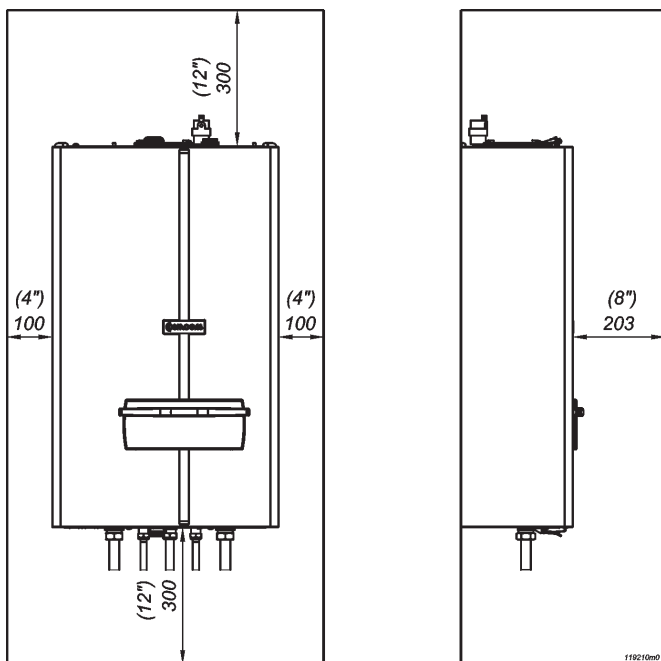


Figure 5-1 Recommended minimum clearance distances for proper installation and servicing

5 - INSTALLATION - Location

When locating the boiler the following factors must be considered:

- ☞ the location of vent/air intake terminals;
- ☞ connection to the gas supply;
- ☞ connection to the water supply;
- ☞ connection to the heating system;
- ☞ connection to the domestic hot water system;
- ☞ connection to the electrical supply;
- ☞ disposal of the condensation produced by the boiler;
- ☞ connection to the room thermostat or equivalent device;
- ☞ piping of the safety relief valve discharge;
- ☞ possible connection of the outdoor temperature sensor;
- ☞ possible connection of an indirect water heater.

5.1.1 - Closet and alcove installations is forbidden

⚠ WARNING!!! It is forbidden the installation of this boiler in a closet or alcove room. Fire can result, causing severe personal injury, death, or substantial property damage.

A closet is any room the boiler is installed in which is less than 100 ft³. An alcove is any room the boiler is installed in which is less than 100 ft³ that it does not have a door.

5.1.2 - Clearances for installation and servicing

Figure 5-1 shows the minimum clearances required for installation and servicing.

NOTE: Service clearances are not mandatory, but are recommended to ensure ease of service should it be required.

5.1.3 - Clearances from combustible material

This boiler may be installed directly onto a wall of combustible material with the following clearance:

- Ceiling: 2 inches (51 mm)
- Front: 2 inches (51 mm)
- Rear: 0 inches (0 mm)
- Sides: 2 inches (51 mm)
- Floor: 2 inches (51 mm)
- Concentric vent: 0 inches (0 mm)
- Split vent (two pipes), first 3ft from the boiler: 1 inch (25 mm)
- Split vent (two pipes), after 3ft from the boiler: 0 inches (0 mm)
- Boiler piping: 1/4 inch (7 mm)

5.1.4 - Vent and air piping

This boiler requires a special vent system, designed for pressurized venting.

The boiler is to be used for either direct vent installation or for installation using room combustion air. When room air is considered, see Section 10-10.

Vent and air may be vented vertically through the roof or out a side wall, unless otherwise specified. You may use any of the vent/air piping methods covered in Section 10. Do not attempt to install the boiler using any other means.

Be sure to locate the boiler such that the vent and air piping can be routed through the building and properly terminated.

The vent/air piping lengths, routing and termination method must all comply with the methods and limits given in Section 10.

5.1.5 - Prevent combustion air contamination

Install air inlet piping for the boiler as described in Section 10. Do not terminate vent/air in locations that can allow contamination of combustion air. Refer to Section 10.2, for products and areas which may cause contaminated combustion air.

⚠ WARNING!!! Ensure that the combustion air will not contain any of the contaminants listed in Section 10.2. Contaminated combustion air will damage the boiler, resulting in possible severe personal injury, death or substantial property damage.

5.2 - Transporting the boiler

⚠ WARNING!!! Always lift and carry the boiler with a hand truck or special equipment. Failure to comply with this provisions could result in severe personal injury or death.

⚠ CAUTION!!! The boiler may be damaged when it is improperly secured and transported.

⚠ CAUTION!!! The unpacked boiler may be damaged when not protected against contamination

- ☞ Only transport the boiler using the right transportation equipment, such as a hand truck with a fastening belt or special equipment for maneuvering steps.
- ☞ During transportation the boiler must be secured on the transportation equipment to prevent it from falling off.
- ☞ Protect all parts against impacts if they are to be transported.
- ☞ Observe the transportation markings on the packaging.
- ☞ Leave the protective covers on the connections.
- ☞ Cover the flue gas and air intake connections at the top of the boiler with plastic film

6 - INSTALLATION - Mounting the boiler

6.1 - Mounting the boiler

Refer to Figure 6-1:

1. place the cardboard template, provided with the boiler, against the wall;
2. ensure that the template is plumb and the screw holes line up with the wall studs;

⚠ WARNING!!! The wall bracket screws must be screwed into the buildings framing or other material capable of supporting the weight of the boiler or the boiler and building may be damaged causing severe personal injury, death, or substantial property damage.

3. mark the screw holes for the wall bracket, "A";
4. remove the cardboard template;
5. install the wall bracket "A", using the screws "E", provided;
6. hang the boiler on the wall bracket, "A", by hanging connections "B" and "C" on tabs "D".

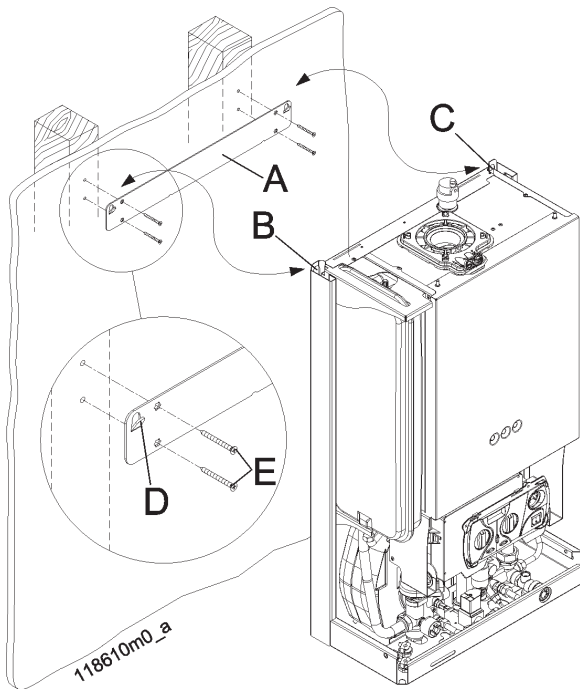
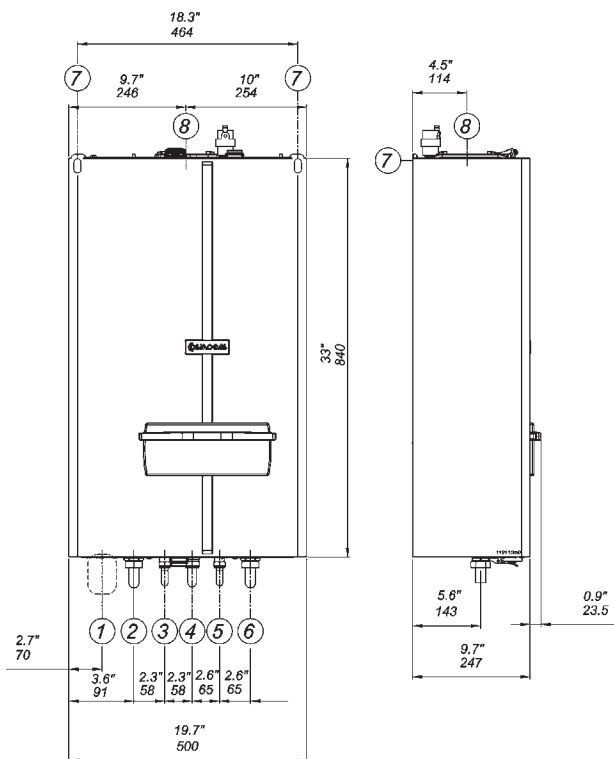


Figure 6-1 Wall bracket installation



- 1 = Area for power supply cable
- 2 = Heating supply connection (3/4")
- 3 = Domestic hot water connection (3/4") (absent on 160-B model)
- 4 = Gas connection (3/4")
- 5 = Domestic cold water connection (3/4") (absent on 160-B model)
- 6 = heating return connection (3/4")
- 7 = positions for boiler support
- 8 = Flue discharge/air intake connection

Figure 6-2 Dimensions

7 - INSTALLATION - Water connection

7.1 - Water connections

The boiler comes with the fittings shown in Figure 7-1.

7.2 - Supply and return piping

CAUTION!!! All heating system piping must be installed in accordance with the ANSI/ASME Boiler and Pressure Vessel Code, Section IV. All applicable local codes and ordinances must also be followed.

CAUTION!!! This boiler must have adequate water flowing of 5 GPM through it whenever the burner is on. Failure to do this will damage the unit and void the warranty!

CAUTION!!! Before connecting the boiler to the heating system the heating system must be thoroughly flushed to remove sediment, flux, filings and other foreign matter. An approved inhibitor should be added to the heating system water to prevent limestone and magnetite deposits from forming and to protect the boiler from galvanic corrosion.

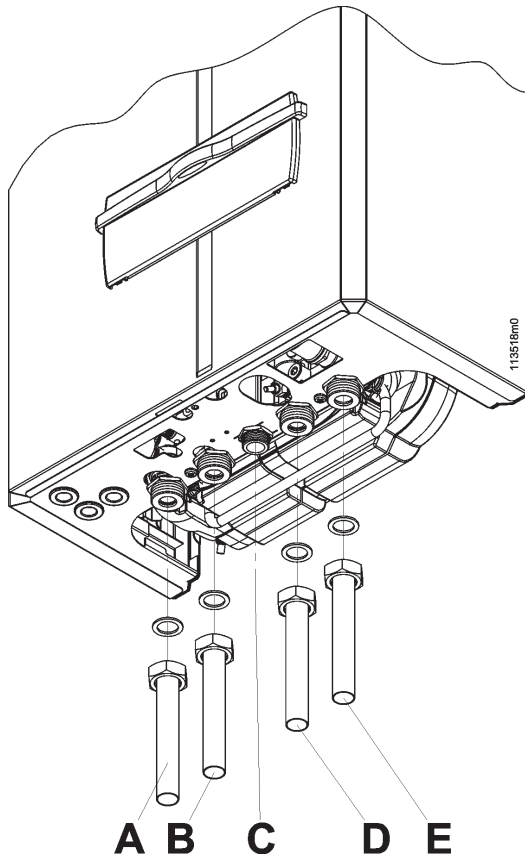
CAUTION!!! Any dirt or foreign matter which is present in the heating circuit, might accumulate inside the secondary domestic heat exchanger, limiting the heat exchange and reducing the production of domestic hot water

CAUTION!!! The manufacturer cannot be held responsible for any damage caused by incorrect use of additives in the heating system.

CAUTION!!! This boiler is equipped with an ASME safety relief valve set at 30 psi (2 bar). The heating system must be designed so that no piping or radiation elements are higher than 65 ft (20 m) or else the hydraulic head of the system will cause the relief valve to open.

CAUTION!!! Continual fresh make-up water will reduce boiler life. Mineral buildup in the heat exchanger reduces heat transfer, overheats the stainless steel heat exchanger, and causes failure. Addition of oxygen carried in by makeup water can cause internal corrosion in system components. Leaks in boiler or piping must be repaired at once to prevent makeup water entering the boiler.

CAUTION!!! This boiler can supply heating water at a temperature up to 190°F (88°C). If the heating system is built with materials not able to resist to this temperature, you must to install a device that shut-off the boiler before the material's limit temperature.



- A = heating system supply (3/4")
- B = domestic hot water supply (3/4")
(Absent on 160-B model)
- C = Inlet gas connection (3/4")
- D = domestic cold water (3/4") (Absent on 160-B model)
- E = heating system return (3/4")

Figure 7-1 Fittings supplied with the boiler

7 - INSTALLATION - Water connections

CAUTION!!! Risk of system damage due to unsuitable heating system water. If oxygen-permeable pipes are used, e.g. for under floor heating systems, the systems must be separated from one another by plate heat exchangers. Unsuitable heating system water promotes sludge and corrosion formation. This can result in heat exchanger damage and malfunction, which is not covered by warranty.

CAUTION!!! Do not use the boiler to directly heat swimming pool or spa water.

System water piping methods

This boiler is designed to function in a closed loop pressurized system not less than 8 psi (0,5 bar). A pressure gauge is included to monitor system pressure. It is important to note that the boiler version 160-B has a minimal amount of pressure drop (see Figure 7-4) and must be figured in when sizing the circulators. Each boiler installation must have an air elimination device, which will remove air from the system. Install the boiler so the gas ignition system components are protected from water (dripping, spraying, etc.) during appliance operation for basic service of circulator replacement, valves, and others. Observe a minimum of 1/4" (7mm) clearance around all un-insulated hot water pipes when openings around the pipes are not protected by non-combustible materials.

Low water cutoff device

On a boiler installed above radiation level, some states and local codes require a low water cutoff device at the time of installation.

Freeze protection

Freeze protection for new or existing systems must use glycol that is specially formulated for this purpose. This includes inhibitors, which prevent the glycol from attacking the metallic system components. Make certain to check that the system fluid is correct for the glycol concentration and inhibitor level. The system should be

tested at least once a year and as recommended by the producer of the glycol solution. Allowance should be made for the expansion of the glycol solution in the system piping.

WARNING!!! Never use non-approved additives or toxic boiler treatment chemicals in the heating system as they can cause serious health problems or possibly death. Any additives introduced into the heating system must be recognized as safe by the United States Food and Drug Administration.

WARNING!!! Use only inhibited propylene glycol solutions, which are specifically formulated for hydronic systems. Ethylene glycol is toxic and can attack gaskets and seals used in hydronic systems.

CAUTION!!! If glycol is used, it must be used in accordance with the instructions supplied with the product.

CAUTION!!! Any additives added to the heating system must not be added directly inside the boiler but through the heating system piping to prevent damage to the boiler.

CAUTION!!! This boiler is capable of servicing multiple temperature loop systems. It is the responsibility of the installer to protect the loops with lower temperature requirements from higher temperatures that may be required by other loops

Floor radiant heating systems

With switch #6 in Figure 9-2, in the ON position, the boiler will maintain the supply water temperature between 68°F (20°C) and 113°F (45°C). No setting changes made from the control panel will cause the supply water temperature to exceed 113°F (45°C).

CAUTION!!! If the boiler is installed in a low temperature system, the switch #6 in Figure 9-2 must be placed in the ON position to prevent the supply water temperature from exceeding 113°F (45°C) or damage to the low temperature system components could occur (see section 5.9).

CAUTION!!! To protect the radiant floor panel against over heating you must install a safety device that shuts-off the boiler before it reaches the floor panel's limit temperature.

CAUTION!!! Risk of system damage due to unsuitable heating system water. If oxygen-permeable pipes are used, e.g. for under floor heating systems, the systems must be separated from one another by plate heat exchangers. Unsuitable heating system water promotes sludge and corrosion formation. This can result in heat exchanger damage and malfunction, which is not covered by warranty.

7.2.1 - Near boiler heating piping components

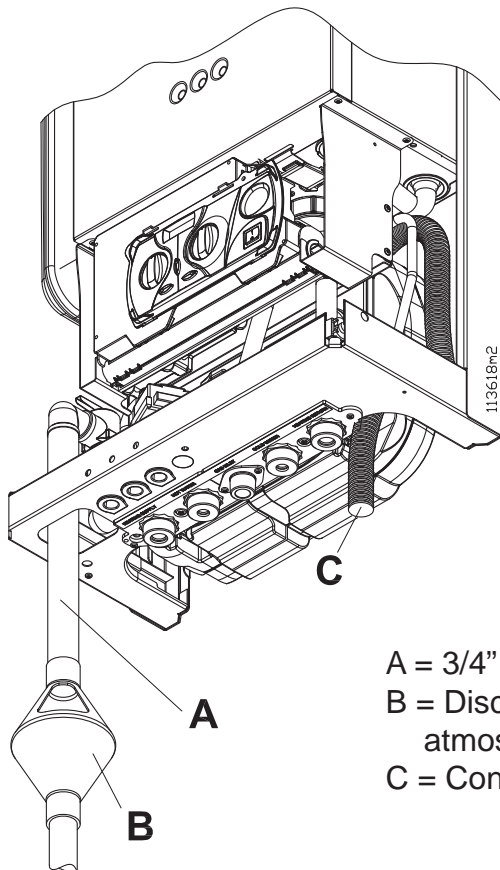
1. Boiler system piping: boiler system piping MUST be properly sized. Reducing the pipe size can restrict the flow rate through the boiler, causing inadvertent high limit shutdowns and poor system performance.
2. Boiler system pump: field supplied for 160-B model. Factory installed for 160-C model. Circulators MUST be sized to meet the specified minimum flow requirements of 5 GPM.
3. Indirect water heater circulating pump: Field supplied. The pump MUST be sized to meet the specified minimum flow requirements of 5 GPM. Consult the indirect water heater operating guide to determine flow characteristics for the selected product used.

7 - INSTALLATION - Water connections

4. Boiler isolation valves: Field supplied. Full port ball valves are required. Failure to use full port ball valves could result in a restricted flow rate through the boiler.
5. Back flow preventer: Field supplied. Back flow preventer valves are recommended for installation as shown in Figures 7-6 and 7-7. Failure to install these valves could result in a reverse flow condition during pump(s) off cycle.
6. Domestic indirect hot water isolation valves: Field supplied. Full port ball valves are required. Failure to use full port ball valves could result in a restricted flow rate through the boiler.
7. Anti-scald mixing valve: Field supplied. An anti-scald mixing valve is recommended (see Figure 7-6). It is recommended also when an indirect water heater is present.
8. Unions: Field supplied. Recommended for unit serviceability.
9. Pressure relief valve: Factory installed. The pressure relief valve is sized to ASME specifications.

10. Indirect water heaters: field supplied. This boiler may be piped to an indirect water heater to heat domestic hot water with the space heat transfer medium. There are two options when utilizing an indirect water heater:
 - A. The space heating piping will branch off to flow the space heat transfer medium through a single wall heat exchanger coil inside the indirect water heater.
 - B. The indirect water heater is connected to the system supply piping. A pump controlled by the boiler's control will regulate the flow of water through the indirect water heater. The indirect water heater's temperature will be regulated by the boiler's control. The boiler is pre-configured to control the operation of the DHW pump with Domestic Hot Water Prioritization programming.

CAUTION!!! It is up to the installer to ensure the minimum system flow is not less than 5 GPM at any time.



- A = 3/4" pipe extension (not provided)
- B = Discharge device open to the atmosphere (not provided)
- C = Condensate discharge pipe

Figure 7-2 Relief valve discharge piping

! WARNING!!! The National Standard Plumbing Code, the National Plumbing Code of Canada and the Uniform Plumbing Code limit the pressure of the heat transfer fluid to less than the minimum working pressure of the potable water system up to 30 psi maximum. Also, the heat transfer fluid must be water or other non-toxic fluid having a toxicity of Class 1, as listed in Clinical Toxicology of Commercial Products, 5th Edition

11. Filter: Field supplied. A filter or equivalent multipurpose strainer is recommended at the return pipe of the boiler to remove system particles from older hydronic systems and protect newer systems.

7.2.2 - Relief valve

This boiler is equipped with a safety relief valve set at 30 psi (2 bar) which must be piped in accordance with the ANSI/ASME Boiler and Pressure Vessel Code, Section IV, to prevent scalding in the event of a discharge. Pipe the discharge to a drain (See Figure 7-2). Provide piping that is the same size as the safety relief valve outlet

! WARNING!!! Failure to properly pipe the relief valve discharge can result in scalding of individuals and animals. Never install any type of valve between the boiler and the relief valve or an explosion causing extensive property damage, severe personal injury or death may occur!

! WARNING!!! Never block the outlet of the safety relief valve or an explosion causing extensive property damage, severe personal injury or death may occur!

7 - INSTALLATION - Water connections

7.2.3 - Expansion Tank and Makeup Water

Boiler model 160-C is factory equipped with its expansion tank with 2 gals volume. Ensure this volume is sufficient for the heating system you are designing. If not, install an additional external expansion tank. For boiler model 160-B, ensure the expansion tank is properly sized for the boiler volume (1,5 gallons [6 litres]) and the system volume, temperature and pressure.

CAUTION!!! Undersized expansion tanks will cause system water to be lost through the pressure relief valve and cause additional makeup water to be added to the system. Eventual boiler heat exchanger failure can result due to this excessive makeup water addition, compromising the functionality of the unit and void its warranty.

For model 160-B (and for 160-C if needed), the expansion tank must be located as shown in Figures 7-6 and 7-7 when using a primary/secondary piping arrangement or as per recognized design methods. Refer to the expansion tank manufacturer instructions for additional installation details.

Connect the expansion tank to an air separator only if the air separator is located on the suction side (inlet) of the system circulator.

Always locate and install the system fill connection at the same location as the expansion tank connection to the system.

7.2.4 - Heating pump

160-C boiler is fitted with a circulator pump. The head available to supply flow through the heating system at the boiler connections is shown in graph form in Figure 7-3. The internal pump is sufficient to run the water into the primary looping.

CAUTION!!! It is up to the installer to ensure the minimum system flow is not less than 5 GPM at any time.

To connect a system pump on the secondary looping see Figure 7-6 and electrically connect the pump follow Figure 8-2

160-B boiler is not fitted with an internal pump. The installer needs to install an external heating pump as illustrated in Figure 7-7. To size the pump, together the system head loss, consider also the graph in Figure 7-4. The minimum allowable flow rate through the boiler is 5 gpm (1,135 l/h).

CAUTION!!! It is up to the installer to ensure the minimum system flow is not less than 5 GPM at any time.

To wire the heating pump to the boiler, refer to Section 9.1. Because the pump is normally used in conjunction with an indirect water heater, see Figure 7-7 which shows a typical installation with a typical rise of 35°F and using the follow heating pump:

- GRUNDFOS model UPS15-58FC
- TACO model 008/0010
- B&G model NRF-36
- Armstrong model Astro 30

For different installations, size the pump using recognized design methods.

7.2.5 - Sizing heating system

Size the piping and system components required in the space heating system, using recognized design methods.

7.2.6 - Domestic Hot Water System Piping when using an indirect water heater

See Figure 7-7, for recommended piping to an indirect water heater. This recommended piping configuration ensures priority is given to the production and recovery of DHW. Install the heating pump (item "9", Figure 7-7) only if you are using a 160-B boiler model. Refer to Figure 9-1 to wire the indirect water heater pump, the system pump and the heating pump (if present).

7.3 - Converting a combi boiler into a heating only boiler

If you are in possession of a combi boiler (160-C) you can use it as a heat only boiler without using the domestic hot water circuit. To do so, simply plug the two fittings, items "3" and "5" of Figure 6-2, and move switch N°5 (see Figure 9-1) from OFF position to ON position. Now knob "11" of Figure 13-1 is disabled.

7 - INSTALLATION - Water connections

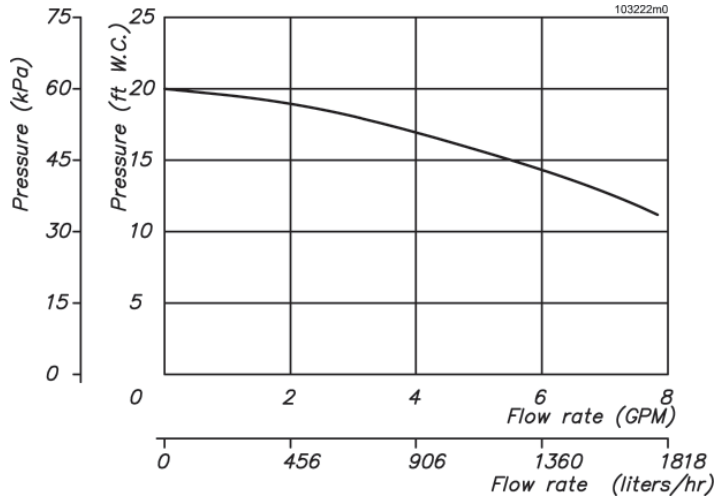


Figure 7-3 Available Head for heating circuit for models “160-C”

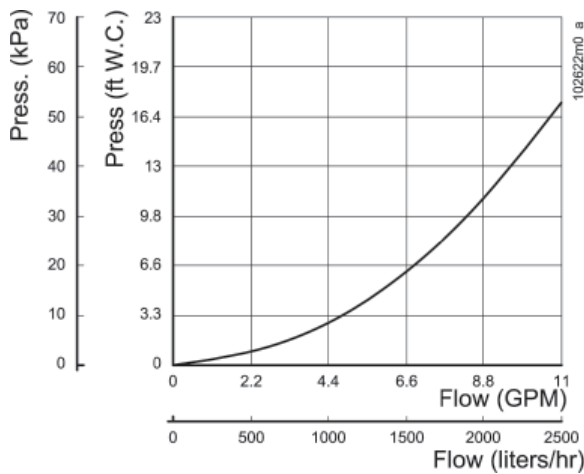


Figure 7-4 Internal Boiler Head Loss for model “160-B”

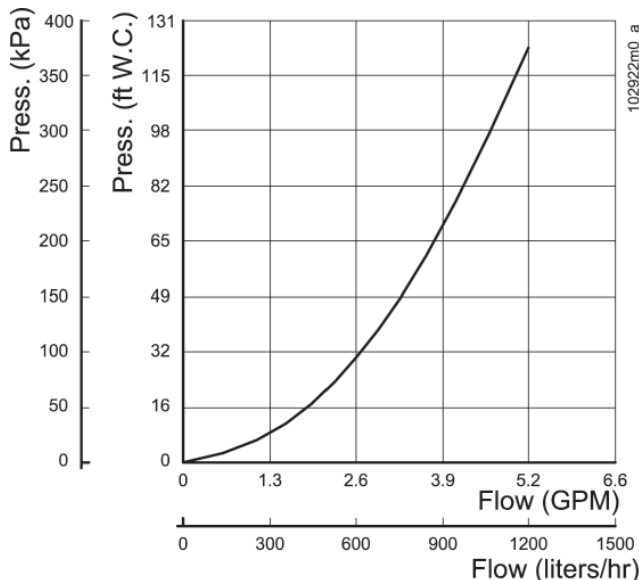


Figure 7-5 Domestic Water Coil Head Loss for model “160-C”

7.4 - Domestic hot and cold water (only for 160-C model)

160-C boiler, offers resistance to the passage of domestic water (see graph flow/pressure of Figure 7-5). The installer or the engineer must take account of this in order to ensure the correct domestic water flow to the utilities.

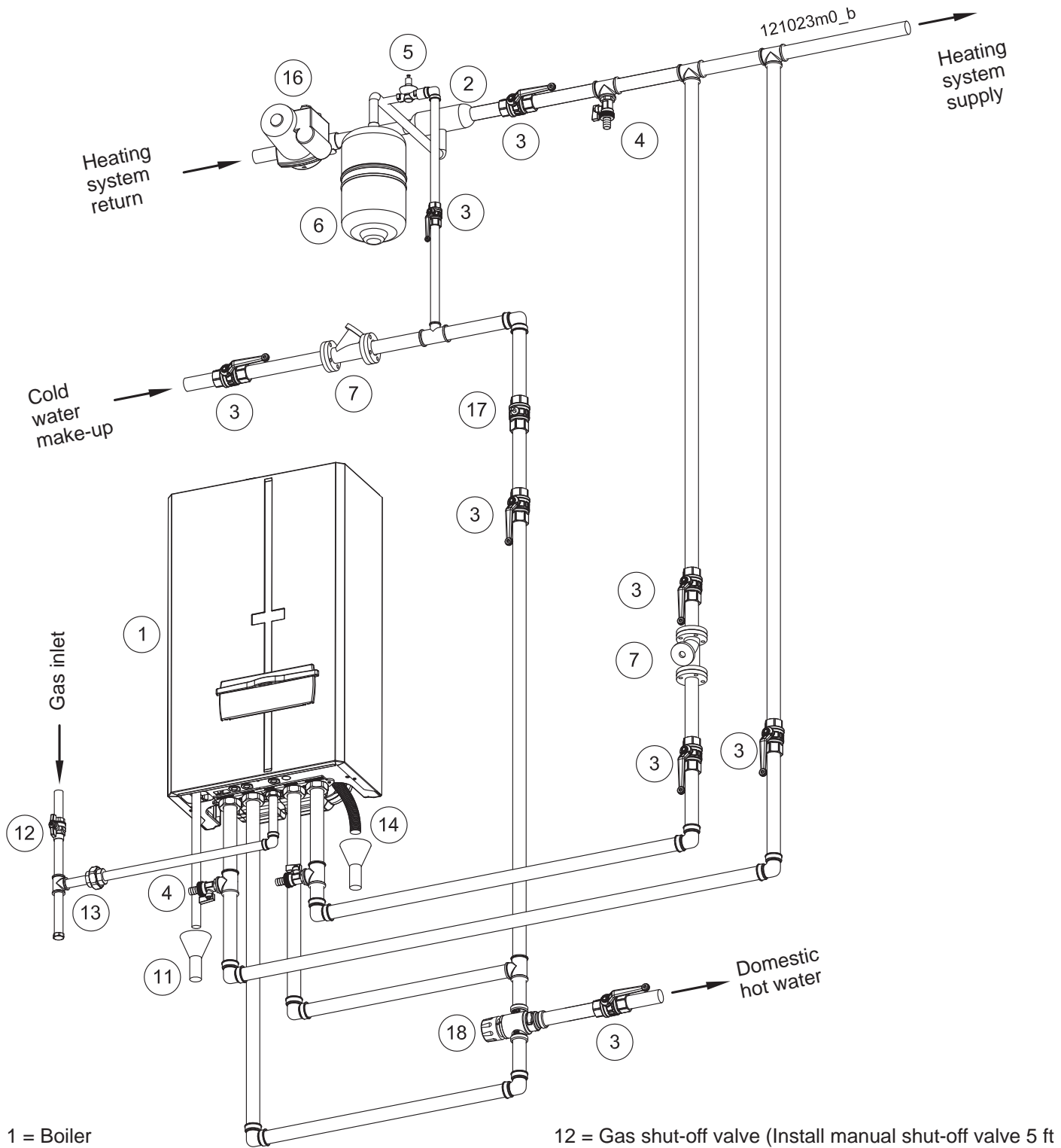
CAUTION!!! If the domestic water hardness is greater than 9 gr/gal (150 mg/l) we recommend installing a water softener with filter. Failure to comply with this requirement may compromise the functionality of the unit and void its warranty.

- ☞ Figure 11 illustrates the positioning of the domestic hot and cold water pipes.
- ☞ For servicing purposes, install an isolation valve upstream from the cold water inlet.
- ☞ To correctly set the domestic water flow, install an adjustable flow restrictor upstream the cold water inlet (see Figure 7-6 item “17”).
- ☞ 160-C boiler can be used as heat only boiler (see Section 7-3).

Anti-scald mixing valve: Field supplied. An anti-scald mixing valve is recommended (see Figure 7-6). It is recommended also when an indirect water heater is present.

! WARNING!!! Install an anti scald mixing valve downstream domestic hot water piping. Failure to comply with this provision can result in scalding of individuals and animals causing, severe personal injury or death!

7 - INSTALLATION - Water connections

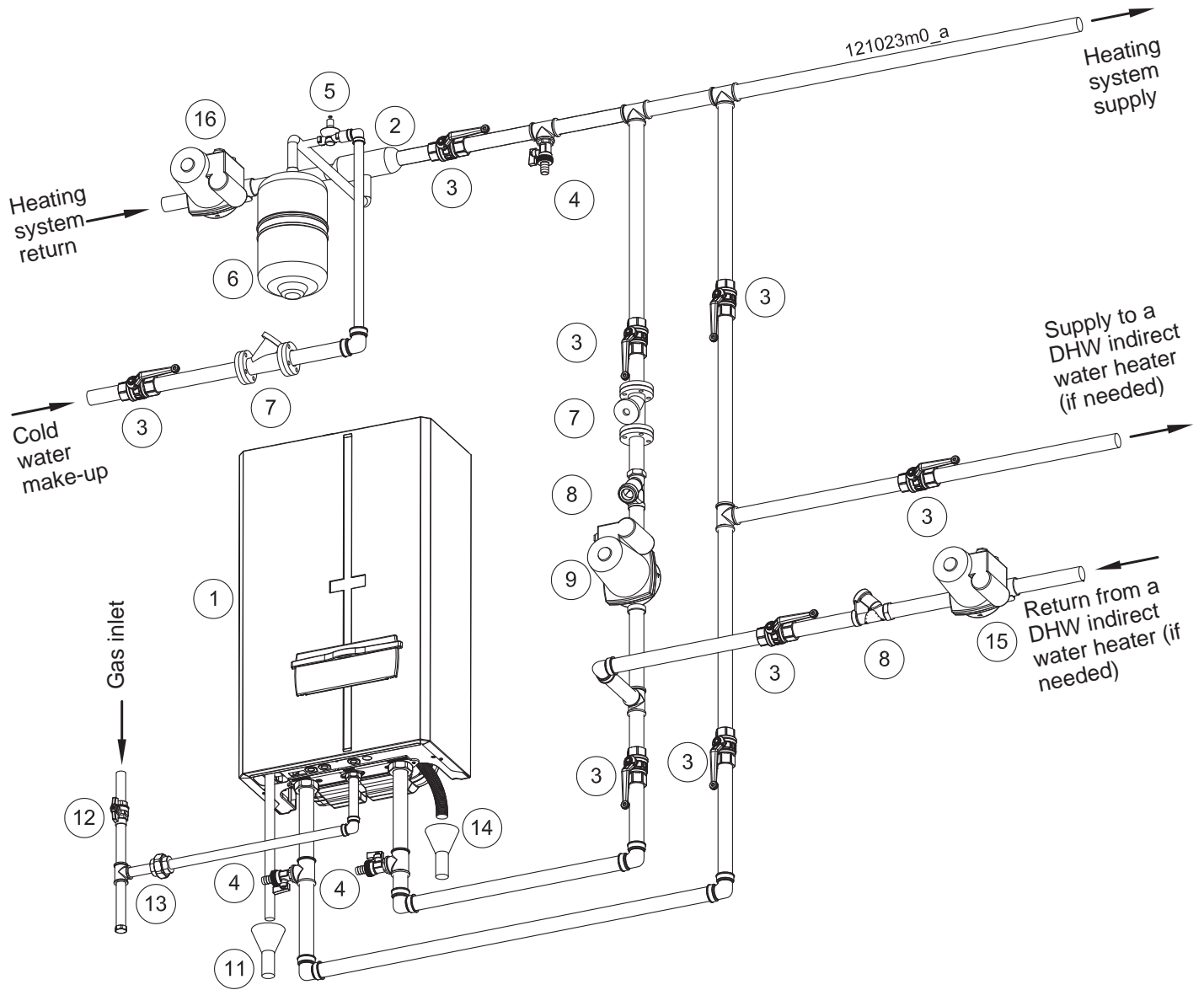


- 1 = Boiler
- 2 = Air separator
- 3 = Ball valve
- 4 = Drain cocks
- 5 = Filling valve
- 6 = Expansion tank (If needed)
- 7 = Filter
- 11 = Relief valve drain

- 12 = Gas shut-off valve (Install manual shut-off valve 5 ft (1.5m) above floor).
- 13 = Ground joint union
- 14 = Condensate drain (see also Figure 7-8)
- 16 = System pump
- 17 = Flow restrictor
- 18 = Mixing valve

Figure 7-6 Piping of the boiler model 160-C

7 - INSTALLATION - Water connections



- 1 = Boiler
- 2 = Air separator
- 3 = Ball valve
- 4 = Drain cocks
- 5 = Filling valve
- 6 = Expansion tank
- 7 = Filter
- 8 = Back flow preventer

- 9 = Heating pump
- 11 = Relief valve drain
- 12 = Gas shut-off valve (Install manual shut-off valve 5 ft (1.5m) above floor)
- 13 = Ground joint union
- 14 = Condensate drain (see also Figure 7-8)
- 15 = Indirect water heater pump (if needed)
- 16 = System pump

Figure 7-7 Piping of the boiler 160-B

7 - INSTALLATION - Water connections

7.5 - Condensate disposal

! WARNING!!!

The condensate trap must be connected to the boiler per the following instructions or combustion gases will enter the room. This can result in excessive levels of carbon monoxide which can cause severe personal injury or death!

This boiler produces water as a byproduct of combustion. The boiler is equipped with a condensate trap, Figure 3-1, item "46", for the evacuation of condensate and to prevent the leakage of combustion products. The condensate trap drains through pipe shown in Figure 7-2 item "C". The condensation disposal system must:

- ☞ be connected by means of an appropriate trap capable of preventing the pressurization of the condensate system and the return of sewer gas (see figure 7-8);
- ☞ slope condensate tubing down and away from the boiler into a drain or condensate neutralizing filter. Condensate from the boiler will be slightly acidic (around pH 4). Install a neutralizing filter if required by local codes.

! CAUTION!!!

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

- ☞ comply with national and/or local codes for condensate neutralizer between pipe "C" of figure 7-2 and the waste disposal system;
- ☞ be carried out with a pipe with an internal diameter equal to or greater than 1/2 in (13 mm);

- ☞ be installed in such a way so as to avoid the freezing of the liquid;
- ☞ never discharge into gutters or rain collectors;
- ☞ be properly pitched towards the point of discharge avoiding high points, which could place the condensate system under pressure.

! CAUTION!!!

The condensate drainage system is designed to empty all the condensate produced by one boiler only. Each boiler must be equipped with its own condensate drainage system or the drainage system may malfunction.

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

COMMONWEALTH OF MASSACHUSETTS SPECIAL REQUIREMENT

When the boiler is installed and used in the Commonwealth of Massachusetts, a neutralization unit **MUST** be installed in the condensate removal system.

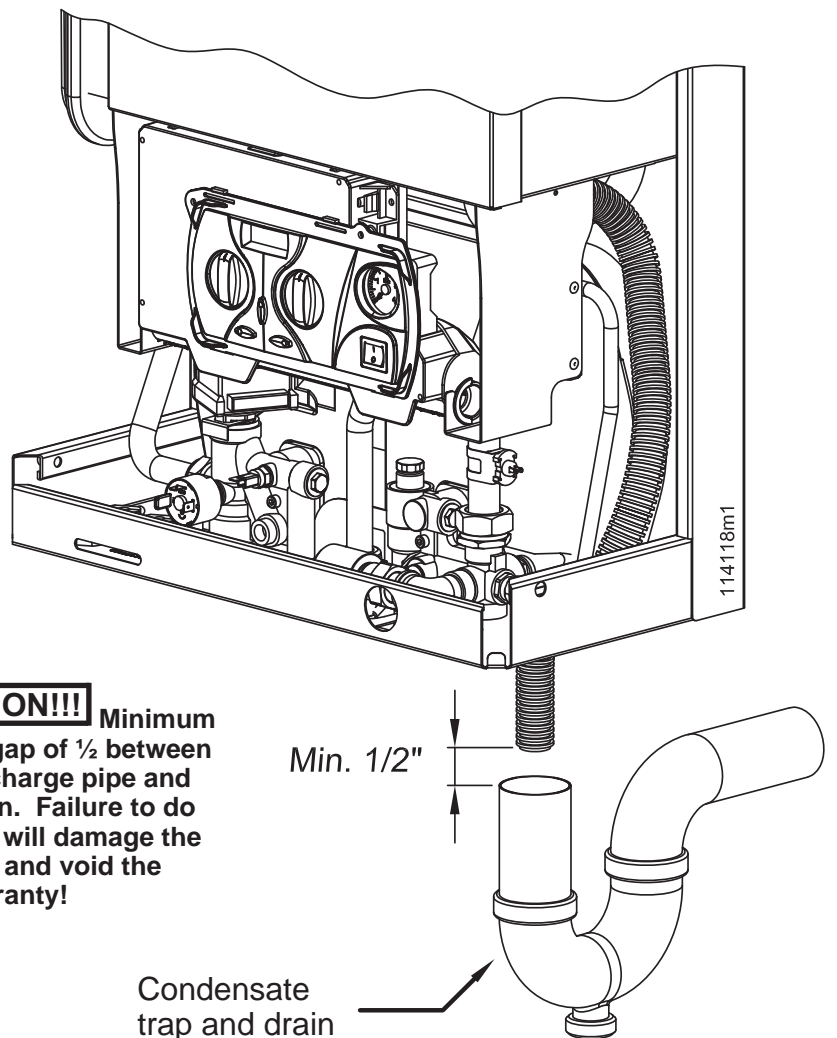
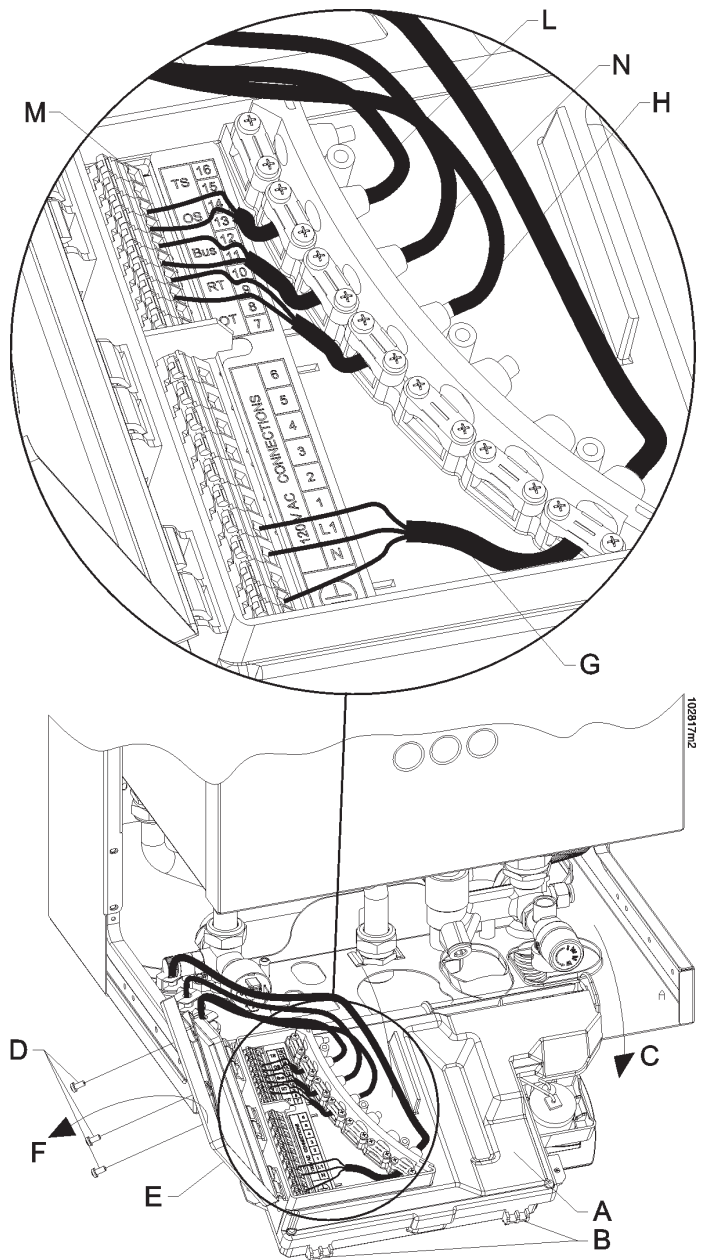


Figure 7-8 Condensate trap and drain connection

8 - INSTALLATION - Electrical connections



- A = Junction box
- B = Plastic spring
- C = Opening direction
- D = Screws for junction box cover
- E = Junction box cover
- F = Junction box cover opening direction
- G = Electrical supply cable
- H = Room thermostat cable (optional)
- L = Outside temperature sensor cable (optional)
- M = Indirect water heater temperature sensor terminals
- N = Remote command cable (optional)

Figure 8-1 Junction box

8.1 - Electrical connections: overview

⚠ WARNING!!! **ELECTRICAL SHOCK HAZARD**
 – For your safety, turn off electrical power supply before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

⚠ WARNING!!! Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation!

⚠ ATTENTION!!! *Au moment de l'entretien des commandes, étiquetez tous les fils avant de les débrancher. Des erreurs de câblage peuvent entraîner un fonctionnement inadéquat et dangereux. S'assurer que l'appareil fonctionne adéquatement une fois l'entretien terminé.*

⚠ WARNING!!! The boiler must be electrically wired to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the *National Electrical Code, ANSI/NFPA 70* and/or the *Canadian Electrical Code Part I, CSA C22.1, Electrical Code*.

NOTICE! Wiring must be N.E.C. Class 1. Use only type 105°C wire or equivalent.

Installation must comply with:

1. National Electrical Code and any other national, state, provincial, or local codes, or regulations.
 2. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.
- ☞ Check that the electrical system is adequate for the power consumption indicated on the rating plate.
 - ☞ Line voltage field wiring of any controls or other devices must conform to the temperature limitation of type T wire at 95 °F (35 °C), above room temperature. Use copper conductors with a minimum size of #14 AWG. Low voltage wiring must not be less than #18 AWG with a neoprene, thermoplastic or other equivalent insulation having a minimum insulation thickness of 0.012 in. (0.3 mm).
 - ☞ A properly rated shut-off switch shall be located nearest to the boiler.
 - ☞ Ensure that the polarity between live and neutral wires is maintained when connecting the boiler.

8 - INSTALLATION - Electrical connections

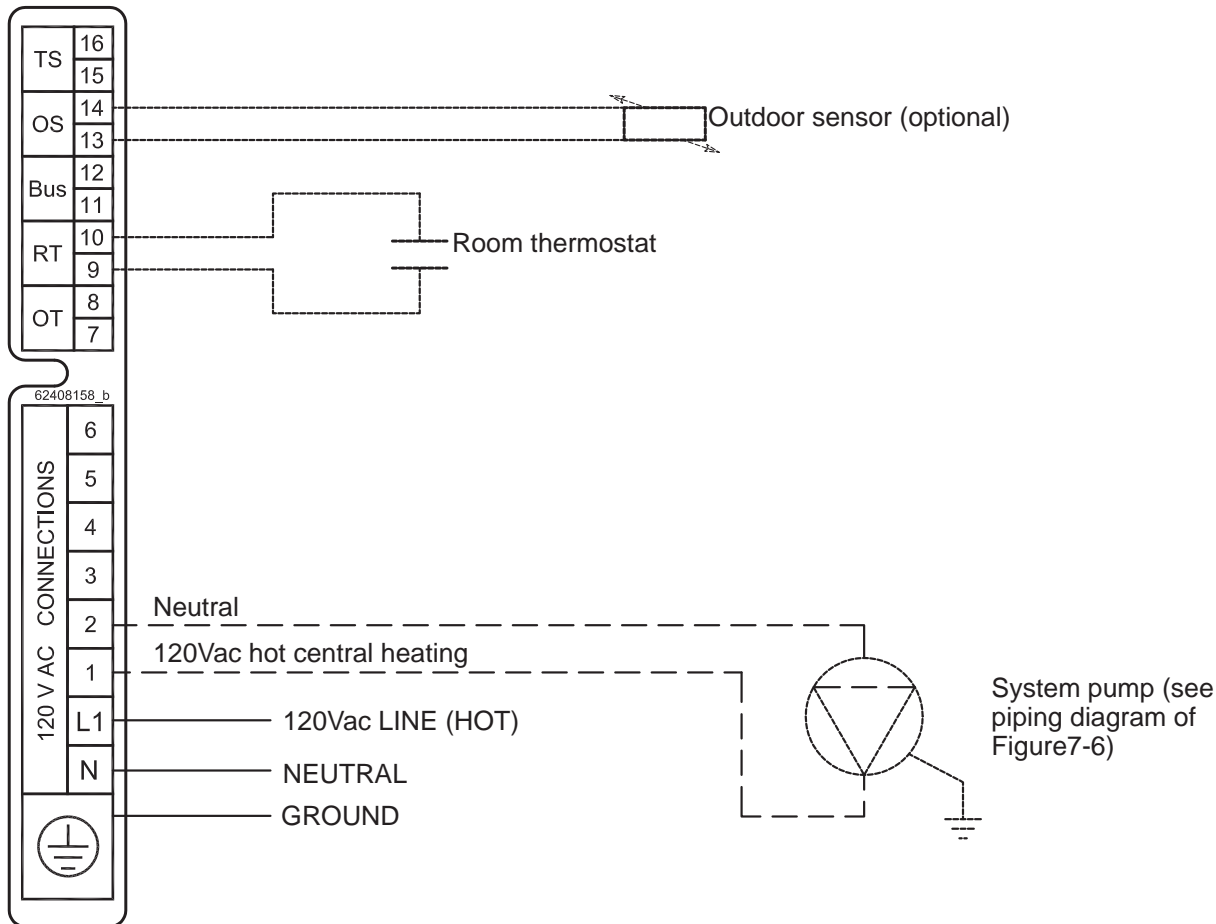


Figure 8-2 Electrical connections for 160-C model (Refer to Figure 7-6)

CAUTION!!! Ensure that heating and water piping is not used as a ground connections for the electric and telephone systems. This piping is completely unsuitable for this purpose and could rapidly lead to serious corrosion damage to the boiler, piping and radiators, voiding the warranty

CAUTION!!! The boiler is not provided with any protection against lightning strikes.

8.1.1 - Connecting the power supply cable

Provide and install a fused disconnect or service switch (15 amp recommended) as required by the code. To connect the electrical power supply cable, follow the steps below while referring to Figures 8-1 and 8-2:

1. remove the boiler casing following the instructions given in Section 14.2 and open the junction box cover;
2. press the two plastic springs tabs labeled "B" on the bottom side;
3. open panel "A" in the "C" direction;
4. remove the three screws labeled "D";
5. open door "E" in the "F" direction;
6. install the power supply wires, "G" as shown;
7. strip the power supply wires being careful to leave the ground wire 1 in (25 mm) longer than the other two;
8. connect the ground wire to the ground terminal;
9. connect the 120 volt hot wire to terminal "L1";
10. connect the 120 volt neutral wire to terminal "N".

NOTICE! If the 120 volt power wires are inverted, the boiler will block, displaying error code E21.

NOTICE! If the boiler is not properly grounded, the boiler will block, displaying error code E23

8.1.2 - Wiring the heating pump for 160-B model

On 160-B model the heating pump is not supplied with the boiler. Install the heating pump following Section 7.2.4. If the boiler is not connected to an indirect water heater, wire the heating pump to the boiler following the steps below while referring to Figures 8-1 and 8-2:

1. remove the boiler casing according to the instructions given in section 14.2 and open the junction box cover;
2. use a three wire cable with a minimum cross section of # 14 AWG between the boiler and the circulator pump;
3. route the circulator cable through an empty cable clamp in the junction box;
4. connect the Hot and Neutral cable wires respectively to the "4 and 5" terminals in the junction box;
5. connect the Ground wire to an empty "Ground" connection inside the junction box.

8 - INSTALLATION - Electrical connections

CAUTION!!! If the pump is larger than 1 hp or 1 amps, you must isolate with a relay.

6. Connect the electrical supply cable to the electrical connections into the pump. Follow manufacturer's instruction of the pump.

NOTICE! If the 120 volt power wires are inverted, the boiler will lock-out, displaying error code L05.

8.1.3 - Thermostat wiring

Install the room thermostat in a part of the house where the temperature is as near to average as possible. Avoid areas subject to sudden temperature changes such as outside windows or doors, above radiation elements, near lamps, etc., (see Figure 8-3).

Connect the room thermostat to the boiler by following the steps below:

1. remove the boiler casing according to the instructions given in Section 14.2 and open the junction box cover;
2. use a two conductor cable with a minimum cross section of #18 AWG between the boiler and the room thermostat;
3. route the cable through an empty cable clamp "E" in the junction box;
4. connect the cable leads to the "9" and "10" terminals as shown in Figure 8-2.

NOTICE! the maximum room thermostat cable length permitted is 32 ft (10 m). For longer lengths, up to 300ft (100 m) a shielded cable, with the shield connected to the ground, must be used.

! WARNING!!! Since the room thermostat wires conduct 24 Vac, they must never be run through conduits containing 120Vac power wires or an electrical shock hazard will exist.

8.1.4 - Installing the outdoor temperature sensor (optional)

The outdoor temperature sensor is supplied with the boiler. Install the outdoor temperature sensor, on an exterior wall of the building facing NORTH or NORTH-EAST, at a height of between 4 ft (1.2 m) and 6 ft (1.8 m) from the ground level. On multi story buildings, install the sensor near the upper half of the second floor. Do not install the sensor above doors, windows or ventilation outlets nor directly under balconies or gutter pipes. Do not shield the outdoor temperature sensor. Do not install the sensor on walls without overhangs, or not protected from rain. To connect the outdoor temperature sensor to the boiler proceed as follows:

1. remove the boiler casing according to the instructions given in Section 14.2 and open the junction box;

2. use a two conductor cable with a minimum cross section of # 18 AWG between the boiler and the outdoor temperature sensor.

NOTICE! the maximum outdoor temperature sensor cable length permitted is 32 ft (10 m). For longer lengths, up to 300 ft (100 m) a shielded cable, with the shield connected to the ground, must be used;

! WARNING!!! Since the outdoor temperature sensor wires conduct 24 Vac, they must never be run through conduits containing 120 Vac power wires or an electrical shock hazard will exist.

3. connect the outdoor temperature sensor cable leads to terminals "13" and "14" as shown in Figure 8-2;
4. connect the outdoor temperature sensor cable leads to the ends of the external temperature sensor.

Set the boiler so that it detects the outdoor temperature sensor, as follows:

1. press down the **Reset** button for 12 seconds until the display starts blinking and shows **U I**;
2. then press and release the **Reset** button several times until the following **[H** parameter appears;
3. using the **+** and **-** keys, change the parameter value from 00 to 01 or 02 in relation to the type of climatic heat adjustment desired as explained in Section 13.10;
4. press the **Reset** button repeatedly until exiting the menu; the display will no longer flash.

8.1.5 - Alarm output

Inside the electrical box (see Figure 9-2) there is an electrical connection for a 120Vac output that is energized each time the boiler goes into a lock-out or error condition. The Installer can use this output to activate, indirectly, any kind of external signal to devices such an audible alarm, phone, or other devices.

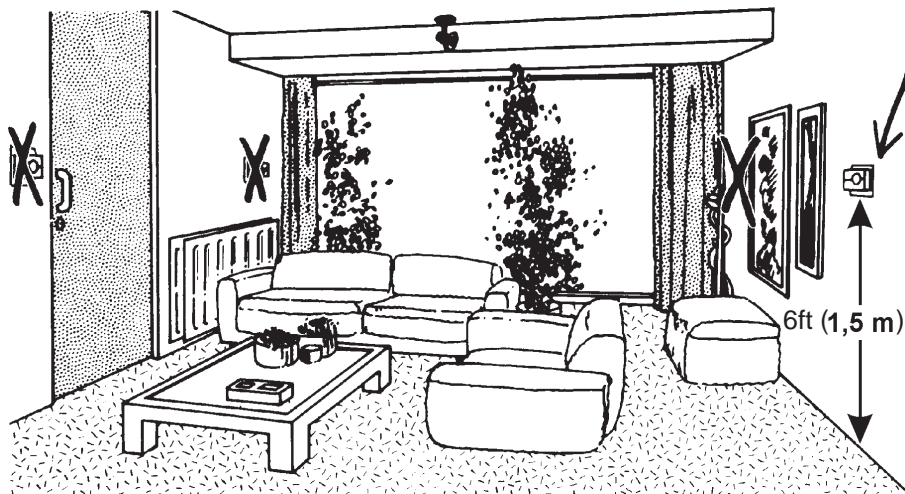


Figure 8-3 Room thermostat location

9 - INSTALLATION - Connecting to an indirect water heater

9.1 - Connecting the boiler to an indirect water heater

This boiler, can be connected to an indirect water heater. The water connection must be made per figure 7-7. Heating pump item "9" of Figure 7-7 is mandatory for boiler model 160-B. The electrical connections must be made per figure 9-1. To change the logic of the boiler, to drive and load an indirect water heater, follow the steps below while referring to Figure 9-2:

1. disconnect the boiler from the electrical supply;
2. remove the boiler casing according to the instructions given in section 14.2;
3. push the plastic spring tabs "B";
4. open the front half of the electrical box in the "C" direction;

5. move switch #1, item "D" to its "ON" position as marked on the control board;
6. move switch #5 in the OFF position;
7. on model 160-C, on the rear side of the electrical junction box board, if present, disconnect the plug with two wires, item "E", corresponding to wires #44 and #45.
8. on model 160-C, on the rear side of the electrical box, disconnect the electrical plug from the diverter valve (see Figure 3-1, item "35"). When you disconnect the plug you must insure that the boiler is in the heating mode. If you are not sure, light the boiler ON, wait the display show "F" and then light-off the boiler. Now you can disconnect the plug from the diverter valve.
9. use a # 18 AWG two wire cable to connect the indirect water heater temperature sensor to terminals "15" and "16", as per Figure 9-1
10. insert the probe of the indirect water heater sensor into the socket of the indirect water heater.

! WARNING!!! Since the indirect water heater temperature sensor wires conduct 24 Vac, they must never be run through conduits containing 120 Vac power wires or an electrical shock hazard will exist.

! WARNING!!! Once the boiler is connected to an indirect water heater, it will perform a weekly antilegionella cycle. This cycle raises the water heater temperature to 140°F one time per week.

NOTE! A few cable conduit holes are provided on the bottom right side of the boiler

CAUTION!!! If the pump is larger than 1 hp or 2 amps, you must isolate with a relay.

11. reinstall all dismantled parts.

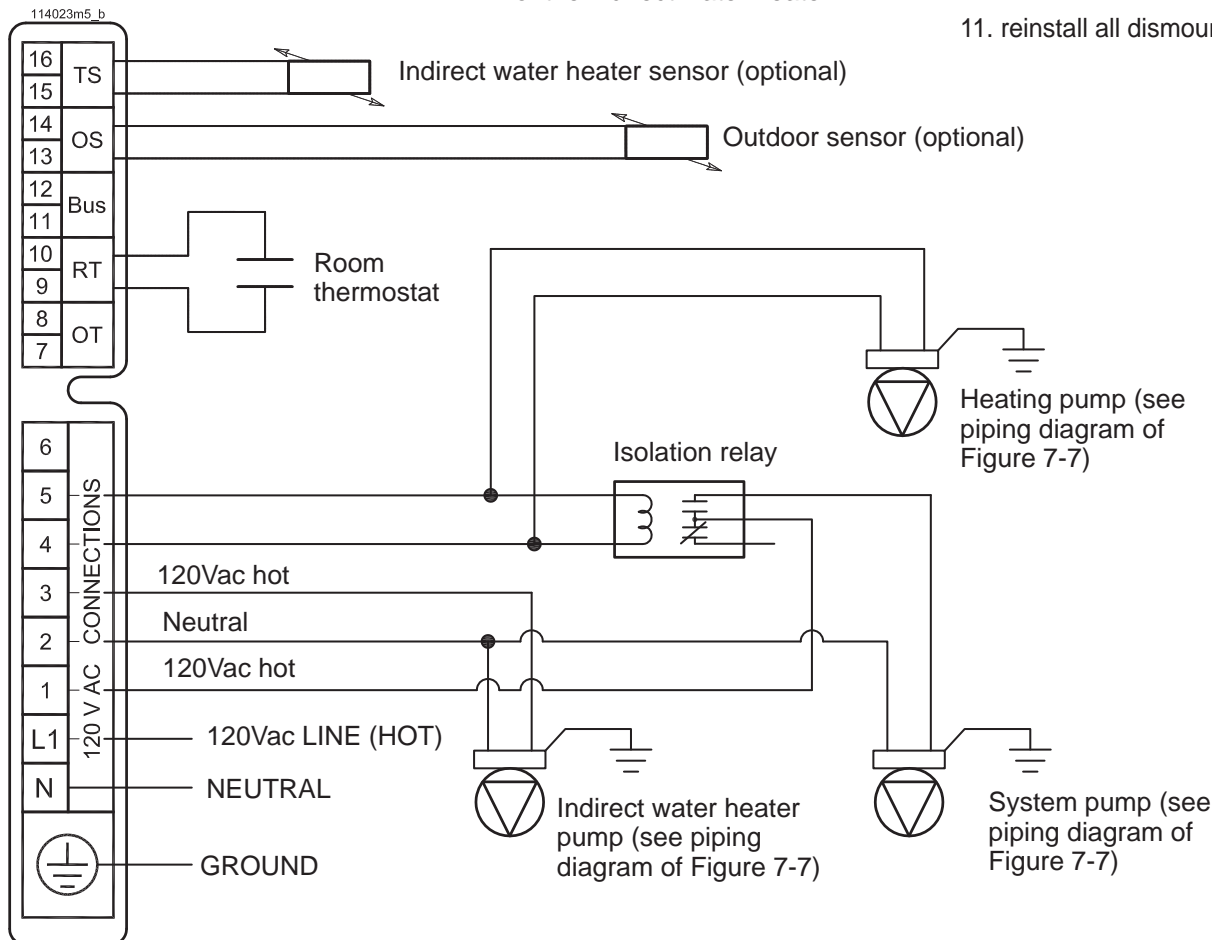


Figure 9-1 Electrical connections for 160-B model (see Figure 7-7)

9 - INSTALLATION - Connecting to an indirect water heater

9.1.1 Indirect water heater priority selection

The boiler is factory set for DHW priority. This means that the boiler will stay in DHW mode until the capacity of the indirect water heater reaches temperature. In some cases this will result in the house cooling because the central heating function was stopped by the DHW priority mode. Once the indirect water heater is satisfied the boiler will automatically return to central heating.

Priority selection is a functionality that toggles between CH and DHW demand when they are both active at the same time. The priority selection

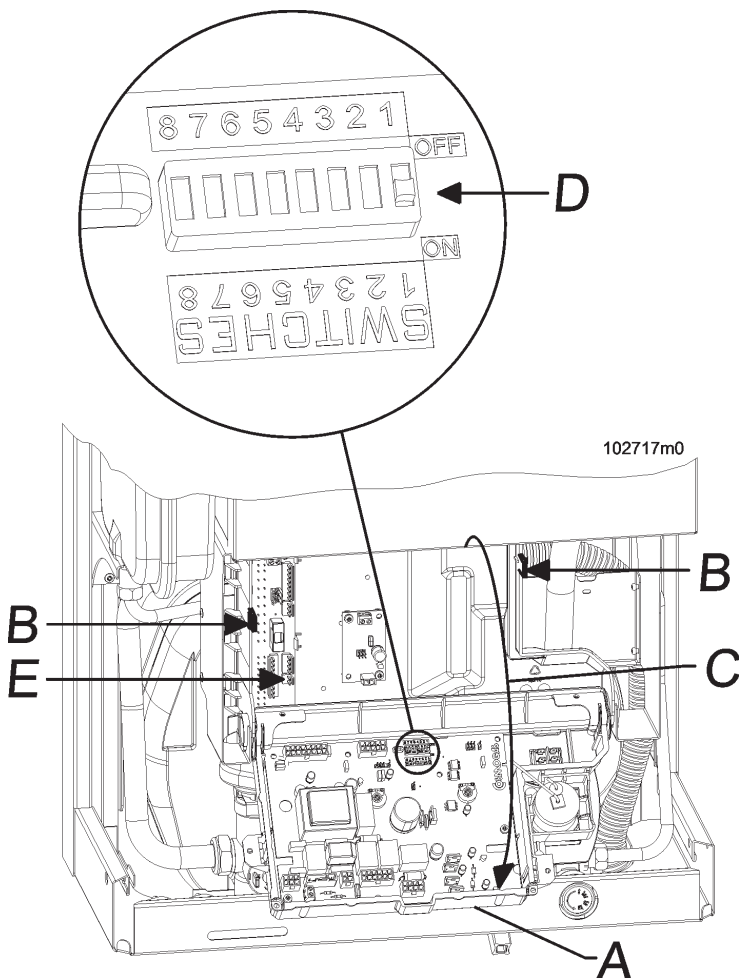
is set with the **dp** (DHW Priority) parameter in the "Installer menu" (see Section 13.17).

Each value set into the **dp** parameter will correspond to the minutes delay boiler toggles between Central Heating and DHW demand.

9.2 - Opening the instrument panel

To open the instrument panel and gain access to the boiler control board, follow this procedure:

1. disconnect the boiler from the electrical supply;
2. remove the boiler casing according to the instructions given in Section 14.2;
3. push the plastic spring tabs "B" shown in Figure 9-2;
4. open the front half of the electrical box in the "C" direction as shown in Figure 9-2;



- A = Front cover of the electrical box
- B = Plastic spring to open the electrical box
- C = Direction to open the electrical box
- D = Switches for the functional setting of the boiler

Figure 9-2 Control board and unit electrical box details

10 - INSTALLATION - Vent and combustion air

10.1 - Removing of a boiler from a common venting system

! WARNING!!! DO NOT connect this boiler or any other appliance using a positive pressure, in a common vent system! Failure to comply with this WARNING could result in the accumulation of carbon monoxide gas which can cause severe personal injury or death!

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 appliances remaining connected to it. 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, while the other appliances remaining connected to the common venting system are not in operation.

- (a) Seal any unused openings in the common venting system.
- (b) 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.
- (c) 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.

(d) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

(e) Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

(f) Alter it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

(g) Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1 /NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate Annex G of the National Fuel Gas Code, ANSI Z223.1 /NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

Au moment du retrait d'une chaudière existante, les mesures suivantes doivent être prises pour chaque appareil toujours raccordé au système d'évacuation commun et qui fonctionne alors que d'autres appareils toujours raccordés au système d'évacuation ne fonctionnent pas: système d'évacuation

(a) *Sceller toutes les ouvertures non utilisées du système d'évacuation.*

(b) *Inspecter de façon visuelle le système d'évacuation pour déterminer la grosseur et l'inclinaison horizontale qui conviennent et s'assurer que le système est exempt d'obstruction, d'étranglement de fuite, de corrosion et autres défaillances qui pourraient présenter des risques.*

(c) *Dans la mesure du possible, fermer toutes les portes et les fenêtres du bâtiment et toutes les portes entre l'espace où les appareils toujours raccordés du système d'évacuation sont installés et les autres espaces du bâtiment. Mettre en marche les sècheuses, tous les appareils non raccordés au système d'évacuation commun et tous les ventilateurs d'extraction comme les hottes de cuisinière et les ventilateurs des salles de bain. S'assurer que ces ventilateurs fonctionnent à la vitesse maximale. Ne pas faire fonctionner les ventilateurs d'été. Fermer les registres des cheminées.*

(d) *Mettre l'appareil inspecté en marche. Suivre les instructions d'allumage. Régler le thermostat de façon que l'appareil fonctionne de façon continue.*

(e) *Faire fonctionner le brûleur principal pendant 5 min ensuite, déterminer si le coupe-tirage déborde à l'ouverture de décharge. Utiliser la flamme d'une allumette ou d'une chandelle ou la fumée d'une cigarette, d'un cigare ou d'une pipe.*

(f) *Une fois qu'il a été déterminé, selon la méthode indiquée ci-dessus, que chaque appareil raccordé au système d'évacuation est mis à l'air libre de façon adéquate. Remettre les portes et les fenêtres, les ventilateurs, les registres de cheminées et les appareils au gaz à leur position originale.*

(g) *Tout mauvais fonctionnement du système d'évacuation commun devrait être corrigé de façon que l'installation soit conforme au National Fuel Gas Code, ANSI Z223.1/NFPA 54 et (ou) aux codes d'installation CSA-B149.1. Si la grosseur d'une section du système d'évacuation doit être modifiée, le système devrait être modifié pour respecter les valeurs minimales des tableaux pertinents de l'appendice G du National Fuel Gas Code, ANSI Z223.1/NFPA 54 et (ou) des codes d'installation CSA-B149.1.*

10 - INSTALLATION - Vent and combustion air

10.2 - Prevent combustion air contamination

Install air inlet piping as described in this Section 10. You must pipe combustion air to the boiler air intake. Do not terminate vent/air in locations that can allow contamination of combustion air.

! WARNING!!! Contaminate combustion air will damage the boiler, resulting in possible severe personal injury, death or substantial property damage.

Ensure that the combustion air will not contain any of the follow contaminants.

Products that may contaminated the air combustion:

- Permanent wave solutions;
- Chlorinated waxes/cleaners;
- Chlorine-based swimming pool chemicals;
- Calcium chloride used for thawing;
- Sodium chloride used for water softening;
- Refrigerant leaks;
- Paint or varnish removers;
- Hydrochloric acid/muriatic acid;
- Cements and glues;
- Antistatic fabric softeners used in clothes dryers;
- Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms;
- Adhesives used to fasten building products and other similar products;

Do not pipe combustion air near sources of products that may contaminate the air combustion, like:

- Dry cleaning/laundry areas and establishments;
- Swimming pools;
- Metal fabrication plants;
- Beauty shops;
- Refrigeration repair shops;
- Photo processing plants;
- Auto body shops;
- Plastic manufacturing plants;
- Furniture refinishing areas and establishments;
- Remodeling areas;
- Garages with workshops.

10.3 - Venting and air piping systems

! WARNING!!! The vent installation must be in accordance with part *Venting of Appliances, of the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54* or section, *Venting Systems and Air Supply for Appliances, of the CAN/CSA B149.1, Natural Gas and Propane Installation code* or applicable provisions of the local building codes. Improper venting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

NOTICE! All vent pipes must be mechanically fixed, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the boiler (to allow drainage of condensate).

NOTICE! The vent system shall be installed so as to prevent the accumulation of condensate.

NOTICE! Due to the high efficiency of the boiler it may discharge what looks like white smoke especially when the outside air temperature is cold. This is a simply water vapor, a purely natural phenomenon and not a reason for concern.

! WARNING!!! The exhaust vent and the air inlet lines, must be supported to prevent sagging. To do this, use a suitable pipe clamp to support the lines. Pipe clamps shall support the line every 3 ft (1 m). Pipe clamp shall be fixed in correspondance of a wall stud. Improper supporting can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

This boiler requires a special vent system, designed for pressurized

venting.

You must install air piping from outside to the boiler air intake. The resultant installation is Direct Vent (sealed combustion).

The boiler is to be used for either Direct Vent installation or for installation using room combustion air. When room air is considered, see Section 10-10.

Vent and air must terminate near one another and may be vented vertically through the roof or out a side wall, unless otherwise specified. You may use any of the vent/air piping methods from Figure 10-1 to Figure 10-6. Do not attempt to install this boiler using any other means.

! WARNING!!! DO NOT mix components from different systems. The vent system could fail, causing leakage of flue products into the living space. Use only approved materials listed on Tables 10-1 and 10-2. Improper materials or mixing materials can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

Be sure to locate the boiler such that the vent and air piping can be routed through the building and properly terminated.

The vent/air piping lengths, routing and termination method must all comply with the methods and limits given in Section 10.4

10 - INSTALLATION - Vent and combustion air

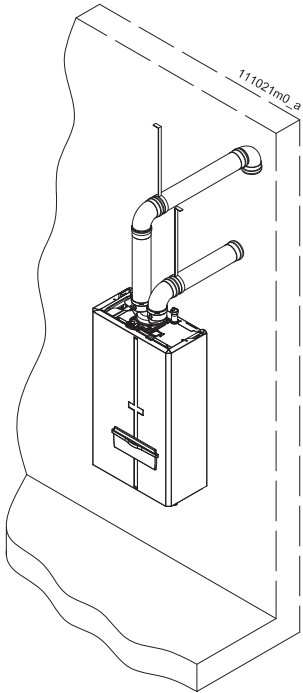


Figure 10-1 Side wall two pipes (Direct venting).

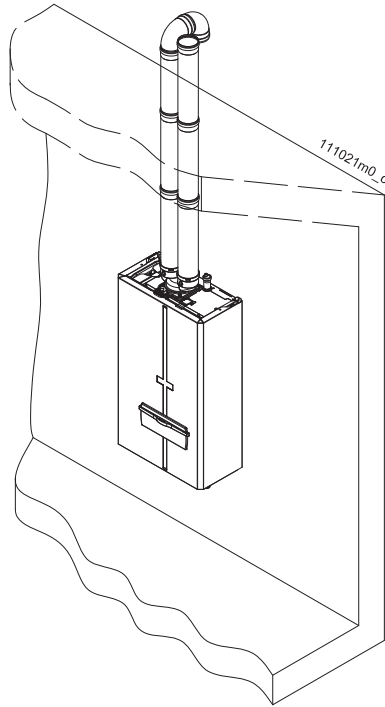


Figure 10-2 Vertical two pipes (Direct Venting).

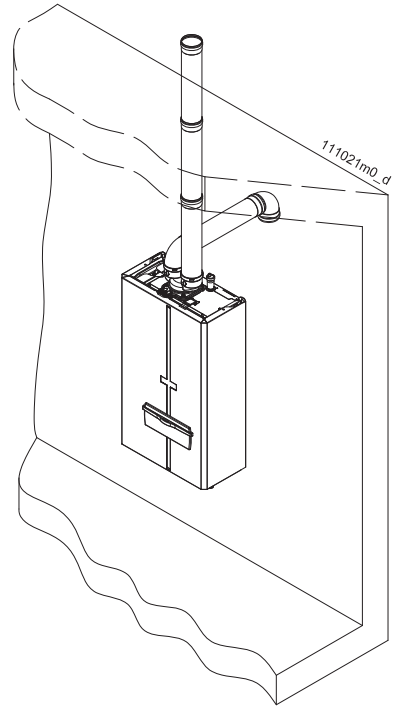


Figure 10-3 Side wall air intake, vertical vent (Direct venting).

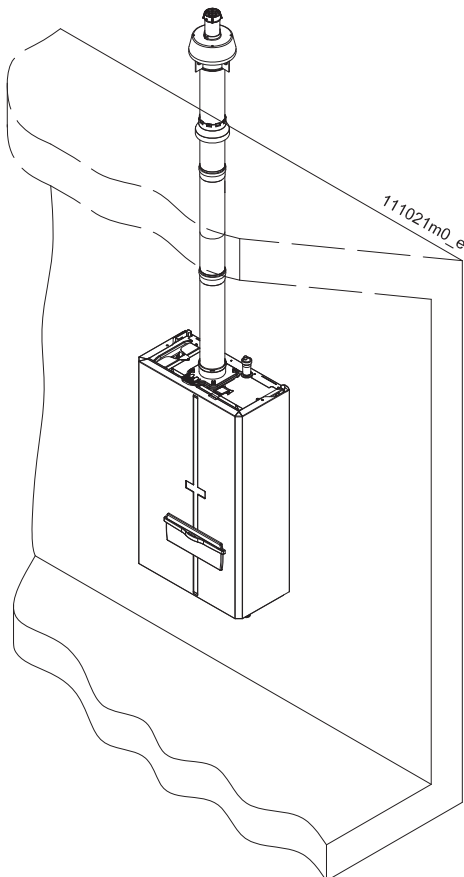


Figure 10-4 Vertical concentric (Direct venting).

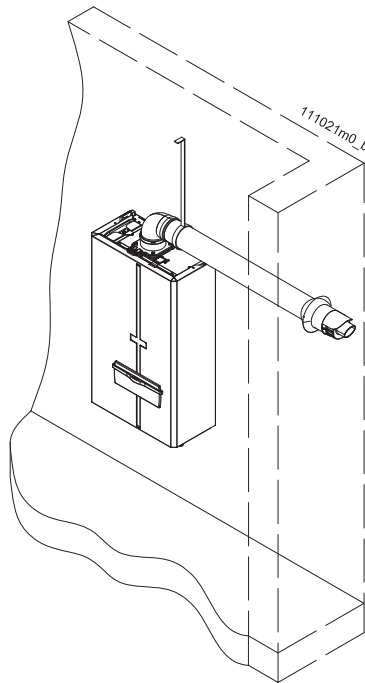


Figure 10-5 Side wall concentric (Direct venting).

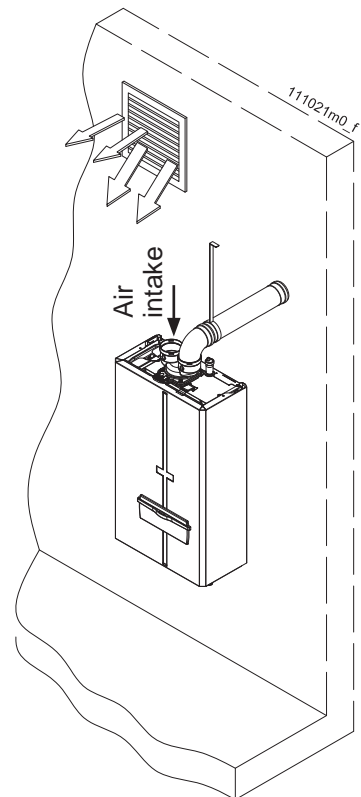


Figure 10-6 Side wall one pipe venting, combustion air from room (not Direct venting).

10 - INSTALLATION - Vent and combustion air

10.4 - Minimum / Maximum allowable combustion air and vent piping lengths

This boiler can be fitted with a very long venting system. However there is a relationship between the length of the venting system and the power input of the boiler. Figure 10-7 shows this relation which an installer must consider when in the designing stage of the venting.

The maximum length of the two pipes vent system is 300 equivalent ft (Air intake plus flue exhaust). However, each single pipe can't be longer than 150 ft.

The maximum length of the concentric system is 70 ft.

Each 45° elbow inserted in the concentric or split venting system, has a loss of pressure equivalent to 2.5 ft of linear pipe.

Each 90° elbow inserted in the concentric or split venting system, has a loss of pressure equivalent to 5 ft of linear pipe.

The minimum length of the venting system (Two pipes or concentric) is 1 ft (357 mm) with one elbow.

10.5 - Install vent and combustion air piping

! WARNING!!! This boiler must be vented and supplied with combustion and ventilation air as described in this section. Ensure the vent and air piping and the combustion air supply comply with these instructions regarding vent system, air system, and combustion air quality. See also Section 10.2 of this manual. Inspect finished vent and air piping thoroughly to ensure all are airtight and comply with the instructions provided and with all requirements of all applicable codes. Failure to provide a properly installed vent and air system will cause severe personal injury or death.

! WARNING!!! Using vent materials other than those listed in Table 10-1 and Table 10-2, failure to properly seal all seams and joints, mixing of venting materials or failure to follow vent pipe and fittings manufacturer's instructions can result in personal injury, death or property damage.

! WARNING!!! Never use cellular (foam) core pipe in vent pipe line and fittings. Failure to comply could result in severe personal injury, death, or substantial property damage.

! WARNING!!! Increasing or decreasing combustion air or vent piping is not authorized. Failure to comply could result in severe personal injury, death, or substantial property damage.

! WARNING!!! Use only the materials listed in Tables 10-1 and 10-2 for vent pipe, and fittings. Failure to comply could result in severe personal injury, death, or substantial property damage.

NOTICE Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian installations.

For installation in Canada, vent pipe system must be certified to ULC-S636 (see Table 10-1).

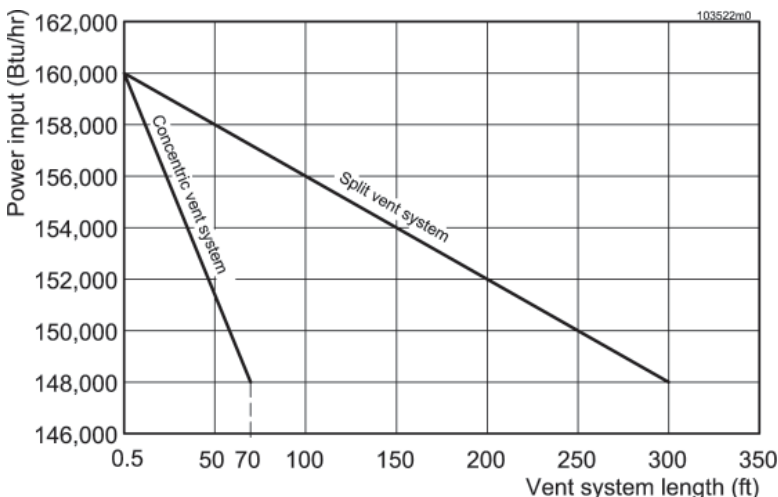


Figure 10-7 Relation between Power input and Vent system length

10 - INSTALLATION - Vent and combustion air

Vent pipe materials and fittings must comply with the following standards			
Item	Material	Standard for installation in USA	Standard for installation in CANADA
Vent pipe and fittings	PVC schedule 40, 80	ANSI/ASTM D1785	ULC-S636
	CPVC schedule 40/80	ANSI/ASTM F441	
	Polypropylene	ULC-S636	
	Stainless steel AL29-4C	UL1738	
Pipe cement/primer	PVC	ANSI/ASTM D2564	
	CPVC	ANSI/ASTM F493	

Table 10-1 Approved vent materials

WARNING: Use of cellular core PVC and CPVC or Radel for venting system is not allowed.

Approved vent manufacturers and items			
Item	Material	Manufacturer/supplier	Manufacturer/supplier Part Number
Concentric roof or wall terminal	PVC	IPEX (System 636)	196006
Two pipes wall terminal	PVC	IPEX (System 636)	081219 or 196985
Single pipe wall terminal (90° elbow)	PVC	IPEX (System 636)	196025
Boiler adapter (80mm to 3" PVC)	Polypropylene	Slant Fin	81 9002 000
Bird screen	PVC	IPEX (System 636)	196051
Two pipes roof terminal	Polypropylene	Slant Fin	81 9177 000 and 81 9181 000
Two pipes wall terminal	Polypropylene	Slant Fin	81 9182 000 and 81 9181 000
Single pipe roof terminal	Polypropylene	Slant Fin	81 9177 000
Single pipe wall terminal	Polypropylene	Slant Fin	81 9182 000
Two or single pipe boiler adapter (80mm to 80mm Polypropylene)	Polypropylene	Slant Fin	81 9001 000
Bird screen	Polypropylene	Slant Fin	81 9181 000
Concentric boiler adapter	Polypropylene	Slant Fin	81 9185 000
Concentric roof terminal	Polypropylene	Slant Fin	81 9005 000
Concentric wall terminal	Polypropylene	Slant Fin	81 9184 000
Single pipe wall or roof terminal	Polypropylene	Centrotherm (Innoflue System)	ISEP0339
Two pipes wall or roof terminal	Polypropylene	Centrotherm (Innoflue System)	ISEP0339 and ISEL0387UV
Bird screen	Polypropylene	Centrotherm (Innoflue System)	IASPP03
Single pipe wall or roof terminal	Polypropylene	Duravent (PolyPro)	3PPS36B
Two pipes wall or roof terminal	Polypropylene	Duravent (PolyPro)	3PPS36B and 3PPS-E90B
Bird screen	Polypropylene	Duravent (PolyPro)	3PPS-BG
Single pipe wall or roof terminal	Stainless steel	Duravent (FasNSeal)	FSVL3603
Two pipes wall or roof terminal	Stainless steel	Duravent (FasNSeal)	FSVL3603 and FSELB8803
Boiler adapter (80mm to 3" stainless steel)	Stainless steel	Duravent (FasNSeal)	FSA-80MM3
Bird screen	Stainless steel	Duravent (FasNSeal)	FSBS3
Single pipe wall or roof terminal	Stainless steel	Heat Fab (SGV)	SGV03L36
Two pipes wall or roof terminal	Stainless steel	Heat Fab (SGV)	SGV03L36 and SGV03E90
Boiler adapter (80mm to 3" stainless steel)	Stainless steel	Heat Fab (SGV)	SGV03AD80
Bird screen	Stainless steel	Heat Fab (SGV)	SGV03TM

Table 10-2 Approved vent manufacturers and items

10 - INSTALLATION - Vent and combustion air

10.6 - Air inlet pipe materials:

⚠ WARNING!!! The air inlet pipe(s) must be sealed. Improper sealed can result in excessive levels of carbon monoxide which can result in severe personal injury or death!

Choose acceptable combustion air inlet pipe materials from the following list:

- PVC, CPVC or ABS Dryer Vent or Sealed Flexible Duct (not recommended for rooftop air inlet)
- Galvanized steel vent pipe with joints and seams sealed as specified in this section.
- Type "B" double-wall vent with joints and seams sealed as specified in this section.
- AL29-4C, stainless steel material to be sealed to specification of its manufacturer.
- Polypropylene material to be sealed to specification of its manufacturer.

NOTICE! PVC, CPVC, ABS Dryer Vent and stainless steel pipe may require an adapter (not provided) to transition between the air inlet connection on the appliance and the air inlet pipe

⚠ WARNING!!! Using vent or air intake materials other than those specified, mixing the specified materials, failure to properly seal all seams and joints or failure to follow the manufacturer's instructions can result in personal injury, death or property damage.

NOTICE The use of double-wall vent or insulated material for the combustion air inlet pipe is recommended in cold climates to prevent the condensation of airborne moisture in the incoming combustion air.

10.6.1 - Sealing of Type "B" double-wall vent material or galvanized vent pipe

Sealing of Type "B" double-wall vent material or galvanized vent pipe material used for air inlet piping on a sidewall or vertical rooftop Combustion Air Supply System:

- a. Seal all joints and seams of the air inlet pipe using either Aluminum Foil Duct Tape meeting UL Standard 723 or 181A-P or a high quality UL Listed silicone sealant.
- b. Do not install seams of vent pipe on the bottom of horizontal runs.
- c. Secure all joints with a minimum of three sheet metal screws or pop rivets. Apply Aluminum Foil Duct Tape or silicone sealant to all screws or rivets installed in the pipe.
- d. Ensure that the air inlet pipes are properly supported.

⚠ WARNING!!! Failure to properly seal all joints and seams as required in the air inlet piping may result in flue gas recirculation, spillage of flue products and carbon monoxide emissions causing severe personal injury or death.

10.6.2 - Sealing of PVC, CPVC or ABS air inlet pipe

The PVC, CPVC, or ABS air inlet pipe should be cleaned and sealed with the pipe manufacturer's recommended solvents and standard commercial pipe cement for the material used. The PVC, CPVC, ABS Dryer Vent or Flex Duct air inlet pipe should use a silicone sealant to ensure a proper seal at the appliance connection and the air inlet cap connection. Dryer vent or Flex Duct should use a screw type clamp to seal the pipe to the appliance air inlet and the air inlet cap. Proper sealing of the air inlet pipe ensures that combustion air will be free of contaminants and supplied in proper volume.

When a sidewall or vertical rooftop combustion air supply system is disconnected for any reason, the air inlet pipe must be resealed to ensure that combustion air will be free of contaminants and supplied in proper volume.

⚠ WARNING!!! Failure to properly seal all joints and seams as required in the air inlet piping may result in flue gas recirculation, spillage of flue products and carbon monoxide emissions causing severe personal injury or death.

10 - INSTALLATION - Vent and combustion air

10.7 - PVC/CPVC vent piping materials

! WARNING!!! Use only the materials listed in Tables 10-1 and 10-2 for vent pipe, and fittings. **DO NOT** mix vent systems of different types or manufacturers, unless listed in this manual. Failure to comply could result in severe personal injury, death, or substantial property damage.

! WARNING!!! This appliance requires a special venting system. The field provided vent fittings must be connected to the boiler following Section 10.7.1. Use only the vent materials, primer, and cement specified in this manual to make the vent connections. Failure to follow this warning could result in fire, personal injury, or death.

! WARNING!!! Do not insulate PVC/CPVC exhaust pipe nor install into an enclosure or any other obstruction thereby preventing the cooling of the exhaust pipe. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!

! WARNING!!! Improper installation of PVC or CPVC systems may result in injury or death.

NOTICE Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S. installations or CSA B149.1 for Canadian installations.

NOTICE The installer must use a specific vent starter adapter at the

flue collar connection, supplied by the vent manufacturer to adapt to its vent system. See Table 10-2 for approved vent adapters.

For installation in Canada, vent pipe system must be certified to ULC-S636 (see Table 10-1).

NOTICE All vent pipes must be glued, properly supported, and the exhaust must be pitched a minimum of a 1/4 inch per foot back to the boiler (to allow drainage of condensate).

NOTICE Installation of a PVC/CPVC vent system should adhere to the PVC/CPVC vent manufacturer's installation instructions supplied with the vent system.

NOTICE The installer must use a specific vent starter adapter at the flue collar connection, supplied by the vent manufacturer to adapt to its vent system. See Table 10-2 for approved vent adapters.

10.7.1 - Installing PVC/CPVC vent and air piping

NOTICE Use only cleaners, primers, and solvents that are approved for the materials which are joined together.

1. Work from the boiler to vent or air termination. Do not exceed the lengths given in Section 10-4.
2. Cut pipe to the required lengths and deburr the inside and outside of the pipe ends.
3. Bevel outside of each pipe end to ensure even cement distribution when joining.
4. Clean all pipe ends and fittings using a clean dry rag (Moisture will retard curing and dirt or grease will prevent adhesion).
5. Dry fit vent or air piping to ensure proper fit up before assembling any joint. The pipe should go a third to two-thirds into the fitting to ensure proper sealing after cement is applied.
6. Priming and Cementing:
 - a. Handle fittings and pipes carefully to prevent contamination of surfaces.
 - b. Apply a liberal even coat of primer

- a. Apply a liberal even coat of primer to the fitting socket.
- c. Apply a liberal even coat of primer to the pipe end to approximately 1/2" beyond the socket depth.
- d. Apply a second primer coat to the fitting socket.
- e. While primer is still wet, apply an even coat of approved cement to the pipe equal to the depth of the fitting socket.
- f. While primer is still wet, apply an even coat of approved cement to the fitting socket.
- g. Apply a second coat of cement to the pipe.
- h. While the cement is still wet, insert the pipe into the fitting, if possible twist the pipe a 1/4 turn as you insert it. NOTE: If voids are present, sufficient cement was not applied and joint could be defective.
- i. Wipe excess cement from the joint removing ring or beads as it will needlessly soften the pipe.

10.7.2 - PVC/CPVC air intake/vent connections

Combustion Air Intake connection (see Figure 10-8 Item "C"). This connection is used to provide combustion air directly to the boiler from outdoors. Combustion air piping must be supported per guidelines listed in the National Mechanical Code, Section 305, Table 305.4 or as local codes dictate. To connect a PVC/CPVC pipe to the air intake connection proceed as follow while referring to Figure 10-8:

1. install boiler adapter "A" above boiler. Rotate boiler adapter "A" so as air intake and vent connections are in the desired left or right side. Check stamped arrow to understand which is the vent and air intake connection.

! WARNING!!! Check stamped arrow on boiler adapter for the correct side of air intake. Failure to follow this warning could result in excessive levels of carbon monoxide or a fire, which can result in severe personal injury or death!