



# BOSCH

Installation Instructions

## Gas Condensing Combi Boilers Singular

Singular 4000 | Singular 5200



**⚠ WARNING:**

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

**⚠ WARNING:**

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.

**⚠ WARNING:**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure to hazardous materials)\* or loss of life. Refer to the user's information manual provided with this boiler. Installation and service must be performed by a qualified installer, service agency or the gas supplier who must read and follow the supplied instructions before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans.

This boiler must be installed in accordance with local, state, and federal codes. In the absence of such requirements, then to the latest edition of the National Fuel Gas Code, ANSI Z223.1./NFPA 54. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

BTC 439003301D / 01.2022



Certified to NSF/ANSI 372



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## 1 Key to Symbols and Safety Instructions

### 1.1 Key to Symbols

#### Warnings



Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- ▶ **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- ▶ **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- ▶ **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- ▶ **NOTICE** is used to address practices not related to personal injury.

#### Important information



This symbol indicates important information where there is no risk to people or property.

### 1.2 Safety

Please read before proceeding



#### WARNING: FIRE, EXPLOSION

- ▶ Vapors from flammable liquids can explode and/or catch fire causing death or severe burns.
- ▶ Keep flammable products far away from the boiler and store them in approved containers. Keep the containers tightly closed and out of the reach of children.
- ▶ The boiler has a main burner flame that can come on at any time and will ignite flammable vapors.
- ▶ Vapors cannot be seen and are heavier than air. They can travel long distances along the ground and can be carried from other rooms to the boiler's main burner flame by air current.



#### WARNING: SCALD HAZARD

- ▶ In normal operation, it is recommended to limit the DHW temperature to 122 °F (50 °C) to limit the risk of scalding.
- ▶ Install a tempering valve if running DHW temperatures above 104 °F (40 °C).
- ▶ Children, the disabled and the elderly are at highest risk of being scalded.
- ▶ Test water before bathing or showering.

| Temperature    | Time to Produce Serious Burn |
|----------------|------------------------------|
| 120 °F (48 °C) | More than 5 minutes          |
| 125 °F (51 °C) | 1.5 to 2 minutes             |
| 130 °F (54 °C) | Approx. 30 seconds           |
| 135 °F (57 °C) | Approx. 10 seconds           |
| 140 °F (60 °C) | Less than 5 seconds          |
| 145 °F (62 °C) | Less than 3 seconds          |
| 150 °F (65 °C) | Approx. 1.5 seconds          |
| 155 °F (68 °C) | Approx. 1 second             |

Table 1



#### WARNING: RISK OF PERSONAL INJURY OR DEATH FROM EXPLOSION!

- ▶ Work on gas components may only be carried out by a trained and certified installer or service company.
- ▶ Appliance installation, the connection of gas and vent piping, initial commissioning, electrical connections, and service and maintenance must only be carried out by a trained and certified installer or service company.


**WARNING: FIRE, EXPLOSION**

- ▶ Do not store combustibles, such as papers or laundry, near the boiler or venting system.
- ▶ Do not store or use gasoline or other flammable liquids near this boiler.
- ▶ Do not store or use compressed gases, such as hair sprays or spray paints, near the boiler or venting system, including the vent termination.


**WARNING: HAZARDOUS VOLTAGE**

- ▶ Do not remove the front cover unless the power to the boiler is turned off or disconnected.
- ▶ Do not touch the internal components of the boiler or the power cord with wet hands.


**WARNING: FIRE, CARBON MONOXIDE**

- ▶ Do not operate the boiler with the front cover opened.
- ▶ Do not operate the boiler without proper venting.
- ▶ Do not place anything in or around the vent terminals that could obstruct the air flow in or out of the boiler.


**WARNING: FIRE, EXPLOSION**

- ▶ Have your installer or plumber show you the location of the gas shut off valve and demonstrate how to close the valve. If the boiler is damaged as a result of overheating, fire, flood, or any other reason, close the manual shut off valve and do not operate the boiler again until it has been inspected by a qualified technician.


**WARNING: FIRE, EXPLOSION**

- ▶ Should overheating occur or if the gas supply fails to shut off, turn off the manual gas shut off valve.


**WARNING: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ Do not allow children to operate or have access to the boiler.


**WARNING: IMPROPER OR DANGEROUS OPERATION**

- ▶ Immediately call a qualified service technician to inspect the appliance and replace any part of the control system and/or any gas control which has been immersed in water.


**WARNING:**

- ▶ This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).


**WARNING: FIRE, CARBON MONOXIDE**

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas detector / analyzer.
- ▶ On re-assembly check all affected seals for cracks hardness and deterioration. If damaged or in any doubt the seal must be replaced.


**CAUTION: INTENDED USE**

- ▶ Do not use the boiler for anything other than its intended purpose, as described in this manual.


**CAUTION: IMPROPER OR DANGEROUS OPERATION**

- ▶ Do not use unapproved replacement or accessory parts.
- ▶ When servicing the controls, label all wires prior to disconnecting them to prevent wiring errors.
- ▶ Do not attempt to repair or replace any part of the boiler, unless it is specifically recommended in this manual. For all other service, contact an authorized technician or licensed professional. Improper adjustments, alterations, service, or maintenance may lead to property damage, personal injury, or death and will void your warranty.

**NOTICE: BOILER DAMAGE**

- ▶ Do not turn on the boiler unless the water and gas supplies are fully opened. Failure to do so may damage the boiler.

### 1.3 Important Note for the State of Massachusetts

#### NOTICE BEFORE INSTALLATION

This appliance must be installed by a licensed plumber or gas fitter in accordance with the Massachusetts Plumbing and Fuel Gas Code 248 CMR Sections 4.00 and 5.00.

**IMPORTANT:** In the State of Massachusetts (248 CMR 4.00 & 5.00)

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 cannot 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.

## 2 General Information

### 2.1 Included Items

The following items are included with the boiler. Check each of the following items before installation.

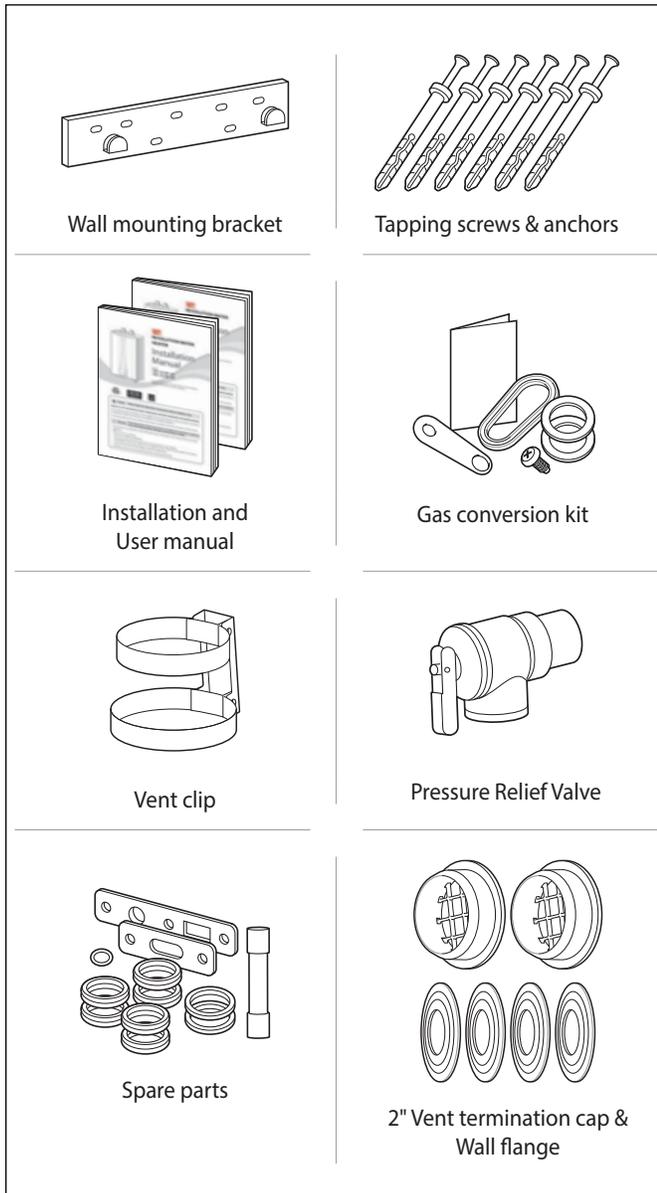


Figure 1

**i** If there is a missing item, please contact Technical Support at 1-866-642-3198.

### 2.2 Optional Accessories

The following optional accessory is not included with the boiler, but may be necessary for the installation. Check the need for the following optional accessory before installation.

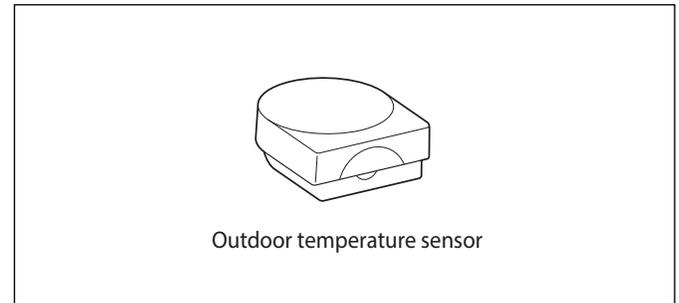


Figure 2



**WARNING:**

- ▶ Installing the appliance and/or any accessories for the appliance may only be carried out by a qualified service technician and 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. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

## 2.3 Specifications

The following table shows the specifications for the boiler. Additional specifications about water, gas, electric, and air supplies (venting) appear in each installation section.

|                              |                             | Singular 4000   | Singular 5200  |
|------------------------------|-----------------------------|---|--|
| Heat Capacity (Input)        | Space Heating               | 19,900–80,000 BTU/H   | 19,900–140,000 BTU/H   |
|                              | Domestic Hot Water          | 19,900–155,000 BTU/H  | 19,900–199,000 BTU/H   |
| Flow Rate (DHW)              | 45°F (25°C) Temp Rise       | 6.0GPM (23LPM)  | 7.7GPM (29LPM)   |
|                              | 67°F (37°C) Temp Rise       | 4.0GPM (15LPM)  | 5.2GPM (20LPM)   |
| AFUE                         | Natural Gas (propane)       | 95.0% (95.0%)   | 95.0% (95.0%)  |
| Dimensions (W x D x H)       |                             | 18.1" x 27.6" x 11.6" (460 mm x 700 mm x 295 mm)  |  |
| Installation Type            |                             | Indoor wall-hung  |  |
| Venting Type                 |                             | Forced draft direct vent  |  |
| Ignition                     |                             | Electronic ignition   |  |
| Water Pressure(Hydronic/DHW) |                             | 12~30psi /15~150 psi  |  |
| Supply Pressure              | Natural Gas                 | 3.5" – 10.5" WC   |  |
|                              | Propane                     | 8" – 13" WC   |  |
| Temperature Range            | Space Heating               | 82°F – 180°F(27°C – 82°C)   |  |
|                              | DHW                         | 86°F – 140°F(31°C – 60°C)   |  |
| Minimum Flow Rate (DHW)      |                             | 0.5GPM(2.0LPM)  |  |
| Power Supply                 | Main Supply                 | 120V AC, 60 Hz / uses less than 5 AMP   |  |
| Connection Sizes             | Space heating Supply/Return | 1" NPT  |  |
|                              | Cold water Inlet            | 3/4" NPT  |  |
|                              | Hot Water Outlet            | 3/4" NPT  |  |
|                              | Gas Inlet                   | 3/4" NPT  |  |
| Materials                    | Primary Heat Exchanger      | Stainless steel   |  |
|                              | Secondary Heat Exchanger    | Stainless steel   |  |
| Venting                      | Exhaust/Intake              |   | "2" or 3" PVC, CPVC, Polypropylene<br>2" or 3" Special gas vent type BH (Class II, A/B/C)" |
|                              | Length                      | 2"  | 60ft(18.3m)  |
|                              |                             | 3"  | 150ft(45.7m)   |
|                              | Vent Clearances             |   | 0" to combustibles   |
| Safety Devices               |                             | Flame rod, APS, Over heat preventer, Low water cut off switch,<br>Exhaust temperature high limit sensor, Power surge fuse |  |

Table 2

**2.4 Rating Plate**

**WARNING: FIRE, EXPLOSION**

- ▶ The gas type and electricity voltage must match the rating plate. Using a different gas type and electricity voltage will cause the boiler to malfunction.

Before the installation, check the rating plate located on the side of the boiler to ensure that the boiler matches the gas type, gas pressure, water pressure, and electrical supply available in the installation location. If the boiler does not match each of these ratings, do not install the boiler. If the gas conversion is required, the included gas conversion kit must be used.

| <b>BOSCH</b>   |                    |   |  |
|--|--------------------|---|--|
| Combination Boiler and Space Heater / Combiné Chaudière et Chauffe-Espace<br>Bosch Thermotechnology Corporation<br>50 Wentworth Ave, Londonderry, NH 03353<br>Tel: +1-800-283-3787<br>For either direct vent installation or for installation using indoor combustion etc.<br>Pour une installation à évacuation directe ou pour une installation utilisant du gaz de combustion à l'intérieur.<br>For installation on noncombustible floors only. Pour l'installation sur des sols incombustibles uniquement. |                    |   |  |
| Model No * Numéro de modèle  |                    | Type of Gas * Type de gaz                                   | Natural Gas                              |
| Max. Input Rating (Space Heating)<br>* Max. Entrée Noté (espace de chauffage)  | Btu/h              | Min. Input Rating<br>* Min. Note d'entrée                   | Btu/h                                    |
| Max. Input Rating (Hot Water)<br>* Max. Entrée Noté (eau chaude)   | Btu/h              | Heating Capacity<br>* Capacité de chauffage                 | Btu/h                                    |
| Category of boiler<br>* Catégorie de chaudière   | Category IV        | Electrical Rating<br>* Régime nominal électrique            | AC 120 Volts<br>60Hz Use less than 5 Amp |
| Inlet Gas Pressure<br>* Pression de gaz d'entrée   | 3,5-10,5 Inch W.C. | Manifold Pressure<br>* Pression d'admission                 | 40,71-44,1 Inch W.C.                     |
| Water temperature limit<br>* Limite de température de l'eau  | 210°F              | Minimum relief valve capacity<br>* Capacité minimum soupape | 189 lbs/hr                               |

3rd Edition of the standard : ANSI Z21.13-2017, CSA 4.3-2017, Low Pressure Boiler

**INSTALLATION CLEARANCES**  
(DÉGAGEMENTS D'INSTALLATION)

Indoor Installation (Installation Intérieure)

| Clearance (Dépassement)                 | Indoor Installation (Installation Intérieure) |
|---|---|
| Top of boiler (Haut de la chaudière)    | Min 12 inches (305mm)                         |
| Back of boiler (Retour de la chaudière) | Min 0,6 inches (15mm)                         |
| Front of boiler (Face de la chaudière)  | Min 6 inches (152mm)                          |
| Side of boiler (Côté de la chaudière)   | Min 3 inches (76mm)                           |
| Bottom of boiler (Bas de la chaudière)  | Min 12 inches (305mm)                         |

\* The pressure relief valve provided by the manufacturer shall be installed at the time of installation of the boiler in the location specified by the manufacturer.  
(La soupape de décharge de pression fournie par le fabricant doit être installée au moment de l'installation de la Chaudière fermement spécifiée par le fabricant.)

\* For safe operation of the boiler, the relief valve must not be removed or plugged.  
(Pour un fonctionnement sûr la chaudière la soupape de décharge ne doit pas être enlevée ou branchée)

\* Valve shall be placed in suitable area where it will not cause damage.  
(La vanne doit être placée dans un endroit approprié où elle ne causera pas de dommages.)

\* Also there shall be no other reducing coupling or other restrictions installed on the discharge line to restrict flow.  
(Aussi il n'y aura pas d'autre raccord de réduction ou d'autres restrictions installées sur la ligne de décharge pour limiter l'écoulement.)

\* See Installation Manual Heading "PRESSURE RELIEF VALVES" for installation and maintenance of relief valve discharge line and safety precaution.  
(Voir Installation Routine Manual "SOUPAPES DE DÉCHARGE" pour l'installation et l'entretien de la ligne d'évacuation de la soupape de décharge et de précaution de sécurité.)

Figure 3

## 2.4 Dimensions

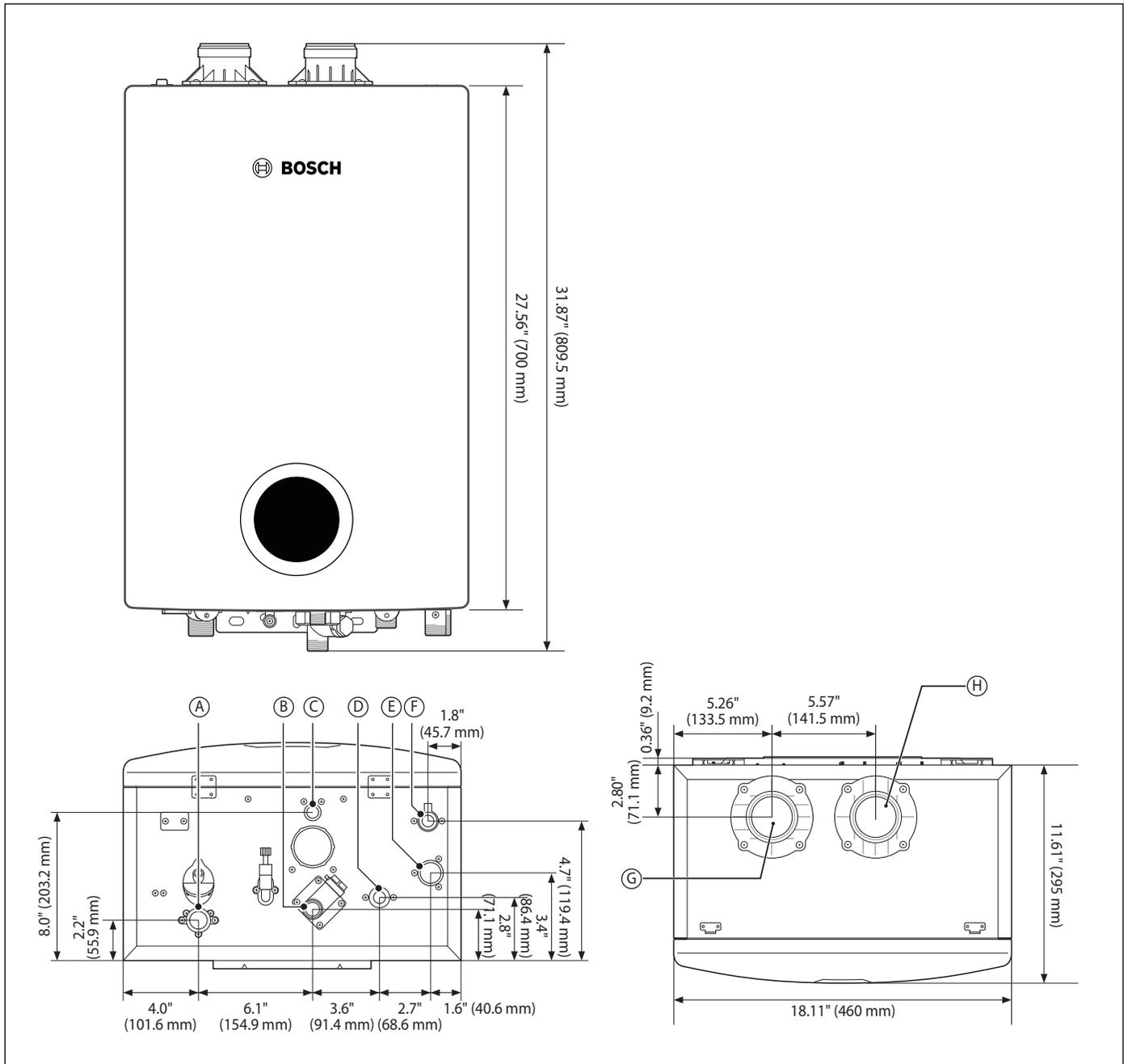


Figure 4

| Position | Description          | Diameter |
|----------|----------------------|----------|
| A        | Space heating Return | 1" NPT   |
| B        | Cold water inlet     | 3/4" NPT |
| C        | Condensate Outlet    | 1/2" NPT |
| D        | Hot water Outlet     | 3/4" NPT |
| E        | Space heating Supply | 1" NPT   |
| F        | Gas Inlet            | 3/4" NPT |
| G        | Exhaust Vent         | 2"       |
| H        | Air inlet            | 2"       |

Table 3

**2.5 Components**

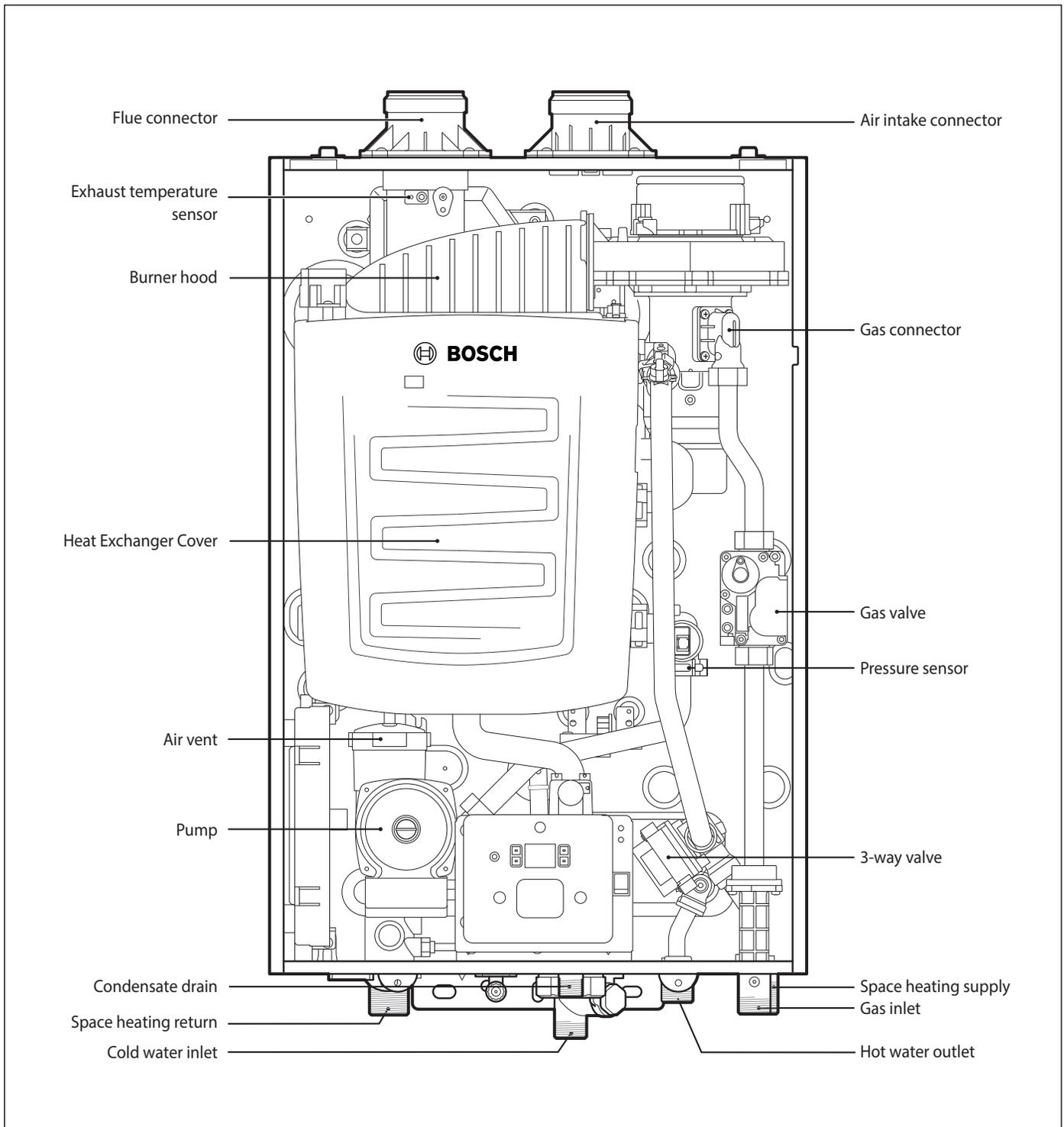


Figure 5

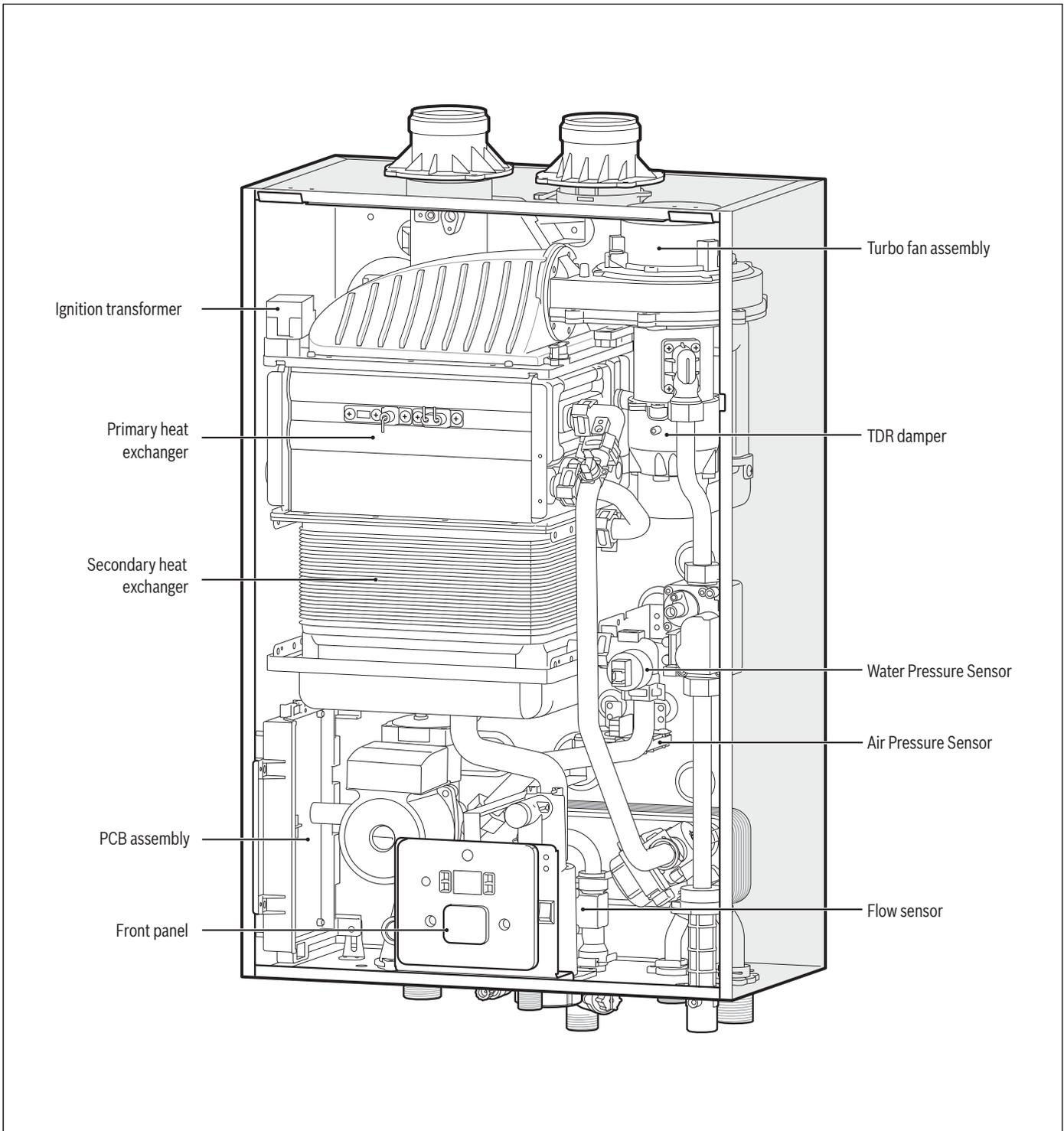


Figure 6

## 3 Boiler Installation

### 3.1 Installer Qualifications

A licensed professional must install and inspect the appliance. A licensed professional is a person who is licensed for the following:

- ▶ Connecting gas lines, water lines, valves, electricity
- ▶ Vent installation through walls and roofs
- ▶ Applicable of local, state, and national codes

### 3.2 Compliance Requirements

- ▶ National electrical code.
- ▶ National fuel gas code, ANSI Z223.1/NFPA 54 and/or CSA B149.1, natural gas and propane installation codes.
- ▶ Local, state, provincial, and national codes, laws, regulations, and ordinances.
- ▶ For Canada only: B149.1 installation Code, CSA C22.1 Canadian Electricity supply enters the building.

### 3.3 Location

For installation:

Observe the current national and local codes and regulations.

- ▶ Observe country-specific requirements.
- ▶ Observe installation instructions of the venting system accessories and their clearances.

When considering a location for installation, the installer, must ensure the following:

- ▶ Access to utilities
- ▶ Humidity and contact with water
- ▶ Water quality
- ▶ Drainage
- ▶ Venting and ventilation
- ▶ Proximity to fixtures and appliances
- ▶ Clearances
- ▶ Clean, debris and chemical-free combustion air
- ▶ High elevation Installations

#### 3.3.1 Access to Utilities

- ▶ Electricity – Close to where the electrical supply enters the building
- ▶ Water – Close to where the domestic water supply enters the building
- ▶ Gas – Close to where the gas supply enters the building

#### 3.3.2 Humidity and Contact with Water

Avoid places with excessive humidity. The boiler has electric gas ignition components. If water gets inside the boiler, the ignition system can be damaged. The boiler must be installed in such a way as to ensure that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during operation and service.

#### 3.3.3 Drainage

A significant amount of condensate is produced during the boiler operation. Install the boiler near a suitable drain and where damage from a possible leak will be minimal. Installing the boiler without a drain will void the warranty. For more information about condensate drainage, refer to "Connecting the Condensate Drain" on page 19.

The Boiler must be located in an area where leakage of the unit or connections will not result in damage to the area adjacent to the appliance or to lower floors of the structure. When such locations cannot be found, installation of an adequately-draining drain pan under the boiler is recommended. When installing the drain pan, ensure that the installation does not restrict combustion air flow.

#### 3.3.4 Venting and Ventilation

Consider venting restrictions caused by windows, doors, air intakes, gas meters, foliage and other buildings, and select a location that requires minimal venting.

When considering an adequate venting and ventilation, ensure the following:

- ▶ Maintain a minimum clearance of 4 feet (1.2 meters) from heating and cooling vents
- ▶ Maintain proper clearances from any openings in the building
- ▶ Install the boiler vent termination with a minimum clearance of 12 inches (300 mm) above an exterior grade or as required by local codes
- ▶ Install the exhaust vent in an area that is free from obstructions and does not allow the exhaust to accumulate
- ▶ Do not enclose the vent termination
- ▶ Do not install the boiler where moisture from the exhaust may discolor or damage walls
- ▶ Do not install the boiler in bathrooms, bedrooms, or any other occupied rooms that is normally kept closed or that is not adequately ventilated

For more information about venting, refer to "Installing a Vent" on page 29.

### 3.3.5 Clearances

The boiler should be installed in an area that allows for service and maintenance access to utility connections, piping, filters, and traps. Ensure the following clearances are maintained:

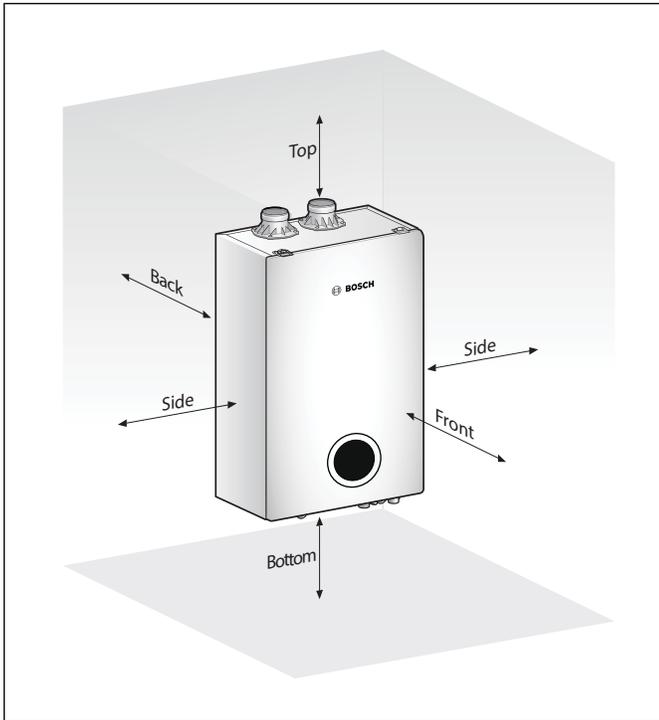


Figure 7

| Clearance From | Wall Mounting           |
|----------------|-------------------------|
| Top            | 12 inches (305 mm) min. |
| Back           | 0.6 inches (15 mm) min. |
| Front          | 6 inches (152 mm) min.  |
| Sides          | 3 inches (76 mm) min.   |
| Bottom         | 12 inches (300 mm) min. |

Table 4

**WARNING: FIRE**

- ▶ Do not install the boiler on carpeting.

### 3.3.6 Clean, Debris and Chemical-Free Combustion Air

- ▶ Do not install the boiler in areas where dust and debris may accumulate or where combustion air can be contaminated.
- ▶ Do not install the boiler in areas with greasy fumes or heavy amounts of steam, if necessary, take measures to prevent fumes and steam from entering the boiler.
- ▶ Chemicals that are corrosive in nature should not be stored or used near the boiler.

### 3.3.7 Position

**WARNING: FIRE, EXPLOSION, PROPERTY DAMAGE**

- ▶ Do not mount the boiler to dry wall that has not been reinforced.

The boiler can be mounted to the wall. For easy installation, use the mounting bracket to mount the boiler to standard wall studs. If the strength of the wall is insufficient and or if the framing is non-standard or uneven, reinforce the area before installation. Avoid installation in unstable locations as the boiler will make some operational noises while it is running.

Consider vent length and surrounding circumstances when mounting the boiler.

### 3.4 Mounting to the Wall

To mount the boiler to the wall:

1. Check that the wall is level and can support the weight of the boiler.
2. Affix the mounting bracket securely to the wall.

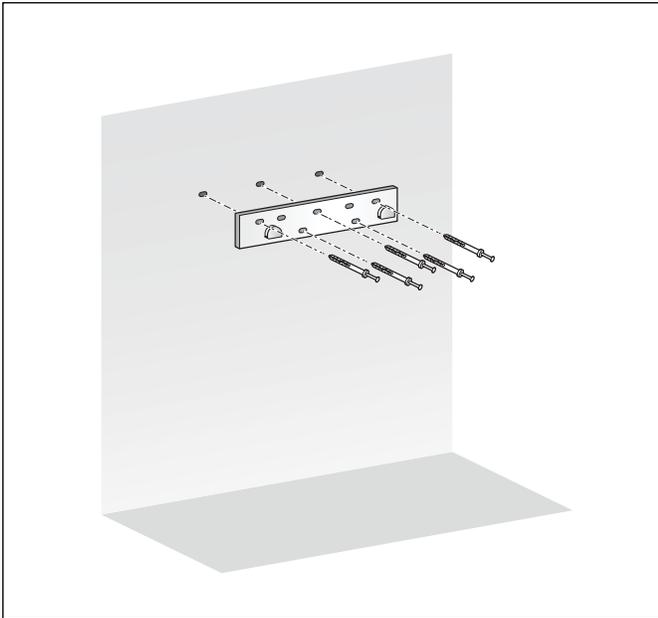


Figure 8

3. Align the grooves on the back of the boiler with the tongues on the mounting bracket and hang the boiler from the bracket.

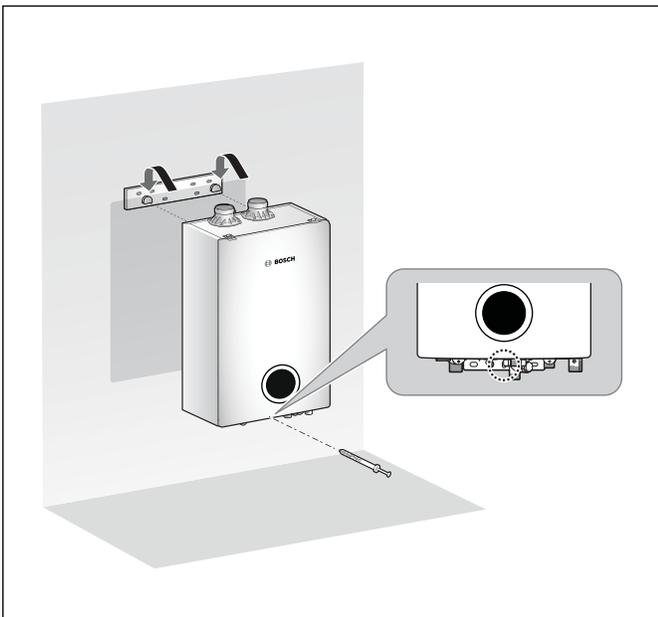


Figure 9



**CAUTION: BODILY INJURY, PRODUCT DAMAGE**

- ▶ The boiler is heavy. Always lift the unit with assistance. Be careful not to drop the boiler while lifting or handling it to avoid bodily injury or damage to the unit.

**NOTICE: PRODUCT DAMAGE**

- ▶ Do not rest the boiler on the bottom end after removing it from the shipping carton. Doing so may result in excessive pressure on protruding pipes and cause product damage.
- ▶ If you must put the boiler down, lay it on its back or put it inside the protective shipping base.

## 4 System Piping

Before connecting the pipes to the boiler, clean all systems to remove sediment, flux, solder, scale, debris, or other impurities that may be harmful to the boiler system. It is important to maintain the inside of the pipes free of debris, copper dust, sand, and dirt while installing the heating system.

When installing the Singular boiler and keeping the existing pipes, all pipes including the radiator should be cleaned.

### NOTICE: PRODUCT DAMAGE

- ▶ If you fail to remove the above-mentioned contaminants from the heating system, your warranty will be void, the heat exchange will break down faster than normal, and property damage may occur as a result.

### 4.1 Installing a Space Heating System

The primary heat exchanger and secondary heat exchanger of Singular boiler are designed optimally to obtain high thermal efficiency. The primary heat exchanger is configured in the finned tube method and the secondary heat exchanger is configured in the plate to plate method, maximizing the heating surface area to achieve high thermal efficiency. In order to allow the heat exchanger to operate effectively over time without trouble, it is important to follow the rules and guidelines mentioned in this section.



### WARNING: FIRE, PERSONAL INJURY, PROPERTY DAMAGE

- ▶ If you fail to follow the guidelines provided in this section, your warranty will be void and property damage, fire, serious injury, or death may occur as a result.

#### 4.1.1 Guidelines for a Space Heating System

Read the guidelines below for installing the boiler heating system safely and properly.

#### Freeze Protection for the Space Heating System

- ▶ Freeze protection products may be used to prevent the space heating system from becoming frozen. A specially manufactured glycol is necessary for preventing a new or existing piping system from becoming frozen. This glycol should include inhibitors not harmful to metallic system components.
- ▶ Before using freeze protection products, it is necessary to check if the amount of glycol use in the space heating water is appropriate and if the inhibitor level in such glycol is appropriate. Bosch recommends against exceeding a 35% concentration of glycol.
- ▶ If freeze protection products are used, the system should be tested at least once a year.
- ▶ When using the freeze protection products, allowance should be made for expansion of the glycol solution.
- ▶ Freeze damage is not covered by the warranty.

### NOTICE: PRODUCT DAMAGE

- ▶ For a system requiring freeze protection, use only inhibited propylene glycol, specially formulated for hydronic heating systems; use of other types of antifreeze may be harmful to the system and will void the warranty.

### System Pressure

- ▶ Singular boiler is intended solely for use in a pressurized closed loop heating system operating with 12-30psi water pressure at the boiler outlet. To obtain the minimum system design pressure, comply with the piping diagram in this section.
- ▶ The space heating system of Singular boiler is not approved to operate as an "open system", and thus cannot be used for direct potable water heating or to process heating of any kind.

### Air Elimination

This boiler can be installed only in a pressurized closed-loop heating system free of air and other impurities.

Install a proper-sized air-purging device at a proper position to eliminate air from the entire heating system.

#### 4.1.2 Essential Elements in a Space Heating System

#### Low Water Cut Off (LWCO) Device

- ▶ **Internal LWCO** - The Singular boiler is equipped with a factory-installed, pressure-sensing type low water cutoff (LWCO) device. The minimum operating pressure of this device is 7.1psig.

Refer to local codes to determine if a LWCO device is required for your system and ensure that the built-in device meets the requirements.

- ▶ **External LWCO** - Install LWCO if it is required by local code. The following figure shows an example of general LWCO installation.

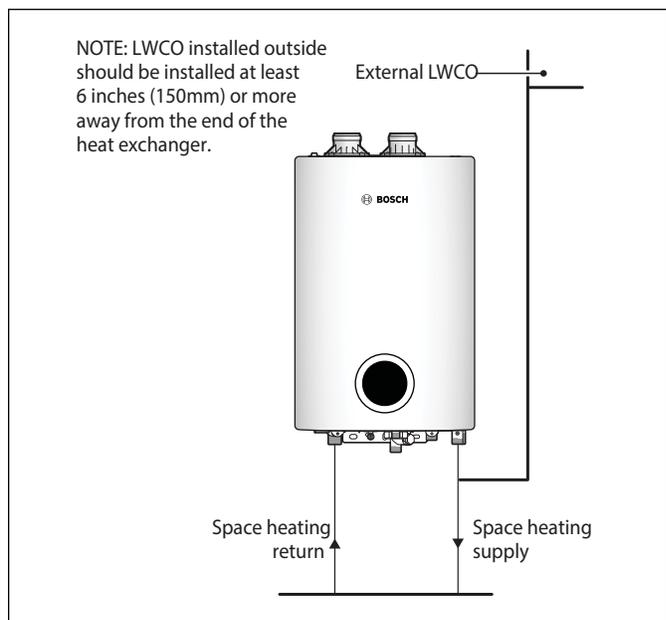


Figure 10

#### Backflow Preventer

When filling the device with water, install a backflow preventer if it is required by local code.

**Expansion Tank**

The expansion tank should be installed in the system pipes in order to prevent excessive pressure in the heating pipes.

When installing the expansion tank, follow the guidelines below.

- ▶ If the air separator is located on the suction side of the system circulator, connect the air separator to the expansion tank.
- ▶ Singular boiler has a connection (water fill connection) for additional water. Therefore, in most cases, an additional water fill connection is not necessary.
- ▶ If an additional water fill connection is necessary for special use, install the water fill connection at the same location as the expansion tank's connection to the system.
- ▶ When replacing the expansion tank, refer to the literature of the expansion tank manufacturer for selecting the proper size.
- ▶ When installing the diaphragm expansion tank, always install an automatic air vent at the top of the air separator in order to remove residual air in the system.

**Isolation Valves and Unions**

- ▶ This boiler system requires a full port ball valve. If a full port ball valve is not used, water may flow at a limited flow rate through the boiler.
- ▶ It is recommended to use unions for the serviceability of the device.

**Pressure Relief Valve**

This boiler comes with an ASME-approved pressure relief valve to install space heating. To complete the installation of the boiler, you must install an approved 3/4", maximum 30 PSI (for space heating).



**WARNING: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ Improper installation of the pressure relief valve may result in property damage, personal injury, or death. Follow all instructions and guidelines when installing the pressure relief valve. Only a licensed professional should install the valve.



**CAUTION: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ Install the pressure relief valve as close to the boiler as possible. No valve should be installed between the pressure relief valve and the boiler.

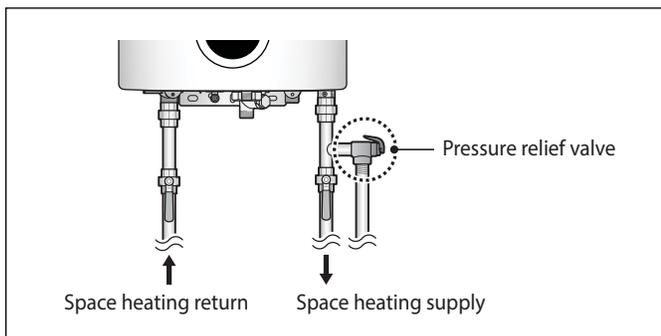


Figure 11

**4.1.3 Space Heating Piping**

When connecting the space heating system, follow these guidelines.

- ▶ Tighten the connection valves carefully in order to avoid damage.
- ▶ After installing the boiler, check if the space heating water flows smoothly and if there is a water leak. Inform the boiler owner of the fact that the strainer should be cleaned periodically to maintain the smooth flow of space heating water. (The strainer is located on the side of the space heating return.)

**NOTICE: PRODUCT DAMAGE**

- ▶ Bosch suggests the installation of a dirt/magnetic separator (boiler filter) on the system return line to help eliminate sludge and particles from entering and damaging the boiler components.

**4.2 Installing a Domestic Hot Water(DHW) System**

The boiler can supply domestic hot water continuously when the flow rate is detected by the flow switch. This is the most appropriate way to minimize standby losses and improve the combustion efficiency.

**4.2.1 Guidelines for a DHW System**

The boiler is designed to provide space heating and domestic hot water.

This boiler is equipped with the flow switch, and when approximately 0.5GPM or more water flows, the flow switch will sense such water flow. The boiler will then switch to the DHW mode immediately regardless of the space heating system's status.

Read and follow the guidelines stated below for the safety and proper installation of DHW system.

**Scald Hazard**

The hotter the water, the higher the risk of burns. If the DHW temperature is set too high, there is a risk of burns from domestic hot water. Make sure to follow the usage guidelines in the user manual.

**Water Quality**

If the quality of water cannot meet the EPA standard, appropriate boiler maintenance is required. Any damage resulting from bad quality of water voids the warranty. The following table shows the permitted maximum contaminant levels based on the EPA National Secondary Drinking Water Regulations (40 CFR Part 143.3).

| Contaminant                  | Maximum Allowable Level     |
|------------------------------|-----------------------------|
| Total Hardness               | 200 mg/l (12 grains/gallon) |
| Aluminum                     | 0.05 – 0.2 mg/l             |
| Chloride                     | 250 mg/l                    |
| Copper                       | 1.0 mg/l                    |
| Iron                         | 0.3 mg/l                    |
| Manganese                    | 0.05 mg/l                   |
| pH                           | 6.5 – 8.5                   |
| Sulfate                      | 250 mg/l                    |
| Total Dissolved Solids (TDS) | 500 mg/l                    |
| Zinc                         | 5 mg/l                      |

Table 5

Bosch is not responsible for the blockage of the domestic system due to the accumulation of foreign matters or scaling. The installer or the user should take appropriate measures in order to avoid any problem related to the quality of water.

**Freeze Protection**

Bosch recommends insulating the DHW pipes. The pipes can be covered using heat-insulating materials. Freeze damage voids the warranty.

**4.2.2 Essential Elements in a DHW System**

**Drain and Isolation Valves**

Install drain and isolation valves on the inlet and outlet of the DHW heat exchanger, so it can be flushed free of possible build-up caused by dirt or hard water.

**DHW Filter**

Singular boiler has a filter on its cold water inlet nipple. Clean the filter periodically to prevent the interruption of water flow by foreign matters.

If such foreign substances adhere to the flow switch, the boiler may malfunction.

**Pressure Relief Valve for DHW**

To complete the installation of the DHW system, you must install the approved 3/4", maximum 150psi pressure relief valve on the hot water outlet.

The DHW pressure relief valve is not provided together with the product. However, it is necessary to install such a valve.

**4.2.3 DHW System Piping**

**CAUTION: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ In order to meet the requirements of ASME or CRN, an additional high temperature limitation device may be required. Refer to the requirements of the local code for whether this device is required.

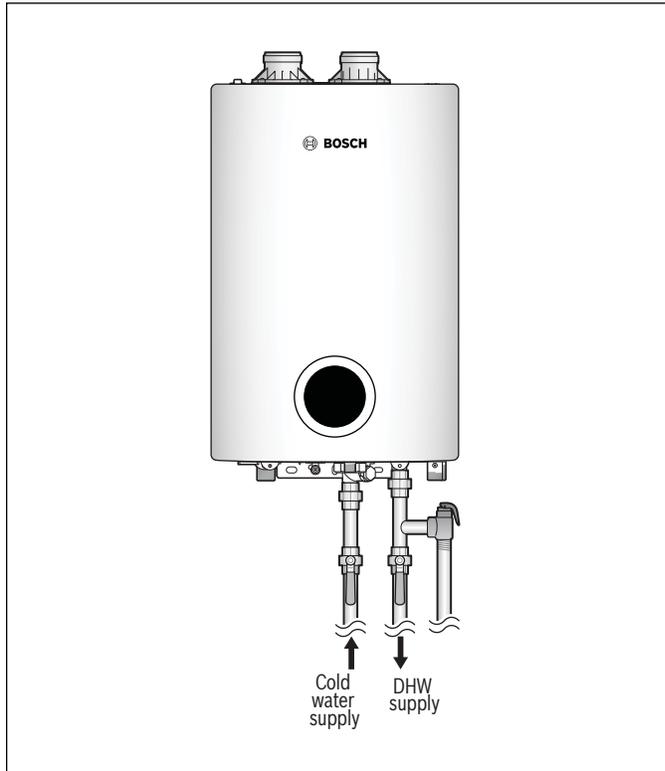


Figure 12

When installing the DHW system, follow the guidelines below.

- ▶ Only use permitted pipes, valves and other parts such as a solder for the potable water system.
- ▶ Tighten the connection valves carefully in order to avoid damage.
- ▶ Bosch recommends the use of unions and manual shut-off valves for the cold water inlet and DHW outlet.
- ▶ Keep the hot water piping system as short as possible, to deliver hot water to the fixtures more quickly.
- ▶ When installing a mixing valve on the DHW piping, ensure that the cold water pressure does not exceed the hot water pressure.
- ▶ To conserve water and energy, insulate the DHW supply and DHW recirculation lines (if applicable). Do not cover the drains or pressure relief valves.
- ▶ After installing the boiler, clean the cold water inlet filter. Then, check if domestic water flows properly and check for water leaks. Inform boiler owner that the filter should be cleaned periodically to ensure that domestic hot water flows smoothly.

**WARNING: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ Improper installation of the pressure relief valve may result in property damage, personal injury, or death.
- ▶ Follow all instructions and guidelines when installing the pressure relief valve. Only a licensed professional should install the valve.

**CAUTION: PERSONAL INJURY, PROPERTY DAMAGE**

- ▶ Install the pressure relief valve as close to the boiler as possible. No valve should be installed between the pressure relief valve and the boiler.

When installing the pressure relief valve, follow the guidelines below.

- ▶ The discharge capacity of the valve should be greater than or equal to the maximum pressure rating of the DHW system in the boiler.
- ▶ The maximum Btu/h rating of the pressure relief valve should be greater than or equal to the maximum input Btu/h rating of the boiler.
- ▶ If the pressure relief valve operates, discharging domestic hot water may scatter or splash onto other equipment around. Connect the pressure relief valve to the DHW outlet pipe.
- ▶ When installing the discharge piping line, do not install a coupling whose internal diameter decreases or has other restrictions.

If the pressure relief valve discharges hot water periodically, it may be caused by thermal expansion of the closed water system. The suggested method of controlling thermal expansion is to install an expansion tank in the cold water line between the boiler and the check valve. Contact the water supplier or a local plumbing contractor. Do not plug the pressure relief valve.

### 4.3 Connecting the Condensate Drain

**NOTICE: BOILER DAMAGE, PROPERTY DAMAGE**

- ▶ All condensate must drain and be disposed of according to local codes.
- ▶ Do not cap or plug the integrated condensate line. If prevented from draining, condensate can damage the boiler.
- ▶ The condensate line must have a negative slope to drain properly.
- ▶ Do not run drain outdoors. Freezing of condensate can cause property damage.
- ▶ Do not connect the condensate drain line directly to the rain sewer
- ▶ Do not connect the condensate drain line with an air conditioning evaporator coil drain.
- ▶ Use only corrosion resistant materials for the condensate drain lines such as PVC pipe or plastic hose.
- ▶ The end of the condensate drain pipe should be open to the atmosphere. The end should not be under water or other substances.

The boiler creates condensation when it operates. This condensation has an acidic pH of 3-5. Follow all local codes and regulations when disposing of condensate from the boiler.

**Disposal:**

- ▶ Dispose of condensate from the boiler, through a neutralizing agent, and then into an external drain using an air gap.

**NOTICE:**

- ▶ If necessary, a condensate pump can be used when there is an uphill pipe run and/or a long distance between the boiler and the disposal point.

**NOTICE:**

- ▶ The neutralizing agent must be replaced periodically. Depletion of the neutralizing agent will vary, based on the usage rate of the boiler. During the first year of operation, the neutralizer should be checked every few months for depletion and replaced as needed.

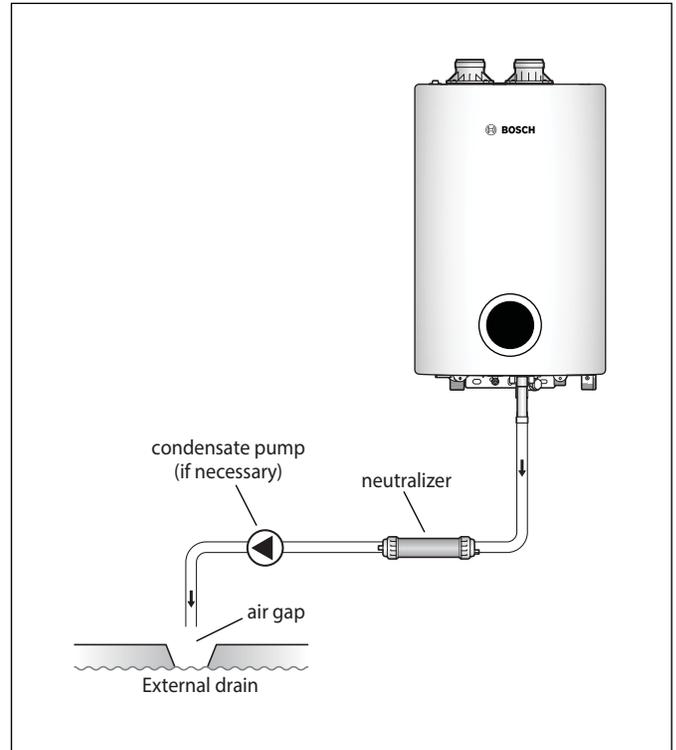


Figure 13

**To connect the condensate drain:**

1. Connect a drain line to the boiler.

**NOTICE:**

- ▶ Use only corrosion-resistant material for the drain line, such as PVC or CPVC. Do not reduce the size of this fitting or the drain line to less than 1/2".

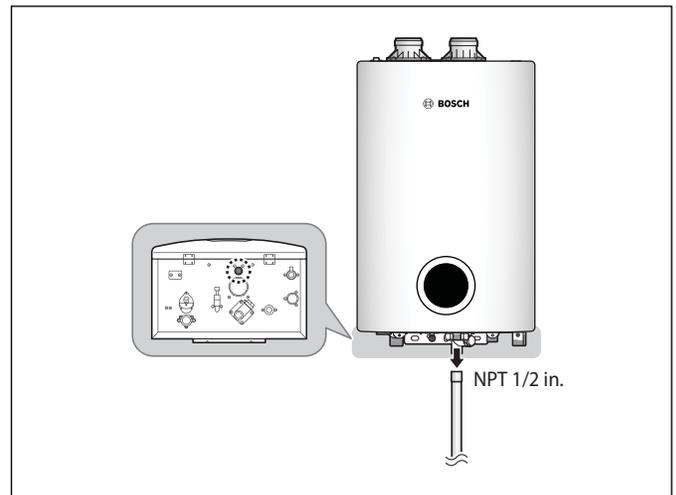


Figure 14

- Place the free end of the drain line into an appropriate drain.

**NOTICE:**

- ▶ If you are using a condensate pump, ensure that the pump allows for up to 2 GPH of drainage for each boiler in the system.
- ▶ If you are not using a condensate pump, ensure that the drain line is pitched downward at a minimum slope of 1/4" per foot.

**4.3.1 Filling the Condensate Trap**

Before operating the boiler, fill the condensate trap with water through the flue connector. The boiler may be severely damaged unless filled with water prior to operation. Pour more than 0.1 gallon (400 ml) of water into the exhaust duct. Open air vent cap sufficiently or equip the air vent with an outlet pipe prior to filling the condensate trap with water (there must be no air inside the heat exchanger).



Figure 15

**4.4 System Filling**

**4.4.1 Built-In Water Filling**

The boiler is designed to fill the system with water. Therefore, additional water fill connection is not necessary in most cases. Filling the system with water should be carried out after all space heating pipes and DHW pipes are connected. The procedure is as follows.

- ▶ When you turn the makeup water feeding valve shown in the figure below counterclockwise, the space heating system will be filed with water.
- ▶ When filling with water after installing it for the first time, it may operate and stop repeatedly due to the presence of air. Allow sufficient time to remove air from the pipes completely.
- ▶ After filling with water completely and removing air completely, close the makeup water feeding valve by turning it clockwise.
- ▶ Fill the system with water to a level at which the pressure inside the system does not exceed 30psi.



Figure 16

**4.4.2 External Water Fill Connection**

External water fill connection may be installed on the system piping if it is required for specific applications. See the following figure for an example of external water fill installation on the system piping.

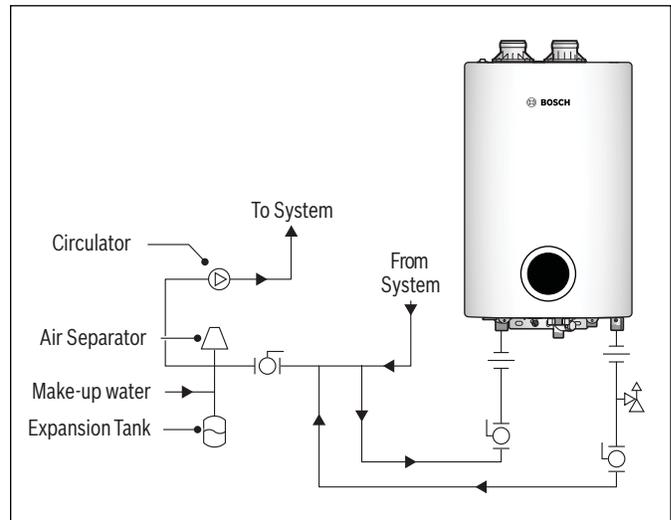


Figure 17

## 4.5 Test the Water System



### WARNING: PERSONAL INJURY, PROPERTY DAMAGE

- ▶ Ensure that the boiler is full of water before firing the burner. Operating the unit without filling it will damage the boiler. Such damage is not covered by the warranty, and may result in property damage, severe personal injury, or death.

Perform fill test after installing the boiler's water system to make sure that the system has been installed properly. Follow the instructions below to perform a fill test on the water system.

- ▶ Fill the boiler with water after checking that the chemical composition of water meets the requirements mentioned in this manual.
- ▶ Close the drain valve of the boiler.
- ▶ Fill the boiler with water. The correct pressure will vary with each application. The normal pressure of the residential system is 12psi. The operating pressure must never exceed the relief valve pressure setting.
- ▶ While filling with water for the first time and carrying out the operation test, check for water leaks from the pipes. If there is a water leak, stop the operation, repair the leak, and continue the operation.

This system may have residual substances that could affect water chemistry. After filling the system with water and completing the water leak test, verify that water pH and chlorine concentrations are within the acceptable range by performing sample testing.

### NOTICE: BOILER DAMAGE

- ▶ Before operating the boiler for the first time, check if the boiler is filled with water. To avoid boiler damage, remove all air from the system.

### 4.5.1 External Water Fill Connection

Read and follow the guidelines below for system piping of the boiler.

- ▶ System application drawings are intended to explain the system piping concept only
- ▶ When installing a mixing valve on the DHW piping, ensure that the cold water pressure does not exceed the hot water pressure.
- ▶ For the upstream side of all circulator, use straight pipes with a minimum diameter of ½" (12mm)
- ▶ Provide a system expansion tank following the guidelines on page 16
- ▶ Installations must comply with all local codes, IN Massachusetts, a vacuum relief valve must be installed in the cold water line per 248 CMR.

### Air Removal

The boiler and system plumbing layout must be configured to promote the removal of air from the water. Air vents and bleeders must be strategically placed throughout the system to aid in purging the air from the system during commissioning of the boiler. The system must also employ the use of a strategically located air removal device, such as an air scoop or micro-bubbler, designed to remove the air from the water as it flows through the system.

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



The boiler has an air vent inside the product in order to purge air in the system.

### Expansion Tank

The size of expansion tank should be calculated according to the boiler capacity and the amount of water in the system. It is important to locate the expansion tank, and make-up water fill, on the inlet side of any circulator in the system, as doing so will guarantee the lowest pressure in the system will be at least equal to the tank and make-up water pressure.

Ensure the expansion tank cannot become isolated from the boiler anytime the system is operating. Failure to follow these instructions may lead to discharge from the pressure relief valve, which may result in property damage or injury.

#### 4.6 Examples of System Applications

Refer to the following examples to properly implement a system for space heating, DHW supply, or both. These examples are provided to suggest basic guidelines when you install the boiler system. However, the actual installation may vary depending on the circumstances, local building codes, or state regulations. Check the local building codes and state regulations thoroughly before installation, and comply with them fully.

##### 4.6.1 System Application – Zone System with Zone Valves

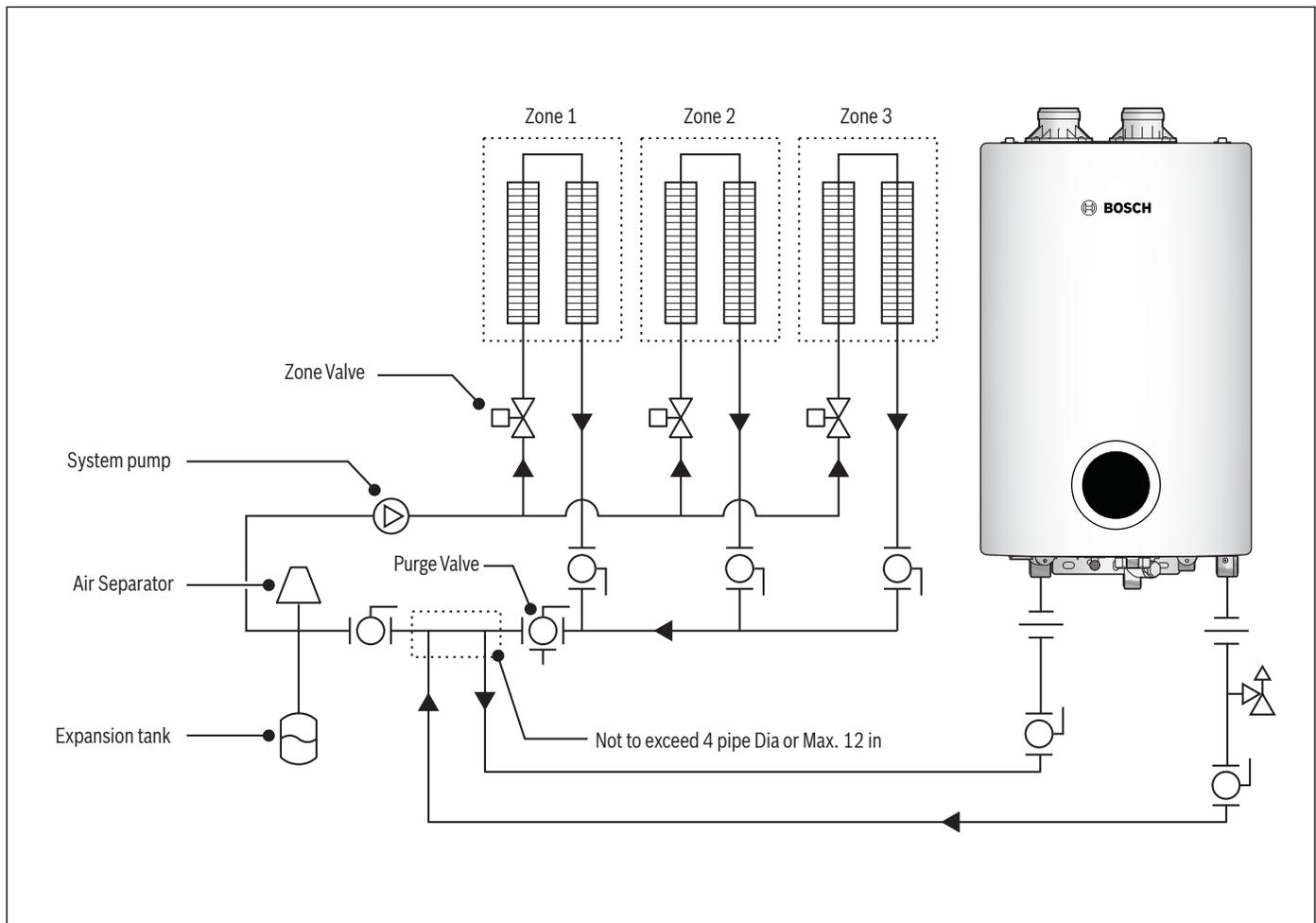


Figure 18

**4.6.2 System Application – Single Zone System**

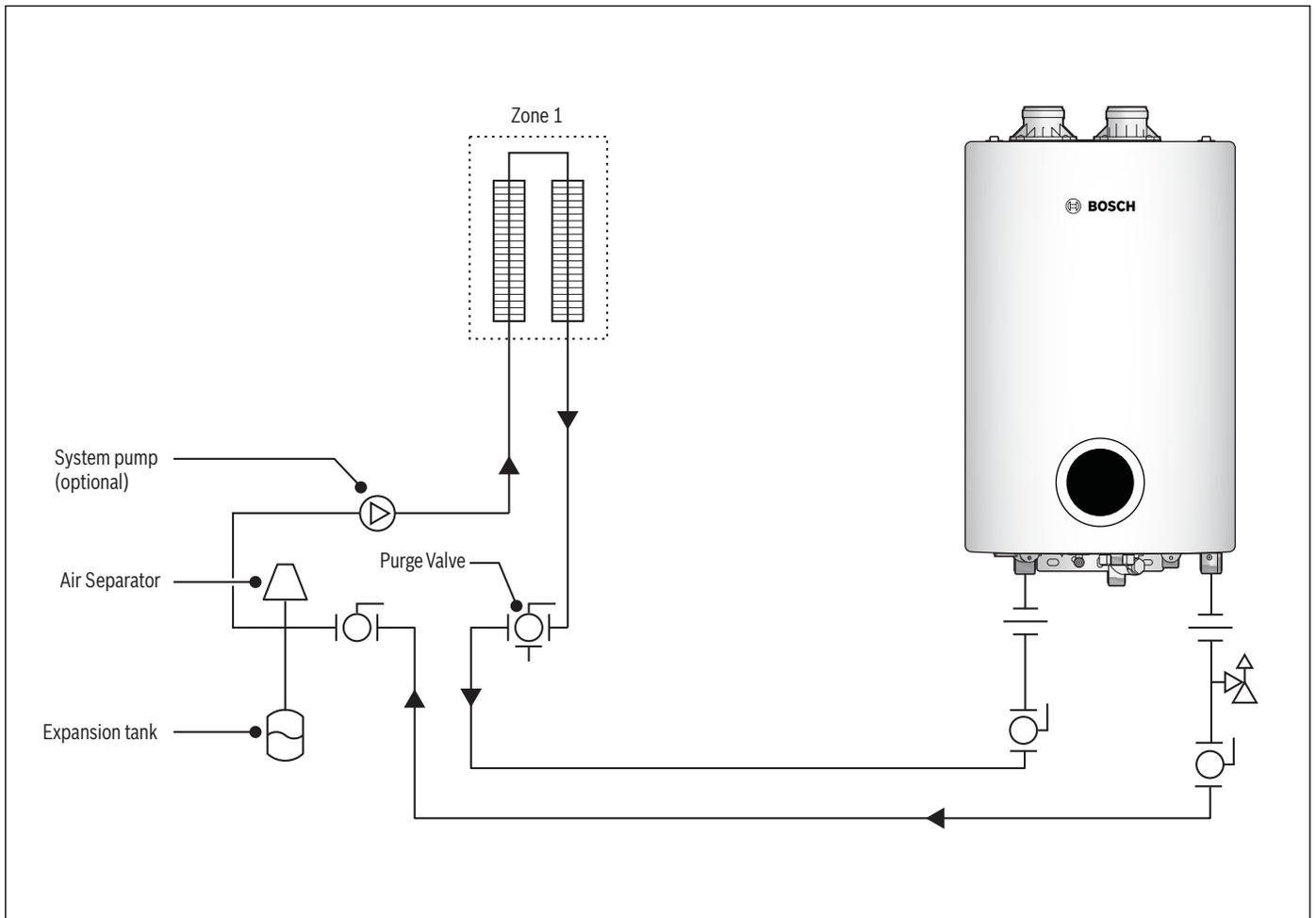


Figure 19

**4.6.3 System Application – Zone System with Circulators**

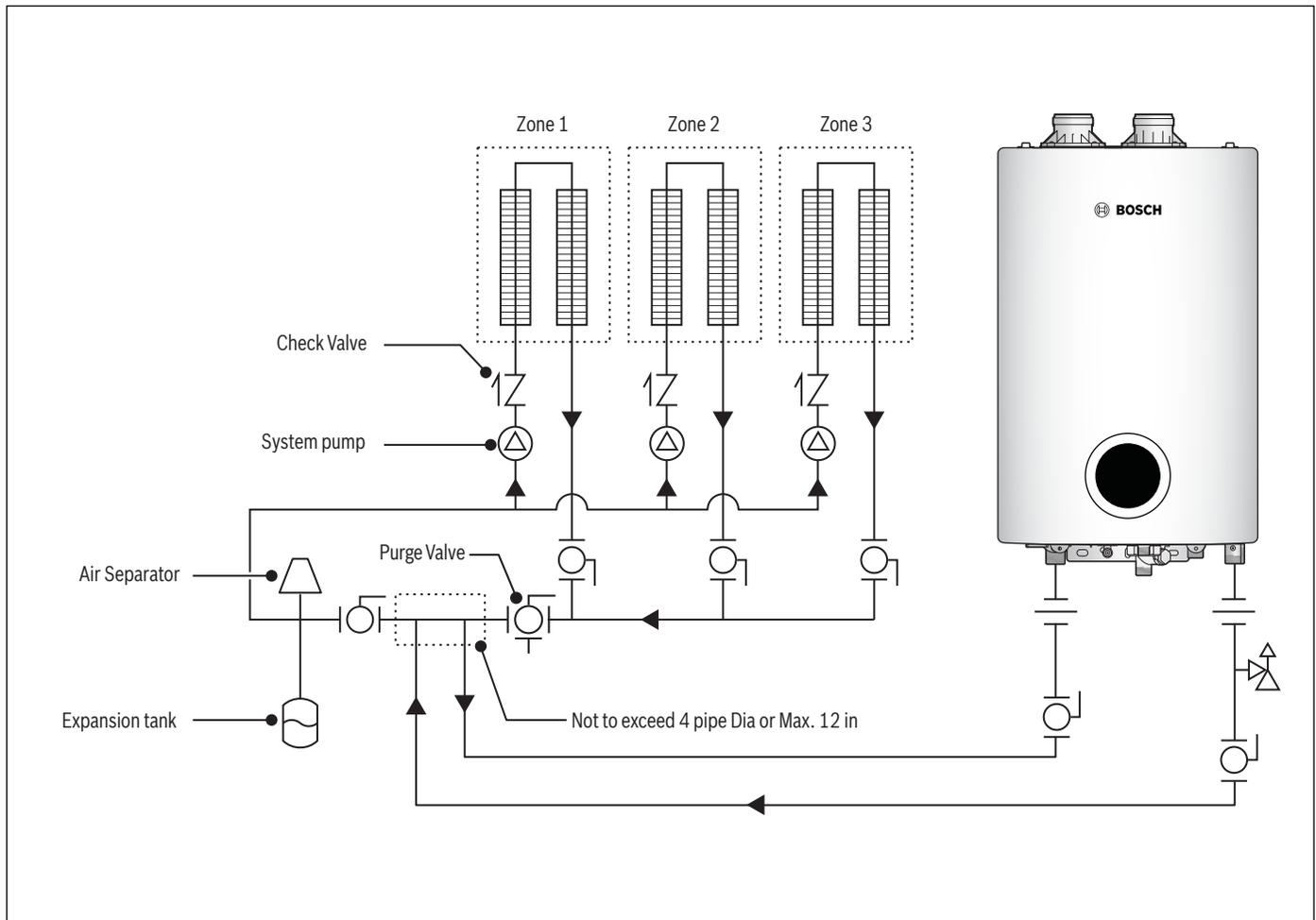


Figure 20

## 5 Connecting the Gas Supply

### 5.1 Gas Pipe Sizing Tables

Gas pipe sizing is based on the gas type, supplied gas pressure, pressure drop in the system, and gas line type. The tables below are for reference only (when the gas supply is piping straight to the boiler with no connections to any other gas appliances). For gas pipe sizing, refer to the latest National Fuel Gas code, NFPA 54 and consult the gas pipe manufacturer for actual gas pipe capacities.

#### Natural Gas

Maximum Capacity of Natural Gas Based on a 0.60 specific gravity at a 0.5" WC pressure drop.

| Pipe Size | kBTU/H of Natural Gas |       |       |       |      |      |      |      |      |      |      |      |      |
|-----------|-----------------------|-------|-------|-------|------|------|------|------|------|------|------|------|------|
| Length    | 10'                   | 20'   | 30'   | 40'   | 50'  | 60'  | 70'  | 80'  | 90'  | 100' | 125' | 150' | 200' |
| 3/4"      | 360                   | 247   | 199   | 170   | 151  | 137  | 126  | 117  | 110  | 104  | 92   | 83   | 71   |
| 1"        | 678                   | 466   | 374   | 320   | 284  | 257  | 237  | 220  | 207  | 195  | 173  | 157  | 134  |
| 1 1/4"    | 1390                  | 957   | 768   | 657   | 583  | 528  | 486  | 452  | 424  | 400  | 355  | 322  | 275  |
| 1 1/2"    | 2090                  | 1430  | 1150  | 985   | 873  | 791  | 728  | 677  | 635  | 600  | 532  | 482  | 412  |
| 2"        | 4020                  | 2760  | 2220  | 1900  | 1680 | 1520 | 1400 | 1300 | 1220 | 1160 | 1020 | 928  | 794  |
| 2 1/2"    | 6400                  | 4400  | 3530  | 3020  | 2680 | 2430 | 2230 | 2080 | 1950 | 1840 | 1630 | 1480 | 1270 |
| 3"        | 11300                 | 7780  | 6250  | 5350  | 4740 | 4290 | 3950 | 3670 | 3450 | 3260 | 2890 | 2610 | 2240 |
| 4"        | 23100                 | 15900 | 12700 | 10900 | 9660 | 8760 | 8050 | 7490 | 7030 | 6640 | 5890 | 5330 | 4560 |

Table 6 For less than 6" WC supply pressure.

Maximum Capacity of Natural Gas Based on a 0.60 specific gravity at a 3.0" WC pressure drop.

| Pipe Size | kBTU/H of Natural Gas |       |       |       |       |       |       |       |       |       |       |       |       |
|-----------|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Length    | 10'                   | 20'   | 30'   | 40'   | 50'   | 60'   | 70'   | 80'   | 90'   | 100'  | 125'  | 150'  | 200'  |
| 1/2"      | 454                   | 312   | 250   | 214   | 190   | 172   | 158   | 147   | 138   | 131   | 116   | 105   | 90    |
| 3/4"      | 949                   | 652   | 524   | 448   | 397   | 360   | 331   | 308   | 289   | 273   | 242   | 219   | 188   |
| 1"        | 1790                  | 1230  | 986   | 844   | 748   | 678   | 624   | 580   | 544   | 514   | 456   | 413   | 353   |
| 1 1/4"    | 3670                  | 2520  | 2030  | 1730  | 1540  | 1390  | 1280  | 1190  | 1120  | 1060  | 936   | 848   | 726   |
| 1 1/2"    | 5500                  | 3780  | 3030  | 2600  | 2300  | 2090  | 1920  | 1790  | 1670  | 1580  | 1400  | 1270  | 1090  |
| 2"        | 10600                 | 7280  | 5840  | 5000  | 4430  | 4020  | 3690  | 3440  | 3230  | 3050  | 2700  | 2450  | 2090  |
| 2 1/2"    | 16900                 | 11600 | 9310  | 7970  | 7060  | 6400  | 5890  | 5480  | 5140  | 4860  | 4300  | 3900  | 3340  |
| 3"        | 29800                 | 20500 | 16500 | 14100 | 12500 | 11300 | 10400 | 9690  | 9090  | 8580  | 7610  | 6890  | 5900  |
| 4"        | 60800                 | 41800 | 33600 | 28700 | 25500 | 23100 | 21200 | 19800 | 18500 | 17500 | 15500 | 14100 | 12000 |

Table 7 For 6" WC or greater supply pressure.

#### Liquid Propane Gas

Maximum Capacity of propane (LP) Gas Based on 11" WC supply pressure at a 0.5" WC pressure drop.

| Pipe Size | kBTU/H of Propane Gas |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Length    | 10'                   | 20'  | 30'  | 40'  | 50'  | 60'  | 80'  | 100' | 125' | 150' | 175' | 200' | 250' |
| 1/2"      | 291                   | 200  | 160  | 137  | 122  | 110  | 101  | 94   | 89   | 84   | 74   | 67   | 62   |
| 3/4"      | 608                   | 418  | 336  | 287  | 255  | 231  | 212  | 197  | 185  | 175  | 155  | 140  | 129  |
| 1"        | 1150                  | 787  | 632  | 541  | 480  | 434  | 400  | 372  | 349  | 330  | 292  | 265  | 243  |
| 1 1/4"    | 2350                  | 1620 | 1300 | 1110 | 985  | 892  | 821  | 763  | 716  | 677  | 600  | 543  | 500  |
| 1 1/2"    | 3520                  | 2420 | 1940 | 1660 | 1480 | 1340 | 1230 | 1140 | 1070 | 1010 | 899  | 814  | 749  |
| 2"        | 6790                  | 4660 | 3750 | 3210 | 2840 | 2570 | 2370 | 2200 | 2070 | 1950 | 1730 | 1570 | 1440 |

Table 8

## 5.2 Gas Piping



**DANGER: FIRE, EXPLOSION**

- ▶ Do not connect to an unregulated or high pressure propane line or to a high pressure commercial natural gas line.
- ▶ The boiler must be isolated from the gas supply piping system during any pressure testing of that system at test pressures equal to or more than 0.5 psig.



**WARNING:**

- ▶ Only a licensed professional should connect the gas supplies.
- ▶ Before connecting the gas supply, determine the gas type and pressure for the boiler by referring to the rating plate. Using a different gas type will result in abnormal combustion and malfunction of the boiler causing fire or explosion.
- ▶ Leak test the appliance and its gas connection before operating the boiler.
- ▶ Do not attempt a field conversion without a conversion kit. Use the Bosch conversion kit to convert from natural gas to propane or vice versa. Failure to do so may result in dangerous operating conditions and will void the warranty.
- ▶ A sediment trap must be provided upstream of the gas controls.

In the United States: The installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code ANSI Z223.1/NFPA 54.

In Canada: The Installation must conform to CGA B149 INSTALLATION CODES and/or local installation codes.

To ensure a sufficient gas supply, it is recommended that the boiler be the first appliance to be connected to the gas supply line.

**To connect the gas supply:**

1. Determine the gas type and pressure by referring to the rating plate.
2. Perform a pressure test on the main gas supply line.
3. Purge the gas line of any debris.
4. Determine the proper type and size for the gas line. Refer to the gas pipe sizing tables on page 25.
5. Install a union.
6. Install a manual gas shut off valve on the gas supply line within easy reach of the appliance.



**WARNING:**

- ▶ The manual gas shut off valve is not provided together with the product.
- ▶ Improper installation of the manual gas shut-off valve may result in property damage, personal injury or death.
- ▶ Only a licensed professional, in accordance with the ANSI Z21.13/CSA4.9, should install the manual gas shut-off valve.

7. Connect the gas supply line.

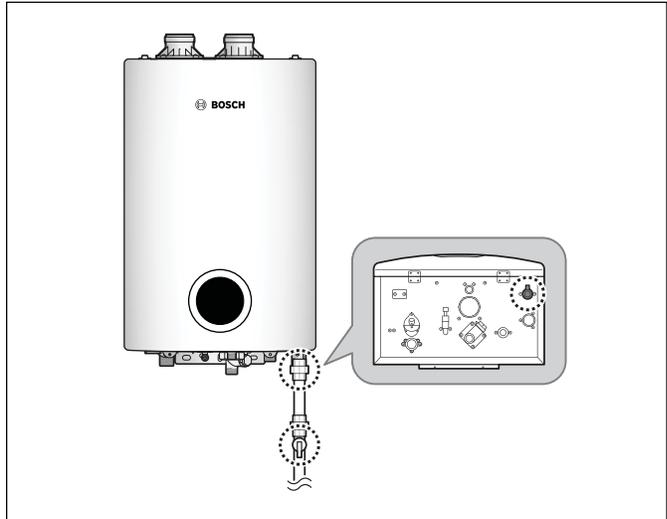


Figure 21

8. Check for gas leaks at all joints.

**NOTICE: PRODUCT DAMAGE**

- ▶ Tighten the boiler connection valves with care to avoid damage.



**WARNING: FIRE, EXPLOSION, PROPERTY DAMAGE**

- ▶ Apply gas leak detection solution to all gas fittings.



The minimum internal diameter required for any appliance connector is 3/4".



When using flexible gas lines, ensure that the pipe's inner diameter and connector is sufficient to supply the required BTUs. Also, ensure that the flexible line has no crimps or tight bends in it, as this will restrict gas flow.



To facilitate any future maintenance or service, the installation of a union on the gas supply line close to the boiler is recommended.

**Gas Piping Examples:**

The following is a LP gas piping example for the single regulator system

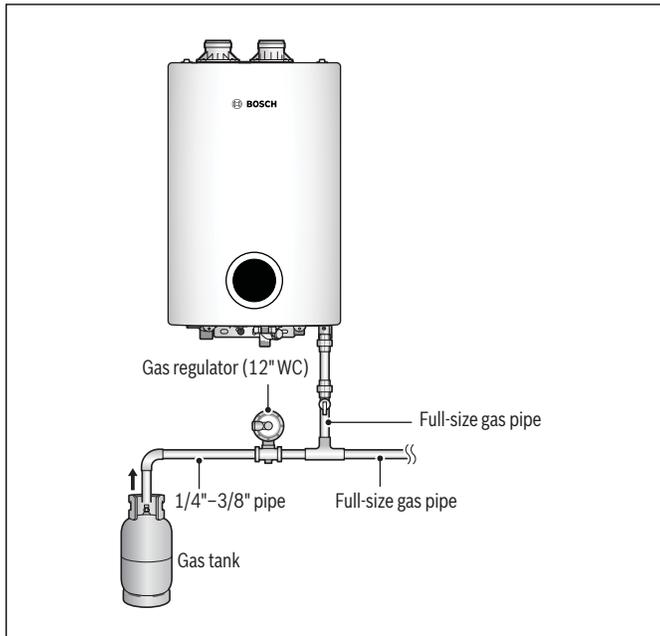


Figure 22



Gas regulator must be a minimum of 10 feet away from the boiler.

The following is an LP gas piping example for the 2-lb. system with multiple regulators.

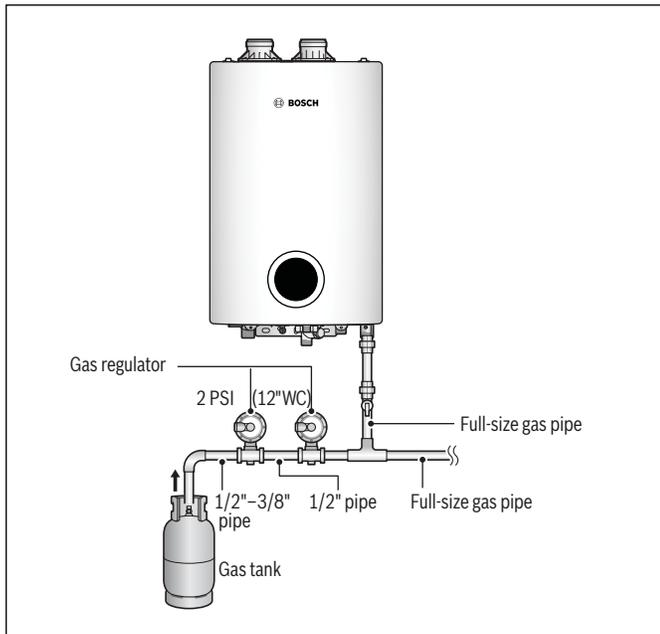


Figure 23



Gas regulators must be a minimum of 10 feet away from the boiler.

**5.3 Inlet Gas Pressure**



**WARNING:**

▶ Inlet gas pressure should be measured by a licensed professional only. The boiler cannot function properly without sufficient inlet gas pressure.

- ▶ The boiler must be isolated from the gas supply piping system during any pressure testing of that system at test pressures equal to or more than 0.5 psig. If overpressure has occurred, through improper testing of the gas lines or malfunction of the supply system, the gas valve must be checked for safe operation.
- ▶ The inlet gas pressure must be maintained between 3.5" and 10.5" WC for natural gas and between 8" and 13" WC for liquefied propane.

**To measure the inlet gas pressure:**

1. Shut off the manual gas valve on the gas supply line.

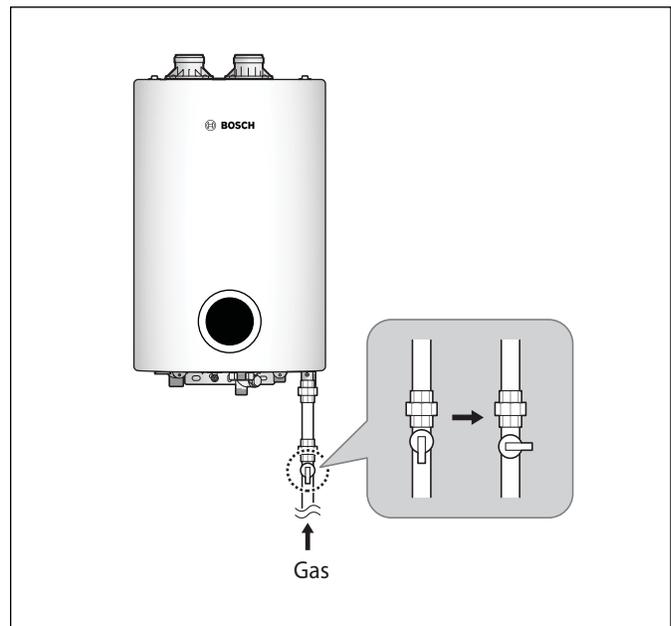


Figure 24

2. Open a hot water faucet. The boiler should turn on and the gas in the gas supply line will be purged.
3. Leave the faucet on until the boiler shuts down due to a lack of gas supply, and then turn off the hot water faucet.
4. Remove the boiler front cover by loosening the 2 Phillips screws securing it to the case.



Figure 25

5. Loosen the screw indicated in the figure below and connect a manometer to the inlet pressure port. Reset the manometer to zero before use.

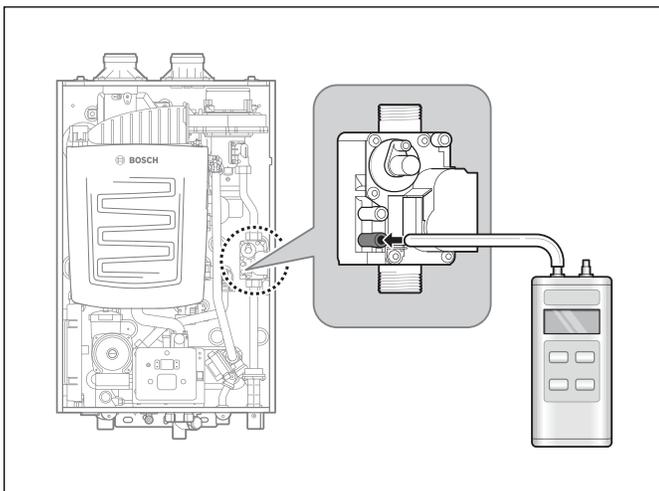


Figure 26

6. Re-open the manual gas shut-off valve and check for leaks.
7. Open multiple fixtures that have high flow rates, such as bathtub and shower faucets, to ramp up the boiler to its maximum firing rate.

8. When the boiler reaches its maximum firing rate, check the inlet gas pressure reading on the manometer. The gas pressure must fall within the ranges specified in "Specifications" on page 8.

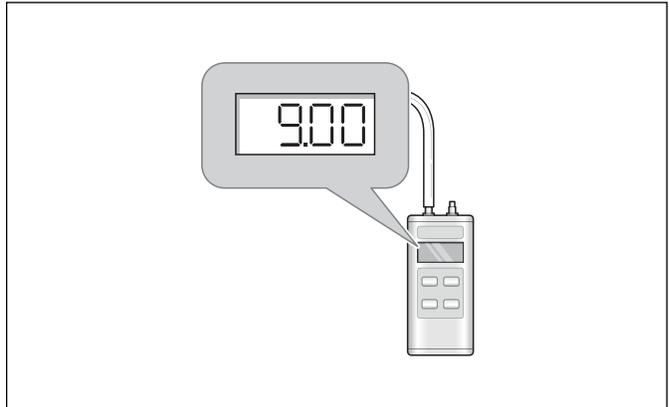


Figure 27

9. Tighten the inlet gas pressure screw.
10. Replace the front cover and tighten the 2 Phillips screws to secure it to the case.

## 6 Installing a Vent



### WARNING: CARBON MONOXIDE

- ▶ Improper venting of the boiler can result in excessive levels of carbon monoxide, which can lead to severe personal injury or death. This boiler must be vented in accordance with the "Venting of Equipment" section of the latest edition of the ANSI Z223.1/NFPA 54 Natural Fuel Gas Code in the USA and/or the "Venting systems and air supply for boilers" section of the latest version of the CAN/CGA B149.1 Natural Gas and Propane Installation Code in Canada, as well as all applicable local building codes and regulations. Follow all instructions and guidelines when venting the boiler. Venting should be performed only by a licensed professional.

The boiler must be properly vented to ensure a constant supply of clean intake air and to ensure that exhaust air is properly removed from living areas. When venting the boiler, follow these guidelines:

- ▶ Do not install the boiler in areas with contaminated air (containing a high level of dust, sawdust, sand, aerosols, or any other such airborne contaminants), as contaminants can cause operational problems. The warranty does not cover damage caused by contaminants in the installation area. If you must install the boiler in an area with contaminated air, use direct venting to supply air from outside the building. We recommend regular filter cleaning and maintenance in these areas.
- ▶ Keep the venting system as short and straight as possible.
- ▶ Locate the boiler as close as possible to the vent termination.
- ▶ Do not connect the boiler vent to a vent for any other gas boiler or vent stack.
- ▶ For horizontal runs, slope the horizontal section back towards the boiler at a rate of 1/4" per foot (2° slope).
- ▶ Create an airtight seal at each joint in the exhaust and intake air pipes from the boiler collar to the vent termination.
- ▶ To avoid moisture and frost build-up and to maintain clearances to openings on adjacent homes, 45° elbows, 90° elbows, or tees may be attached to the end of the termination vent pipe to direct the exhaust fumes away from buildings, as long as the restrictions on total allowable vent lengths, maximum number of elbows, and distances to air intake are observed.
- ▶ Do not store hazardous or flammable substances near the vent termination.
- ▶ If this boiler is to be installed in an area where snow is known to accumulate, protect the vent termination from blockage.
- ▶ Ensure that the vent termination is at least 12" (305mm) above ground, or as required by local codes.
- ▶ Support the vent pipe with hangers at regular intervals or as required by local codes.
- ▶ Exhaust and intake air pipes must be supported at least every 4 feet (1.2m).
- ▶ The vent for this appliance shall not terminate over public walkways; or near soft vents or crawl space vents or where condensate or vapor could create a nuisance or hazard or cause property damage; or where condensate or vapor could cause damage or could be detrimental to the operation of regulators, relief valves, or other equipment.

## 6.1 Vent Type

All boilers are prepared at the factory to be direct vent (sealed combustion) boilers that draw all of their required combustion air directly from outside the building. Bosch recommends direct air vent installations whenever possible to avoid back drafting cold air through the boiler. Bosch recommends direct air vent installations when installing the boiler in your attic to get fresh air into the boiler. If you cannot use a direct vent, ensure that an ample supply of make-up air is available in the installation location. Bosch also recommends installing a new vent system with this appliance. If reusing an existing vent system, thoroughly inspect it for punctures, cracks, or blockages prior to connecting it to the boiler. When using non-direct venting, you must provide two openings as specified in the table on page 31.

### 6.1.1 Direct Venting

The boiler uses 2" or 3" diameter exhaust and 2" or 3" diameter intake air ducts. To ensure the draw of air directly from and exhaust of air directly to the outside of the building, create an airtight seal from the boiler collar to the vent termination. Intake materials can be made of ABS, PVC, CPVC, PP, stainless steel, corrugated aluminum or any other similar materials. If you use a corrugated material, ensure that there is not inadvertent crimping of, or damage to, the intake air pipe. When using direct venting, maintain the following venting clearances, as required by ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CGA B149.1 Natural Gas and Propane Installation Code.

To use direct venting for the boiler:

- ▶ Install the 2" vent directly. Ensure the vent is properly seated.
- ▶ To install the 3" vent, reducer (3" to 2") must be used.
- ▶ Install the reducer (3" to 2") vertically. If installed horizontally, water may stagnate.

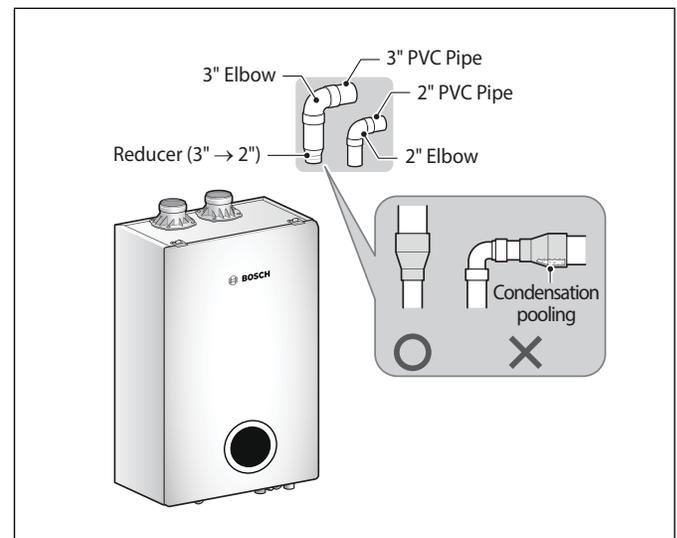


Figure 28

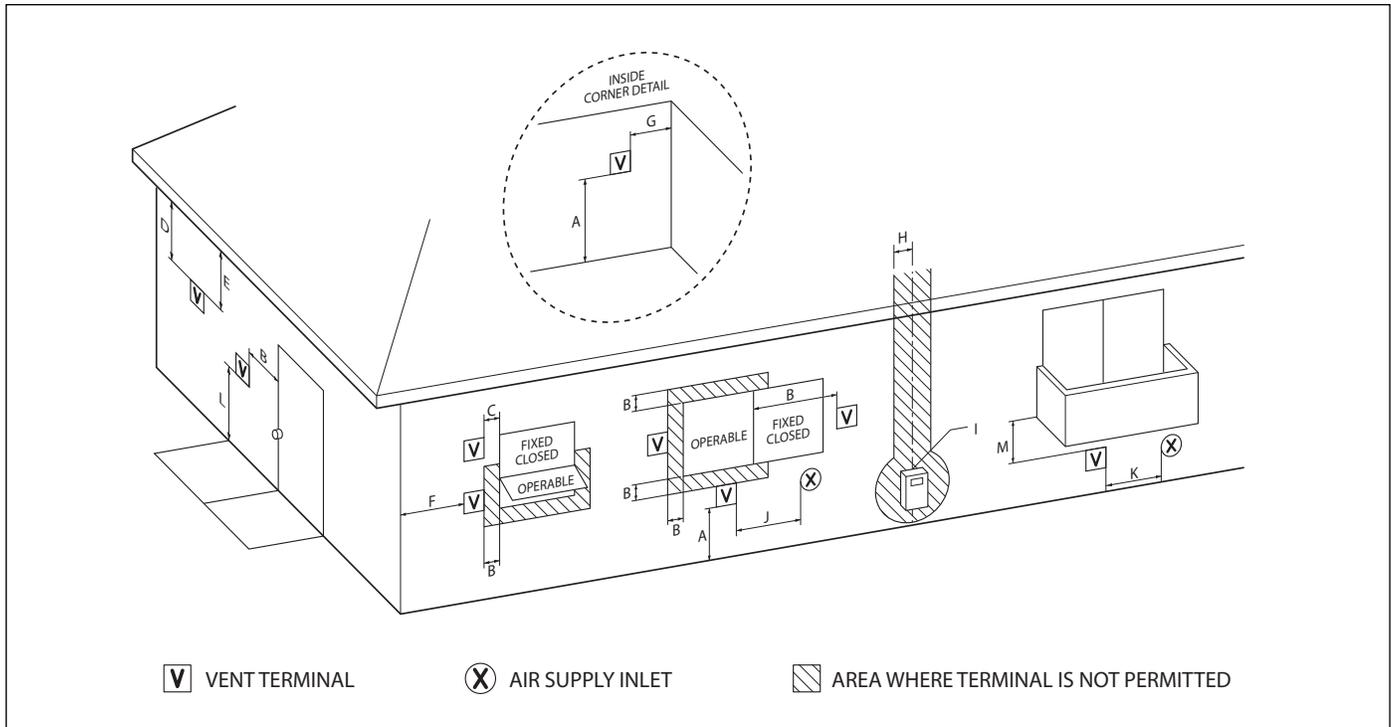


Figure 29

|   |  | Canadian Direct Vent Installations <sup>1)</sup>                      | U.S. Direct Vent Installation <sup>2)</sup>         |
|---|--|---|---|
| A | Clearance above grade, veranda, porch, deck or balcony   | 12 in. (30 cm)  | 12 in. (30 cm)                                      |
| B | Clearance to window or door that may be opened   | 36 in. (91 cm)  | 12 in. (30 cm)                                      |
| C | Clearance to permanently closed window   | *   | *   |
| D | Vertical clearance to ventilated soffit located above the vent termination within a horizontal distance of 2 feet (61cm) from the center line of the termination | *   | *   |
| E | Clearance to unventilated soffit   | *   | *   |
| F | Clearance to outside corner  | *   | *   |
| G | Clearance to inside corner   | *   | *   |
| H | Clearance to each side of center line extended above gas meter/gas regulator assembly  | 36 in. (91 cm) within a height 15 feet above meter/regulator assembly | *   |
| I | Clearance to service gas regulator vent outlet   | 36 in. (91 cm)  | *   |
| J | Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other application  | 36 in. (91 cm)  | 12 in. (30 cm)                                      |
| K | Clearance to mechanical air supply inlet   | 72 in. (182 cm)   | 36 in. (91 cm) above if within 10 feet horizontally |
| L | Clearance above paved sidewalk or paved driveway located on public property  | 84 in. (213 cm) <sup>3)</sup>   | *   |
| M | Clearance under veranda, porch deck or balcony   | 12 in. (30 cm) <sup>4)</sup>  | *   |

Table 9 Direct Venting

<sup>1)</sup> In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.  
<sup>2)</sup> In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code.  
<sup>3)</sup> A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.  
<sup>4)</sup> Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor.  
 [\*] For clearances not specified in ANSI Z223.1 / NFPA 54 or CSAB149.1, one of the following shall be indicated:  
 a) A minimum clearance value determined by testing in accordance with section 2.20, or;  
 b) A reference to the following footnote:  
 "Clearance in accordance with local installation codes and the requirements of the gas supplier."

**6.1.2 Non-Direct Venting**

If, at any time, the installation location could experience negative pressure, there is a possibility of back-drafting cold air through the boiler's heat exchanger. This situation could lead to the freezing of the heat exchanger and malfunction of the boiler.

However, building codes in most jurisdictions disallow negative pressures in residences. In a home with a well-balanced air supply, the heat exchanger should not be in danger of freezing. Because the cause of back-drafting is not considered a manufacturing problem, any freezing damage which occurs from back-drafting will not be covered by the Bosch warranty. If there is any question about the possibility of back-drafting in the installation location, use a direct venting system for the boiler. When installed in a manufactured home (mobile home), all combustion air must be supplied from the outdoors as described on page 30. When using non-direct venting, maintain non-direct vent clearances shown on page 32 as required by ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CSA B149.1 Natural Gas and Propane Installation Code.

To use non-direct venting for the boiler:

- ▶ Insert the elbow into the intake air duct.

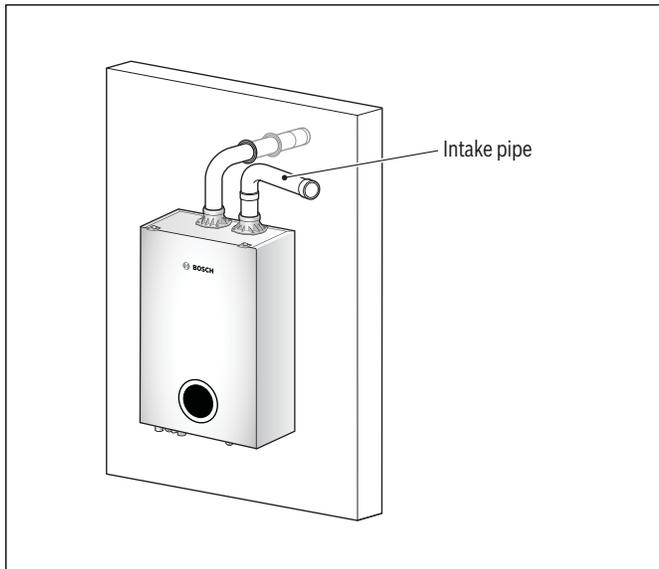


Figure 30

- ▶ Provide two openings to allow for circulation of combustion air as specified by ANSI Z223.1/NFPA 54 or CAN/CGA B-149.1:

| Boiler        | Maximum Input (BTU/H) | If outdoor make up air is provided, a minimum free area of 1 in <sup>2</sup> . per 4,000 BTU/H | If indoor make up air is provided, a minimum free area of 1 in <sup>2</sup> per 1,000 BTU/H |
|---------------|-----------------------|--|---|
| Singular 4000 | 155,000               | 40 in <sup>2</sup><br>10"(W) x 4" (H) or<br>7" round"  | 150 in <sup>2</sup><br>12 1/4" (W) x<br>12 1/4" (H)   |
| Singular 5200 | 199,000               | 50 in <sup>2</sup><br>10" (W) x 5" (H) or<br>8" round  | 199 in <sup>2</sup><br>14 1/4" (W) x<br>14 1/4" (H)   |

Table 10

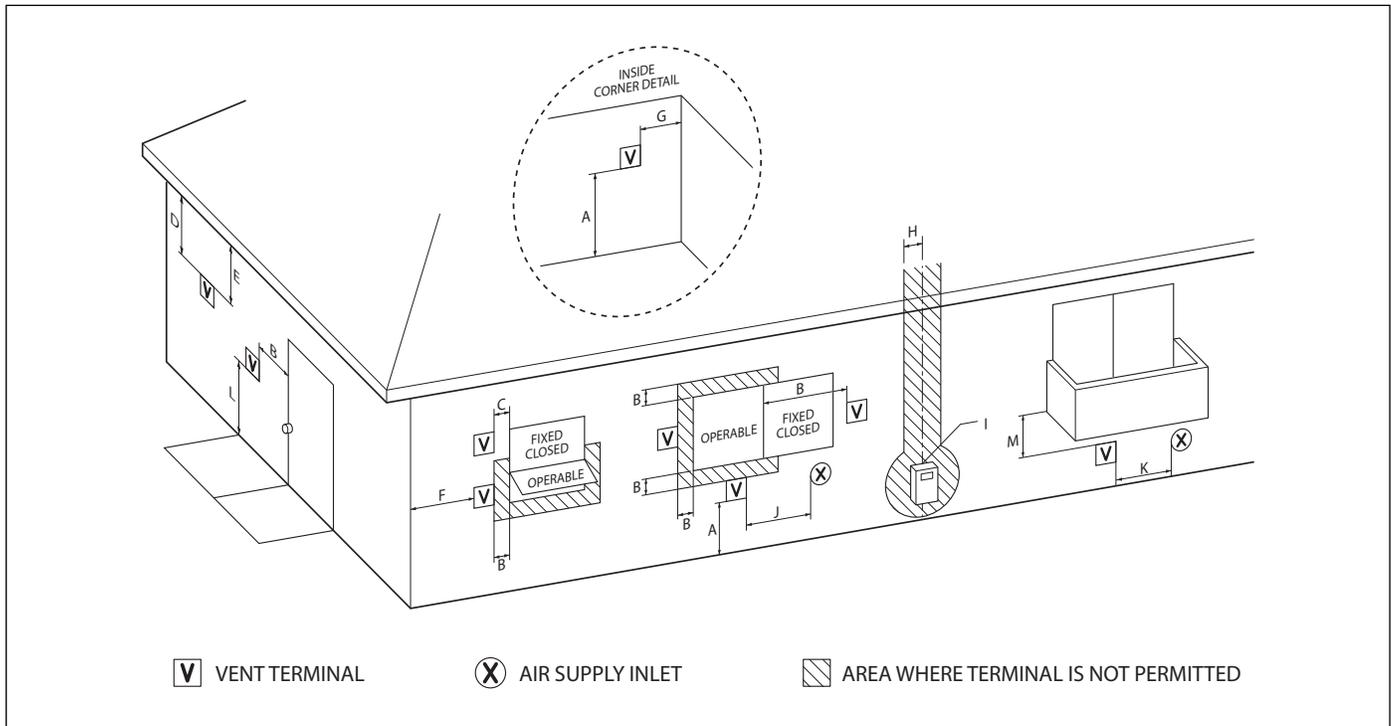


Figure 31

|   |  | Canadian Non-Direct Vent Installation <sup>1)</sup>                    | U.S. Non-Direct Vent Installation <sup>2)</sup>             |
|---|--|--|---|
| A | Clearance above grade, veranda, porch, deck or balcony   | 12 in. (30 cm)   | 12 in. (30 cm)  |
| B | Clearance to window or door that may be opened   | 36 in. (91 cm)   | 4 feet below or to side of opening;<br>1 foot above opening |
| C | Clearance to permanently closed window   | *  | *   |
| D | Vertical clearance to ventilated soffit located above the vent termination within a horizontal distance of 2 feet (61cm) from the center line of the termination | *  | *   |
| E | Clearance to unventilated soffit   | *  | *   |
| F | Clearance to outside corner  | *  | *   |
| G | Clearance to inside corner   | *  | *   |
| H | Clearance to each side of center line extended above gas meter/gas regulator assembly  | 36 in. (91 cm) within a height 15 feet above meter/ regulator assembly | *   |
| I | Clearance to service gas regulator vent outlet   | 36 in. (91 cm)   | *   |
| J | Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other application  | 36 in. (91 cm)   | 4 feet below or to side of opening;<br>1 foot above opening |
| K | Clearance to mechanical air supply inlet   | 72 in. (182 cm)  | 36 in. (91 cm) above if within 10 feet horizontally         |
| L | Clearance above paved sidewalk or paved driveway located on public property  | 84 in. (213 cm) <sup>3)</sup>  | 84 in. (236 cm)   |
| M | Clearance under veranda, porch deck or balcony   | 12 in. (30 cm) <sup>4)</sup>   | *   |

Table 11 Non-Direct Venting

<sup>1)</sup> In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.  
<sup>2)</sup> In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code.  
<sup>3)</sup> A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.  
<sup>4)</sup> Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor.  
[\*] For clearances not specified in ANSI Z223.1 / NFPA 54 or CSAB149.1, one of the following shall be indicated:  
a) A minimum clearance value determined by testing in accordance with section 2.20, or;  
b) A reference to the following footnote:  
"Clearance in accordance with local installation codes and the requirements of the gas supplier."

**6.2 Vent Pipe Materials**

 **WARNING:**

- ▶ Venting requirements differ in the US and Canada. Consult the following chart or the most recent edition of ANSI Z223.1/ NFPA 54 or CAN/CGA B149.1, as well as all applicable local codes and regulations when selecting vent pipe materials. Do not use cellular core PVC (ASTM F891), cellular core CPVC, Radel® (polyphenolsulfone) for the exhaust vent.
- ▶ Covering non-metallic vent pipe and fittings with thermal insulation shall be prohibited.

| Location | Recommended Vent Materials  |
|----------|---|
| USA      | PVC Schedule 40 (solid core)<br>CPVC Schedule 40 or 80 (solid core)<br>Approved Polypropylene   |
| Canada*  | Type BH Special Gas Vent Class IIA (PVC)<br>Type BH Special Gas Vent Class IIB (CPVC)<br>Type BH Special Gas Vent Class IIC (Polypropylene) |

Table 12

\* For installation in Canada, field-supplied plastic vent piping must comply with CAN/CGA B149.1 (latest edition) and be certified to the Standard For Type BH Gas Venting Systems, ULC-S636. Components of this listed system must not be interchanged with other vent systems or unlisted pipes or fittings. All plastic components and specified primers and glues of the certified vent system must be from a single system manufacturer and must not be intermixed with another system manufacturer's parts. The supplied vent connector and vent termination are certified as part of the boiler.

- ▶ Generally, the boiler limits the flue gas to remain below 150°F (65°C) to use the flue pipe.
- ▶ When the return water temperature to the boiler is higher than 140°F (60°C), DIP switch #1 must be set to ON to release the flue gas limit. CPVC or PP must be used in such case.

**NOTICE:**

- ▶ PCB DIP switch #1 is set to OFF as factory default
- ▶ When you set PCB DIP switch #1 to ON, ensure that CPVC piping shall be used for exhaust venting.

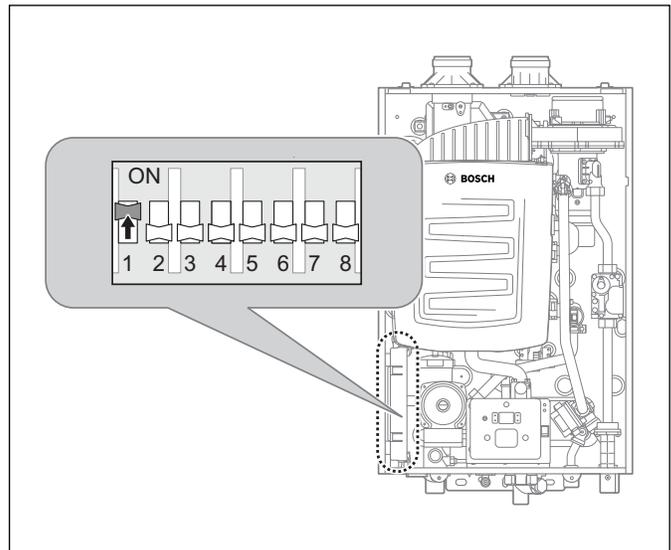


Figure 32

 **WARNING:**

- ▶ This boiler has a built-in control to limit the exhaust temperature to 149°F (65°C). As a result, the boiler can be vented with Schedule 40 PVC.
- ▶ In high temperature applications, the exhaust temperature can exceed 149°F (65°C). In that case, to prevent nuisance tripping of the control you must install Schedule 40 or 80 CPVC or Approved Polypropylene in the USA or Type BH Special Gas Vent Class IIB (CPVC) or Class IC (Polypropylene) that conforms to ULC-S636 in Canada. Then the dip switch setting can be changed to "ON".
- ▶ If the exhaust temperature exceeds **149°F (65°C)** and the system is vented with **2 inch vents, CPVC or Polypropylene pipe** (\*field supplied) **must be used for the first 3 feet (36 inches) of equivalent pipe length.**  
\*Purchased separately. Not supplied with boiler.
- ▶ If the exhaust temperature exceeds **149°F (65°C)** and the system is vented with **3 inch vents, CPVC or Polypropylene pipe** (\*field supplied) **must be used for the first five inches (5 in.) of equivalent pipe length.**  
\*Purchased separately. Not supplied with boiler.

### 6.3 Vent Length

The maximum vent length when using 2" exhaust ducts is 60'. The maximum vent length when using 3" vent ducts is 150'. The intake duct length can be of equal length to the exhaust duct length. Both maximum lengths are reduced by the number of elbows used, as shown in the following table:

| Vent Size | Maximum Length | Maximum # of Elbows | Equivalent Lengths  |
|-----------|----------------|---------------------|---|
| 2"        | 60' (18 m)     | 6                   | Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> <li>▶ Each 90° elbow equates to 8 linear feet (2.4 m) of vent</li> <li>▶ Each 45° elbow equates to 4 linear feet (1.2 m) of vent</li> </ul>  |
| 3"        | 150' (45 m)    | 8                   | Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> <li>▶ Each 90° elbow equates to 5 linear feet (1.5 m) of vent</li> <li>▶ Each 45° elbow equates to 3 linear feet (0.9 m) of vent"</li> </ul> |

Table 13

**i** The maximum length does not include any elbows.

**i** If using a concentric termination as shown on pages 36, count this as 8 linear feet (2.4 m) of vent.

### 6.4 Connecting the Vent Clip

**CAUTION:**

- ▶ To connect the exhaust vent firmly, you must use the vent clip included with boiler.

**To connect the vent clip:**

1. Connect the vent clip to the exhaust vent.

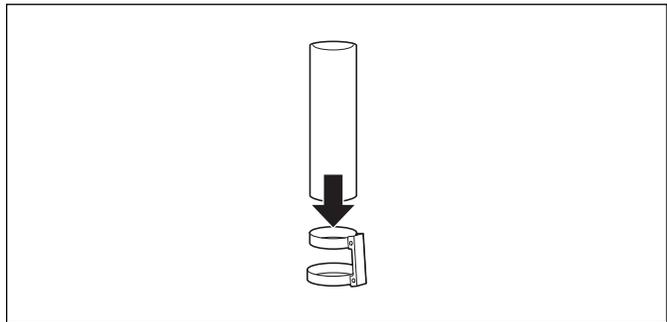


Figure 33

2. Connect the exhaust vent and the vent clip to the flue connector.

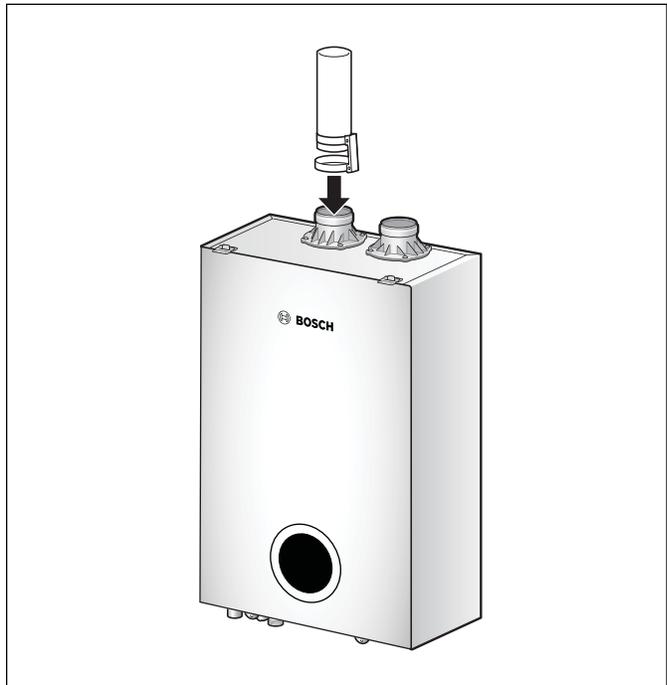


Figure 34

3. Tighten the screws and fix the vent clip.

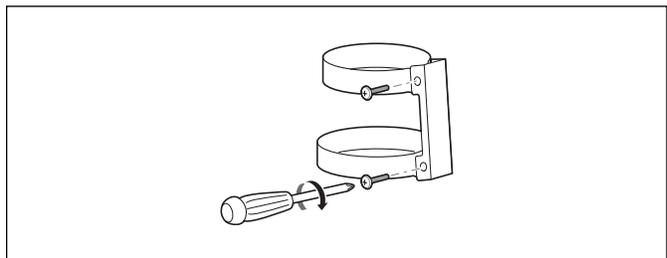


Figure 35

**6.5 Vent Termination**

**WARNING:**

- ▶ Air intake must be protected from any debris.
- ▶ When connecting to the air intake connector and exhaust flue connector, all connecting parts must be installed properly.
- ▶ Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- ▶ Install a bird screen at the end of the intake air pipe and exhaust pipe.

Before installing the boiler, determine what type of vent termination is appropriate for the installation location and situation. The subsections that follow describe some typical venting configurations, but do not include all possible options.

**6.5.1 Single-Pipe Sidewall Venting**

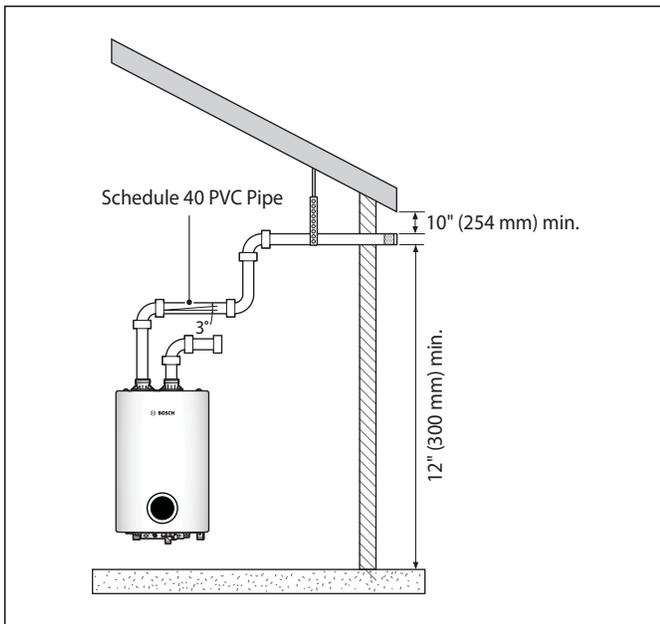


Figure 36

**CAUTION:**

- ▶ Single-pipe venting requires that adequate combustion air be provided in end-use installations per NFPA 54 C.9.3.2.

**6.5.2 Two-Pipe Sidewall Venting**

**Internal view**

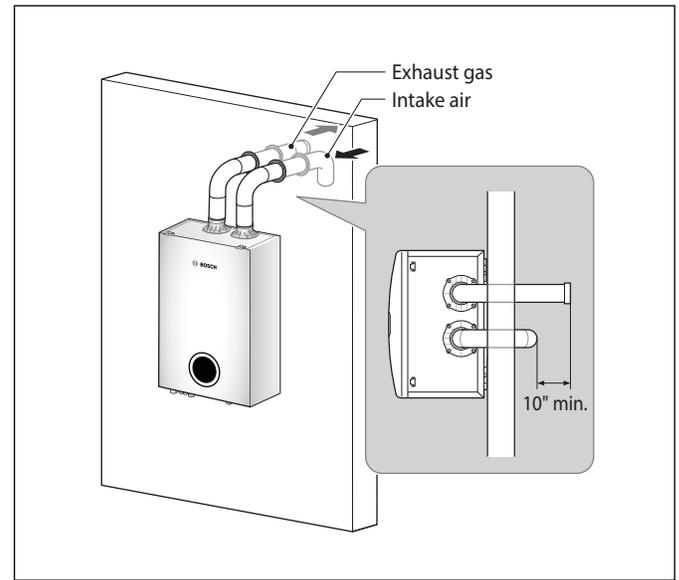


Figure 37

**External view**

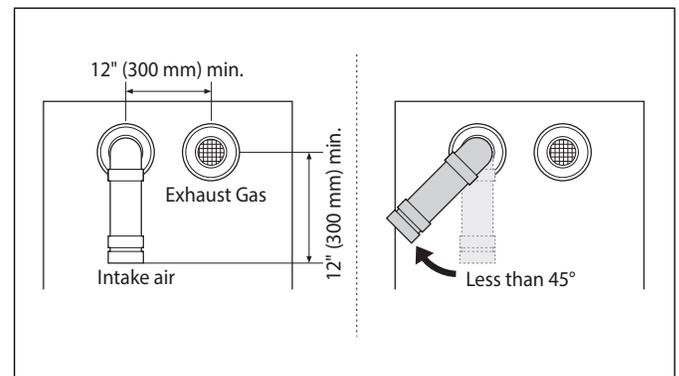


Figure 38

If the side wall vent termination kit is used, refer to the figure below for the orientation of the vent.

The following terminations can also be used:

IPEX Low Profile Termination Kits:

- ▶ 2 in Low Profile Vent Kit #196984
- ▶ 3 in Low Profile Vent Kit #196985

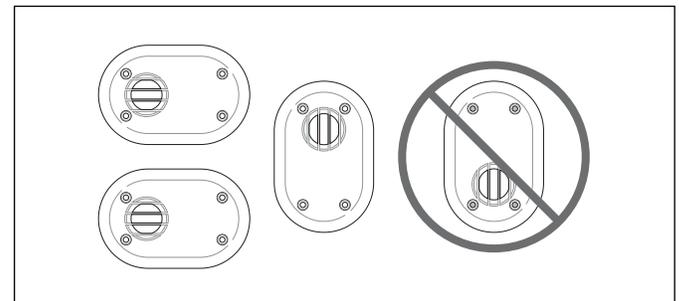


Figure 39

### 6.5.3 Snorkel Flue

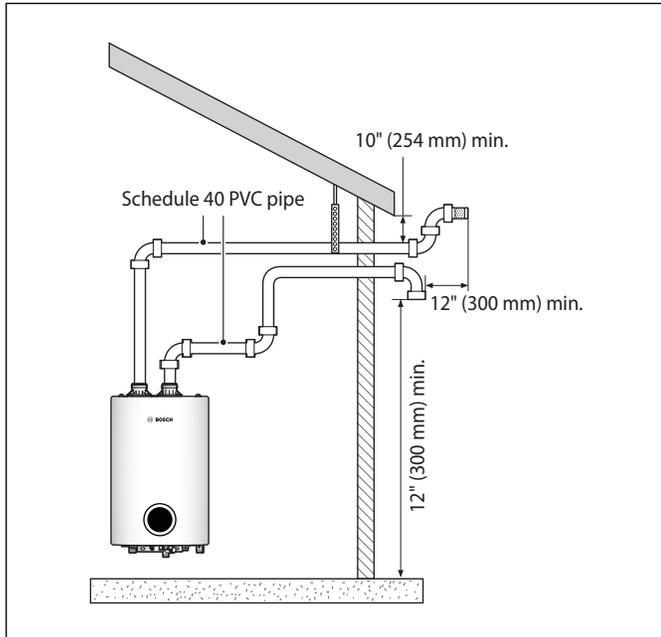


Figure 40

**WARNING:**

- ▶ Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.

### 6.5.4 Non-Concentric Sidewall Venting

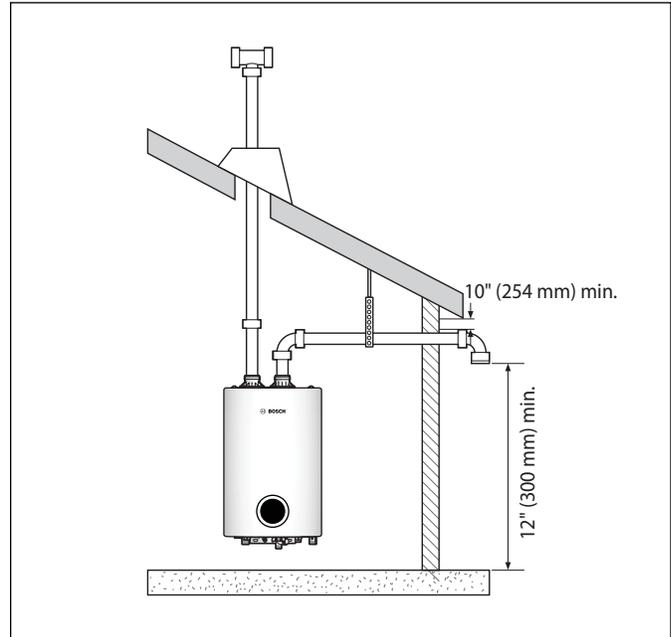


Figure 41

**NOTICE:**

- ▶ Install a bird screen at the end of the intake air pipe and exhaust pipe.
- ▶ Air is drawn from a different location at a minimum of 12" (300mm) from the exhaust termination. Try to minimize the length of the intake air pipe with this venting.

### 6.5.5 Concentric Sidewall Venting

The following terminations can also be used:  
 Duravent PolyPro Horizontal Concentric Termination Kit.

- ▶ 2 in x 4 in Concentric Vent Kit #2PPS-HK
- ▶ 3 in x 5 in Concentric Vent Kit #3PPS-HK

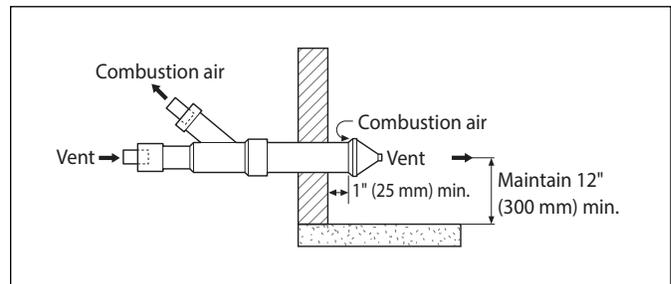


Figure 42

**WARNING:**

- ▶ Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.

**6.5.6 Two-Pipe Vertical Venting**

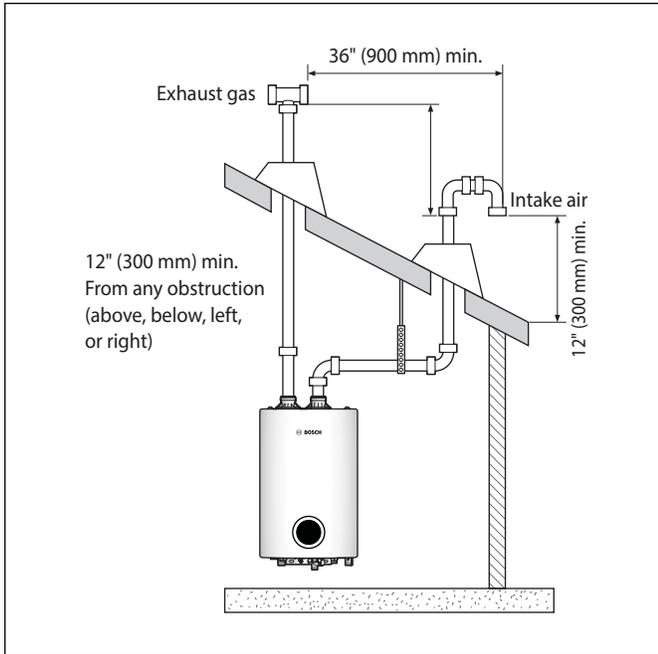


Figure 43

**6.5.7 Concentric Roof Venting**

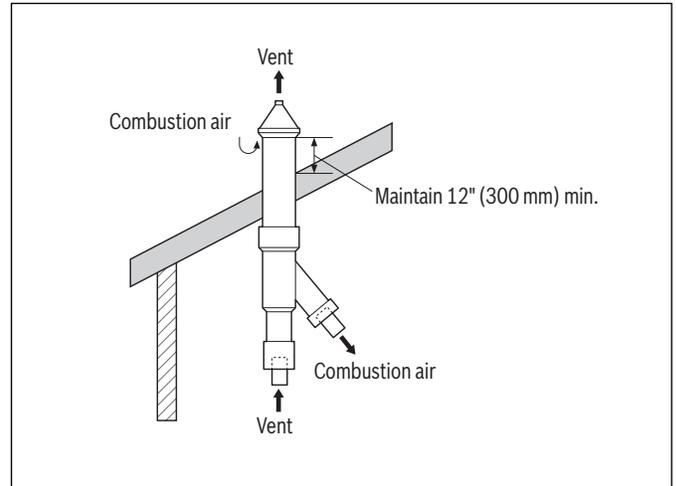


Figure 44



**WARNING:**

- ▶ Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.

**NOTICE:**

- ▶ Install a bird screen at the end of the intake air pipe and exhaust pipe.



Intake and exhaust pipes do not have to terminate in the same area.

## 7 Setting the DIP Switches

The boiler has a DIP switch on the main circuit board (PCB)

Set the DIP switch appropriately, depending on the installation environment.

| Switch | Function                                 |  |            |             |            |
|--------|--|--|------------|-------------|------------|
|        | Temperature limit switch for exhaust gas | ON: No temperature limit for exhaust gas<br>OFF: Temperature limit for exhaust gas |            |             |            |
|        | EEP ROM data change switch               | ON: Enable EEP ROM data change<br>OFF: Disable EEP ROM data change                 |            |             |            |
|        | Long flue Length 1                       | DIP S/W #3   | DIP S/W #4 | FLUE LENGTH |            |
|        |  |  |            | 2" PVC      | 3" PVC     |
|        | Long flue Length 2                       | OFF  | OFF        | Up to 15'   | Up to 150' |
|        |  | OFF  | ON         | Up to 30'   | N/A        |
|        |  | ON   | OFF        | Up to 45'   |            |
|        | N/A                                      | N/A  |            |             |            |
|        | Minimum heat capacity operation          | ON : Minimum operation<br>OFF : Normal operation                                   |            |             |            |
|        | Maximum heat capacity operation          | ON : Maximum operation<br>OFF : Normal Operation                                   |            |             |            |
|        | N/A                                      | N/A  |            |             |            |

Table 14 Dip Switches

## 8 Connecting the Power Supply

**WARNING:**

- ▶ Improperly connecting the power supply can result in electrical shock and electrocution. Follow all applicable electrical codes of the local authority having jurisdiction. In the absence of such requirements, follow the latest edition of the National Electrical Code (NFPA 70) in the USA or the latest edition of CSA C22.1 Canadian Electrical Code Part 1 in Canada. Connecting the power supply should be performed only by a licensed professional.

When connecting the power supply, follow these guidelines:

- ▶ Do not connect the electric supply until all plumbing and gas piping is complete and the boiler has been filled with water.
- ▶ Do not connect the boiler to a 220–240V AC power supply. Doing so will damage the boiler and void the warranty.
- ▶ All boilers come with a factory-installed, 3-pronged (grounded) plug. The boiler can be plugged into any grounded electrical outlet nearby, as it requires only 5A. It is not necessary to run a dedicated electrical line to the boiler.
- ▶ If local codes require the boiler to be wired directly, remove and discard the factory-installed plug. Install a power switch between the breaker and the boiler to facilitate end-user maintenance and servicing. Connect the boiler to a 110–120V AC at 60 Hz with a maximum of 5A rating electrical supply.
- ▶ The boiler must be electrically grounded. If using the power plug, ensure that the electrical outlet you connect the boiler to is properly grounded. If wiring the boiler directly to a power supply, do not attach the ground wire to either the gas or the water piping as plastic pipe or dielectric unions may prevent proper grounding.
- ▶ We recommend using a surge protector to protect the boiler from power surges.
- ▶ If there is a power failure in cold weather areas, the freeze prevention system in the boiler will not operate and may result in freezing of the heat exchanger. In cold weather areas where power failures are common, you must completely drain the boiler to prevent damage if the power is expected to be off for any extended period of time. A battery back-up (available at most computer retailers) may be used to supply hot water during periods of power outages. Damage caused by freezing is not covered under warranty.

## 9 Installation Checklist

After the boiler installation, examine the following checklist. If you are not able to answer "Yes" to all of the items in the checklist, review the appropriate sections. To troubleshoot any operational problems, refer to "Troubleshooting" in the User's Manual. If there are additional questions or if you need assistance, contact technical support at 1-866-642-3198.

| Installing the boiler   | Check                    |
|---|--------------------------|
| Have you maintained the required clearances from building openings and intake air vents?                        | <input type="checkbox"/> |
| Have you minimized the distance between the boiler and the vent termination?                                    | <input type="checkbox"/> |
| Have you minimized the distance between the boiler and major fixtures?  | <input type="checkbox"/> |
| Have you maintained the proper service and maintenance clearances?  | <input type="checkbox"/> |
| Is the make-up air supply sufficient for proper operation?  | <input type="checkbox"/> |
| Is the make-up air supply free from dust, dirt, corrosive elements, and flammable vapors?                       | <input type="checkbox"/> |
| Is the boiler and vent piping clear of combustible materials, including clothing, cleaning materials, and rags? | <input type="checkbox"/> |
| Connecting the Gas Supply   | Check                    |
| Does the gas supply match the type specified on the boiler's rating plate?                                      | <input type="checkbox"/> |
| Is the gas line at least 1/2 or 3/4 in ID (Inner Diameter)?   | <input type="checkbox"/> |
| Is the gas supply line sufficient in length and diameter to deliver the required BTUs?                          | <input type="checkbox"/> |
| Have you measured the pressure of the gas supply line?  | <input type="checkbox"/> |
| Is the gas supply pressure within the recommended ranges specified in this manual?                              | <input type="checkbox"/> |
| Is the gas supply line equipped with a manual shut-off valve?   | <input type="checkbox"/> |
| Have you tested the gas line pressure and all fittings for leaks?   | <input type="checkbox"/> |
| Has the gas company inspected the installation, if required?  | <input type="checkbox"/> |
| Connecting the Domestic Water Supply  | Check                    |
| Is the water supply pressure sufficient (greater than 40 psi)?  | <input type="checkbox"/> |
| Have you installed shut off valves on the inlet and outlet to facilitate cleaning of the inlet water filter?    | <input type="checkbox"/> |
| Have you bled the air out at each fixture?  | <input type="checkbox"/> |
| Have you checked each fixture to ensure hot water is being supplied?  | <input type="checkbox"/> |
| Have you cleaned the inlet water filter?  | <input type="checkbox"/> |
| If you installed a recirculation line, have you insulated the hot water pipes and the return line?              | <input type="checkbox"/> |
| Connecting the Space Heating Piping   | Check                    |
| Has the system been filled (less than 30 psi) and purged of air?  | <input type="checkbox"/> |
| Does the piping incorporate means for air removal (scoop, separator, etc.)?                                     | <input type="checkbox"/> |
| Is there an expansion tank installed and set to the proper system pressure?                                     | <input type="checkbox"/> |
| If antifreeze has been used, is it the proper type and is the concentration appropriate?                        | <input type="checkbox"/> |

Table 15 Installation Checklist

| Connecting a Pressure Relief Valve  | Check                    |
|---|--------------------------|
| Have you installed an approved pressure relief valve on the boiler?   | <input type="checkbox"/> |
| Does the rating of the pressure relief valve match or exceed the maximum BTU rating of the boiler?  | <input type="checkbox"/> |
| Is the pressure relief valve 3/4 in on the hot water outlet and 3/4 in at the pressure relief valve adapter?  | <input type="checkbox"/> |
| Have you installed the pressure relief valve on the space heating and hot water outlet pipe near the boiler?  | <input type="checkbox"/> |
| Have you installed a discharge drain tube from the pressure relief valve to within 6-12 in (150-300 mm) of the floor?   | <input type="checkbox"/> |
| Operating the Boiler  | Check                    |
| Have you shown the owner how to clean the inlet water filter?   | <input type="checkbox"/> |
| Have you given the Installation Manual and User's Manual to the owner for future reference?   | <input type="checkbox"/> |
| Have you shown the owner how to shut off the gas in case of an emergency?   | <input type="checkbox"/> |
| Connecting the Condensate Drain   | Check                    |
| Have you installed a condensate drain line from the boiler to a drain or laundry tub?   | <input type="checkbox"/> |
| Venting the boiler  | Check                    |
| Have you vented the boiler with 2/3 in PVC, CPVC, Polypropylene, Type BH Special Gas Vent (ULC-S636) for Category IV boilers (Canada), or in accordance with all local codes and the guidelines in this manual? | <input type="checkbox"/> |
| Have you ensured that ABS or PVC cellular core pipe has not been used as venting for the boiler?  | <input type="checkbox"/> |
| Is the vent sloped back towards the boiler at a rate of 1/4 in per foot (2° grade)?   | <input type="checkbox"/> |
| Are all vent runs properly supported?   | <input type="checkbox"/> |
| Have you properly supported the vent termination?   | <input type="checkbox"/> |
| Have you properly sealed all air intake and exhaust joints, from the flue collar to the vent termination?   | <input type="checkbox"/> |
| Have you installed end caps on the exhaust and intake pipes?  | <input type="checkbox"/> |
| Have you checked the venting for leaks?   | <input type="checkbox"/> |
| Is the vent termination at least 12 in (300mm) above the exterior grade or anticipated snow level?  | <input type="checkbox"/> |
| Have you ensured that sufficient make-up air is available?  | <input type="checkbox"/> |
| Is the total vent length within the maximum vent length restriction?  | <input type="checkbox"/> |
| Connecting the Power Supply   | Check                    |
| Is the supplied voltage 110–120V AC?  | <input type="checkbox"/> |
| Is the boiler plugged into a properly grounded outlet?  | <input type="checkbox"/> |
| If you have made a direct power supply connection, have you installed a power switch to facilitate end-user maintenance?  | <input type="checkbox"/> |
| Have you checked the polarity of the electrical connection?   | <input type="checkbox"/> |
| Is the system properly set up for cascading operation (master and slave boiler), if applicable?   | <input type="checkbox"/> |

Table 16 Installation Checklist

## 10 Operating the Boiler

### 10.1 Turning the Boiler On or Off

To turn the Boiler on or off, press the button.

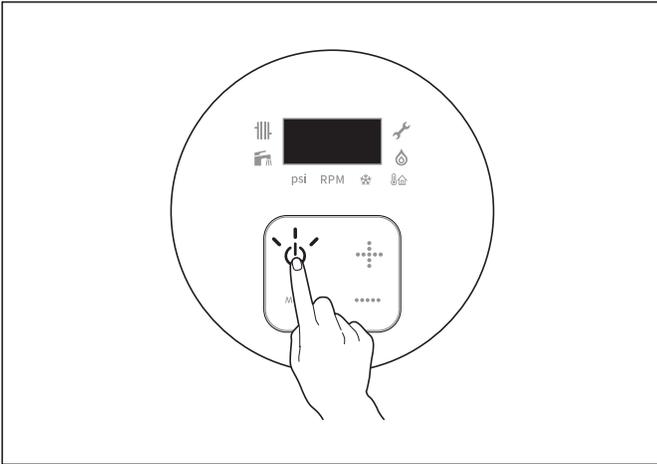


Figure 45

When the boiler is on, the water temperature which has been set recently will appear on the digital display.

### 10.2 Checking the Ignition System

1. To turn the Boiler on or off, press the button.
2. After checking combustion, close the manual gas shutoff valve.

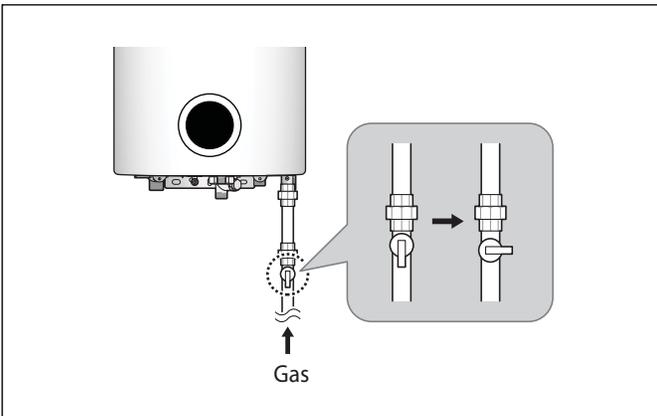


Figure 46

3. Check that the combustion lamp is off on the digital display.

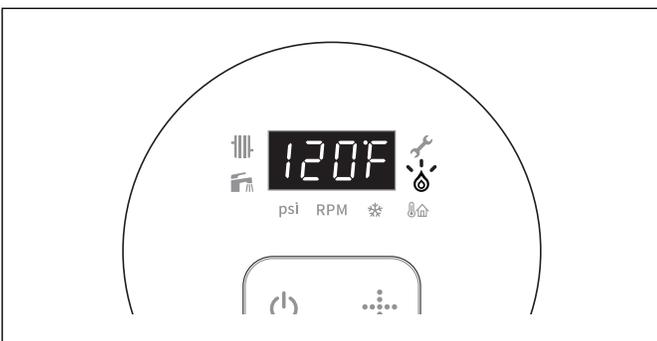


Figure 47

4. If the lamp does not turn off, contact the installer or supplier.

### 10.3 Setting the Space Heating Temperature



**WARNING:**

- ▶ If your household includes children, or elderly or disabled individuals, consider using a lower temperature setting. High temperatures circulating through baseboards or radiators can cause burns when touched.

To set the space heating water temperature:

1. Press the MODE button until the icon turns on.

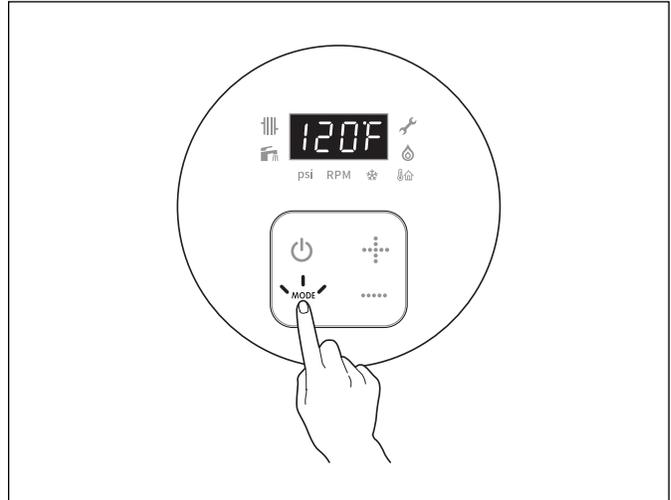


Figure 48

2. Press the or buttons until the desired temperature appears on the digital display.

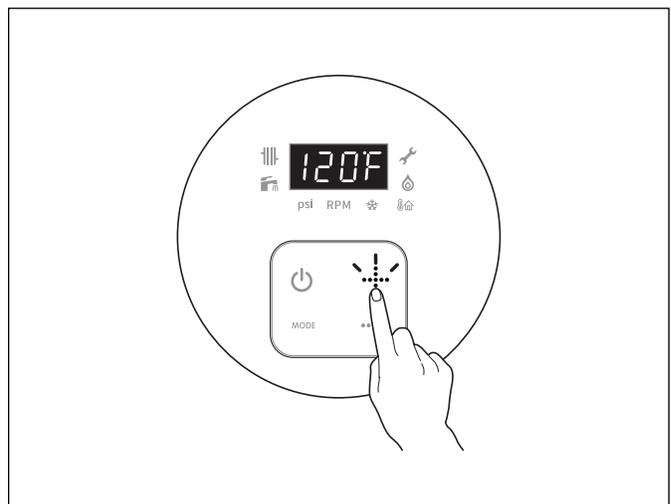


Figure 49

| Temperature range          | Adjusting the water temperature |
|----------------------------|---------------------------------|
| 82–180°F (Fahrenheit mode) | 2°F increments                  |
| 27–82°C (Celsius mode)     | 1°C increments                  |

Table 17

### 10.4 Setting the DHW (Domestic Hot Water) Temperature

**WARNING:**

- ▶ Water above 120°F (50°C) can cause instant scalding, severe burns, or death.

To adjust the water temperature:

1. Press the Mode button until the  icon turns on.

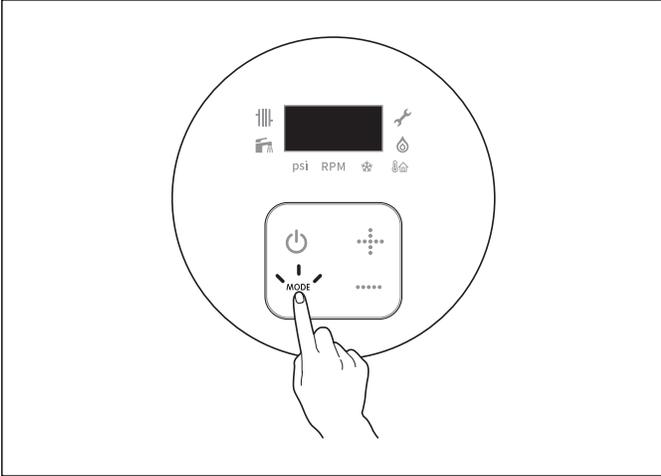


Figure 50

2. Press the  or  buttons until the desired temperature appears on the display.

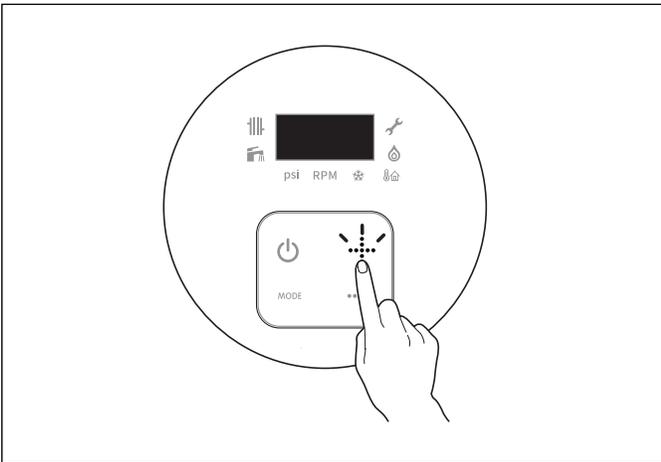


Figure 51

| Temperature range                                    | Adjusting the water temperature                           |
|--|---|
| 86-140°F (Fahrenheit mode)<br>31-60°C (Celsius mode) | 2°F increments<br>1°C increments (31-45°C) & 46, 48, 50°C |
| 130°F, 140°F<br>55°C, 60°C                           | 10°F or 5°C increments                                    |

Table 18

**i** To change the temperature over 120°F, hold down  button for 5 seconds to unlock.

### 10.5 Viewing Basic Information

To turn the boiler on, press the  button.

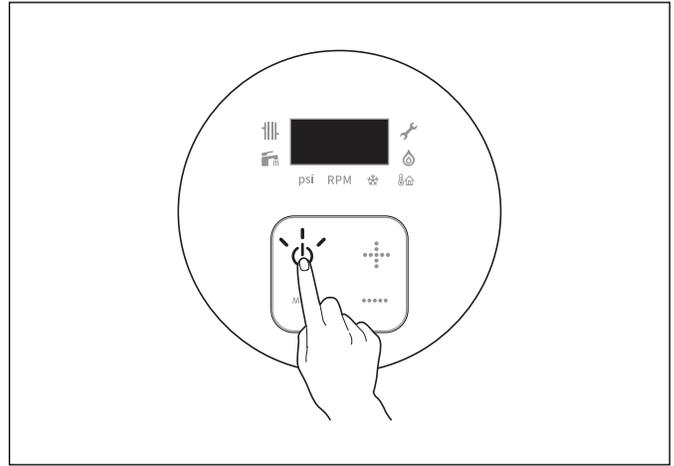


Figure 52

To view information about the boiler, press the MODE and  buttons for 5 seconds.

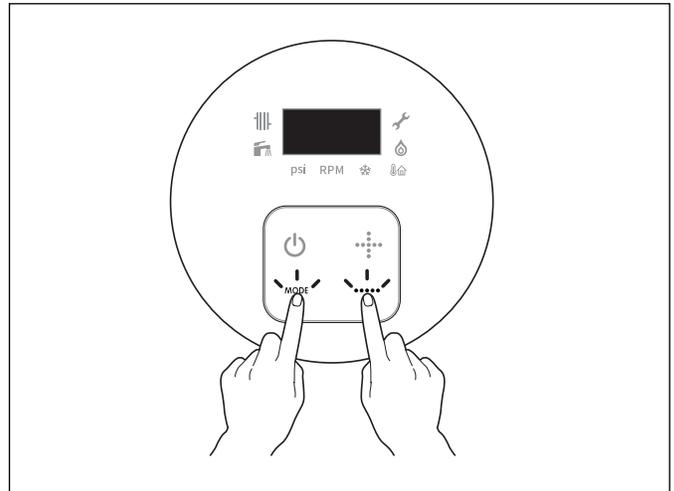


Figure 53

Press the MODE button to switch between the information types.

### 10.5.1 H0 mode

- ▶ This is the mode for checking the previous error.
- ▶ H0 and the previous error (example: A6) will be displayed repeatedly on the screen.

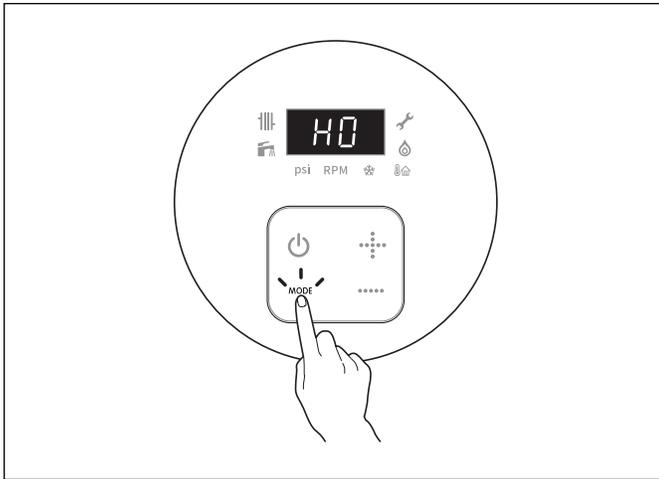


Figure 54

### 10.5.3 H2 mode

- ▶ This is the mode for checking the current error.
- ▶ H2 and the current error (Example : A3) will be displayed repeatedly on the screen.

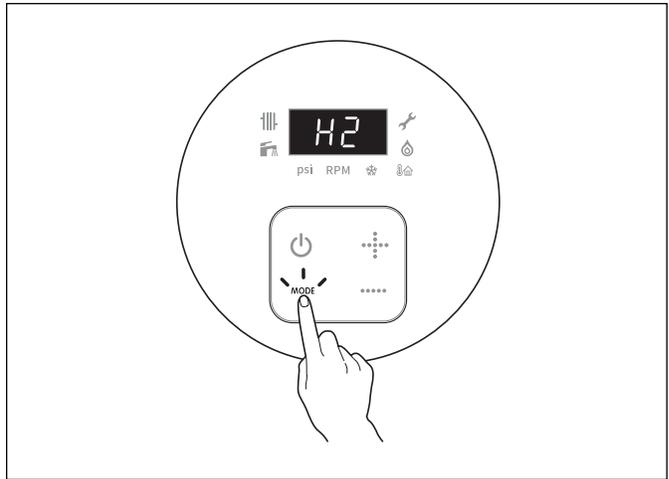


Figure 56

### 10.5.2 H1 mode

- ▶ This is the mode for checking the most recent error.
- ▶ H1 and the most recent error (Example : A2) will be displayed repeatedly on the screen.

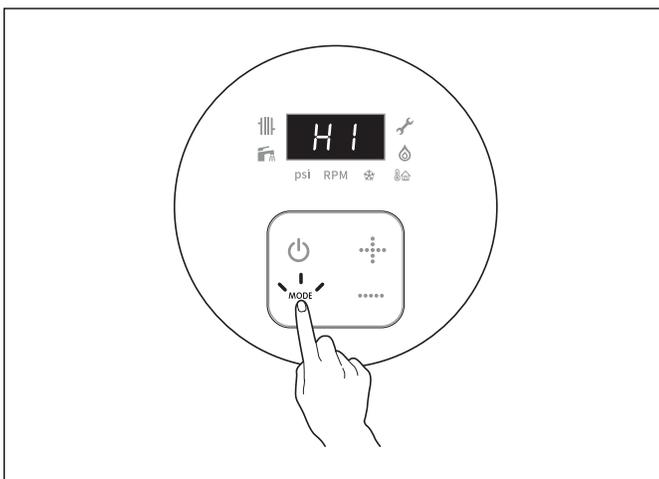


Figure 55

### 10.5.4 H3 mode

- ▶ This is the mode for checking the current pressure in the system.
- ▶ H3 and the current pressure in the boiler (Example : 25) will be displayed repeatedly on the screen.
- ▶ The pressure unit is PSI.

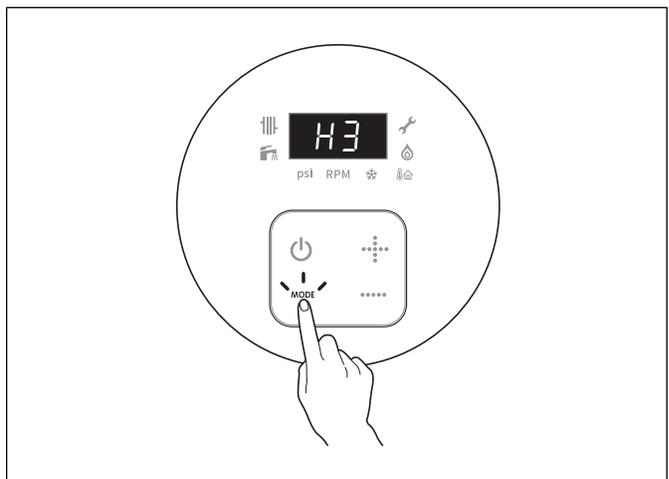


Figure 57

**10.5.5 H4 mode**

- ▶ This is the mode for checking the current number of revolutions of the fan.
- ▶ H4 and the current number of revolutions of the fan (Example : 3600) will be displayed repeatedly on the screen.
- ▶ The unit is rpm.

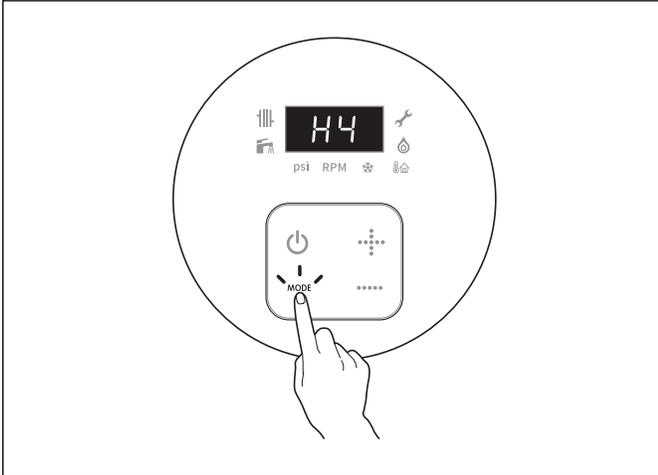


Figure 58

**10.5.7 H6 mode**

- ▶ This is the mode for checking the current exhaust gas temperature.
- ▶ H6 and the current exhaust gas temperature (example: 120) will be displayed repeatedly on the screen.
- ▶ The unit is °F.

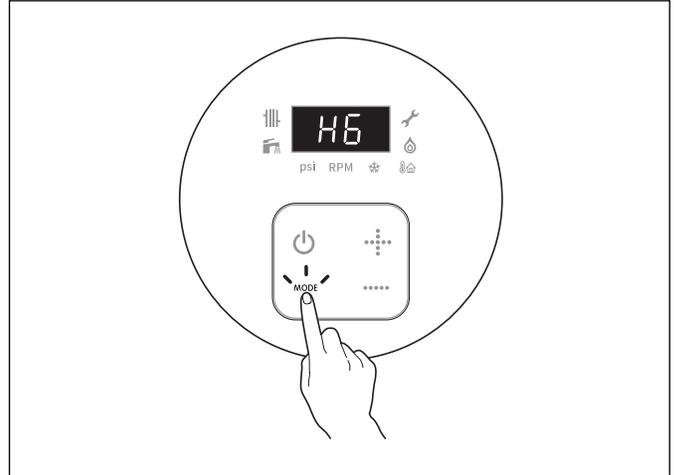


Figure 60

**10.5.6 H5 mode**

- ▶ This is the mode for checking the output voltage of the fan.
- ▶ H5 and the output voltage (Example : C5) will be displayed repeatedly on the screen.

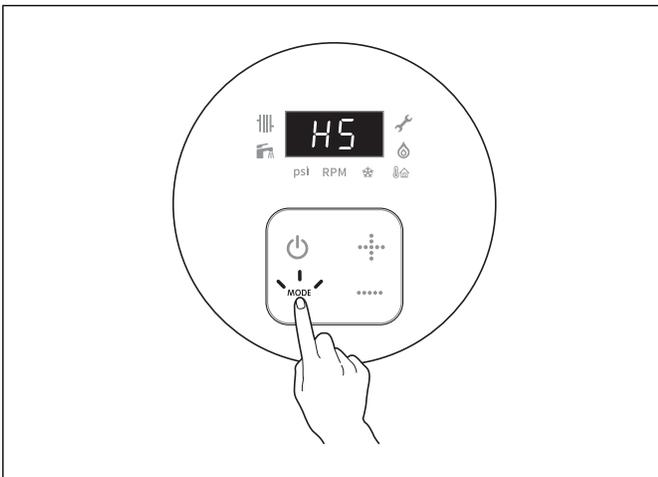


Figure 59

**10.5.8 H7 mode**

- ▶ This is the mode for checking the current domestic hot water temperature (DHW).
- ▶ H7 and the hot water temperature (example: 100) will be displayed repeatedly on the screen.
- ▶ The unit is °F.

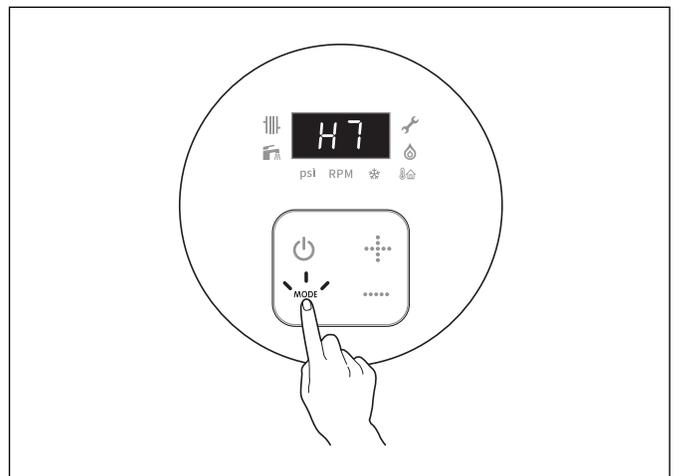


Figure 61

### 10.5.9 H8 mode

- ▶ This is the mode for checking the current ambient temperature.
- ▶ H8 and the current ambient temperature (example: 25) will be displayed repeatedly on the screen.
- ▶ The unit is °F.

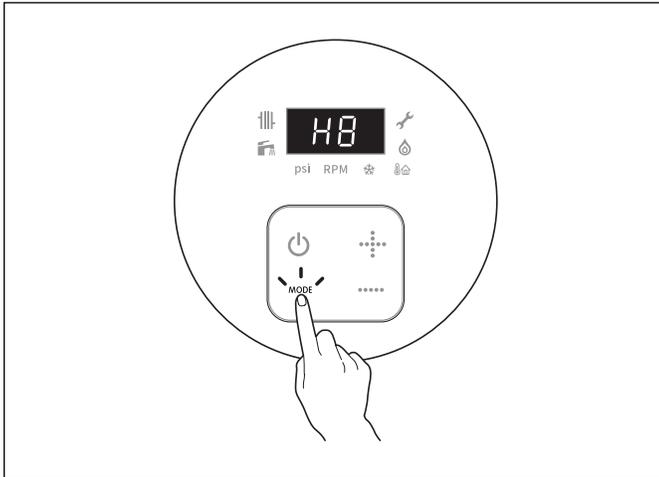


Figure 62

### 10.5.11 HA mode

- ▶ This is the mode for checking the hot water and heating modes.
- ▶ HA and the heating mode or the hot water mode (example: FF or 00) will be displayed repeatedly on the screen.
- ▶ FF is the current hot water mode, and 00 is the heating mode.

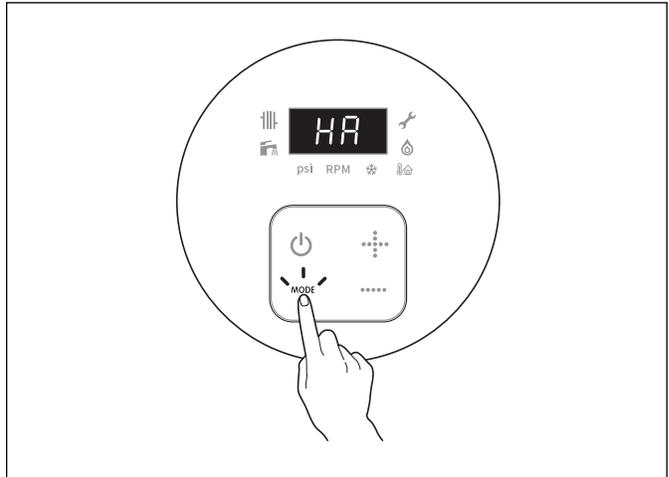


Figure 64

### 10.5.10 H9 mode

- ▶ This is the mode for checking the return temperature of the boiler.
- ▶ H9 and the return temperature (example: 120) will be displayed repeatedly on the screen.
- ▶ The unit is °F.

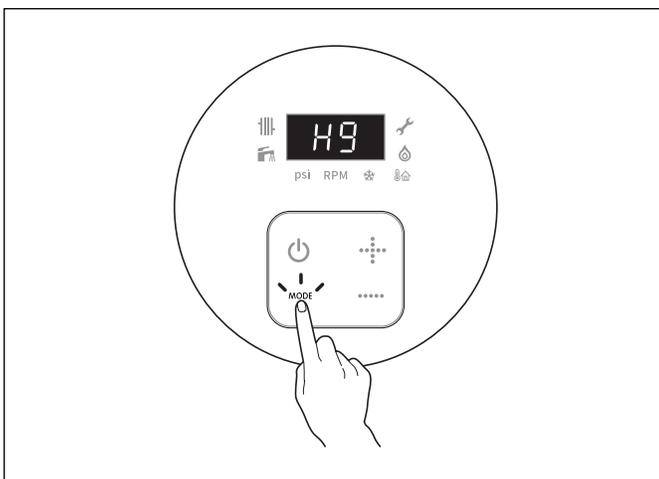


Figure 63

### 10.5.12 HB mode

- ▶ This is the mode for checking the current control board version (example: 1.0).
- ▶ HB and the control board version will be displayed repeatedly on the screen.

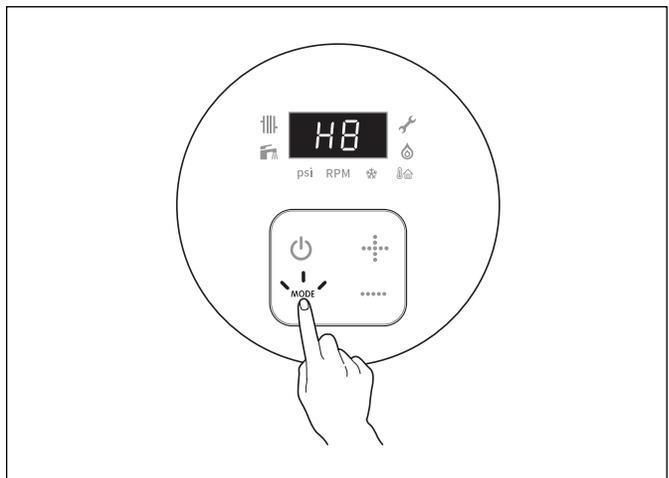


Figure 65

**10.5.13 Cd mode**

- This is the mode for setting the cascade function of the heat only boiler and is not available for the combi boiler product line.

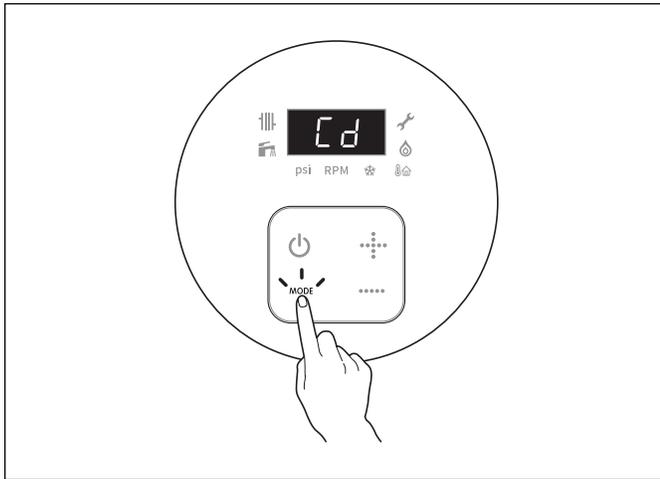


Figure 66

**10.6 Zone Control Wire (X/X Connections)**

1. Use the two protruding brown wires located at the bottom of the boiler to connect to a zone control or thermostat. These are dry contacts and are not capable of handling any voltage. It is recommended to use a relay if connecting to a smart thermostat directly to the boiler. Any voltage applied to the zone control wires on the boiler can damage the control board.

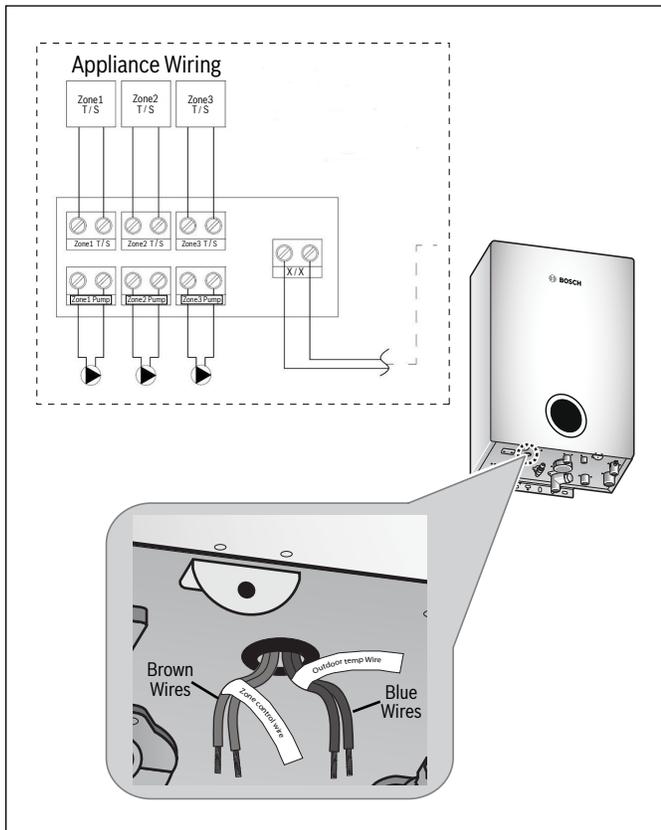


Figure 67

**10.7 Setting the Heat Load for The Outdoor Reset Control Mode**

1. Move No. 2 PCB DIP switch in the ON direction.

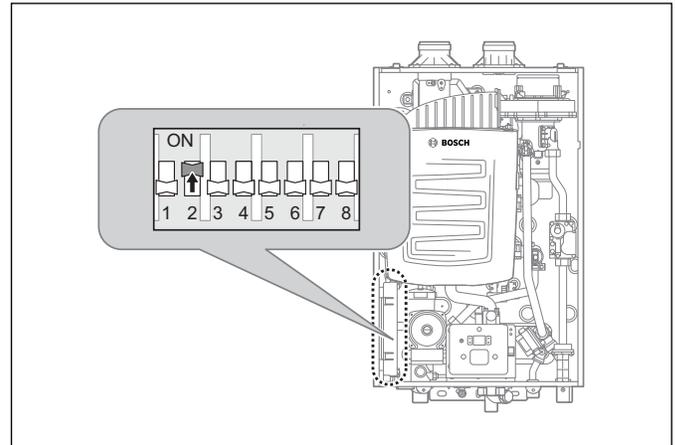


Figure 68

2. Make sure the touch pad display is powered off. Press the MODE and buttons for 5 seconds. The outdoor reset lamp will turn on, and C7 and ON or OFF will be displayed repeatedly on the screen.

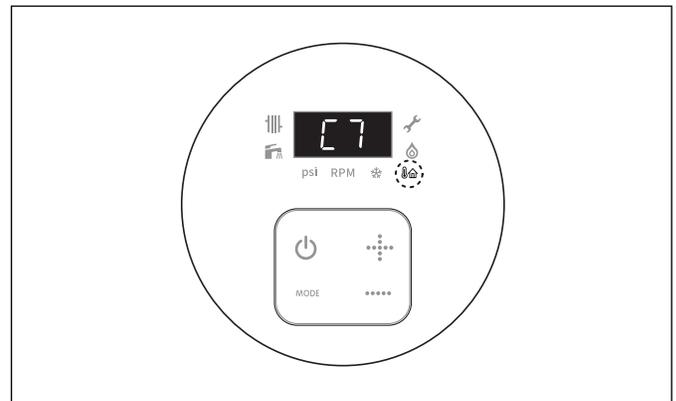


Figure 69

3. At this time, you can set ON or OFF using the or button.
  - C7 : ON = The boiler operates in outdoor reset mode using the ambient temperature sensor.
  - C7 : OFF = The boiler operates according to the heating water temperature.

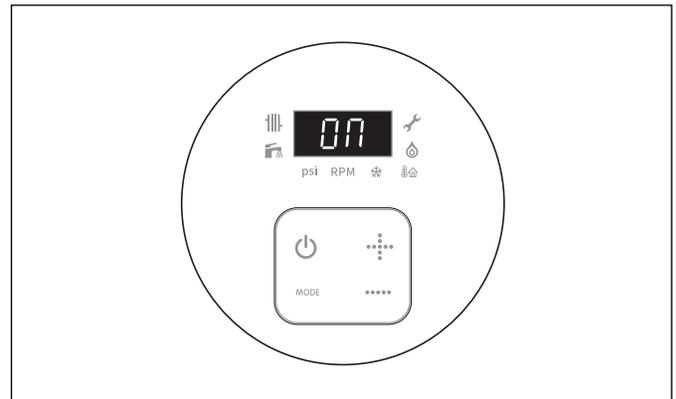


Figure 70

- ▶ When you set ON for C7 and press the MODE button, C8 and “1” will be displayed repeatedly.
- ▶ You can set a value from 0 to 6 using the and buttons. (The factory default value is 1.) The meaning of each number is as follows.

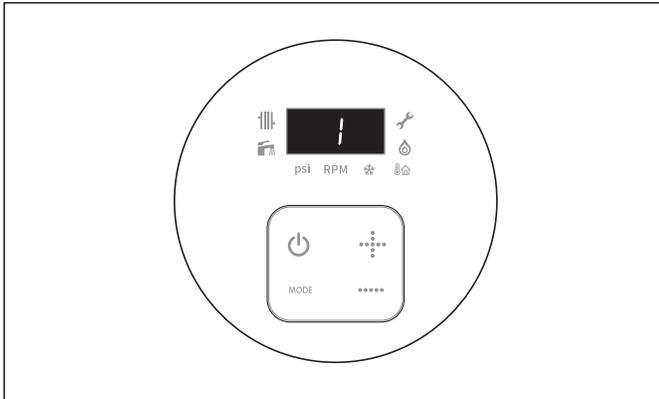


Figure 71

**Outdoor reset heat load types**

- 0: Finned tube heat load types
- 1: Fan coil
- 2: Cast iron baseboard
- 3: Low mass radiant
- 4: High mass radiant
- 5: Radiator
- 6: Custom

The set temperature for each heat load type is as follows.

| Heat load                   | Minimum set-point | Maximum set-point | Out temperature Min-maximum          |
|-----------------------------|-------------------|-------------------|--------------------------------------|
| Finned tube heat load types | 118°F (48°C)      | 180°F (82°C)      |                                      |
| Fan coil                    | 120°F (60°C)      | 180°F (82°C)      | Minimum out temperature: 14°F(-10°C) |
| Cast iron baseboard         | 100°F (38°C)      | 170°F (77°C)      |                                      |
| Low mass radiant            | 82°F (28°C)       | 140°F (60°C)      | Maximum out temperature: 68°F(20°C)  |
| High mass radiant           | 82°F (28°C)       | 122°F (50°C)      |                                      |
| Radiator                    | 118°F (48°C)      | 170°F (77°C)      |                                      |
| Custom                      | User define       |                   |                                      |

Table 19

- ▶ When “6”(custom mode) is set for C8, the user can set the temperature.

By pressing the MODE button, the user can enter modes such as C9, CA, Cb, and CC, and can set the temperature.

The content of each mode is as follows:

**Custom setting: lowest space heating temperature**

| Display    | Description                                      |
|------------|--|
| C6<br>82°F | Temperature range:<br>82°F (28°C) – 118°F (48°C) |

Table 20

**Custom setting: highest space heating temperature**

| Display     | Description                                       |
|-------------|---|
| CC<br>122°F | Temperature range:<br>122°F (50°C) – 180°F (82°C) |

Table 21

**Custom setting: lowest outdoor temperature**

| Display    | Description                                     |
|------------|---|
| C9<br>32°F | Temperature range:<br>-4°F (-20°C) – 32°F (0°C) |

Table 22

**Custom setting: highest outdoor temperature**

| Display    | Description                                    |
|------------|--|
| CA<br>86°F | Temperature range:<br>34°F (1°C) – 86°F (30°C) |

Table 23

### 10.8 Altitude Adjustment

These instructions shall address derating at altitudes above 2,000 ft. Boiler input ratings are based on sea level operation. No adjustments needed on installations up to 2,000ft. Adjust the program data based on altitude. See Table 24 below.

| Program Data | Altitude Setting |                  |
|--------------|------------------|------------------|
| P4           | 0 ~ 1,999 ft     | 2,000 ~ 4,500 ft |
|              | 50               | 55               |

Table 24

#### How to program boiler:

1. Connect the power supply if not already done.
2. Press the power button to make sure the display on the touch pad is off.

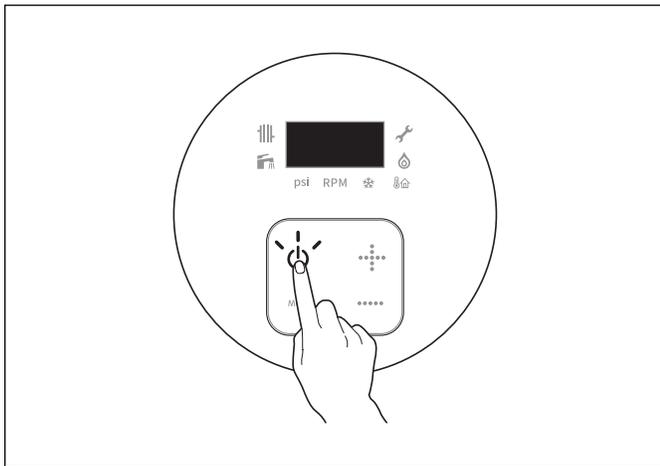


Figure 72

3. Place dip switch 2 in the on position.

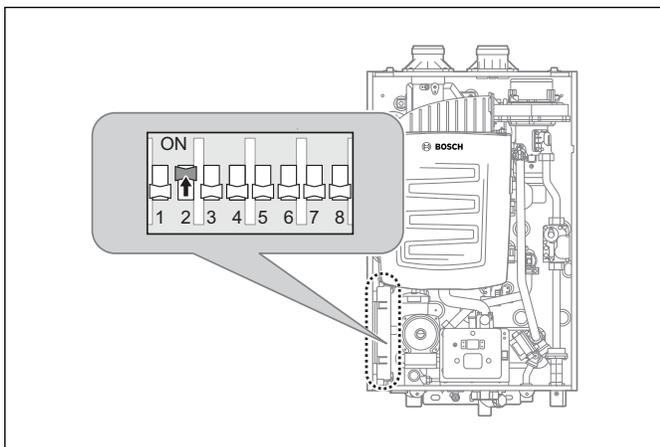


Figure 73

4. Press and hold the and buttons for 5 seconds.

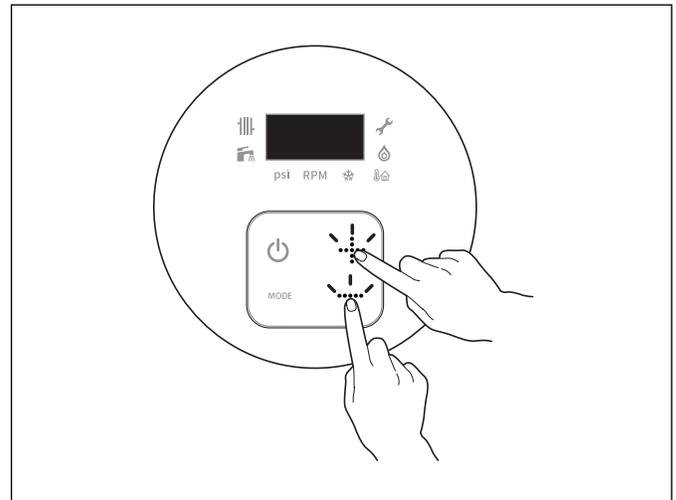


Figure 74

5. P0 will show on the display. Press the MODE button to scroll through the menu to get to P4.

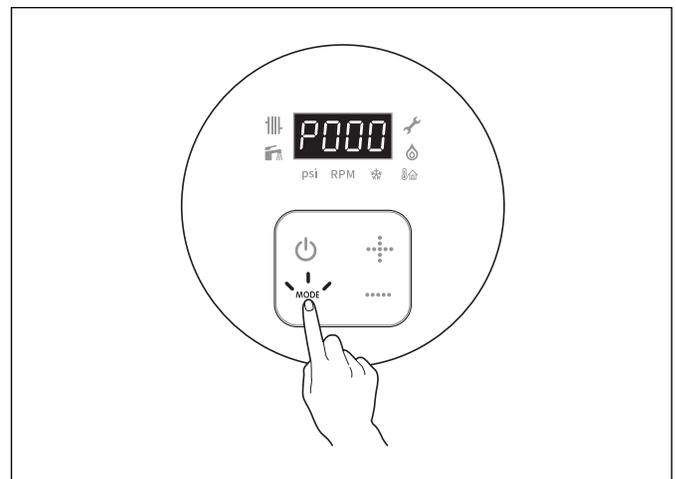


Figure 75

6. Use the button to change the setting from 50 to 55. Press the power button to save the setting.
7. Turn Dip switch 2 in the off position.

## 11 Gas Conversion

This boiler is configured for Natural Gas from the factory. If conversion to Propane Gas is required, the conversion kit supplied with the boiler must be used.



### DANGER: FIRE, EXPLOSION

- ▶ Inspect the packing between the gas valve and gas pipe whenever they are disassembled. The packing must be installed and must be in good condition. Failure to comply will cause a gas leak, resulting in severe personal injury or death.



### WARNING:

- ▶ This conversion kit shall be installed by a qualified service agency\* in accordance with Bosch's instructions and all applicable codes and requirements of the authority having jurisdiction. The information in these instructions must be followed to minimize the risk of fire or explosion and/or to prevent property damage, personal injury or death. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit.

\* A qualified service agency is any individual, firm, corporation or company which either in person or through a representative is engaged in and is responsible for the connection, utilization, repair or servicing of gas utilization equipment or accessories; who is experienced in such work, familiar with all precautions required, and has complied with all of the requirements of the authority having jurisdiction.

**In Canada:** The conversion shall be carried out in accordance with the requirements of the provincial authorities having jurisdiction and in accordance with the requirements of the CAN B149.1 and CAN1 B149.2 Installation Codes.

To convert the gas:

1. Turn off the manual gas shut off valve and the water supply to the boiler.

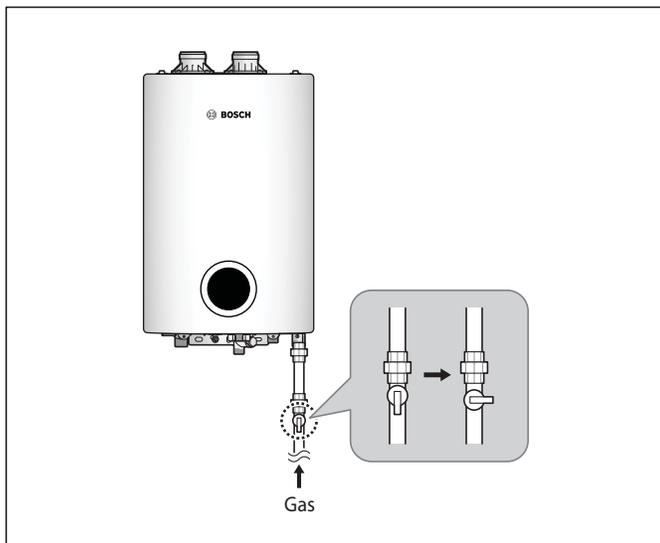


Figure 76

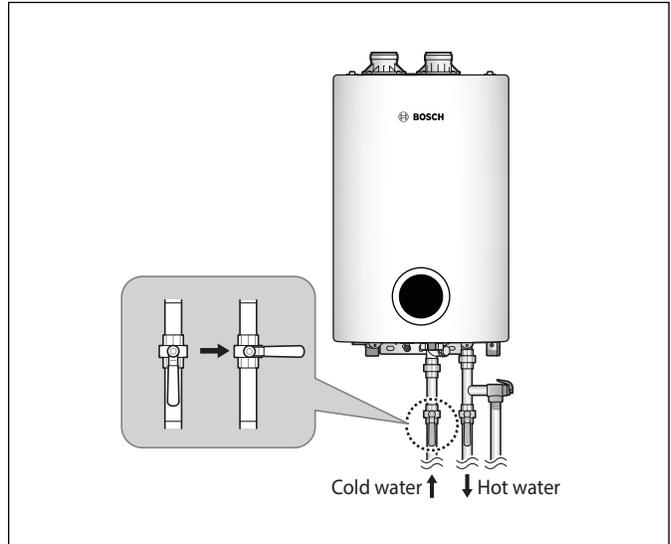


Figure 77

2. Remove the boiler front cover by loosening the 2 Phillips screws securing it to the case.



Figure 78

- Once the front cover is removed, place it in a safe location to prevent accidental damage. With the internal components exposed, locate the gas connector and the gas valve.

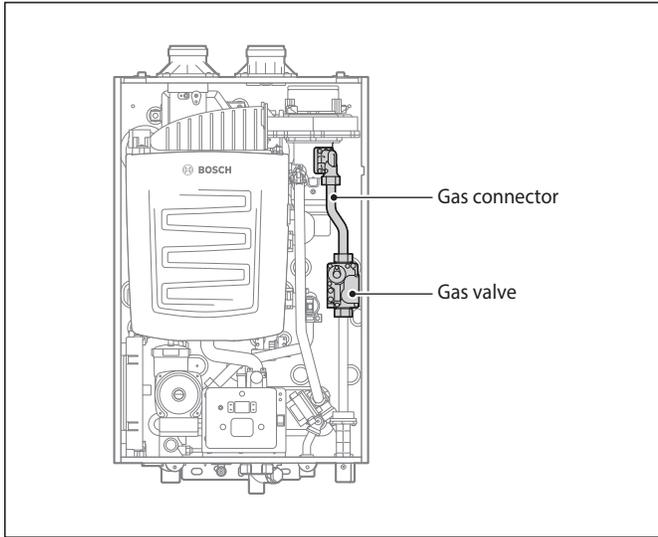


Figure 79

- Loosen the nut connecting the gas connector and the gas valve. Carefully separate the gas inlet pipe.

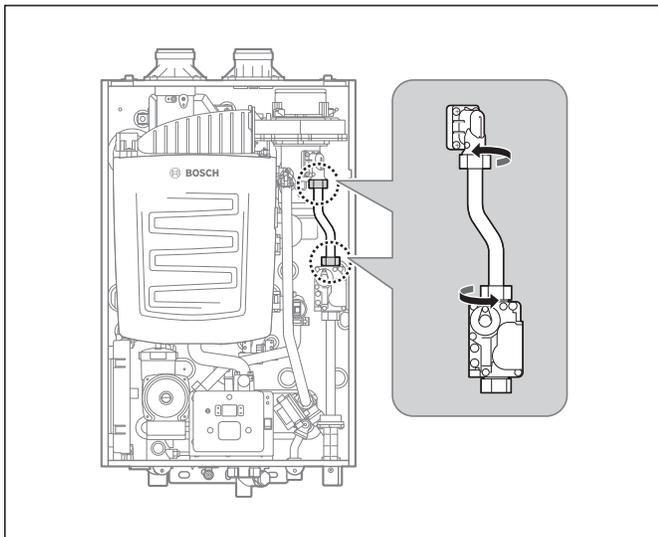


Figure 80

- Once the gas inlet pipe is detached, carefully remove the four screws on the gas connector by hand using a Phillips screwdriver and pull the gas connector away from the TDR damper.
- Once the gas orifice is exposed, remove the screw that holds the gas orifice in place and remove the gas orifice from its housing.

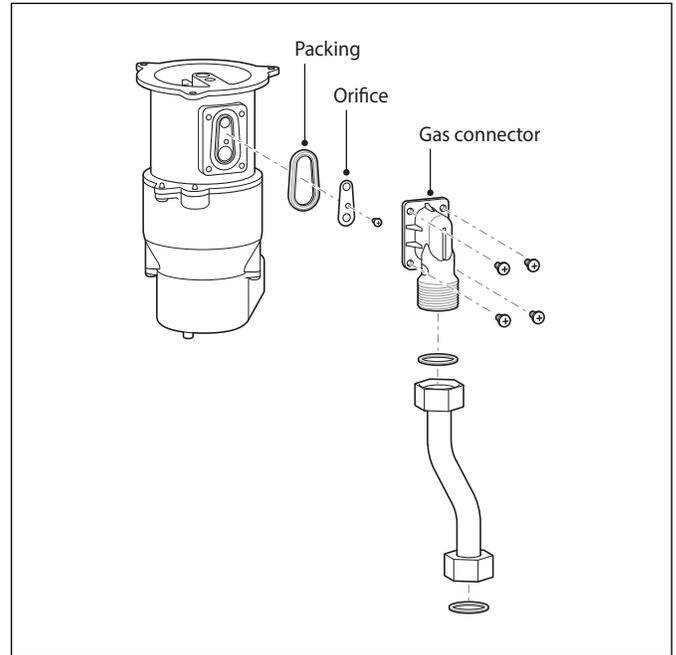


Figure 81

- Replace the old orifice piece and the packing with new part for use with LP gas. Ensure that the orifice is properly seated inside the port.



**DANGER: FIRE, EXPLOSION**

- Inspect the packing whenever they are disassembled. The packing must be in good condition and must be installed. Failure to comply will cause a gas leak, resulting in severe injury or death.

- Remove two sealing packings from silencer.

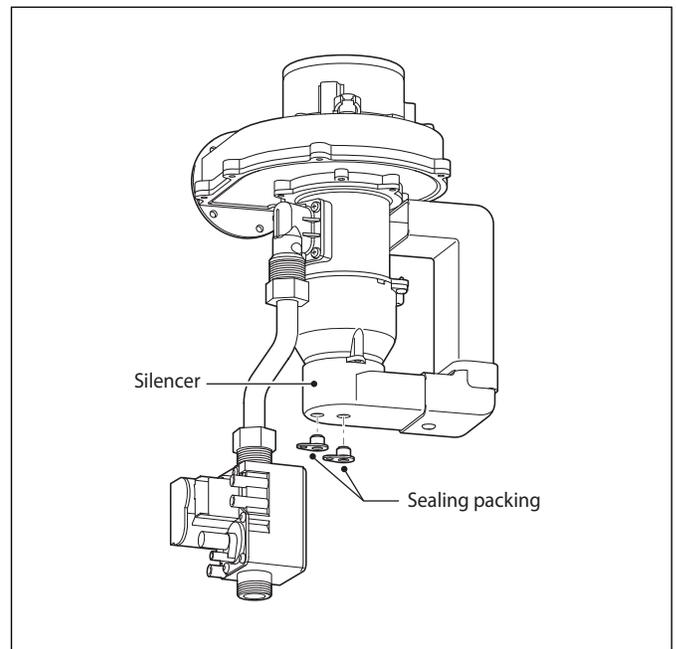


Figure 82

9. Replace the gas connector and the gas inlet pipe to its original position and secure all connections.
10. Turn on the gas and water supply to the boiler.

### 11.1 Combustion Analysis



**WARNING:**

- ▶ Be sure to turn off the power before changing the DIP switch setting.

1. Set the DIP switch to minimum heat capacity operation.



For more information about setting the DIP switches, refer to "Setting the DIP Switches" on page 38.

2. To access the exhaust analyzer hole:
  - a. loosen the screw (do not remove) and rotate the bracket
  - b. lift the top of the rubber cap and rotate that to the side

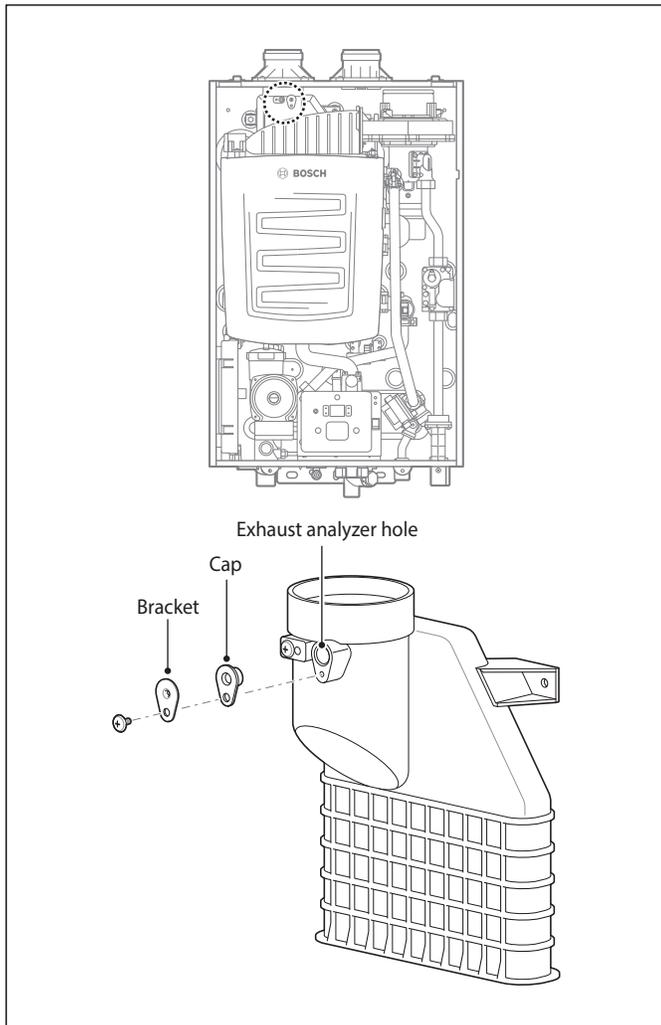


Figure 83

3. Insert analyzer into the exhaust analyzer hole and measure the gas/air ratio (using combustion analyzer is recommended)

| Type | High fire           | Low fire            |
|------|---------------------|---------------------|
|      | CO <sub>2</sub> (%) | CO <sub>2</sub> (%) |
| NG   | 9.5 ± 0.5           | 9.9 ± 0.5           |
| LPG  | 9.5 ± 0.5           | 11.5 ± 0.5          |

Table 25

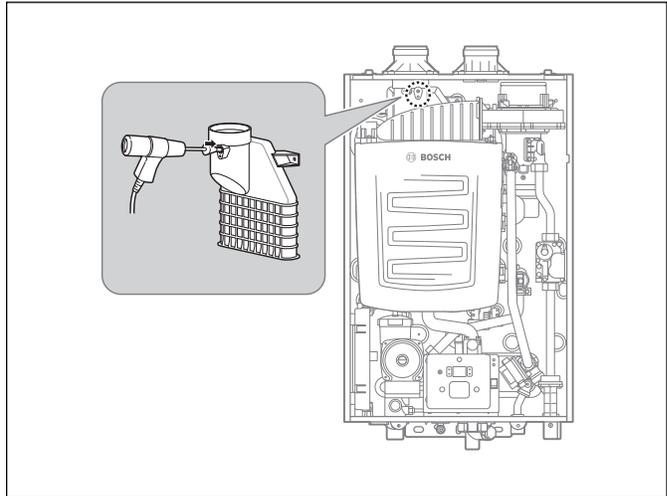


Figure 84

4. Fully open several hot water fixtures and if the CO<sub>2</sub> value at low fire is not within 0.5% of the value listed in the table above, the gas valve set screw will need to be adjusted. If adjustment is necessary, locate the set screw. Using a 5/32" or 4mm Allen wrench, turn the set screw a 1/4 turn at a time. Clockwise to raise or counterclockwise to lower the CO<sub>2</sub> value.



**WARNING:**

- ▶ Improper gas valve settings can cause severe injury, death or property damage.

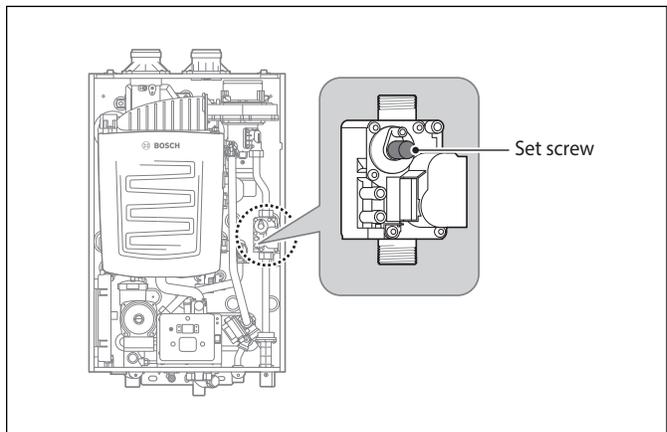


Figure 85

 **WARNING:**

- ▶ Be sure to turn off the power before changing the DIP switch setting.

5. Set the DIP switch to maximum heat capacity operation.

 For more information about setting the DIP switches, refer to "Setting the DIP Switches" on page 38.

6. Fully open several hot water fixtures and if the CO<sub>2</sub> value at high fire is not within 0.5% of the value listed in the table above, do not adjust the gas valve set screw and check if the gas orifice is properly installed.

 **WARNING:**

- ▶ Improper gas valve settings can cause severe injury, death or property damage.

**NOTICE:**

- ▶ While measuring the gas/air ratio in maximum heat capacity operation, do not adjust the gas valve set screw.

7. When the gas conversion is completed, attach the conversion sticker to the top of the rating plate.

This boiler was converted on \_\_\_\_\_ / \_\_\_\_\_ / to \_\_\_\_\_ gas  
with Kit No. \_\_\_\_\_  
by \_\_\_\_\_  
(name and address of organization making this conversion, who accepts the responsibility for the correctness of this conversion).

Conversion Sticker

This appliance has been converted to Propane fuel /  
Cet appareil a été converti au propane  
Orifice Size / injecteur  
Min. 3.9mm to Max. 3.1mm  
Inlet Gas Pressure / Pression d'entree du gaz  
Min. 8.0 to Max. 13.0" WC  
Manifold Pressure /  
Pression à la tubulure d'alimentation  
Min. -0.03 to Max. -0.51(100), -0.57(120, 140) WC  
Input (Btu/hr) / Débit calorifique  
Min. 19,900 to Max. 100,000–140,000  
Conversion Kit No. 42110398

Conversion Rating Plate

Figure 86

## 12 Wiring Diagram

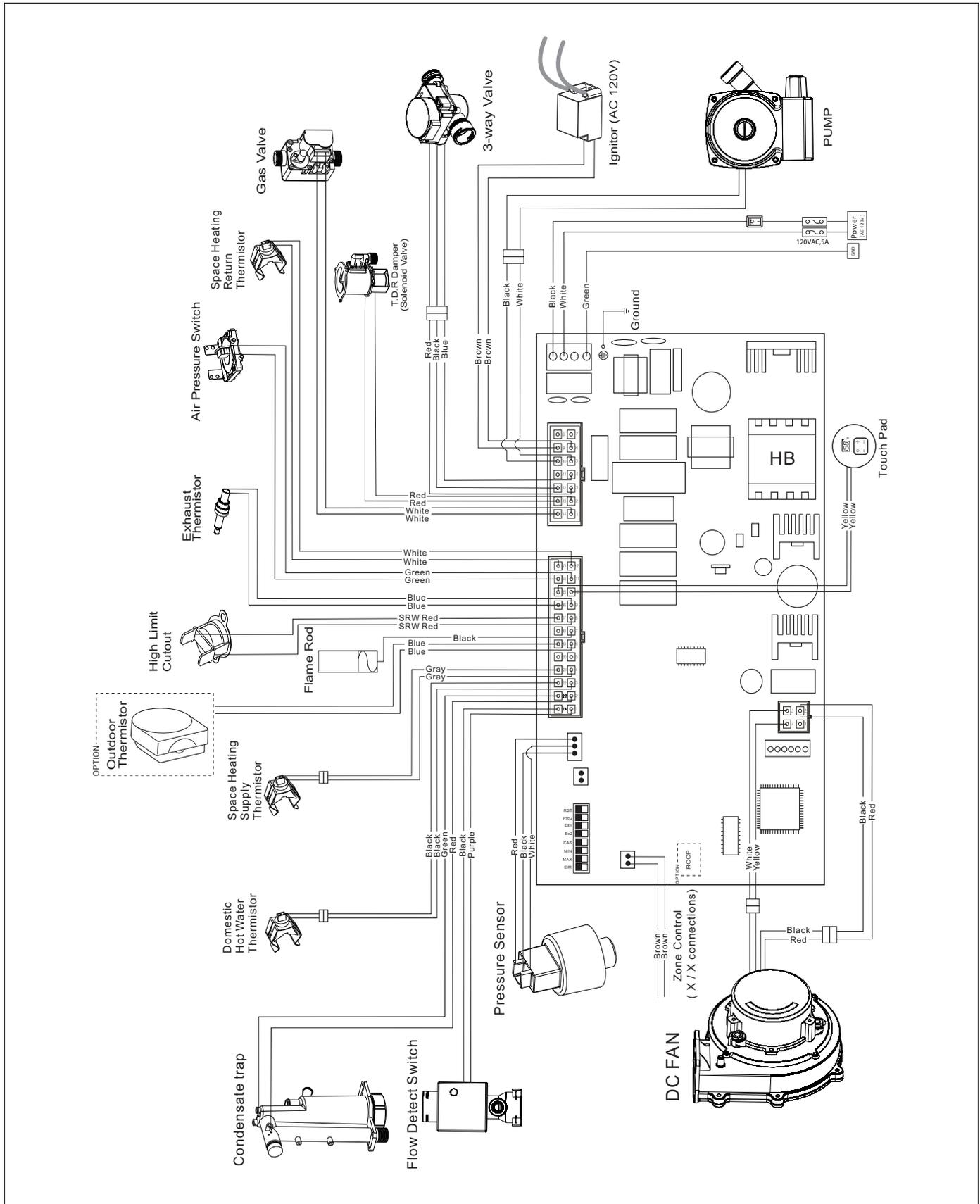


Figure 87

**13 Ladder Diagram**

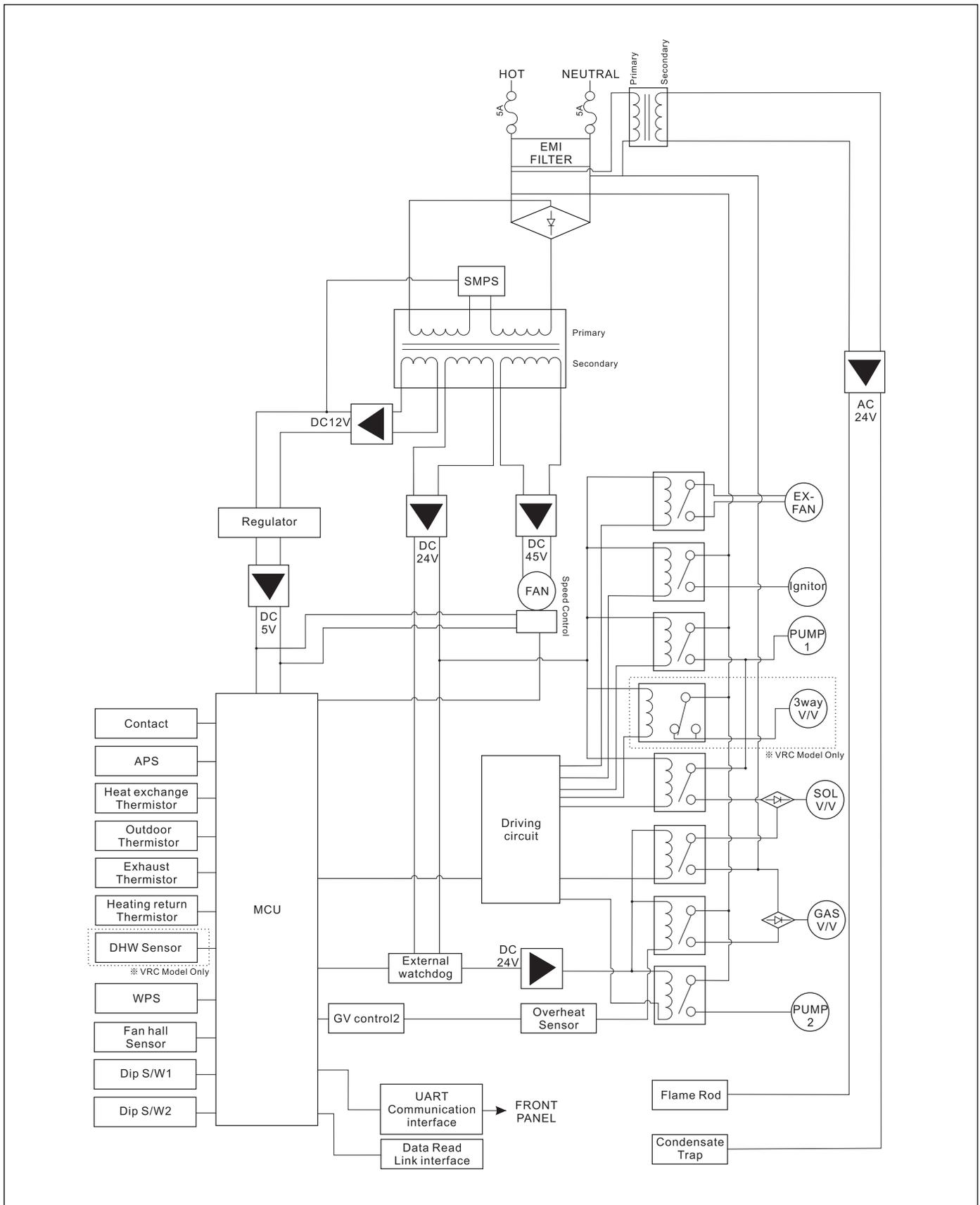


Figure 88

## 14 Normal Operating Sequence

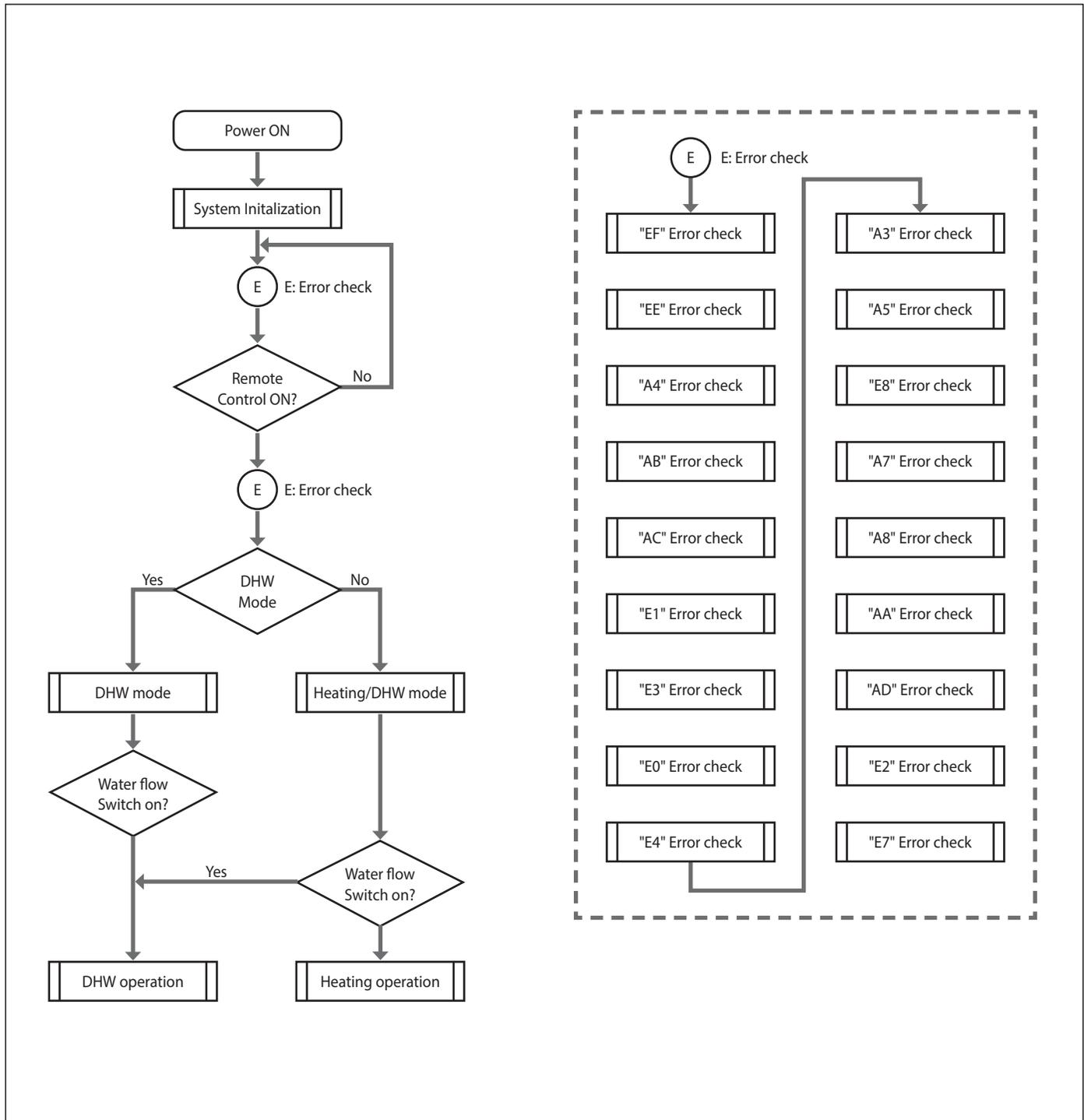


Figure 89

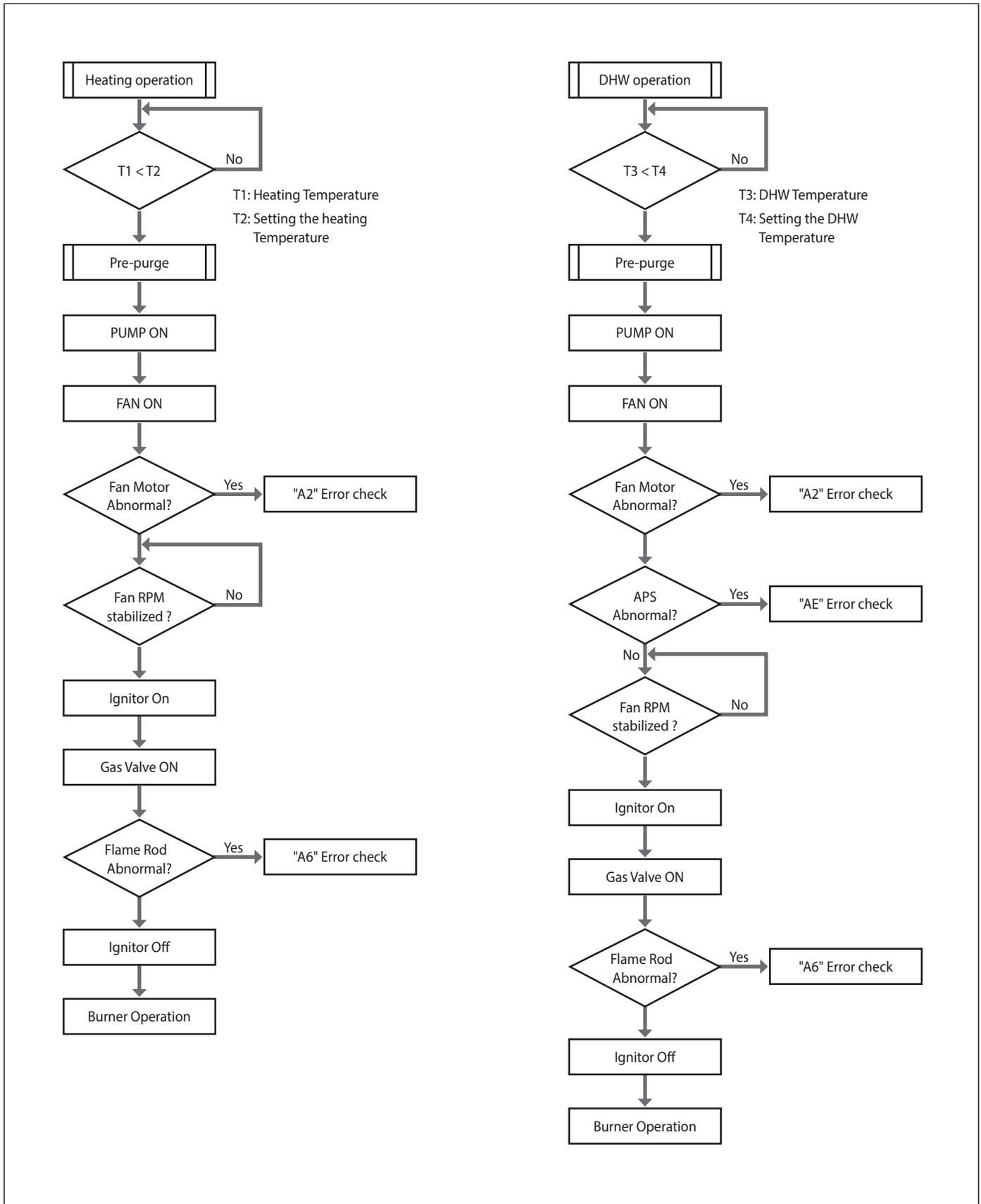


Figure 90

## 15 Outdoor Temperature Sensor

### 15.1 Outdoor Temperature Sensor Installation (Optional)

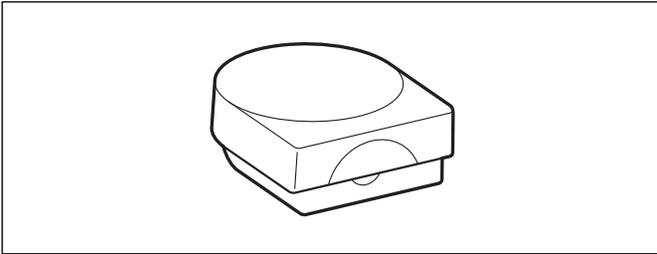


Figure 91

1. Separate the sensor body from the sensor cap.
2. Attach the sensor body to the wall using the provided screws.
3. Run the wires into the device body through the grommet opening.
4. Connect the wires to the terminal block.
5. Attach the cap to the sensor body.
6. Run wire back to boiler
7. Identify the two blue wires extruding from the bottom of the boiler labeled Outdoor temp wire.

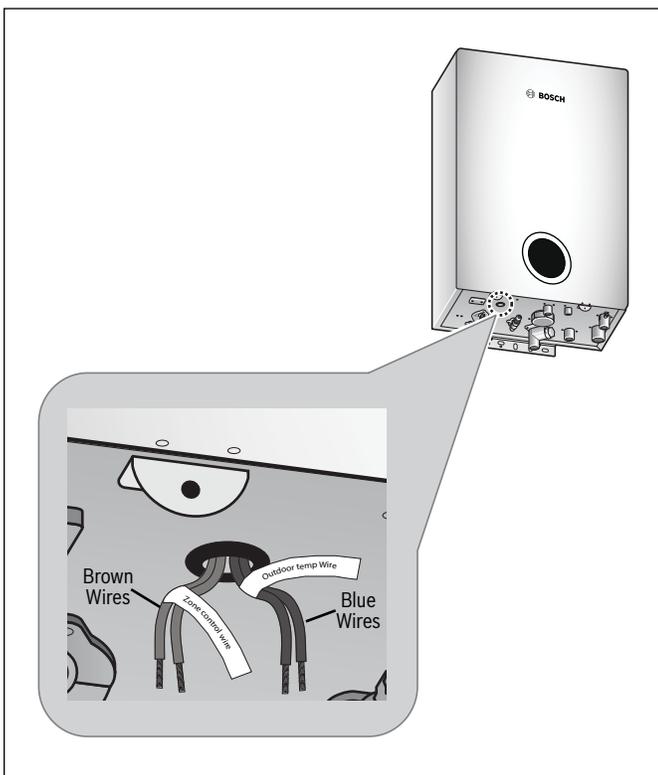


Figure 92

8. Connect the two wires from the sensor to these two wires using wire caps.

### 15.2 Outdoor Temperature Sensor Installation Guidelines

- ▶ Avoid installing the temperature sensor in a location where the temperature may change due to direct sunlight or a location where the representative outdoor temperature is not indicated.
- ▶ The best place to install the temperature sensor is to the north or northeast of the eaves, where direct sunlight can be avoided.
- ▶ Do not install the sensor near a heat source that may affect sensing of a correct temperature (fans, exhaust vents, lights).
- ▶ Avoid installing the sensor in a location with a high amount of moisture.
- ▶ Use 18gauge wiring with no splices
- ▶ Before attaching the cap, ensure the wiring is fixed firmly.
- ▶ The sensor is a water resistant device.

**15.3 Outdoor Reset Control**  
**(Available with Optional Outdoor Temperature Sensor)**

The outdoor reset control can be used in order to improve the energy efficiency. With the Outdoor Reset Control, the space heating temperature setting automatically changes according to the outdoor temperature and the current space heating system application (system load).

**i** The outdoor reset control can be used only when the outdoor temperature sensor is installed. In addition, it only works when the boiler is running in the normal operation mode. It does not work when the boiler is running in either the Minimum(MIN) or Maximum(MAX) mode, or When the boiler's front panel displays a fault.

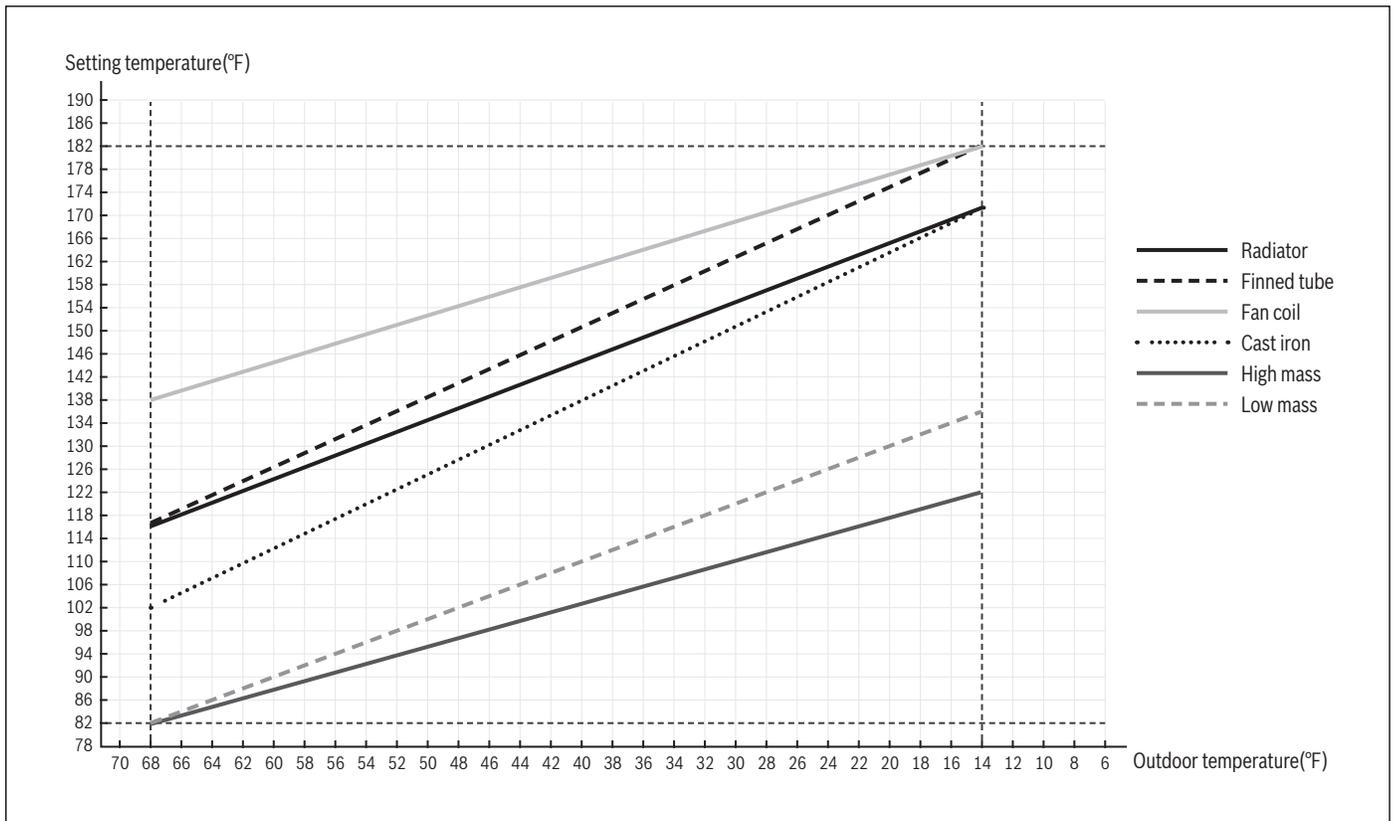


Figure 93

The following table lists the default space heating temperature range by system heat load and the applicable outdoor temperature ranges.

| Heat load                   | Minimum set-point | Maximum set-point | Outdoor temperature min-max               |
|-----------------------------|-------------------|-------------------|---|
| Finned tube heat load types | 118°F (48°C)      | 180°F (82°C)      | Minimum outdoor temperature: 14°F (-10°C) |
| Fan coil                    | 120°F (60°C)      | 180°F (82°C)      |   |
| Cast iron baseboard         | 100°F (38°C)      | 170°F (77°C)      |   |
| Low mass radiant            | 82°F (28°C)       | 140°F (60°C)      | Maximum outdoor temperature: 68°F (20°C)  |
| High mass radiant           | 82°F (28°C)       | 122°F (50°C)      |   |
| Radiator                    | 118°F (48°C)      | 170°F (77°C)      |   |
| Custom                      | User define       |                   |   |

Table 26

## 16 Inspection and Maintenance

Annual service and maintenance is required for the safe and long service life of the appliance, for efficient and economical operation, and to keep the environmental impact as low as possible. Owners/operators are encouraged to sign a service and maintenance contract with a trained and certified installer for annual servicing and maintenance of the boiler.



**WARNING: ELECTRIC SHOCK HAZARD**

- ▶ Always disconnect the appliance from the main power supply before performing any work. Disconnect the emergency shutoff switch or disengage the heating system circuit breaker. Take measures to prevent accidental re-connection.



**WARNING: SCALD HAZARD**

- ▶ The boiler may remain hot for few minutes after it is turned off. Wait until the boiler has cooled down before cleaning to prevent burns.



**WARNING: EXPLOSION!**

- ▶ Close the gas supply shutoff valve prior to working on the gas train.
- ▶ Check for gas leaks after carrying out work on the gas train.



**WARNING: RISK OF FLUE GAS POISONING**

- ▶ Check for leaks after carrying out work on the venting system.

**NOTICE: INSUFFICIENT ANTIFREEZE CAN ACCELERATE CORROSION**

- ▶ Frost protection level has to be checked annually during the regular scheduled maintenance of the condensing boiler.

### 16.1 Draining the Boiler

To perform maintenance tasks or to prevent the boiler from freezing when it will not be used for an extended period, the boiler must be drained.

To drain the boiler:

1. Press the button to turn off the boiler.
2. Disconnect the power supply to the boiler.
3. Turn off the gas valve.

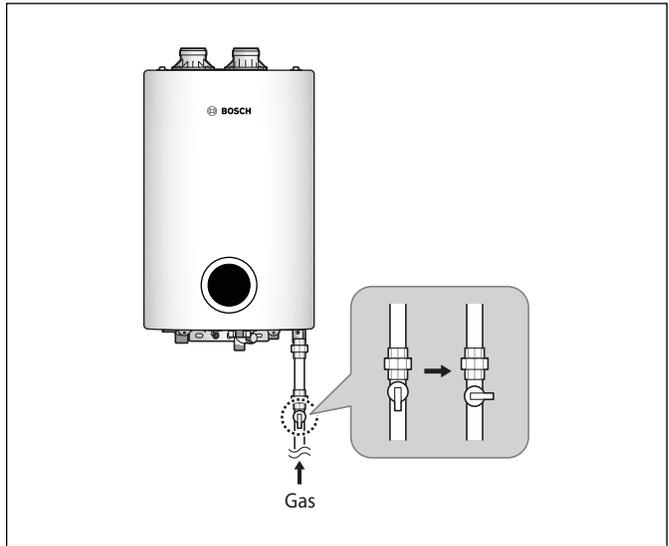


Figure 94

4. Turn off the water supply valve on the inlet to the boiler.

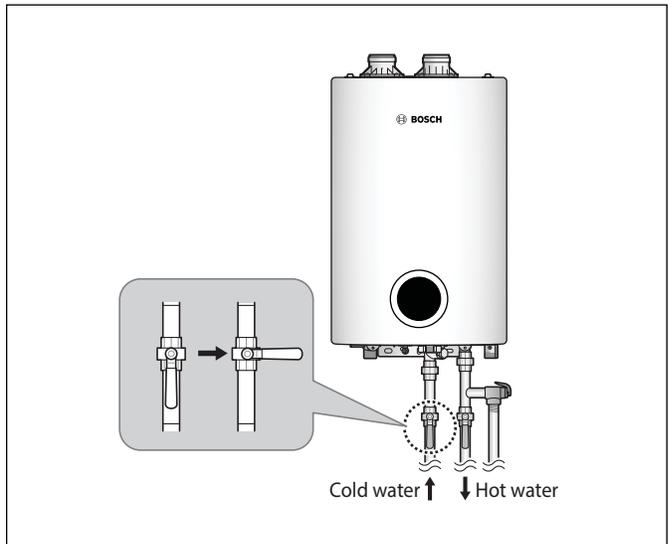


Figure 95

**i** If there is no water supply valve, turn off the water supply at the water main.

- Remove the boiler front cover by loosening the 2 Phillips screws securing it to the case.



Figure 96

- Open the drain valve.



Figure 97

- Remove the strainer from the bottom of the boiler.



Figure 98

- Close the drain valve when the water is completely drained.
- Remove the cold water inlet filter.
- Allow the residual water to drain from the boiler.
- When the water is completely drained, reinsert the cold water inlet filter and close the drain valve.

**i** Follow the steps in reverse order to refill the boiler. Be careful not to lose the drain plug.

## 16.2 Cleaning the Cold Water Inlet Filter

To clean the cold water inlet filter:

1. Drain the boiler. Refer to Section 16.1 "Draining the Boiler".
2. Remove the cold water inlet filter from the boiler.



Figure 99

3. Rinse the cold water inlet filter with clean running water.
4. Reinsert the cold water inlet filter.
5. Refill the boiler. Refer to "Draining the Boiler" on page 60.

## 16.3 Cleaning the Air Intake Filter

To maintain the boiler properly, clean the air intake filter every 2–3 months. If the air intake filter is clogged by dust or lint, the boiler will cease to operate or error can occur.

To clean the air intake filter:

1. Press the  button to turn off the boiler.
2. Disconnect the power supply to the boiler.
3. Remove the boiler front cover by loosening the 2 Phillips screws securing it to the case.



Figure 100

4. Remove the air intake filter located under the air intake connector.

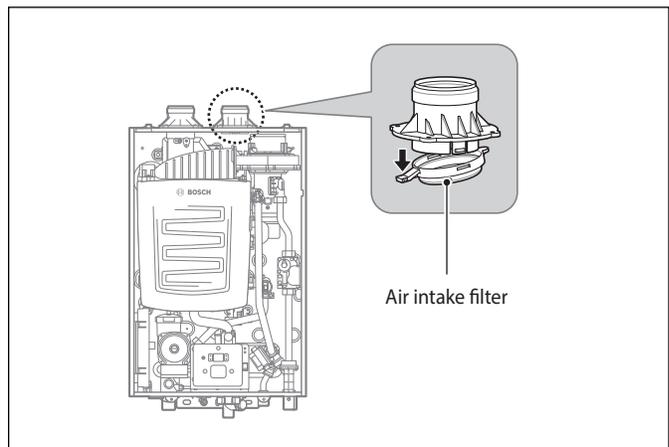


Figure 101

5. Rinse the air intake filter with clean running water.
6. Dry the air intake filter completely.
7. Reinsert the air intake filter and replace the front cover.

### 16.4 Protecting the Boiler from Freezing

**NOTICE: BOILER DAMAGE, PROPERTY DAMAGE**

- ▶ To protect the boiler from freezing, recommend the use of a direct vent exhaust and intake system. Ensure that the exhaust vent pipe and the air intake pipe are both connected directly from the collars on the top of the boiler to the outdoors. This type of vent system minimizes air movement within the boiler.
- ▶ Freezing damage usually occurs due to back-drafting caused by negative pressure in the building. This is not a manufacturing defect, and therefore, Bosch will not warrant any damage due to freezing. The installer is responsible for ensuring that there is sufficient make-up air to avoid such a situation, and the owner is responsible for ensuring protection against freezing.

To protect the boiler from freezing, follow these guidelines:

- ▶ Do not unplug the power supply cord, except for routine maintenance. The boiler has a freeze protection function that warms up the boiler. The freeze protection function will operate regardless of whether or not the front panel is turned on or off, as long as the power supply is still connected.
- ▶ If the power or gas supply must be disconnected for an extended period, drain the boiler.
- ▶ Protect and insulate all water pipes, including the condensate trap drain line, from freezing.
- ▶ If the boiler will not be used for an extended period of time, drain the boiler.



If you suspect that the boiler is frozen, contact an authorized technician or licensed professional.

### 16.5 Maintenance Schedules



**WARNING:**

- ▶ A qualified service agency must inspect the boiler at the beginning of every heating season and/or when there is a problem.

#### 16.5.1 Owner Maintenance

| Frequency      | Task   |
|----------------|--|
| Daily          | <ul style="list-style-type: none"> <li>▶ Check that the area where the boiler is installed is free of combustible/flammable material and air-contaminants.</li> <li>▶ Visually inspect the exterior of the boiler.</li> </ul>                          |
| Monthly        | <ul style="list-style-type: none"> <li>▶ Inspect the condensate trap and the PVC fittings.</li> <li>▶ Visually inspect the piping (water and gas) for leaks.</li> <li>▶ Visually inspect the vent piping for signs of leakage and blockage.</li> </ul> |
| Every 6 Months | <ul style="list-style-type: none"> <li>▶ Inspect the piping (water and gas) for leaks.</li> <li>▶ Inspect the vent piping for leakage and blockage.</li> <li>▶ Test to make sure the pressure relief valve is operating properly.</li> </ul>           |

Table 27

#### 16.5.2 Service Technician Maintenance



**WARNING: PERSONAL INJURY OR DEATH.**

- ▶ Failure to inspect and properly maintain and repair the boiler can result in severe personal injury or death.

| Frequency  | Task  |
|------------|---|
| Every Year | <ul style="list-style-type: none"> <li>▶ Inspect the interior of the boiler.</li> <li>▶ Clean the condensate trap and fill with fresh water.</li> <li>▶ Clean the air intake filter.</li> <li>▶ Check for leaks (gas, water, flue, and condensate).</li> <li>▶ Check the system pressure (gas, and water).</li> <li>▶ Check ignition and flame rod.</li> <li>▶ Check wiring connections.</li> <li>▶ Combustion analysis.</li> </ul> |

Table 28

**WARNING:**

- ▶ Follow the service and maintenance procedures given throughout this manual and in component literature shipped with the boiler. Failure to perform the service and maintenance could result in damage to the boiler or system.
- ▶ Failure to follow the directions in this manual and component literature could result in severe personal injury, death, or substantial property damage.
- ▶ The boiler must be inspected annually by a qualified service agency. In addition, the maintenance and care of the boiler must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.
- ▶ Electrical shock hazard – Turn off power to the boiler before any service operation on the boiler except as noted otherwise in this instruction manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury or death.

**Addressing the Reported Problems**

- ▶ Inspect any problems reported by the owner and correct before proceeding.

**Inspecting the Installation Area**

1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
2. Verify that air intake area is free of any of the contaminants listed in Installation Manual. If any of these are present in the boiler intake air vicinity, they must be removed (pg 29, Installing a Vent). If they cannot be removed, reinstall the air and vent lines per the Installation Manual.

**Inspecting the Boiler Interior**

1. Remove the front cover and inspect the interior of the boiler.
2. Vacuum any sediment from inside the boiler and components. Remove any obstructions.

**Cleaning the Condensate Trap**

1. Inspect the condensate drain line, condensate fittings, and condensate trap.
2. Remove any sediment in the trap.
3. Fill

**Checking the Flue Vent System and Air Piping**

1. Visually inspect the entire flue gas venting system and air piping for blockage, deterioration or leakage. Repair any joints that show signs of leakage. Verify that air inlet pipe is connected and properly sealed (if installed).
2. Verify that boiler vent discharge and air intake are clean and free of obstructions.

## 17 Troubleshooting

### 17.1 Basic Problems

If there is a problem with the boiler, refer to the following table for possible remedies. For minor problems, turning the boiler off and then turning back on may resolve the situation. If turning the boiler off and on and attempting the remedies

suggested below do not resolve the problem, contact an authorized technician, licensed professional, or technical support at 1-866-642-3198.

| Category                 | Problem   | Possible Cause(s)  | What to Do   |
|--------------------------|---|--|--|
| <b>Initial operation</b> | Boiler does not ignite.   | ▶ Are the gas and water pipes connected properly?  | 1. Check for correct plumbing or crossed piping to the unit.   |
|                          | Unit attempts to ignite but fails   | ▶ Is there air in the gas line?<br>▶ Is the gas supply pressure sufficient?  | 1. Turn off the boiler and then turn it back on.<br>2. Have your installing contractor check the gas supply pressure.<br>3. Ensure the boiler is powered by 120 V-1 PH-60 Hz.  |
| <b>Temperature</b>       | Space heating side malfunction  | ▶ Is the setting temperature too low?  | 1. Check the boiler's temperature setting. See "Operating the Boiler" on page 42.  |
|                          |   | ▶ Is there power to the system, or is the system in stand by?  | 1. Make sure the power is on, and plugged into the outlet with the correct voltage. Press the Power button and raise the setting temperature. Make sure the boiler is turned on.   |
|                          | Hot water is not produced when a faucet is opened.                        | ▶ Are the gas and water supply valves fully open?<br>▶ Is the water supply cut off to the household?<br>▶ Is gas being provided by the gas meter?<br>▶ Is there enough gas (for LP) in the tank?<br>▶ Is the water inlet filter clogged?<br>▶ Is the power button turned on? | 1. Fully open the gas and water supply valves.<br>2. Check the water inlet filter for debris.<br>3. Check the power status of the boiler.  |
|                          | No water is available when a faucet is opened.                            | ▶ Is the water supply cut off?<br>▶ Is the boiler frozen?<br>▶ Are the pipes frozen?   | 1. Open the cold water supply.<br>2. Check if the boiler and/or the pipes are frozen.  |
|                          | The hot water is not at the correct temperature.                          | ▶ Is the hot water faucet sufficiently open?   | 1. Fully open the hot water faucet.  |
|                          | Water takes a long time to become hot after opening the hot water faucet. | ▶ Have you allowed enough time for the cold water in the pipes to drain out?   | 1. Even though the unit may be operating properly, the cold water contained in the piping will need to flow through the faucet before the hot water can reach the faucet. Wait for several minutes.  |
|                          | The water is too hot.   | ▶ Are the gas and cold water supply valves fully open?<br>▶ Is the water temperature setting appropriate?  | 1. If the cold water supply temperature is too high, it is possible for the temperature to be higher than the temperature set on the front panel. Decrease the water temperature on the front panel.<br>2. If only a small amount of hot water is required, it is possible for the temperature to be higher than the temperature set on the front panel. Decrease the water temperature on the front panel.<br>3. If the cold water supply passes through a solar preheating system, it passes for the delivered water temperature to be higher than the temperature set on the front panel. |
|                          | The water is not hot enough.  | ▶ Are the gas and cold water supply valves fully open?<br>▶ Is the water temperature setting correct?"   | 1. Fully open the gas and cold water supply valves.<br>2. Check the water temperature setting.   |
|                          | Fluctuation in hot water temperature.                                     | ▶ Is the water inlet filter clogged?   | 1. Clean the water inlet filter for debris.  |

Table 29

## 17.2 Error Codes

If an error code appears on the digital display, refer to the following chart for the reason, and a possible remedy for the situation. If the situation requires more support please contact Bosch at 866-642-3198.

| Error Code | Cause   | Self-diagnosis/Action   |
|------------|---|---|
| A2         | ▶ Abnormal operation: FAN                               | <ol style="list-style-type: none"> <li>1. Clean the intake air filter.</li> <li>2. Check the fan connector.</li> <li>3. Contact original installer or licensed professional.</li> </ol> |
| A3         | ▶ Abnormal operation: Pump                              | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| A4         | ▶ Overheating of heat exchanger                         | <ol style="list-style-type: none"> <li>1. Turn off the system for at least 30 minutes, and then restart it.</li> <li>2. Contact original installer or licensed professional.</li> </ol> |
| A5         | ▶ Low water pressure                                    | <ol style="list-style-type: none"> <li>1. Reference Built-In Water Filling of manual page 20</li> <li>2. Contact original installer or licensed professional.</li> </ol>                |
| A6         | ▶ Ignition error  | <ol style="list-style-type: none"> <li>1. Ensure that the main gas supply valve is open.</li> <li>2. Contact original installer or licensed professional.</li> </ol>                    |
| A7         | ▶ Abnormal operation: gas valve relay "open"            | <ol style="list-style-type: none"> <li>1. Turn off the main gas valve.</li> <li>2. Contact original installer or licensed professional.</li> </ol>                                      |
| A8         | ▶ Abnormal operation: flame detection                   | <ol style="list-style-type: none"> <li>1. Turn off the main gas valve.</li> <li>2. Contact original installer or licensed professional.</li> </ol>                                      |
| AA         | ▶ Overheating   | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| AB         | ▶ Abnormal operation: heat exchanger temperature sensor | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| AC         | ▶ Abnormal operation: DHW temperature sensor            | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| AD         | ▶ Clog of condensate trap                               | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| AE         | ▶ Blockage of flue Pipe                                 | <ol style="list-style-type: none"> <li>1. Clean the vent terminal.</li> <li>2. Contact original installer or licensed professional.</li> </ol>  |
| E0         | ▶ Abnormal operation: Outdoor temperature sensor        | <ol style="list-style-type: none"> <li>1. Check the outdoor temperature sensor wiring connection.</li> <li>2. Contact original installer or licensed professional.</li> </ol>           |
| E1         | ▶ Abnormal operation: Exhaust temperature sensor        | <ol style="list-style-type: none"> <li>1. Check the exhaust temperature sensor wiring connection.</li> <li>2. Contact original installer or licensed professional.</li> </ol>           |
| E2         | ▶ Abnormal operation: Exhaust temperature overheating   | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| E3         | ▶ Abnormal operation: Return water temperature sensor   | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| E4         | ▶ Abnormal operation: Pressure sensor                   | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| E7         | ▶ Abnormal operation: gas valve relay "Close"           | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| EB         | ▶ Overheating of DHW temperature sensor                 | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| EE         | ▶ Abnormal operation:Data Communication                 | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |
| EF         | ▶ Abnormal operation: eep-rom error                     | <ol style="list-style-type: none"> <li>1. Contact original installer or licensed professional.</li> </ol>   |

Table 30

**NOTES:**

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**BTC 439003301 D / 01.2022**

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