FOR USE IN RESIDENTIAL OR MANUFACTURED HOME APPLICATIONS.

Installation must conform with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 - latest edition and/or the Natural Gas and Propane Installation Code CSA B149.1 - latest edition.

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

PB Heat reserves the right to discontinue, or change at any time, the designs and/or specifications of its products without notice.

Contact Pavilion Customer Center at 1-855-443-8468, if you have any questions or concerns.

CAUTION

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

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

Requests to Installers

- In order to use the Combi Boiler safely, read this installation manual carefully, and follow the installation instructions.
- Failures and damage caused by erroneous work or work not as instructed in this manual are not covered by the Pavilion Limited Warranty.
- Check that the installation was done properly in accordance with this Installation Manual upon completion.
- After completing installation, either place this Installation Manual and Owner’s Guide (the warranty registration information included) in a plastic pouch and attach it to the side of the Combi Boiler (or the inside of the pipe cover or recess box if applicable), or hand it to the customer to retain for future reference. For the warranty conditions and limitations, see the Owner’s Guide.

CAUTION

FOR USE IN RESIDENTIAL OR MANUFACTURED HOME APPLICATIONS.

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1 Before Installation

Potential dangers from accidents during installation and use are divided into the following four categories. Closely observe these warnings, they are critical to your safety.

⚠️ **DANGER**
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠️ **WARNING**
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠️ **CAUTION**
Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠️ **NOTICE**
Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

⚠️ **DANGER**
Checkup
Check the fixing brackets and vent pipe yearly for damage or wear. Replace if necessary.

⚠️ **WARNING**
Precautions on Vent Pipe Replacement
The vent system will almost certainly need to be replaced when this appliance is being installed. Only use vent materials that are specified in this Installation Manual for use on this appliance. Refer to the “Venting the Combi Boiler” section for details. If PVC, CPVC, or Category IV listed pipe is already installed, check for punctures, cracks, or blockages and consult with the vent pipe manufacturer before reusing. Improper venting may result in fires, property damage or exposure to Carbon Monoxide.

Snow Precaution
If this product will be installed in an area where snow is known to accumulate, protect the vent termination from blockage by snow drifts or damage from snow falling off of roofs.

Check the Power
The power supply required is 120 VAC, at 60 Hz. Using the incorrect voltage may result in fire or electric shock.

⚠️ **CAUTION**
Do Not Use Appliance for Purposes Other Than Those Specified
Do not use for other than increasing the temperature of the water supply, as unexpected accidents may occur as a result.

Check Water Supply Quality
If the water supply is in excess of 12 grains per gallon (200 mg/L) of hardness, acidic or otherwise impure, treat the water with approved methods in order to ensure full warranty coverage.

⚠️ **NOTICE**
Check the Gas
- Check that the rating plate indicates the correct type of gas.
- Check that the gas supply line is sized for 199,900 Btu/h.

Chemicals
This product can expose you to chemicals including lead, lead compounds and carbon bisulfide which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠️ **NOTICE**
Do Not Use Appliance for Purposes Other Than Those Specified
Do not use for other than increasing the temperature of the water supply, as unexpected accidents may occur as a result.

Check Water Supply Quality
If the water supply is in excess of 12 grains per gallon (200 mg/L) of hardness, acidic or otherwise impure, treat the water with approved methods in order to ensure full warranty coverage.
Please read if installing in Massachusetts

Massachusetts requires manufacturers of Side Wall Vented products to provide the following information from the Massachusetts code:

- A hard wired carbon monoxide detector with an alarm and battery back-up must be installed on the floor level where the gas equipment is to be installed AND on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment.
- 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.
- Detector(s) must be installed by qualified licensed professionals.
- APPROVED CARBON MONOXIDE DETECTORS: Each carbon monoxide detector shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
- SIGNAGE: A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) ft 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) in. in size, “GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS”.
- EXEMPTIONS to the requirements listed above:
  - The above requirements do not apply if the exhaust vent termination is seven (7) ft or more above finished grade in the area of the venting, including but not limited to decks and porches.
  - The above requirements do not apply to a product installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.
- This installation manual shall remain with the product at the completion of the installation.

See the latest edition of Massachusetts Code 248 CMR for complete verbiage and also for additional (non-vent related) requirements (248 CMR is available online). If your installation is NOT in Massachusetts, please see your authority of jurisdiction for requirements that may be in effect in your area. In the absence of such requirements, follow the National Fuel Gas Code, ANSI Z223.1/ NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.
2 About the Combi Boiler

2.1 Included Accessories

The following accessories are included with the Combi Boiler. Check for any missing items before starting installation.

- Anchoring Screw (× 7)
- Outdoor Temperature Sensor (× 1)
- Owner’s Guide (including Warranty) Installation Manual (this document) (1 each)
- Pressure Relief Valve for Heating (ASME Certified) (3/4 in., 30 psi) (× 1)
- Wall Mounting Bracket (× 1)
- Anchoring Screw & Anchor for Outdoor Temperature Sensor (2 each)

2.2 Optional Accessories

The accessories listed below are not included with the Combi Boiler, but may be necessary for installation.

NOTE Additional vent pieces are available; consult the latest product catalogue for details.

- Quick Connect Cord (× 1) [Stock Code: 1809]
- PVC Concentric Termination (× 1) 2 in. (50 mm): [Stock Code: 1813] 3 in. (75 mm): [Stock Code: 1813-1]
- 2 in. SV Conversion Kit (× 1) [Stock Code: 1814]
  - 90° Elbow (With Inlet Screen)
  - 2 in. × 3 in. Increaser coupling
  - 2 in. Pipe
  - Installation Manual (Check List)
- Bird Screen for 2 in. (50 mm) PVC [Stock Code: 1816]
- Bird Screen for 3 in. (75 mm) PVC [Stock Code: 1817]
- 3 in. (75 mm) Horizontal Hood Termination [Stock Code: 1818]
Universal Concentric Vent Kit  
[Stock Code: 1819]

Low Profile Termination Kit  
2 in.: [Stock Code: 1820]  
3 in.: [Stock Code: 1820-1]  
ULC S636 / UL 1738 certified for use in both Canada and USA

Plastic Rain Cap  
[Stock Code: 1821]  
Not approved for use in Canada.

Neutralizer (× 1)  
[Stock Code: 1822]

Manifold Kit (× 1)  
[Stock Code: 1827]

2.3 Field Purchased Accessories

Service Valve Kit with Pressure Relief Valve (1 each)

Not supplied from PB Heat. Isolation valves may be purchased separately from an authorized wholesaler. The following are required specification for isolation valves.
1. Comply with Lead Free installation requirement.
2. Certified to NSF/ANSI 61.
3. Shall facilitate isolation of the Combi Boiler from the water line.
4. 3/4” FTP Unions for connection to Combi Boiler.
5. 3/4” size connection for water lines (Cold and Domestic hot water lines).
6. Equipped with purge and drain valve for hose connection and tethered brass cap.
7. Equipped with the 3/4” connection for optional pressure relief valve (150psi).

Scale Inhibitor (1 each)

Damage to the Heat Exchanger caused by Scale Build-up is not covered by the Pavilion Limited Warranty. To prevent the Heat Exchanger damage, the water must be treated with a Southeastern Filtration Scale Stick™, 3M Aqua-Pure™ scale inhibitor, or other scale inhibitor system.
## 2.4 Specifications

- Specifications may be changed without prior notice.
- The capacity may differ slightly, depending on the water pressure, water supply, piping conditions, and water temperature.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>PV199DV (GHQ-C3201WX-FF PB US)</td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>Indoor / Outdoor Wall mounted</td>
</tr>
<tr>
<td>Air Supply / Exhaust</td>
<td>Power Vented</td>
</tr>
<tr>
<td>Ignition</td>
<td>Direct Ignition</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td></td>
</tr>
<tr>
<td>DHW</td>
<td>15-150 psi (Recommended 30 psi for maximum performance)</td>
</tr>
<tr>
<td>Heating</td>
<td>12-30 psi</td>
</tr>
<tr>
<td>Minimum Activation Flow Rate*</td>
<td>0.4 GPM (1.5 L/min)</td>
</tr>
<tr>
<td>Minimum Operating Flow Rate*</td>
<td>0.29 GPM (1.1 L/min)</td>
</tr>
<tr>
<td>Dimensions (Height) × (Width) × (Depth)</td>
<td>27.0 in. (687 mm) × 18.5 in. (471 mm) × 12.8 in. (325 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>95 lbs. (43 kg)</td>
</tr>
<tr>
<td>Water Holding Capacity for DHW</td>
<td>0.37 Gallon (1.4 L)</td>
</tr>
<tr>
<td>Pressure Relief Valve Setting</td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td>30 psi</td>
</tr>
<tr>
<td>Connection Sizes</td>
<td></td>
</tr>
<tr>
<td>DHW Cold Water Inlet</td>
<td>NPT 3/4 in.</td>
</tr>
<tr>
<td>DHW Outlet</td>
<td>NPT 3/4 in.</td>
</tr>
<tr>
<td>Heating Supply</td>
<td>NPT 1 in.</td>
</tr>
<tr>
<td>Heating Return</td>
<td>NPT 1 in.</td>
</tr>
<tr>
<td>Heating Pressure Relief Valve</td>
<td>NPT 3/4 in.</td>
</tr>
<tr>
<td>Auto Feeder Inlet</td>
<td>NPT 1/2 in.</td>
</tr>
<tr>
<td>Gas Inlet</td>
<td>NPT 3/4 in.</td>
</tr>
<tr>
<td>Condensate Drain</td>
<td>NPT 1/2 in.</td>
</tr>
<tr>
<td>Power Supply</td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>120 VAC (60 Hz)</td>
</tr>
<tr>
<td>Consumption</td>
<td>NG: 210 W LP: 210 W Freeze Prevention: 125 W</td>
</tr>
<tr>
<td>Maximum Current</td>
<td>4 Amps</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
</tr>
<tr>
<td>Casing</td>
<td>• Front Cover, Side / Top Plate: Hot-dipped zinc-aluminum-magnesium-alloy-coated steel w/ Polyester Coating</td>
</tr>
<tr>
<td></td>
<td>• Back Plate: Hot-dipped zinc-aluminum-magnesium-alloy-coated steel w/o Coating</td>
</tr>
<tr>
<td></td>
<td>• Bottom Plate: Zincified Steel Plate / Polyester Coating</td>
</tr>
<tr>
<td>Flue Collar</td>
<td>PP</td>
</tr>
<tr>
<td>Primary Heat Exchanger</td>
<td>Stainless Steel 316L</td>
</tr>
<tr>
<td>Secondary Heat Exchanger</td>
<td>Stainless Steel 316L</td>
</tr>
<tr>
<td>Safety Devices</td>
<td>Flame Rod, High Limit Switch, Lightning Protection Device (ZNR), Freezing Prevention Device, Fan Rotation Detector</td>
</tr>
<tr>
<td>Included Accessories</td>
<td>Anchoring Screws, Wall Mounting Bracket, Outdoor Temperature Sensor, Anchoring Screws &amp; Anchors for Outdoor Temperature Sensor</td>
</tr>
</tbody>
</table>

* Minimum flow rate may change by setting temperature and water temperature.
Performances

<table>
<thead>
<tr>
<th>Item</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gas Consumption</strong></td>
<td></td>
</tr>
<tr>
<td><strong>DHW</strong></td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td>199,900 Btu/h</td>
</tr>
<tr>
<td>LP</td>
<td>199,900 Btu/h</td>
</tr>
<tr>
<td><strong>Heating</strong></td>
<td></td>
</tr>
<tr>
<td>NG</td>
<td>120,000 Btu/h</td>
</tr>
<tr>
<td>LP</td>
<td>120,000 Btu/h</td>
</tr>
<tr>
<td><strong>Maximum Hot Water Capacity</strong> (45°F (25°C) Rise)</td>
<td>8.4 GPM (32 L/min)</td>
</tr>
<tr>
<td><strong>Capacity Range</strong></td>
<td>0.4-11.1 GPM (2-42 L/min)</td>
</tr>
<tr>
<td><strong>Temperature Settings</strong></td>
<td></td>
</tr>
<tr>
<td>DHW*</td>
<td></td>
</tr>
<tr>
<td>°F Mode</td>
<td>90-140°F (In 5°F intervals) (11 Options)</td>
</tr>
<tr>
<td>°C Mode</td>
<td>32°C, 35°C, 37°C-48°C (In 1°C intervals), 50°C, 55°C, 60°C (17 Options)</td>
</tr>
<tr>
<td>Heating</td>
<td></td>
</tr>
<tr>
<td>°F Mode</td>
<td>100-180°F (In 1°F intervals) (81 Options)**</td>
</tr>
<tr>
<td>°C Mode</td>
<td>40-82°C (In 1°C intervals) (43 Options)**</td>
</tr>
</tbody>
</table>

* When you use Quick Connect Multi System, temperature setting range is changed below.
  °F Mode: 100-140°F (In 5°F intervals)
  °C Mode: 37-48°C (In 1°C intervals), 50°C, 55°C, 60°C
** Heating Temperature range depends on Installer Mode Setting.
  Refer to the Installation Manual for details.

Pump Performance(with internal pressure drop)

Space Heating Rating

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Combination Boiler Space Heating Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Input, MBH</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td>PV199DV (GHQ-C3201WX-FF PB US)</td>
<td>NG</td>
</tr>
<tr>
<td></td>
<td>LP</td>
</tr>
</tbody>
</table>

* Based on standard test procedures prescribed by United States Department of Energy (DOE).
** The Net AHRI water ratings shown are based on a piping and pickup allowance of 1.15.
  Consult Pavilion Customer Center before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping system, etc.
### 2.5 Dimensions

**Outdoor Temperature Sensor**

- Height: 2.3" [59]
- Width: 3.6" [92]
- Depth: 1.3" [34]

**Wall Mounting Bracket**

- Height: 16" [406]
- Width: 10.2" [260]
- Depth: 5.1" [130]

**Pressure Relief Valve for Heating**

- Top: 1.0" [26]
- Bottom: 2.0" [51]

**Domestic Water Outlet**

- Bottom: 1.9" [49]

**Domestic Water Inlet**

- Bottom: 1.9" [49]

**Heating Water Outlet**

- Bottom: 2.2" [55]

**Heating Water Inlet**

- Bottom: 3.4" [86]

**Auto Feeder Water Inlet**

- Bottom: 2.3" [58]

**Condensate Drain**

- Bottom: 1.7" [42]

**GAS INLET**

- Bottom: 2.2" [55]

**WIRING THROUGHWAY**

- AC120V 4 x Ø0.5" [Ø13]

**Dimensions**

- 4 x 0.24" x 0.6" [6 x 15] OBLONG HOLE
- 4 x Ø0.5" [Ø13]
- 2 x 0.24" x 0.4" [6 x 10] OBLONG HOLE

---

**Height of Each Fitting from Case**

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Top</th>
<th>Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Relief Valve for Heating</td>
<td></td>
<td>1.0&quot; [26]</td>
</tr>
<tr>
<td>Domestic Water Outlet</td>
<td></td>
<td>2.0&quot; [51]</td>
</tr>
<tr>
<td>Domestic Water Inlet</td>
<td></td>
<td>1.9&quot; [49]</td>
</tr>
<tr>
<td>Heating Water Outlet</td>
<td></td>
<td>2.2&quot; [55]</td>
</tr>
<tr>
<td>Heating Water Inlet</td>
<td></td>
<td>3.4&quot; [86]</td>
</tr>
<tr>
<td>Auto Feeder Water Inlet</td>
<td></td>
<td>2.3&quot; [58]</td>
</tr>
<tr>
<td>Condensate Drain</td>
<td></td>
<td>1.7&quot; [42]</td>
</tr>
<tr>
<td>GAS INLET</td>
<td></td>
<td>2.2&quot; [55]</td>
</tr>
</tbody>
</table>
2.6 External View

Indoor Installation

- Intake Pipe
- Exhaust Pipe
- Pressure Relief Valve (Heating)
- Drain Pipe
- Operation Display
- Water Drain Valve
- Water Drain Valve (with Water Filter)
- Water Drain Valve (with Water Filter)
- Auto Feeder Shutoff Valve
- Heating Supply
- Heating Return
- Auto Feeder Inlet
- Water Drain Valve (with Water Filter)
- Water Supply Valve
- Water Drain Valve
- Gas Supply Valve
- Hot Water Outlet (DHW)
- Cold Water Inlet (DHW)
- Drain Pipe
- Pressure Relief Valve (DHW)
3 Choosing an Installation Location

**DANGER**
Locate the vent terminal and make sure there are no obstacles around the termination for exhaust to accumulate or be obstructed. Do not enclose the termination with corrugated metal or other materials. Carbon monoxide poisoning or fire may occur as a result.

**WARNING**
- Avoid places where fires are common, such as those where gasoline, benzene and adhesives are handled, or places in which corrosive gases (ammonia, chlorine, sulfur, ethylene compounds, acids) are present. If you do not follow the above, a fire or explosion may result causing property damage, personal injury or death.
- Avoid installation in places where dust or debris will accumulate. Dust may accumulate and reduce the performance of the fan of the appliance. This can result in incomplete combustion.
- Avoid installation in places where special chemical agents (e.g. hair spray or spray detergent) are used. Ignition failures and malfunctions may occur as a result.
- Do not install this Combi Boiler in a recreational vehicle or on a boat as this may be a Carbon Monoxide Poisoning Hazard.
- The manufacturer does not recommend installing the Combi Boiler in an attic due to safety issues. If you install the Combi Boiler in an attic:
  - Make sure the appliance will have enough combustion air and proper ventilation.
  - Keep the area around the Combi Boiler clean. Dust may accumulate and reduce the performance of the fan of the appliance. This can result in incomplete combustion.
  - A drain pan, or other means of protection against water damage, is required to be installed under the Combi Boiler in case of leaks.

**CAUTION**
Outdoor installation
- The Combi Boiler is designed for either indoor or outdoor installation. For information about outdoor installation, contact Pavilion Customer Center at https://www.peerlessboilers.com/ or 1-855-443-8468. Never install it in a bathroom, it may be damaged or a fire may be caused.

Do not install in the following places
- A location where it is not free from obstacles and stagnant air.
- Near staircases or emergency exits.
- A place where it may be threatened by falling objects, such as under shelves.
- On common walls as the appliance will make some operational noises while it is running.

Consideration to the surroundings
- Do not install the Combi Boiler where the exhaust will blow on outer walls, other walls or material not resistant to heat. Also consider the surrounding trees and animals. The heat and moisture from the Combi Boiler may cause discoloration of walls and resinous materials, or corrosion of aluminum materials.
- Do not locate the vent termination directed towards a window or any other structure which has glass or wired glass facing the termination.
- Take care that noise and exhaust gas will not affect neighbors.
- If the appliance is installed in a location with very high humidity, condensate may form inside the appliance and/or cause incomplete combustion, damage to the electrical components, or electric leakage.

Install according to regulations and manual
- Install the Combi Boiler in an area that allows for the proper clearances to combustible and non-combustible construction. Consult the rating plate on the appliance for proper clearances.
- The Combi Boiler must be installed according to manual.
- Before installing, make sure that the exhaust flue termination will have the proper clearances according to the National Fuel Gas Code (ANSI Z223.1 - latest edition) or the Natural Gas and Propane Installation Code (CSA B149.1).
Installation in the vicinity of gas ranges, stoves, fans, and range hoods

- Avoid installation above gas ranges or stoves.
- Avoid installation between the kitchen fan and stove. If oily fumes or a large amount of steam are present in the installation location, take measures to prevent the fumes and steam from entering in the appliance.

- Install in a location where the exhaust gas flow will not be affected by fans or range hoods.

NOT CORRECT

NOT CORRECT

CAUTION

CORRECT

NOTE

Place the appliance for easy access for maintenance and repair.

Do not install the Combi Boiler in a location where the appliance will be exposed to excessive winds.

Locate the appliance in an area where leakage from the appliance or connections will not result in damage to the area adjacent to the appliance or to the lower floors of the structure. When such installation locations cannot be avoided, a suitable drain pan, adequately drained, must be installed under the appliance. The pan must not restrict combustion air flow.

As with any water heating appliance, the potential for leakage at some time in the life of the product does exist. The manufacturer will not be responsible for any water damage that may occur.

- Water quality:
  If this Combi Boiler will be installed in a location where the hardness of the supply water is high, scale build-up may cause damage to the Plate Heat Exchanger. Perform suggested treatment and maintenance measures in reference to “8.2 Water Treatment”.
  Damage to the Combi Boiler as a result of the below is not covered by the Pavilion Limited Warranty.
  - Water in excess of 12 gpg (200 mg/L) of hardness
  - Poor water quality (see the following table)

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Maximum Allowable Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Hardness*</td>
<td>200 mg/L (12 gpg) or less</td>
</tr>
<tr>
<td>Aluminum</td>
<td>0.05 to 0.2 mg/L or less</td>
</tr>
<tr>
<td>Chloride</td>
<td>250 mg/L or less</td>
</tr>
<tr>
<td>Copper</td>
<td>1.0 mg/L or less</td>
</tr>
<tr>
<td>Iron</td>
<td>0.3 mg/L or less</td>
</tr>
<tr>
<td>Manganese</td>
<td>0.05 mg/L or less</td>
</tr>
<tr>
<td>pH</td>
<td>6.5-8.5</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>500 mg/L or less</td>
</tr>
<tr>
<td>Zinc</td>
<td>5 mg/L or less</td>
</tr>
<tr>
<td>Sulfate</td>
<td>250 mg/L or less</td>
</tr>
<tr>
<td>Residual chlorine*</td>
<td>4 mg/L or less</td>
</tr>
</tbody>
</table>

Source: EPA National Secondary Drinking Water Regulations (40 CFR Part 143.3)

* Maximum limit suggested/approved by the manufacturer.

NOTE Consult with the customer concerning the location of installation.
State of California: The Combi Boiler must be braced, anchored or strapped to avoid moving during an earthquake. Contact local utilities for code requirements in your area or call 1-855-443-8468 and request instructions.

For Venting Manufacturers Requirements, see the Pavilion website (https://www.peerlessboilers.com/).
4 Installation Clearances

**WARNING**

**Before installing, check for the following:**
Install in accordance with relevant building and mechanical codes, as well as any local, state or national regulations, or in the absence of local and state codes, refer to National Fuel Gas Code ANSI Z223.1 / NFPA 54- latest edition. In Canada, see the Natural Gas and Propane Installation Code CSA B149.1- latest edition for detailed requirements.

### 4.1 Indoor Installation

#### Required Clearances From the Combi Boiler

Maintain the clearances from both combustible and non-combustible materials.

![Diagram of required clearances](image)

- 12 in. (300 mm) or more
- 4 in. (100 mm) or more
- 3 in. (76 mm) or more

#### Securing of space for inspection/repair

In order to facilitate inspection and repair, the minimum clearances should be met.

![Diagram of securing space](image)

- * 3 in. (76 mm) or more
- ** 8 in. (203 mm) or more
- 24 in. (610 mm) or more

### 4.2 For Quick Connect Multi-System

The Quick Connect Cord is 6 ft (1.8 m) long. Install the units 3-18 in. (76-457 mm) apart from each other to ensure the cord will be able to reach between the units.

![Diagram of units and cord](image)

- 3-18 in. (76-457 mm)

#### Cooking Equipment

When utilizing an indoor air supply, if the Combi Boiler will be installed in the vicinity of a permanent kitchen range or stove that has the possibility of generating steam that contains fats or oils, use a dividing plate or other measure to ensure that the Combi Boiler is not exposed to air containing such impurities.
5 Installation of the Combi Boiler

5.1 Mounting the Combi Boiler to the wall

**WARNING**
Do not drop or apply unnecessary force to the appliance when installing. Internal parts may be damaged and may become highly dangerous.

**CAUTION**
- Protect your hands with gloves and take caution to not inflict injury.
- Be careful not to hit electrical wiring, gas, or water piping while drilling holes.

**NOTICE**
- The weight of the appliance will be applied to the wall. If the strength of the wall is not sufficient, reinforcement must be done to prevent the transfer of vibration.
- Install the appliance on a vertical wall and ensure that it is level.

1. Ensure that the Wall Mounting Bracket is leveled.
   Drill holes for the Wall Mounting Bracket and affix the Wall Mounting Bracket securely to the wall by 5 screws.
   Finally, make sure the bracket can support the weight of the Combi Boiler.

2. Hang the Combi Boiler on the Wall Mounting Bracket.

3. Affix the Mounting Bracket (Lower) to the wall by 2 screws.
5.2 Elevation Adjustment Above 2,000 ft

- Adjust the DIP switches as illustrated in the table below, if this Combi Boiler is installed at an altitude of 2,000 ft (610 m) or higher.
- Disconnect the electrical power and then adjust the DIP switches.
Refer to page 68 for the location of the DIP switch bank and how to change the DIP switches.
Failure to perform this step will result a “73” code displayed on the Operation Display and a cease in operation.
If this occurs, disconnect, then reconnect the electrical power to the Combi Boiler to reset the system.

**NOTE** Do not change any other DIP switches.

<table>
<thead>
<tr>
<th>High elevation adjustment</th>
<th>DIP switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2,000 ft (0-610 m)</td>
<td>○ ○</td>
</tr>
<tr>
<td>2,001-4,000 ft (611-1,219 m)</td>
<td>● ○</td>
</tr>
<tr>
<td>4,001-7,000 ft (1,220-2,134 m)</td>
<td>○ ●</td>
</tr>
<tr>
<td>7,001-10,000 ft (2,135-3,048 m)</td>
<td>● ●</td>
</tr>
</tbody>
</table>

5.3 Filling the condensate container with water

**DANGER**
Prior to initial start up, make sure that you fill the condensate container with water.
This is to prevent dangerous exhaust gases from entering the building.
Failure to fill the condensate container could result in severe personal injury or death.

Follow the procedure described below to ensure that the condensate container is filled with water.

Fill the condensate container by pouring approx. 10 oz. (280 mL) of water into the exhaust flue on the top of the Combi Boiler as illustrated below.

If the vent pipe has already been installed:
After installing the condensate drain pipe, make sure that the area around the Combi Boiler is well ventilated; open a window or a door if necessary.
Then, operate the Combi Boiler and verify that condensate is coming out of the condensate drain pipe.
(During normal use of the Combi Boiler, condensate will begin to discharge from the condensate drain pipe within 15 minutes of use. However, depending on the season and/or installation site conditions, it may take longer.)
6 Venting the Combi Boiler

**WARNING**

CARBON MONOXIDE POISONING
Follow all vent system requirements in accordance with relevant local or state regulation, or, in the absence of local or state code, if in the U.S., refer to the National Fuel Gas Code ANSI Z223.1 / NFPA 54 - latest edition, and if in Canada, in accordance with the Natural Gas and Propane Installation Code CSA B149.1 - latest edition.

**CAUTION**

Outdoor installation
- The Combi Boiler is designed for either indoor or outdoor installation. For information about outdoor installation, contact Pavilion Customer Center at https://www.peerlessboilers.com/ or 1-855-443-8468.

Never install it in a bathroom, it may be damaged or a fire may be caused.

6.1 Venting Installation Sequence

1. Install the Combi Boiler.
2. Determine the termination method—horizontal or vertical, etc.
3. Determine proper location for wall or roof penetration for each termination.

**NOTE** Do not exceed maximum allowed vent lengths as described in this manual.

4. Install termination assembly as described in this manual or in the vent manufacturer’s instructions.
   If necessary, install Bird Screen (not supplied with Combi Boiler).
5. Install combustion air and exhaust vent piping from Combi Boiler to termination.
6. Slope the horizontal vent 1/4 in. upwards for every 12 in. (305 mm) toward the termination.
7. Install supports and hanger straps allowing for movement from expansion, or as per vent pipe manufacturer’s instructions or local code requirements.

6.2 General Requirements

6.2.1 Vent Piping Material

- **This is a Category IV appliance.**
  Only vent materials approved for use with Category IV appliances shall be used.

  - Under normal conditions, this Combi Boiler will not produce an exhaust flue temperature in excess of 149°F (65°C).

For PVC/CPVC/PP material

- Schedule 40 PVC pipe may be used as the vent material. **If required by local code, use schedule 40/80 CPVC or PP.**
- **If the Combi Boiler set temperature is 160°F (70°C) or higher, use schedule 40/80 CPVC or PP.** Refer to the following.
- This Combi Boiler must be vented with plastic pipe materials as specified in the table below. Vent installations in Canada which utilize plastic vent systems must comply with ULC S636.

<table>
<thead>
<tr>
<th>Exhaust Vent / Air Intake</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule 40 PVC</td>
<td>ANSI/ASTM D1785</td>
<td>CSA B137.3</td>
</tr>
<tr>
<td>PVC-DWV</td>
<td>ANSI/ASTM D2665</td>
<td>CSA B181.2</td>
</tr>
<tr>
<td>Schedule 40 CPVC</td>
<td>ANSI/ASTM F441</td>
<td>CSA B137.3</td>
</tr>
<tr>
<td>Polypropylene (PP)*</td>
<td>Centrotherm - InnoFlue® (certified ULC S636), DuraVent PolyPro® (certified ULC S636)</td>
<td></td>
</tr>
<tr>
<td>System 1738™ PVC Fuel Gas Venting</td>
<td>IPEX Management Inc. (certified UL 1738)</td>
<td></td>
</tr>
</tbody>
</table>

* Only listed manufacture specified vent parts may be used for this Combi Boiler. Refer to the manufacture’s literature for detailed information.

- **Approved Vent Manufacture:**
  - Centrotherm - InnoFlue® PP
  - DuraVent PolyPro®

**Applicable vent termination are “90° elbow” or “Tee type”. Concentric vent termination of polypropylene are prohibited.**
**WARNING**

Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic venting system is prohibited.

- Use only solid PVC / CPVC (schedule 40) or PP pipe.
- 2 in. or 3 in. schedule 80 pipe may also be used on this Combi Boiler, however the Btu/h input of the Combi Boiler will be reduced by up to 9%.
- Maintain the same vent pipe diameter from the Combi Boiler flue to the termination.
- In Canada, plastic vent systems must be certified to ULC S636. The components of the certified vent system must not be interchanged with other vent systems or unlisted pipe/fitness.
- In Canada, specified primers and glues of the ULC S636 certified vent system must be from a single system manufacturer and not intermixed with other system manufacturer’s vent system parts.

**NOTE** Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

**For flexible pipe for chimney**

- During the installation, ambient temperatures must be greater than 40 °F (5 °C). Afterwards, installation site ambient temperature must be greater than -4 °F (-20 °C). Flexible vent pipe breakage may occur if these temperature requirements are not observed.
- Only listed manufacture specified vent parts may be used for this appliance. Refer to the manufacture’s literature for detailed information.

<table>
<thead>
<tr>
<th>Material</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>ANSI/ASTM D2564</td>
<td>ULC S636 Certified Materials Only</td>
</tr>
<tr>
<td>CPVC</td>
<td>ANSI/ASTM F493</td>
<td></td>
</tr>
</tbody>
</table>

**- DuraVent®- Flex Through Chimney w/ Air Intake**

<table>
<thead>
<tr>
<th>Exhaust</th>
<th>Intake</th>
<th>Exhaust &amp; Intake*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flex Chimney Lining Kit (3 in.): 3PPS-FKL</td>
<td>Aluminum Flex Length (3 in.): 3DFA-xx</td>
<td>Elbow (3 in.): 3PPS-E45L, 3PPS-E90L</td>
</tr>
<tr>
<td>Flex Length (3 in.): 3PPS-FLEXxx</td>
<td>Coupler (3 in.): 3DFA-FCP</td>
<td>Single-Wall Pipe (3 in.): 3PPS-xxL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appliance Adapter for PVC Coupler (2 in.): 2PPS-ADL,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increaser: 2PPS-X3L</td>
</tr>
</tbody>
</table>

**- Centrotherm- InnoFlue® PP**

<table>
<thead>
<tr>
<th>Exhaust</th>
<th>Intake</th>
<th>Exhaust &amp; Intake*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chimney Kit (3 in.): IFCK03xx, Flexible Pipe PP (3 in.): IFVL03xxx</td>
<td>Single Wall Pipe (3 in.): ISVL03xx(UV), ISEP03xx</td>
<td>Single Wall Pipe (3 in.): ISVL03xx(UV), ISEP03xx</td>
</tr>
<tr>
<td></td>
<td>Bird Screen: IASPP03</td>
<td>Elbow (3 in.): ISEL0387UV, ISEL0345UV, ISEL0387, ISEL0345,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increaser: ISIA0203</td>
</tr>
</tbody>
</table>

* Recommended items.
** Applicable vent termination are “87° elbow” or “Tee type”.
Concentric vent termination of polypropylene are prohibited.

### 6.2.2 Installation Instructions

**WARNING**

**CARBON MONOXIDE POISONING**
- Failure to properly seal the vent system could cause flue products to enter the living space.
- (For flexible pipe for chimney)
Handle the flexible vent carefully.
Dropping, Crushing and Stacking may cause damage, and may result in fires, property damage or exposure to Carbon Monoxide.

- Follow all general venting guidelines as outlined in this manual.
- Clearance described in this document is the minimum recommendation/required distance. Take appropriate clearance according to the situations of the site.
- Make sure the vent system is gas tight and will not leak.
- Support the vent pipe with hangers at regular intervals as specified by these instructions or the instructions of the vent manufacturer.
- All piping must be fully supported. Use pipe hangers at a minimum of 3 ft (0.9 m) intervals.

**NOTE**
- Do not use the Combi Boiler to support the vent piping.
- Do not common vent or connect more than one appliance to this venting system.

- Ensure at least 3 ft (0.9 m) or more distance between the near edge of the air intake pipe or exhaust pipe to the inside corner of a wall.

- [Pipe Cement / Primer]

<table>
<thead>
<tr>
<th>Material</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>ANSI/ASTM D2564</td>
<td>ULC S636 Certified Materials Only</td>
</tr>
<tr>
<td>CPVC</td>
<td>ANSI/ASTM F493</td>
<td></td>
</tr>
</tbody>
</table>

- [Diagram of venting system]
For PVC/CPVC/PP material

• When preparing and assembling the pipe, follow instructions as provided by the pipe manufacturer. In general, the following practices must be observed:
  - Squarely cut all pieces of pipe.
  - Remove all burrs and debris from joints and fittings.
  - All joints must be properly cleaned, primed, and cemented. Use only cement and primer approved for use with the pipe material as outlined on page 20.
• PVC, CPVC or PP pipe has been approved for use on this Combi Boiler with zero clearance to combustibles.
• The pipe shall be installed so that the first 3 ft (0.9 m) of pipe from the Combi Boiler flue outlet is readily accessible for visual inspection.

[How to tighten the Vent Pipe]

1. Continue to insert the Vent Pipe until it reaches to the base of the Combi Boiler Exhaust and Intake Flue.
   • The Vent Pipe will be inserted approximately 2.3 in. (60 mm).
2. Secure the Vent Pipe by tightening the band using a screwdriver.
   • The tightening torque shall be the following:
     - For PVC/CPVC pipe: between 16 and 20 in lb
     - For PP pipe: between 12 and 15 in lb

For flexible pipe for chimney

• Every venting system must be properly planned and installed for optimum performance and safety. A flexible pipe installation always begins with an inspection of the existing masonry chimney (Chimney must be clean, sized correctly, properly constructed and in good condition, if being installed in a chimney as a liner). Inspect chimney to make certain it is constructed according to the latest revision of the NFPA211. Local codes may differ from this code and should be checked. Where there is a conflict, the local code will prevail. In Canada refer to the National Building Code or CSA-A405 as applicable.
### 6.2.3 Termination Considerations

- Do not store hazardous or flammable substances near the vent termination and check that the termination is not blocked in any way.
- Steam or condensed water may come out from the vent termination. Select the location for the termination as to prevent injury or property damage.
- If snow is expected to accumulate, make sure the termination will not be covered with snow or hit by falling lumps of snow.
- (For PVC/CPVC/PP material) A bird screen must be installed on the vent terminations to prevent debris or animals from entering the piping. These screens are not supplied with the Combi Boiler and must be purchased separately.

<table>
<thead>
<tr>
<th>Vent Material</th>
<th>Bird Screen Parts #</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in. (50 mm) PVC or CPVC</td>
<td>Pavilion Stock Code: 1816</td>
</tr>
<tr>
<td>3 in. (75 mm) PVC or CPVC</td>
<td>Pavilion Stock Code: 1817</td>
</tr>
<tr>
<td>Centrotherm- 2 in. (50 mm) PP</td>
<td>IASPP02</td>
</tr>
<tr>
<td>Centrotherm- 3 in. (75 mm) PP</td>
<td>IASPP03</td>
</tr>
<tr>
<td>DuraVent- 2 in. (60 mm) PP</td>
<td>2PPS-BG</td>
</tr>
<tr>
<td>DuraVent- 3 in. (80 mm) PP</td>
<td>3PPS-BG</td>
</tr>
</tbody>
</table>

- The following termination can also be used.
  - Termination Manufacturer: IPEX Management Inc.
  - Item description

<table>
<thead>
<tr>
<th>Item</th>
<th>Stock Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Concentric Vent Kit (UCVK)*</td>
<td>1819</td>
</tr>
<tr>
<td>(PVC ULC S636/UL 1738- Certified for use in both Canada and USA)</td>
<td>(397007)</td>
</tr>
<tr>
<td>IPEX Low Profile Termination Kit**</td>
<td>1820</td>
</tr>
<tr>
<td>(PVC ULC S636/UL 1738- Certified for use in both Canada and USA)</td>
<td>(397100)</td>
</tr>
<tr>
<td></td>
<td>1820-1</td>
</tr>
<tr>
<td></td>
<td>(397101)</td>
</tr>
</tbody>
</table>

**NOTE** Below are additional models approved for use by the manufacturer and supplied by IPEX. Refer to the IPEX literature or web site for additional details.

* Universal Concentric Vent Kit:
  - **USA** #397256- PVC System 1738
  - **Canada** #196256- PVC System 636
  #197256- CPVC System 636

** Low Profile Termination Kit:
  - **USA** #397984- 2” PVC System 1738
  #397985- 3” PVC System 1738
  - **Canada** #196984- 2” PVC System 636
  #196985- 3” PVC System 636

### 6.2.4 Maximum Vent Length

- This Combi Boiler has been designed to be vented with either 2 in. (50 mm) or 3 in. (75 mm) PVC, CPVC, PP, or 3 in. (75 mm) flexible pipe for chimney.
- The minimum total vent length including horizontal and vertical vent runs should not be less than:
  - PVC/CPVC/PP, 3 in. (75 mm) flexible pipe for chimney: 3 ft (0.9 m)
- The Combi Boiler can be adjusted to accommodate longer vent runs; refer to the table below. Do not exceed the maximum vent length.
- Disconnect the electrical power and then adjust the DIP switches according to the vent condition noted in the tables below.
- Refer to page 68 for the location of the DIP switch bank and how to change the DIP switches. Failure to perform this step will result a “73” code displayed on the Operation Display and a cease in operation.
- If this occurs, disconnect, then reconnect the electrical power to the Combi Boiler to reset the system.

**NOTE**
- When adjusting the DIP switches for longer vent runs, the Btu/h input of the Combi Boiler will be reduced by up to 9%.
- Do not change any other DIP switches.

### Maximum Vent Length Configurations (For PVC/CPVC/PP material)

- The maximum vent length when using 2 in. (50 mm) pipe is 60 ft.
- The maximum vent length when using 3 in. (75 mm) pipe is 100 ft.

**Both maximum lengths are reduced by the number of elbows used, as shown in the following table:**

<table>
<thead>
<tr>
<th>Vent diameter</th>
<th>Maximum equivalent vent length<strong>1</strong> V (Vertical) + H (Horizontal)</th>
<th>Maximum # of elbows<strong>2</strong></th>
<th>Equivalent length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 in.</td>
<td>60 ft (18 m)</td>
<td>6</td>
<td>90° elbow: 5 ft (1.5 m)</td>
</tr>
<tr>
<td>3 in.</td>
<td>100 ft (30 m)</td>
<td>8</td>
<td>45° elbow: 3 ft (0.9 m)</td>
</tr>
</tbody>
</table>

*1 The maximum vent length includes elbows.
*2 Not including the termination.

**NOTE** Below are additional models approved for use by the manufacturer and supplied by IPEX. Refer to the IPEX literature or web site for additional details.
### [DIP Switch Adjustment]

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>#7</th>
<th>#8</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Less than 33 ft using 2 in. (50 mm) pipe</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>② 33 ft or more using 2 in. (50 mm) pipe</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>③ Less than 50 ft using 3 in. (75 mm) pipe</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>④ 50 ft or more using 3 in. (75 mm) pipe</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### [Vent length Calculation example]

**Step 1:**
Vent Diameter
2 in.

**Step 2:**
Straight pipe length
(Vertical length + Horizontal length)
17 ft

**Step 3:**
Number of elbows
90° elbows: 2
45° elbows: 2

**Step 4:**
Calculate equivalent length
90° elbows: 2 × 5 ft = 10 ft
45° elbows: 2 × 3 ft = 6 ft

**Step 5:**
Total vent length
(Add Step 2 and Step 4 together)
17 ft + 16 ft = 33 ft

**Step 6:**
Check [DIP Switch Adjustment] and select DIP switch settings.

② [33 ft or more using 2 in. (50 mm) pipe]
(i.e., turn ON DIP switch #7)

### Maximum Vent Length Configurations (For flexible pipe for chimney)

**[DuraVent® - Flex Through Chimney w/ Air Intake (Only 3 in.)]***

The vent length condition setting depends on the flexible pipe length, the rigid pipe length and number of elbows. Calculate each ventilation system equivalent length, then adjust the DIP switch.

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switch #7</th>
<th>Maximum equivalent vent length*&lt;br&gt;V (Vertical) + H (Horizontal)</th>
<th>Equivalent length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>&lt; 50 ft (15 m)</td>
<td>Flexible pipe: 1 ft (0.3 m) Rigid pipe: 1 ft (0.3 m) 90° elbow: 5 ft (1.5 m) 45° elbow: 3 ft (0.9 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>50 ft (15 m)–75 ft (22.5 m)</td>
<td></td>
</tr>
</tbody>
</table>

* The maximum vent length includes elbows.

### Equivalent vent length calculation example:

**[Example 1]**
- Vent Size: 3 in.
- V (Vertical length): 20 ft
- H (Horizontal length): 6 ft
- 90° elbow: 2

1 ft × 20 + 1 ft × 6 + 5 ft × 2 = 36 ft
Total equivalent length ≤ 50 ft

**Select “Short length”**

**[Example 2]**
- Vent Size: 3 in.
- V (Vertical length): 35 ft
- H (Horizontal length): 10 ft
- 90° elbow: 3

1 ft × 35 + 1 ft × 10 + 5 ft × 3 = 60 ft
50 ft < Total equivalent length ≤ 75 ft

**Select “Long length”**
Below items are required for connecting.

- 2PPS-X3L (DuraVent®)
- 2PPS-ADL (DuraVent®)
- 2 in. PVC/CPVC coupler
- 2 in. PVC/CPVC pipe

**Slope the Vents Upward**

---

**[Centrotherm® - Flex Through Chimney w/ Air Intake (Only 3 in.)]**

The vent length condition setting depends on the flexible pipe length, the rigid pipe length and number of elbows. Calculate an each ventilation system equivalent length, then adjust the DIP switch.

---

### Vent Length Condition

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switch #7</th>
<th>Maximum equivalent vent length</th>
<th>Equivalent length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>Exhaust vent V (Vertical) + H (Horizontal): &lt; 50 ft (15 m)</td>
<td>Flexible pipe: 1 ft (0.3 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air Intake: &lt; 50 ft (15 m)</td>
<td>Rigid pipe: 1 ft (0.3 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>87° elbow: 5 ft (1.5 m)</td>
<td>45° elbow: 3 ft (0.9 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>Exhaust vent V (Vertical) + H (Horizontal): 50 ft (15 m)–75 ft (22.5 m)</td>
<td>Air Intake: 50 ft (15 m)–75 ft (22.5 m)</td>
</tr>
</tbody>
</table>

ON = ● / OFF = ○

*The maximum vent length includes elbows.*

---

**• Equivalent vent length calculation example:**

**[Example 1]**
- Vent Size: 3 in.
- V (Vertical length): 25 ft
- H (Horizontal length): 5 ft
- 87° elbow: 2

\[
1 \text{ ft} \times 25 + 1 \text{ ft} \times 5 + 5 \text{ ft} \times 2 = 40 \text{ ft}
\]

Total equivalent length ≤ 50 ft

Select “Short length”

**[Example 2]**
- Vent Size: 3 in.
- V (Vertical length): 30 ft
- H (Horizontal length): 10 ft
- 87° elbow: 3

\[
1 \text{ ft} \times 30 + 1 \text{ ft} \times 10 + 5 \text{ ft} \times 3 = 55 \text{ ft}
\]

50 ft < Total equivalent length ≤ 75 ft

Select “Long length”

---

**Slope the Vents Upward**
6.3 Select a Vent Type

Direct Vent
Combustion air is supplied from the outdoors. Combustion air and exhaust are separate vent pipes.

Non-Direct Vent (with SV Conversion Kit)
Combustion air is supplied from the surrounding indoor air.

WARNING
Exhaust gasses and combustion air must not be combined into a single PVC pipe using a "Y" fitting.
6.4 Vent Pipe Installation (Direct Vent)

### 6.4.1 Clearance Requirements from Vent Terminations to Building Openings

[When supplying combustion air from the outdoors]

- All clearance requirements are in accordance with ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1 and in Canada, in accordance with the Natural Gas and Propane Installation Code CSA B149.1.

![Diagram of vent terminal and clearance requirements]

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Canadian Direct Vent Installations</th>
<th>US Direct Vent Installations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clearance above grade, veranda, porch, deck, or balcony</td>
<td>12 in. (30 cm)</td>
<td>12 in. (30 cm)</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that may be opened</td>
<td>6 in. (15 cm) for appliances ≤ 10,000 Btuh (3kW), 12 in. (30 cm) for appliances &gt; 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30 kW), 36 in. (91 cm) for appliances &gt; 100,000 Btuh (30 kW)</td>
<td>6 in. (15 cm) for appliances ≤ 10,000 Btuh (3kW), 9 in. (23 cm) for appliances &gt; 10,000 Btuh (3kW) and ≤ 50,000 Btuh (15 kW), 12 in. (30 cm) for appliances &gt; 50,000 Btuh (15 kW)</td>
</tr>
<tr>
<td>C</td>
<td>Clearance to permanently closed window</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>D</td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>E</td>
<td>Clearance to unventilated soffit</td>
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<td>F</td>
<td>Clearance to outside corner</td>
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<td>G</td>
<td>Clearance to inside corner</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>H</td>
<td>Clearance to each side of center line extended above meter/ regulator assembly</td>
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<td>*</td>
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<td>I</td>
<td>Clearance to service regulator vent outlet</td>
<td>Above a regulator within 3 ft (91 cm) horizontally of the vertical center line of the regulator vent outlet to a maximum vertical distance of 15 ft (4.5 m)</td>
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</tr>
<tr>
<td>J</td>
<td>Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance</td>
<td>6 in. (15 cm) for appliances ≤ 10,000 Btuh (3kW), 12 in. (30 cm) for appliances &gt; 10,000 Btuh (3kW) and ≤ 100,000 Btuh (30 kW), 36 in. (91 cm) for appliances &gt; 100,000 Btuh (30 kW)</td>
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</tr>
<tr>
<td>K</td>
<td>Clearance to a mechanical air supply inlet</td>
<td>6 ft (1.83 m)</td>
<td>3 ft (91 cm) above if within 10 ft (3 m) horizontally</td>
</tr>
<tr>
<td>L</td>
<td>Clearance above paved sidewalk or paved driveway located on public property</td>
<td>7 ft (2.13 m)†</td>
<td>*</td>
</tr>
<tr>
<td>M</td>
<td>Clearance under veranda, porch, deck, or balcony</td>
<td>12 in. (30 cm)‡</td>
<td>*</td>
</tr>
</tbody>
</table>

1 In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code
2 In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code
† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.
‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
* Clearance in accordance with local installation codes and the requirements of the gas supplier. Clearance to opposite wall is 24 in. (60 cm).
### 6.4.2 Horizontal Vent Termination

**For Horizontal Vent Termination - PVC/CPVC Material Only**

- Use a condensation drain if necessary.
- In the Commonwealth of Massachusetts a carbon monoxide detector is required for all side wall horizontally vented gas fuel equipment. Refer to the page 4 for more detail information.

---

#### Possible Orientations

- 3 in. (75 mm) pipe and 2 in. × 3 in. Increaser couplings required when using plastic horizontal hood terminations. Increaser couplings must be installed just above the units vent flue connections.
- Slope the horizontal exhaust vent 1/4 in. upwards for every 12 in. (305 mm) toward the termination.

---

#### (e.g. Horizontal Hood Termination installation)

- Intake* 3 in. (75 mm)
- Exhaust* 3 in. (75 mm) or 2 in. (50 mm)
- The PVC/CPVC elbow may be used in place of Hood Termination as the horizontal vent termination.
- * When choosing intake and exhaust terminations, you must use the same type of elbow (i.e. both 90° elbows). This will help with proper combustion by putting both terminations in the same pressure zone.

---

#### (e.g. Low Profile Termination)

- Intake
- Exhaust
- 2 in. or 3 in. Low Profile Termination
- ≥ 12 in. (305 mm) Min.
- If 3 ft (0.9 m) distance between Intake and Exhaust cannot be ensured, the installation can be carried out only in the installation method shown in “Alternate Horizontal Vent Termination”.

---

* ceiling

* wall

* intake

* exhaust

* overhang
Alternate Horizontal Vent Termination- PVC, CPVC or PP Material
(When 3 ft (0.9 m) distance between Intake and Exhaust cannot be ensured.)

**WARNING**
- If the distance between the air inlet and exhaust vent terminations is too short, the Combi Boiler will draw in the exhaust gases through the intake. There is a risk of inadequate combustion air for the Combi Boiler, thus increasing Carbon Monoxide (CO) emissions and noise due to vibration.
- Termination elbows must be oriented vertically, pointing directly downward. Attempts to prevent exhaust air from entering the air inlet by angling termination elbows in directions other than directly downward will increase the risk of freezing.
- Reversing the air intake and exhaust pipes is not allowed. Carbon Monoxide (CO) emissions and noise due to vibration will increase.

- Insert the bird screen into the 90° elbow installed vertically downward.
- Intake and exhaust should face the same direction. Intake and exhaust should keep the same pressure zone.

**NOTE** Do not use Hood termination.
For Horizontal PVC Concentric Termination - PVC/CPVC Material Only

- The concentric termination may be shortened, but not lengthened from its original factory supplied length.
- 2 in. (50 mm) or 3 in. (75 mm) PVC or CPVC pipe may be used with the concentric termination. Maintain the same vent pipe diameter from the Combi Boiler flue to the termination.
- Use a condensation drain if necessary.
- In the Commonwealth of Massachusetts a carbon monoxide detector is required for all side wall horizontally vented gas fuel equipment. Refer to the page 4 for more detail information.

For Universal Concentric Vent Kit

- Insert Bird Screen in End of Termination. Bird Screen is not supplied with Combi Boiler. It is included in PVC Concentric Termination.

When using 3 in. Concentric Termination, 3 in. (75 mm) pipe and 2 in. - 3 in. Increaser couplings are required. Increaser couplings must be installed just above the Combi Boilers vent flue connections.

* The length of the pipe between the Increaser couplings and the Exhaust and Intake Flue of the Combi Boiler should be up to 6 in. (152 mm).

(e.g. 2 in. Concentric Termination installation)
6.4.3 Vertical Vent Termination

For Vertical Vent Termination - PVC, CPVC or PP Material

*About the termination
- When choosing intake and exhaust terminations, you must use the same type of elbow (i.e. both 90° elbows).
- This will help with proper combustion by putting both terminations in the same pressure zone.
- Insert Bird Screen in End of 90° Elbow.
- Bird Screen is not supplied with Combi Boiler, order separately.
- To prevent excessive condensation formation, only the vent termination should be located on the exterior of the building.

- The combustion air intake of any appliance
- Any other building opening

When the vent termination is located not less than 8 ft (2.4 m) from a vertical wall or similar obstruction, terminate above the roof at least 2 ft (0.6 m), but not more than 6 ft (1.87 m), in accordance with the National Fuel Gas Code ANSI Z223.1 / NFPA 54 or Natural Gas and Propane Installation Code CSA B149.1.

Provide vertical support every 3 ft (0.9 m) or as required by the vent pipe manufacturer’s instructions.

• A short horizontal section is required to prevent debris from falling into the Combi Boiler.
• When using a horizontal section, slope the horizontal vent 1/4 in. upwards for every 12 in. (305 mm) toward the termination to drain condensate.

* The length of the pipe between the Increaser couplings and the Exhaust and Intake Flue of the Combi Boiler should be up to 6 in. (152 mm).

Intake
2 in. (50 mm) or
3 in. (75 mm)

Exhaust
2 in. (50 mm) or
3 in. (75 mm)

Support
Firestop

<table>
<thead>
<tr>
<th>2 in. × 3 in. Increaser couplings are required when using 3 in. (75 mm) pipe.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 in. pipe</td>
</tr>
<tr>
<td>2 in. × 3 in. Increaser coupling</td>
</tr>
<tr>
<td>2 in. pipe*</td>
</tr>
</tbody>
</table>

* The length of the pipe between the Increaser couplings and the Exhaust and Intake Flue of the Combi Boiler should be up to 6 in. (152 mm).
For Vertical PVC Concentric Termination - PVC/CPVC Material Only

- The concentric termination may be shortened, but not lengthened from its original factory supplied length.
- 2 in. (50 mm) or 3 in. (75 mm) PVC or CPVC pipe may be used with the concentric termination. Maintain the same vent pipe diameter from the Combi Boiler flue to the termination.
- Use a condensation drain if necessary.
- In the Commonwealth of Massachusetts a carbon monoxide detector is required for all side wall horizontally vented gas fuel equipment. Refer to the page 4 for more detail information.

** The length of the pipe between the Increaser couplings and the Exhaust and Intake Flue of the Combi Boiler, and the concentric termination vent pipe connections should be up to 6 in. (152 mm).
6.5 Vent Pipe Installation (Non-Direct Vent)

6.5.1 Clearance Requirements from Vent Terminations to Building Openings
[Other than Direct Vent]

- All clearance requirements are in accordance with ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1 and in Canada, in accordance with the Natural Gas and Propane Installation Code CSA B149.1.

<table>
<thead>
<tr>
<th>Ref</th>
<th>Description</th>
<th>Canadian Non-Direct Vent Installations ¹</th>
<th>US Non-Direct Vent Installations ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clearance above grade, veranda, porch, deck, or balcony</td>
<td>12 in. (30 cm)</td>
<td>12 in. (30 cm)</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that may be opened</td>
<td>6 in. (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in. (30 cm) for appliances &gt; 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in. (91 cm) for appliances &gt; 100,000 Btuh (30 kW)</td>
<td>4 ft (1.2 m) below or to side of opening; 1 ft (300 mm) above opening</td>
</tr>
<tr>
<td>C</td>
<td>Clearance to permanently closed window</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>D</td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>E</td>
<td>Clearance to unventilated soffit</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>F</td>
<td>Clearance to outside corner</td>
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<tr>
<td>H</td>
<td>Clearance to each side of center line extended above meter/regulator assembly</td>
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</tr>
<tr>
<td>J</td>
<td>Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance</td>
<td>6 in. (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 in. (30 cm) for appliances &gt; 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 in. (91 cm) for appliances &gt; 100,000 Btuh (30 kW)</td>
<td>4 ft (1.2 m) below or to side of opening; 1 ft (300 mm) above opening</td>
</tr>
<tr>
<td>K</td>
<td>Clearance to a mechanical air supply inlet</td>
<td>6 ft (1.83 m)</td>
<td>3 ft (91 cm) above if within 10 ft (3 m) horizontally</td>
</tr>
<tr>
<td>L</td>
<td>Clearance above paved sidewalk or paved driveway located on public property</td>
<td>7 ft (2.13 m) †</td>
<td>*</td>
</tr>
<tr>
<td>M</td>
<td>Clearance under veranda, porch, deck, or balcony</td>
<td>12 in. (30 cm) ‡</td>
<td>*</td>
</tr>
</tbody>
</table>

¹ In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code
² In accordance with the current ANSI Z223.1 / NFPA 54 National Fuel Gas Code
† A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.
‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
* Clearance in accordance with local installation codes and the requirements of the gas supplier. Clearance to opposite wall is 24 in. (60 cm).
### 6.5.2 Consideration for Installation

**DANGER**
- When installing this Combi Boiler in an area with a large amount of lint such as a commercial Laundromat, direct vent (“-DV”) system must be used. The “-SV” configuration (using SV Conversion Kit) is prohibited.
- When installing this Combi Boiler in a mobile home, all combustion must be drawn directly from the outdoors. The “-SV” configuration (using SV Conversion Kit) is prohibited.

**For SV Conversion Kit**

**WARNING**
Failure to change DIP switch #3 and use SV Conversion Kit could result in a fire or explosion causing property damage, personal injury or death.
Refer to the instructions provided with the conversion kit for additional details.

- Disconnect the electrical power and then turn ON DIP switch #3 if combustion air will be supplied from the indoors. Refer to page 68 for the location of the DIP switch bank and how to change the DIP switch. Failure to perform this step will result a “73” code displayed on the Operation Display and a cease in operation. If this occurs, disconnect, then reconnect the electrical power to the Combi Boiler to reset the system.
- SV Conversion Kit is required for the air intake.
- It is recommended that a carbon monoxide alarm installed in same room space as Combi Boiler when supplying combustion air from the indoors.

**WARNING**
To prevent possible personal injury or death due to asphyxiation, common venting with other manufacturer’s induced draft appliances is not allowed.

### 6.5.3 Combustion Air

**NOTE** Provide adequate combustion air so as to not create negative pressure within the building.

- A minimum free area of each opening:

<table>
<thead>
<tr>
<th>Indoor make up air is provided</th>
<th>200 in²</th>
</tr>
</thead>
<tbody>
<tr>
<td>example 20 in. (W) × 10 in. (H)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Outdoor make up air is provided</th>
<th>50 in²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct or Vertical ducts</td>
<td>example 10 in. (W) × 5 in. (H)</td>
</tr>
<tr>
<td>Horizontal ducts</td>
<td>100 in²</td>
</tr>
<tr>
<td>example 20 in. (W) × 5 in. (H)</td>
<td></td>
</tr>
</tbody>
</table>

Provide two permanent openings to allow circulation of combustion air.

- If the Combi Boiler is installed in a mechanical closet, a minimum of permanent clearance of 4 in. or more in front of the Combi Boiler is required. In order to facilitate maintenance and repair, a minimum clearance (24 in. or more) should be met.
- If combustion air will be provided through a duct, size the duct to provide 70 ft³ of fresh air per minute.
6.5.4 Horizontal Vent Termination

- Use a condensation drain if necessary.
- In the Commonwealth of Massachusetts a carbon monoxide detector is required for all side wall horizontally vented gas fuel equipment. Refer to the page 4 for more detail information.

Either a tee or the Hood Termination may be used for the vent termination.

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Either a tee or the Hood Termination may be used for the vent termination.
**6.5.5 Vertical Vent Termination**

**For SV Conversion Kit**

*About the termination*
- Insert Bird Screen in End of 90° Elbow.
- Bird Screen is not supplied with Combi Boiler, order separately.
- To prevent excessive condensation formation, only the vent termination should be located on the exterior of the building.

- The combustion air intake of any appliance
- Any other building opening

≥ 3 ft Min.

12 in. over maximum snow level

When the vent penetrates a floor or ceiling and is not running in a fire rated shaft, a firestop and support is required.

* ≥ 3 ft Min.

When the vent termination is located not less than 8 ft (2.4 m) from a vertical wall or similar obstruction, terminate above the roof at least 2 ft (0.6 m), but not more than 6 ft (1.87 m), in accordance with the National Fuel Gas Code ANSI Z223.1 / NFPA 54 or Natural Gas and Propane Installation Code CSA B149.1.

Provide vertical support every 3 ft (0.9 m) or as required by the vent pipe manufacturer’s instructions.

- A short horizontal section is required to prevent debris from falling into the Combi Boiler.
- When using a horizontal section, slope the horizontal vent 1/4 in. upwards for every 12 in. (305 mm) toward the termination to drain condensate.

*The length of the pipe between the increaser couplings and the Exhaust and Intake Flue of the Combi Boiler should be up to 6 in. (152 mm).*

2 in. × 3 in. Increaser coupling is required when using 3 in. (75 mm) pipe.

2 in. × 3 in. Increaser coupling

3 in. pipe

2 in. pipe*

2 in. × 3 in. pipe

*About the termination*

- Insert Bird Screen in End of 90° Elbow.
- Bird Screen is not supplied with Combi Boiler, order separately.
- To prevent excessive condensation formation, only the vent termination should be located on the exterior of the building.

- The combustion air intake of any appliance
- Any other building opening

≥ 3 ft Min.

12 in. over maximum snow level

When the vent penetrates a floor or ceiling and is not running in a fire rated shaft, a firestop and support is required.

* ≥ 3 ft Min.

When the vent termination is located not less than 8 ft (2.4 m) from a vertical wall or similar obstruction, terminate above the roof at least 2 ft (0.6 m), but not more than 6 ft (1.87 m), in accordance with the National Fuel Gas Code ANSI Z223.1 / NFPA 54 or Natural Gas and Propane Installation Code CSA B149.1.

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2 in. × 3 in. Increaser coupling

3 in. pipe

2 in. pipe*

2 in. × 3 in. pipe

*The length of the pipe between the increaser couplings and the Exhaust and Intake Flue of the Combi Boiler should be up to 6 in. (152 mm).*

2 in. × 3 in. Increaser coupling is required when using 3 in. (75 mm) pipe.
7 Connecting the Gas Supply

Follow the instructions from the gas supplier.

**WARNING**
The sizing and installation of the gas system for this Combi Boiler, as with any gas appliance, is the sole responsibility of the installer. The installer must be professionally trained to do such work and must always follow all local and national codes and regulations.

**Gas Type**
The gas type indicated on the Combi Boiler’s rating plate (NG or LP) must match the type of gas being supplied to the Combi Boiler.

**Gas Conversions**
- If the supplied gas does not match the gas type on the rating plate, contact your Combi Boiler supplier for a replacement Combi Boiler with the proper gas type.
- If a gas conversion is needed, there are conversion kits available for some models.
- The conversion kit shall be installed by a qualified service agency in accordance with the manufacturer’s instructions and all applicable codes and requirements of the authority having jurisdiction. The qualified service agency is responsible for the proper installation of this kit. Improper installation of this kit will void the Pavilion Limited Warranty. Conversion kits will only be shipped directly to the Distributor or Agency performing the conversion.

**Meter**
- The gas meter must be sized properly for the Combi Boiler and other gas appliances to operate properly.
- Select a gas meter capable of supplying the entire Btu/h demand of all gas appliances in the building.

**Regulators**

**WARNING**
- Ensure that all gas regulators used are operating properly and providing gas pressures within the specified range of the Combi Boiler being installed.
- Excess gas inlet pressure may cause serious accidents.

**Pressure**
- Check the gas supply pressure immediately upstream at a location provided by the gas company.
- Supplied gas pressure must be within the limits shown in the specifications section with all gas appliances operating.

**WARNING**
The inlet gas pressure must be within the range specified. This is for the purposes of input adjustment. Low gas pressure may cause a loss of flame or ignition failure at other appliances in the home, which may result in unburned gas in the home. Serious accidents such as fire or explosion may result.

**Pressure Test**
The appliance and its gas connections must be leak tested before placing the appliance in operation.

- Test at test pressures equal to or less than ½ psi (3.5 kPa).
- The appliance must be isolated from the gas supply piping system by closing its individual manual shut off valve during any pressure testing of the gas supply piping system.
- If test pressures are in excess of 1/2 psi (3.5 kPa), the appliance and its individual shut off valve must be completely disconnected from the gas supply piping system during the test process.

**Measuring Gas Pressure**
In order to check the gas supply pressure to the Combi Boiler, a tap is provided on the gas inlet.

1. Remove the 9/32 in. hex head /Phillips screw from the tap.
2. Connect a manometer using a silicon tube.
3. Open up at least two fixtures with hot water side fully.
4. Hold in the “Maximum Burner Set Button” on the circuit board.
Pipe Sizing

- A gas shut off valve must be installed on the supply line.
- Gas piping shall be in accordance with local utility company requirements and/or in the absence of local codes, use the latest edition of National Fuel Gas Code (NFPA54GC), ANSI Z223.1. In Canada, use the latest edition of CSA B149.1, Natural Gas and Propane installation code.
- Size the gas line according to total Btu/h demand of the building and length from the meter or regulator so that the following supply pressures are available even at maximum demand.

<table>
<thead>
<tr>
<th>Supply Pressure</th>
<th>Natural Gas</th>
<th>LP Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>3.5 in. W.C.</td>
<td>8 in. W.C.</td>
</tr>
<tr>
<td>Max</td>
<td>10.5 in. W.C.</td>
<td>14 in. W.C.</td>
</tr>
</tbody>
</table>

**Flexible Connectors**

Flexible gas lines are not recommended unless the minimum inside diameter is ¾ in. or greater and the rated capacity of the connector is equal to or greater than the Btu/h demand of the Combi Boiler.

**Reference Tools & Sample Calculations**

**NOTICE**

The tables and samples below are for reference only. The professional sizing and installing the gas line should always run the appropriate calculations before all installations.

**[Calculation Example]**

A partial set of sizing tables are printed on page 39. In cases where these tables are not appropriate, refer to the NFPA.

1. Draw a sketch of a piping system. Enter the system information.

   (e.g.)

   ![Sketch of a piping system]

   - Gas type: Natural
   - Supply gas pressure: 6 in. W.C.
   - Piping material: Sch 40 steel
   - Table used: 2
   - Pressure drop: 1.0 in. W.C.

2. Determine the gas type used and supply gas Pressure, and enter it. Determine the piping material and enter it to the below. Select the appropriate pipe sizing table from page 39 and enter it to the below.

   (e.g.)

   - Gas type: Natural
   - Supply gas pressure: 6 in. W.C.
   - Piping material: Sch 40 steel
   - Table used: 2
   - Pressure drop: 1.0 in. W.C.

3. On the sketch, label the section of pipe from the point of delivery (meter or regulator) to the first tee as Section 1. Label the section from the first tee to the second tee as Section 2, and label the section from the first tee to the third tee as Section 3. Use similar section numbers for additional sections.

   (e.g.)

   ![Sketch of a piping system]
4. Enter the demand is the amount of gas flowing through a section of pipe in the table below.
- For natural gas, use total Btu/h rating/1000 (ft³/h).
- For propane, use total Btu/h.
• For each section, determine the longest piping from the point of delivery to the furthest appliance through each section. Enter this length for all pipe sections in the table below.
• Round up to the lengths in the appropriate table on page 39. Read across until a capacity equal to or greater than the required demand for the section is found. Read up to find the size. Repeat for each section of piping. Enter this size in the table below.

<table>
<thead>
<tr>
<th>Section</th>
<th>Demand</th>
<th>The longest length</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>409.9</td>
<td>45 ft</td>
<td>1 in.</td>
</tr>
<tr>
<td>2</td>
<td>299.9</td>
<td>35 ft</td>
<td>1 in.</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>45 ft</td>
<td>3/4 in.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Enter the input rating for each appliance in the table below.
- For natural gas appliances, enter the input rating in Btu/h/1000 (ft³/h).
- For propane appliances, enter the input rating in Btu/h.
• Enter the outlet length from each appliance to the point of delivery in the table below.
• Round up to the lengths in the appropriate table on page 39. Read across until a capacity equal to or greater than the required demand for the section is found. Read up to find the size. Repeat for each appliance. Enter this size in the table below.

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Demand</th>
<th>Outlet length</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlet A</td>
<td>35</td>
<td>45 ft</td>
<td>1/2 in.</td>
</tr>
<tr>
<td>Outlet B</td>
<td>75</td>
<td>40 ft</td>
<td>1/2 in.</td>
</tr>
<tr>
<td>Outlet C</td>
<td>199.9</td>
<td>35 ft</td>
<td>3/4 in.</td>
</tr>
<tr>
<td>Outlet D</td>
<td>100</td>
<td>35 ft</td>
<td>1/2 in.</td>
</tr>
</tbody>
</table>

Final Check
1. Turn on and operate all gas appliances including the Combi Boiler.
2. Check the inlet pressure at each appliance shall be such that the supply pressure at the appliance is greater than or equal to the minimum pressure required by the appliance.

**NOTE** If all appliances are not receiving the minimum inlet pressure, the gas piping system may need to be changed.
### 1. Maximum Natural Gas Delivery Capacity (For Less than 6 in. W.C. initial supply pressure)

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>0.5 in. W.C. Pressure Drop</th>
<th>1.0 in. W.C. Pressure Drop</th>
<th>2.0 in. W.C. Pressure Drop</th>
<th>3.0 in. W.C. Pressure Drop</th>
<th>4.5 in. W.C. Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>(3 m)</td>
<td>(6 m)</td>
<td>(9 m)</td>
<td>(12 m)</td>
<td>(15 m)</td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>172</td>
<td>118</td>
<td>95</td>
<td>81</td>
<td>72</td>
</tr>
<tr>
<td>2 in.</td>
<td>360</td>
<td>247</td>
<td>199</td>
<td>170</td>
<td>151</td>
</tr>
<tr>
<td>1 in.</td>
<td>47</td>
<td>34</td>
<td>27</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>1 1/4 in.</td>
<td>11</td>
<td>33</td>
<td>28</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>1/2 in.</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

(Continued)

### 2. Maximum Natural Gas Delivery Capacity (For 6 - 7 in. W.C. initial supply pressure)

### 3. Maximum Natural Gas Delivery Capacity (For 7 - 8 in. W.C. initial supply pressure)

### 4. Maximum Natural Gas Delivery Capacity (For 8 - 10.5 in. W.C. initial supply pressure)

### 5. Maximum Undiluted Propane (LP) Delivery Capacity in Thousands of Btu/h

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>0.5 in. W.C. Pressure Drop</th>
<th>1.0 in. W.C. Pressure Drop</th>
<th>2.0 in. W.C. Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>(3 m)</td>
<td>(6 m)</td>
<td>(9 m)</td>
</tr>
<tr>
<td>1 1/2 in.</td>
<td>172</td>
<td>118</td>
<td>95</td>
</tr>
<tr>
<td>2 in.</td>
<td>360</td>
<td>247</td>
<td>199</td>
</tr>
<tr>
<td>1 in.</td>
<td>47</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>1 1/4 in.</td>
<td>11</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>1/2 in.</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Connecting the Gas Supply
8 Connecting the DHW pipe

- Installation and service must be performed by a qualified plumber.
- In the Commonwealth of Massachusetts, this product must be installed by a licensed plumber or gas fitter in accordance with the Massachusetts Plumbing and Fuel Gas Code 248 CMR Sections 2.00 and 5.00.
- Observe all applicable codes.
- Components used in domestic piping must meet requirements in NSF/ANSI 61 Drinking Water System Components.

8.1 Installation

8.1.1 Guidelines

Installation location

- If the Combi Boiler is installed in a closed water supply system, such as one having a backflow preventer on the DHW cold water supply line, means shall be provided to control thermal expansion. Contact the water supplier or a local plumbing inspector on how to control this situation.
- If installing the Combi Boiler on a roof:
  - If the Combi Boiler is installed on a roof to supply hot water to the levels below, make sure that the water pressure supplied to the Combi Boiler does not drop below 29 psi. It may be necessary to install a pump system to ensure that the water pressure is maintained at this level or to decrease the flow rate by adjusting the water fixture. Check the pressure before putting the Combi Boiler into operation. Failure to supply the proper pressure to the Combi Boiler may result in noisy operation, shorter lifetime of the Combi Boiler, and may cause the Combi Boiler to shut down frequently.

Potable water

- DHW Piping and components connected to the Combi Boiler shall be suitable for use with potable water.
- Toxic chemicals, such as those used for boiler treatment, shall not be introduced into the potable water.
- A Combi Boiler used to supply potable water may not be connected to any heating system or components previously used with a nonpotable water heating appliance.

Pressure Relief Valve

- A pressure relief valve must be installed near the DHW outlet that is rated in accordance with and complying with either The Standard for Relief Valves and Automatic Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22, or The ANSI/ASME Boiler and Pressure Vessel Code, Section IV (Heating Boilers).
- A pressure relief valve must be capable of an hourly Btu rated temperature steam discharge capacity of 199,900 Btu/h. Multiple valves may be used. The pressure relief capacity in DHW must not exceed 150 psi. (The pressure relief capacity on the heating pressure relief valve connection must not exceed 30 psig.)
- Do not install a shutoff valve between a relief valve and the Combi Boiler. The relief valve must be installed such that the discharge will be conducted to a suitable place for disposal when relief occurs.
- No reducing coupling or other restriction may be installed in the discharge line. The discharge line must be installed to allow complete drainage of both the valve and the line.
- If this Combi Boiler is installed with a separate storage vessel, the separate vessel must have its own temperature and pressure relief valve.
- Temperature and pressure relief valve must also comply with The Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22 (in the U.S. only).
- A temperature relief valve is not required, but if one is used, do not install the valve with the probe directly in the flow of water. This may cause unwarranted discharge of the valve.
- When the system requires water for space heating at temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those uses in order to reduce scald hazard potential.

Connecting water supply

- Flush water through the pipe to clean out metal powder, sand and dirt before connecting it.
- Use a union coupling or flexible pipe for connecting the pipes to reduce the force applied to the piping.

NOTE

- Do not use piping with a diameter smaller than the coupling.
- Avoid using joints as much as possible to keep the piping simple.
- Avoid piping in which an air holdup can occur.

Cold water supply

- Be sure to check the water pressure. - in order for the client to use the Combi Boiler comfortably, 15 to 150 psi* (103.4 to 1034 kPa) of pressure is needed from the water supply.
  - Recommended 30 psi for maximum

*Recommended 30 psi for maximum pressure.
Do not use PVC, iron, or any piping which has been treated with chromates, boiler seal or other chemicals.

**Hot water supply**

- Try to make the piping as short as possible. The longer the piping, the greater the heat loss.
- Use mixing valves with low water flow resistance.
- Use shower heads with low pressure loss.

**NOTE** Do not use lead, PVC, iron or any piping which has been treated with chromates, boiler seal or other chemicals.

### 8.1.2 Freeze Prevention

Perform the following insulation measures for prevention of freezing.

- Take appropriate heat insulation measures (e.g. wrapping with heat insulation materials, using heat tape, electric heaters, solenoids, or pipe covers) according to the climate of the region to prevent the plumbing external to the Combi Boiler from freezing.
- Make sure that there are no water leaks from the cold and hot water supply lines, then insulate the pipes completely.
- Be sure to also completely insulate the water supply valve and the cold and hot water connections on the Combi Boiler.
- For temporary freeze protection measures, refer to the Owner’s Guide.

**Indoor Installation**

- This Combi Boiler has functions to protect itself from freezing by operating the pump and turning on the burner when the thermistor detects lower than 39°F (4°C).
- Freezing is prevented within the Combi Boiler automatically unless the outside temperature without wind is below -30°F (-35°C).
- If this model is installed in an area where the outside temperature can approach freezing conditions of -30°F (-35°C) or below, then additional freeze protection measures must be used. For temporary freeze protection measures, refer to the Owner’s Guide.

**NOTE** The room temperature must be greater than 32°F (0°C) to prevent freezing and the room inside must not have negative pressure.

**Outdoor Installation**

- For information about outdoor installation, contact Pavilion Customer Center at 1-855-443-8468.

**Both Indoor and Outdoor Installation**

- The freeze prevention will not prevent freezing in the external plumbing of the unit. Protect this plumbing with insulation, heat tape or electric heaters, solenoids, or pipe covers.
- In order for the freeze prevention to operate, the unit must have power at all times.

**NOTE** Freeze damage is not covered by the warranty.

---

**CAUTION**

- Freezing is prevented within the Combi Boiler automatically unless the outside temperature without wind is below -4°F (-20°C).
- If this model is installed in an area where the outside temperature can approach freezing conditions of -4°F (-20°C) or below, then additional freeze protection measures must be used.
8.2 Water Treatment

If this Combi Boiler will be installed in a location where the hardness of the supply water is high, scale build-up may cause damage to the Plate Heat Exchanger. Perform suggested treatment and maintenance measures to be taken based on the water hardness level according to the below table.

<table>
<thead>
<tr>
<th>Type of Water</th>
<th>Hardness Level</th>
<th>Treatment Device</th>
<th>Flush Frequency*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft</td>
<td>0-1 gpg (0-17 mg/L)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Slightly Hard</td>
<td>1-3 gpg (17-51 mg/L)</td>
<td>Scale Inhibitor*3 or</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Softener</td>
<td></td>
</tr>
<tr>
<td>Moderately Hard</td>
<td>3-7 gpg (51-120 mg/L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard</td>
<td>7-10 gpg (120-171 mg/L)</td>
<td></td>
<td>Once a Year*4</td>
</tr>
<tr>
<td>Very Hard</td>
<td>10-12 gpg (171-200 mg/L)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extremely Hard</td>
<td>&gt; 12 gpg (&gt; 200 mg/L)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: When selecting a treatment device, you must consult with the device’s spec sheet and installation manual for guidelines and limitations. Not all water supplies are compatible. A water test may be required.

*2: Install Service Valve Kit with Pressure Relief Valve to allow for flushing.

*3: See the page 6 for more detail information about Scale Inhibitor.

*4: Flushing is required if a water treatment device is not installed.

NOTE: Damage to the Combi Boiler as a result of the items below is not covered by the Pavilion Limited Warranty.
- Water in excess of 12 gpg (200 mg/L) of hardness
- Poor water quality (See the Water Quality List on page 14).

Water treatment device

- The water must be treated with either the a Scale Inhibitor* or a water softener.
  * Scale Inhibitor: See the page 6 for more detail information.
- Water softeners may be regulated by the local water jurisdiction, consult with the manufacturer for code, sizing, and installation guidelines.

The below diagram is for reference only. For more information about Scale Inhibitor, contact Pavilion Customer Center at https://www.peerlessboilers.com/ or 1-855-443-8468.

The illustration is an example. Check with the actual Combi Boiler about the position of piping, and form.
Flushing the Plate Heat Exchanger

• The Plate Heat Exchanger regularly needs to be flushed to prevent damage from Scale Build-up. Refer to the “Procedure for flushing the Plate Heat Exchanger” on page 81 or contact Pavilion Customer Center at https://www.peerlessboilers.com/ or 1-855-443-8468.
9 Connecting the Heating Pipe

**WARNING**
Immediately repair any leaks in the system plumbing to avoid the addition of make-up water, make-up water provides a source of oxygen and minerals that may lead to heat exchanger failure to follow these instructions will result in poor performance, unnecessary wear of system components and premature failure.

### 9.1 General Requirements

#### System Pressure
- The Combi Boiler is intended solely for use in pressurized closed loop heating systems operating with 12-30 psi water pressure at the Combi Boiler outlet.
- To obtain the minimum system design pressure, follow the piping diagrams illustrated in this section.
- The Combi Boiler’s Heating system is not approved for operation in an “open system”, thus it cannot be used for direct potable water heating or to process heating of any kind.

#### Backflow Preventer
Install a backflow preventer valve in the make-up water supply to the unit as required by local codes.

#### Expansion Tank
An expansion tank must be installed in the heating piping to prevent excessive building in the system.
See the examples of system application at the end of this section for the installation location.
Refer to the expansion tank manufacturer’s instructions for additional details.
Follow the guidelines below when installing an expansion tank.
- Connect an air separator to the expansion tank only if the air separator is located on the suction side of the system circulator.
- The Combi Boiler is equipped with an auto-feeding water connection and motorized feeding valve.
  Therefore, installation of additional system water fill connection is not necessary in most cases.
- If an additional water fill connection is required for a specific use, install the water fill connection at the same location as the expansion tank’s connection to the system.
- When replacing an expansion tank, consult the expansion tank manufacturer’s literature for proper sizing.
- For diaphragm expansion tanks, always install an automatic air vent on the top side of the air separator to remove residual air from the system.

#### Internal of the Combi Boiler
- The Combi Boiler is equipped with a factory installed, pressure sensor type low water cutoff device.
- The lowest operation pressure for this device is 8 psi. (operation pressure = (default valve 12 psi) - (4 psi))
  The Combi Boiler performs water replenishment automatically when the built-in water pressure sensor detects insufficient water level in the Combi Boiler system.

#### External of the Combi Boiler
- Low water cutoffs shall comply with the Safety Standard for Limit Controls, ANSI/UL 353, or the Standard for Temperature Indicating and Regulating Equipment, CAN/CSA C22.2, No. 24, as applicable. The following illustrates example of typical LWCO installation.
- Install the probe above the minimum safe water level.

  **NOTE** This may be in a tapping on the Combi Boiler or in the Combi Boiler supply or return piping.

- Install the probe to extend into the Combi Boiler cavity or piping to make contact with the water.
- Low water cutoffs shall be located so as to provide adequate access for cleaning, repairing, testing and inspection.

### 9.2 Low Water Cutoff (LWCO)

#### Internal of the Combi Boiler
- The Combi Boiler is equipped with a factory installed, pressure sensor type low water cutoff device.
- The lowest operation pressure for this device is 8 psi. (operation pressure = (default valve 12 psi) - (4 psi))
  The Combi Boiler performs water replenishment automatically when the built-in water pressure sensor detects insufficient water level in the Combi Boiler system.

#### External of the Combi Boiler
- Low water cutoffs shall comply with the Safety Standard for Limit Controls, ANSI/UL 353, or the Standard for Temperature Indicating and Regulating Equipment, CAN/CSA C22.2, No. 24, as applicable. The following illustrates example of typical LWCO installation.
- Install the probe above the minimum safe water level.

  **NOTE** This may be in a tapping on the Combi Boiler or in the Combi Boiler supply or return piping.

- Install the probe to extend into the Combi Boiler cavity or piping to make contact with the water.
- Low water cutoffs shall be located so as to provide adequate access for cleaning, repairing, testing and inspection.
LWCO needs to be installed above the top of casing.

**NOTE**
DO NOT install a relief valve (DHW pipe line) with pressure higher than 150 psi and relief valve (Heating pipe line) with pressure higher than 30 psi. This is the maximum allowable relief valve setting for the Combi Boiler.

- External pressure relief valve must be installed. Observe the following. Failure to comply with the guidelines on installing the pressure relief valve and discharge piping can result in personal injury, death or substantial property damage.

- Remove the factory installed jumper on the LWCO terminals (CN234) prior to connecting the LWCO.
- The Combi Boiler supplies 24 VAC from the terminal (CN231) (see below illustration).
- Approved “Pressure Relief Valve” must be used. An approved ASME HV Valve must be installed on the DHW supply line for hydronic domestic hot water loop as close to the unit as possible. (Valve size 3/4”, maximum 150 psi) Refer to the figure below for more information on approved pressure relief valves. (Install “pressure relief valve”, Field Supplied).
- No other valve should be installed between the pressure relief valve and Combi Boiler.
- Direct the discharge piping of the pressure relief valve so that hot water will not splash on anyone or any nearby equipment. Attach the discharge line to the pressure relief valve and run the end of the line to within 6-12” (150-300 mm) of the floor.
- Service Valve Kit with Pressure Relief Valve should be installed, sold separately.
9.4 Auto Feeder Connection

- Before filling the Combi Boiler, loosen the air vent cap and open the pressure relief valve by lifting the lever on top to allow the system to fill properly. Tighten the cap and close the pressure relief valve when system is full.

- The Combi Boiler is equipped with an auto feeder valve. Therefore, installation of additional system water fill connection is not necessary in most cases. See the following figure for an example of a water fill installation using the built-in connection.
• External water feeder may be installed on the system piping if it is required for specific applications. See the following figure for an example of external water feeder installation on the system piping.
• If the heating system does not require the Auto Feeder (the internal water feeder) operation, plug the Auto Feeder Water Inlet Connection. And set “Auto Feeder Activation” OFF.
* Refer to page 63 for changing “Auto Feeder Activation” Setting.

9.5 Freeze Prevention

9.5.1 Unit

Indoor Installation
• This Combi Boiler has functions to protect itself from freezing by operating the pump and turning on the burner when the thermistor detects lower than 39°F (4°C).
• Freezing is prevented within the device automatically unless the outside temperature without wind is below -30°F (-35°C).
* When combustion air is supplied from the indoors, the room temperature must be greater than 32°F (0°C) to prevent freezing and the room inside must not have negative pressure.
• If this model is installed in an area where the outside temperature can reach freezing conditions of -30°F (-35°C) or below, then additional freeze protection measures must be used. For temporary freeze protection measures, refer to the Owner’s Guide.

Outdoor Installation
For information about outdoor installation, contact Pavilion Customer Center at 1-855-443-8468.

Both Indoor and Outdoor Installation
• The freeze prevention will not prevent freezing in the external plumbing of the unit. Protect this plumbing with insulation, heat tape or electric heaters, solenoids, or pipe covers.
• In order for the freeze prevention to operate, the unit must have power at all times.

CAUTION
• Freezing is prevented within the Combi Boiler automatically unless the outside temperature without wind is below -4°F (-20°C).
• If this model is installed in an area where the outside temperature can approach freezing conditions of -4°F (-20°C) or below, then additional freeze protection measures must be used.
9.5.2 Heating System

- Freeze protection products may be used for the heating system. Freeze protection for new or existing systems requires specially formulated glycol, which contains inhibitors to prevent the glycol from attacking the metallic system components.
- Before using freeze protection products, ensure that system fluid contains proper glycol concentration and the inhibitor level is appropriate. It is recommended that against exceeding a 50% concentration of glycol.
- When using freeze protection products, the system must be tested at least once a year, and as recommended by the manufacturer of the glycol solution.
- When using the freeze protection products, allowance should be made for expansion of the glycol solution.

**NOTE** Freeze damage is not covered by the warranty. When using freeze protection products, it is recommended to plug the Auto Feeder Water Inlet Connection and set “Auto Feeder Activation” OFF.

* Refer to page 63 for changing “Auto Feeder Activation” Setting.

10 Connecting the Condensate Drain

**Condensing Combi Boiler**

- In order to ensure proper operation of this Combi Boiler, need to install the condensate drain pipe to drain acidic condensate which produces during operation.
- The pH level of the condensate is approximately 2-3. An external neutralizer must be installed on the condensate drain piping prior to disposal when required by local code or when the condensate could cause damage.

**NOTE** Damage caused by improperly handled condensate is not covered by the Pavilion Limited Warranty.

**Location of the condensate drain piping**

In climates where temperature routinely reaches below freezing, do not drain the condensate to the outdoors. If the condensate drain pipe freezes during cold weather, the pipe will not drain condensate and the Combi Boiler will stop operating.

**Material of the condensate drain piping**

Use plastic pipe, such as PVC, for the drain line.

**NOTE** Do not use steel, black iron, or any other material which can corrode when placed into contact with acidic condensate.

**Sizing of the condensate drain piping**

In order to drain the condensate, a 1/2 in. threaded fitting is provided at the base of the Combi Boiler.

**NOTE** Do not reduce the size of the fitting or the condensate drain piping to less than 1/2 in.

**Long runs or applications where the nearest drain is above the Combi Boiler**

Require the use of a condensate pump. Size the pump to allow for a maximum condensate discharge of 2 GPH from the Combi Boiler.
Condensate drain piping

Make the condensate drain piping run as short as possible.

**NOTE** Do not make a trap.

- Make sure that there are no obstructions blocking the condensate drain line from discharging condensate.
- Be sure to check that condensate is freely flowing from the condensate drain piping. Condensate will begin flowing out of the Combi Boiler within 15 minutes after operation has started.

Freeze prevention

Take measures to prevent the condensate drain lines from freezing (insulation, heat tape, electric heaters, etc.).

[If an external neutralizer is installed]

Periodic replacement of the neutralizing agent will be required. Refer to the instructions supplied with the neutralizer for suggested replacement intervals.

After installing the condensate drain piping

- Make sure that there are no obstructions blocking the condensate drain line from discharging condensate.
- Be sure to check that condensate is freely flowing from the condensate drain piping. Condensate will begin flowing out of the Combi Boiler within 15 minutes after operation has started.
11 Connecting Electricity

Consult a qualified electrician for the electrical work.

11.1 Combi Boiler

This appliance must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70. In Canada, the latest CSA C22.1 Electrical Code.

**WARNING**

Electrical Shock Hazard
Do not connect the electrical power to the appliance until all electrical wiring has been completed. Failure to do so may result in death or serious injury from electrical shock.

**CAUTION**

- Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.
- Electrostatic discharge can affect electronic components. Take precautions to prevent electrostatic discharges from personnel or hand tools during the Combi Boiler installation and servicing to protect product’s electronic control.

**Ground**

To prevent electrical shock, provide a ground with resistance less than 100 Ω. An electrician should do this work.

**NOTE**

- Do not connect the ground to the city water or gas piping.
- Do not tie the ground to a telephone line.

**Breaker Installation**

Mount a device which shuts off the electrical path automatically (leakage breaker) to detect electrical leakage.

**Power Supply**

- The electrical supply required by the Combi Boiler is 120 VAC at 60 Hz. The power consumption may be up to 210 W or higher if using optional accessories. Use an appropriate circuit.
- Tie the redundant power cord outside the Combi Boiler. Putting the redundant length of cord inside the Combi Boiler may cause electrical interference and faulty operation.

**NOTE**

- Do not let the power cord contact the gas piping.
- Do not disconnect the electrical power when not in use. When the power is off, the freeze prevention in the Combi Boiler will not activate, resulting in possible freezing damage.
11.2 Quick Connect Cord

**NOTE**  The Quick Connect Multi System allows the installation of two units together utilizing only the Quick Connect Cord. For Quick Connect Multi-System installation only use the Quick Connect Cord, sold separately (See the optional accessory list on page 5).

**WARNING**

Electrical Shock Hazard
Do not turn power on until electrical wiring is finished. Disconnect power before servicing. Failure to do so may result in death or serious injury from electrical shock.

**NOTE**  When connecting two units, use only the Combi Boiler’s Operation Display. This system is operated by the Combi Boiler’s Operation Display. Don’t connect the remote controller to the other unit.

- The wire coloring on the Quick Connect Cord will not be the same as the wire coloring of the connection plug inside the unit.

### Connecting the Quick Connect Cord

1. Check the electrical power is disconnected from the both units.
2. Remove the front cover (4 screws).
3. Pass the Quick Connect Cord through the wiring throughway and into the unit.
4. Plug the connector on the Quick Connect Cord to the connector inside the unit.
5. Connect the ground wire (gray color wire) to the screw at the base of the unit.

**NOTE**  If the ground wire is not attached, electrical noise may cause problems.

---

**Connection Item** | **Pages** | **Note**
--- | --- | ---
[CN231] 24VACOUT | 44-45 | 24 VAC for LWCO
[CN232] A/H * | 62, 71 | Air Handler
[CN233] T-T | 75-77 | Heat Demand Input (T-T)
[CN234] LWCO | 44-45 | The factory installed a jumper on the terminals.
[CN235] 0-10V | 57-58 | Heat Demand Input (0-10 VDC)
[CN236] O/S | 53-56 | Outdoor Temperature Sensor
[CN237] Pump ** | 62, 75, 77 | 120 VAC / Max 2.0 A
[CN238] SV | 51-52, 79 | 120 VAC / Max 1.5 A

* Air Handler Terminal: [I:08_Air] should be “on” in Installer Mode to activate this terminal.
** External Pump Terminal: [I:09_EP] should be “on” in Installer Mode to activate this terminal.
**6. Secure the Quick Connect Cord with a clamp.**

**7. Reattach the front cover (4 screws).**

---

![Diagram of Quick Connect Cord and Circuit Board](image)

---

**6.** Secure the Quick Connect Cord with a clamp.

**7.** Reattach the front cover (4 screws).

---

**Checking the Quick Connect Multi System Installation**

After install the Quick Connect System, do the following step to check proper installation.

1. The **ON/OFF button** is ON.

2. Press the **MAINTENANCE button**.

   ![Operation Display](image)

3. Press the **ENTER button** to view the “Technical Data”.

   ![Solenoid Valve](image)

---

**Specifications for a solenoid valve**

- Pipe size: 3/4 in.
- Voltage: 120 VAC
- Current: Max 1.5 A
- Normally open (Closed when de-energized)

---

**Check the Quick Connect Cord connection.**

- Select **74**, then check **002** appears.
- If **001** appears, check the Quick Connect Cord connection.

---

**Open the front cover and a hot water fixture.**

Press and hold the “Mode” and “Minimum” Buttons on the Circuit Board simultaneously for more than 3 seconds.

Check step 7 within 30 minutes.

---

**Check the Combi Boiler operation.**

- Select **75**, then check **002** appears.
- If **001** appears, check the plumbing and the Solenoid Valve.

When you are done, press the “Mode” Button for more than 3 seconds, then close the hot water fixture and the front cover.

---

**Press the BACK button twice or let it sit for approximately 10 minutes to return to the home screen.**

---

**NOTE**

The Water Heater can be set as the master unit in the quick connect multi system. The master unit controls the DHW ON/OFF status of the Combi Boiler in the system. Once turned on by the master unit, the Combi Boiler will operate in stages to satisfy the DHW demands.

---

* Please contact Pavilion Customer Center at 1-855-443-8468 if you have any questions or concerns.*
11.3 Outdoor Reset Control with Outdoor Temperature Sensor

Outdoor Reset Control

- The Outdoor Reset Control feature may be used to enhance energy efficiency while maintaining optimal heating performance. With the Outdoor Reset Control, the heating temperature setting automatically changes according to the outdoor temperature and the current heating system application.
- There are various pre-defined temperature range options available to assist matching the system heat load with the applicable outdoor temperature range.
- The built-in outdoor reset control provides simple heating curve selection based upon pre-defined Combi Boiler set temperature ranges determined by the type of heating application. This can be adjusted either by selecting the appropriate menu option, or by utilizing the fully customizable mode (or wire) to the screw at the base of the unit.

**NOTE** The optimal set up should be determined for each job location. [7:CU] default setting: Max Temperature: 180°F, Min Temperature: 100°F
Setting the Outdoor Reset Control Mode
[I:01_HCt]

1. Connect Outdoor Temperature Sensor to terminal. (Refer to pages 55, 56 for details.)
2. The ON/OFF button is OFF. The Operation Display must be off.
3. Press the SETTING button.
   Select \[2:n\] using the \[\Delta/\n\] buttons, and then press the ENTER button.
   • The “Installer Mode” screen appears.
4. When entering the “Installer Mode”, display will change to \[1:01\] or \[1:00\].
   • This function will appear within the first 10 minutes of connecting electrical power and before pressing the ON/OFF button.
5. When display shows \[1:00\] after 1sec., press the \[\Delta/\n\] buttons to navigate \[1:01\] in the “Installer Mode”.
6. Select \[1:01\] using the \[\Delta/\n\] buttons, then press the ENTER button to enter the function.
   
   \[1:st\]
   (St: Standard)
7. Press the \[\Delta/\n\] buttons to change the parameter value \[2:or\] , and then press the ENTER button to save the settings and to exit the function. And additional menu items will become available to adjust.
   • The icon \[\&\] will flash if the outdoor sensor is not detected.

Adjusting Outdoor Reset Control Options

1. The ON/OFF button is OFF. The Operation Display must be off.
2. Press the \[\Delta/\n\] buttons to navigate \[1:02\] in the “Installer Mode”.
3. Select \[1:02\] using the \[\Delta/\n\] buttons, and then press the ENTER button to enter the function.
4. Press the \[\Delta/\n\] buttons to navigate into desired system.

Types of Heating System

<table>
<thead>
<tr>
<th>Type of Heating System</th>
<th>Screen Display</th>
<th>Temperature (°F)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin Tube Baseboard</td>
<td>[1:Ft]</td>
<td>120</td>
<td>49</td>
</tr>
<tr>
<td>Air Handler</td>
<td>[2:AH]</td>
<td>140</td>
<td>60</td>
</tr>
<tr>
<td>Cast Iron Baseboard</td>
<td>[3:CI]</td>
<td>100</td>
<td>38</td>
</tr>
<tr>
<td>Low Mass Radiant Floor</td>
<td>[4:Lr]</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>Mass Radiant Floor</td>
<td>[5:rF]</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>Radiator</td>
<td>[6:rA]</td>
<td>120</td>
<td>49</td>
</tr>
<tr>
<td>Custom</td>
<td>[7:CU]</td>
<td>100*</td>
<td>38*</td>
</tr>
</tbody>
</table>

* Factory Default.
**Customized Settings**

1. The **ON/OFF button** is OFF. The Operation Display must be off.

2. Select **7CU**
   (Refer to page 54 for Adjusting Outdoor Reset Control Options.)

3. (e.g. To set Highest Outdoor Temperature) Press the **Δ / ▽ buttons** to navigate **1:03 1 sec. Hot** in the "Installer Mode".

   | Installer Mode [I:03_Hot]: Highest Outdoor Temperature |
   | Installer Mode [I:04_Lot]: Lowest Outdoor Temperature |
   | Installer Mode [I:05_HHt]: Heating High Temp Range |
   | Installer Mode [I:06_HLt]: Heating Low Temp Range |

4. Select **1:03 1 sec. Hot**, and then press the **ENTER button** to enter the function.

   (Default setting = 70°F)

5. Press the **Δ / ▽ buttons** to navigate into desired temperature.

6. Press the **ENTER button** to save the settings and to exit the function.
   - The others are similar to the above mentioned method.

**Outdoor Temperature Sensor Installation Guidelines**

- Avoid areas with direct sunlight and where temperatures may not be representative of true outdoor temperature.
- Avoid placing sensor in close proximity of heat sources that may affect correct temperature sensing. (fans, exhausts, vents, lights)
- Avoid installing the sensor in areas where the sensor is subjected to excessive moisture.
- Make sure wiring connections are secure before closing the cap.
- The sensor is a water resistant device.
- Any damage to the device may require the replacement of the entire component.
- If the system requires a fixed operating temperature, the outdoor sensor is not required and should not be installed.
  There is no connection required if an outdoor sensor is not used in the installation.
- Use a minimum 22 AWG wire for runs of 100 ft or less and minimum 18 AWG wire for runs of up to 150 ft.
- Mount the outdoor sensor on an exterior surface of the building, preferably on the North or Northeast side, in an area that will not be affected by direct sunlight or will be exposed to varying weather conditions.
- For correct mounting procedures, follow instructions provided with the sensor.
- If sensor wires are located in an area with sources of potential electromagnetic interference (EMI), the sensor wires should be shielded, or the wires routed in a grounded metal conduit.
  If using shielded cable, the shielding should be connected to the common ground of the appliance.
Outdoor Temperature Sensor Installation

1. Loosen the screw by hand using a Phillips screwdriver indicated in the figure.

2. Remove the cover by lifting it and pulling it outward.

3. Mount the outdoor sensor onto an exterior surface of the building with the supplied screws (2 pcs) by hand using a Phillips screwdriver.

   • if necessary, use anchors (Included Accessory).

4. There is a through hole to pass wire into the case.

5. After leading wire into the case, connect wire to the terminal by hand using a Phillips screwdriver.

6. You can use two knobs to relieve stress of wire.

7. Replace the cover. The hook should be attached to the stopper.

8. Tighten the screw by hand using a Phillips screwdriver indicated in the figure.
**Outdoor Reset Control [0-10 Volt Input Control]**

- The Outdoor Reset Control feature may be used to enhance energy efficiency while maintaining optimal heating performance. With the Outdoor Reset Control, the heating temperature setting automatically changes according to the voltage input from external controller that is decided by outdoor temperature.
- Blinking [ ] on the Operation Display is not an Error Code.
- [ ] is lit on the Operation Display, when the Combi Boiler receive 1.5 VDC or more and the Outdoor Reset (Energy Saving) is enabled.
- A signal from external (i.e. building management system) may be connected to the Combi Boiler to enable remote control.
  This signal should be a 0-10 volt positive DC signal. When this input is enabled (1.5 VDC or more), an external control system can be used to control the set point temperature of the Combi Boiler.
- The control interprets the 0-10 volt signal as follows; when the signal is between 0 and 1.5 volts, the Combi Boiler will be in standby mode, not firing (Blinking [ ] on the Operation Display. This is not an Error Code.]
  When the signal rises above 1.5 volts, the Combi Boiler will ignite. As the signal continues to rise towards its maximum of 10 volts, the Combi Boiler will increase the set point temperature.
- Connect an external control system to the terminals marked for this purpose on the Combi Boiler terminal block (refer to page 58). Caution should be used to ensure that the 0-10 volt connection does not become connected to ground.

**NOTE**
- Ensure that the polarity of the connections from the external modulating controller to the Combi Boiler is correct.
  Reversed polarity could lead to erratic and/or no response from the Combi Boiler controller.
- [ ] will flash if an external control system does not supply 1.5 VDC or more.

---

### Graph

<table>
<thead>
<tr>
<th>Heating Set Temperature [°F (°C)]</th>
<th>0 - 10 Volt Input (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 (16)</td>
<td>0</td>
</tr>
<tr>
<td>80 (27)</td>
<td>1</td>
</tr>
<tr>
<td>100 (38)</td>
<td>2</td>
</tr>
<tr>
<td>120 (49)</td>
<td>3</td>
</tr>
<tr>
<td>140 (60)</td>
<td>4</td>
</tr>
<tr>
<td>160 (71)</td>
<td>5</td>
</tr>
<tr>
<td>180 (82)</td>
<td>6</td>
</tr>
<tr>
<td>200 (93)</td>
<td>7</td>
</tr>
</tbody>
</table>

I:05_HHt

I:06_HLt
Setting the Outdoor Reset Control
[0-10 Volt Input control] - [I:01_HCt]

1. Connect Heat Demand (0-10 VDC) to terminal.
(Refer to the figure on the right for details.)

2. The ON/OFF button is OFF.
The Operation Display must be off.

3. Press the SETTING button.
   Select using the △ / ▽ buttons, and then press the ENTER button.
   • The “Installer Mode” screen appears.

4. When entering the “Installer Mode”, display will change to
   • This function will appear within the first 10 minutes of connecting electrical power and before pressing the ON/OFF button.

5. When display shows after 1sec.
   press the △ / ▽ buttons to
   navigate in the “Installer Mode”.

6. Select , then
   press the ENTER button to enter the function.
   • The icon will flash if the Heat Demand Input (0-10 VDC) is not detected.

7. Press the △ / ▽ buttons to change the parameter value , and then press the ENTER button to save the settings and to exit the function.
   • Do NOT connect room thermostat to heat demand (T-T) when an external control system is connected.
   * The Combi Boiler is activated only by receiving voltage.

   NOTE DO NOT mix [Room Thermostat Control], [External Voltage Control System (without Room Thermostat)] and [Outdoor Temperature Control with Outdoor Temperature Sensor and Room Thermostat]

• The “Installer Mode” screen appears.

4. When entering the “Installer Mode”, display will change to
   • This function will appear within the first 10 minutes of connecting electrical power and before pressing the ON/OFF button.

5. When display shows after 1sec.
   press the △ / ▽ buttons to
   navigate in the “Installer Mode”.

6. Select , then
   press the ENTER button to enter the function.
   • The icon will flash if the Heat Demand Input (0-10 VDC) is not detected.

• Do NOT connect room thermostat to heat demand (T-T) when an external control system is connected.
   * The Combi Boiler is activated only by receiving voltage.

   NOTE DO NOT mix [Room Thermostat Control], [External Voltage Control System (without Room Thermostat)] and [Outdoor Temperature Control with Outdoor Temperature Sensor and Room Thermostat]
12 Installer Mode (Parameter Settings)

How to enter “Installer Mode”

1. The **ON/OFF button** is OFF. The Operation Display must be off.

2. Press the **SETTING button**. Select using the Δ / V buttons, and then press the **ENTER button**.
   - The “Installer Mode” screen appears.

3. When entering the “Installer Mode”, display will change to 1 sec., or 10 sec.
   - This function will appear within the first 10 minutes of connecting electrical power and before pressing the **ON/OFF button**.

4. Press the Δ / V buttons to navigate into the desired function in the “Installer Mode”.

5. Select the desired function, then press the **ENTER button** to enter the function.

6. Press the Δ / V buttons to change the parameter value.

7. When you are done, press the **ENTER button** to save the settings and to exit the function.

8. To exit the “Installer Mode” or another function, press the **BACK button**.
Parameter Settings

[I:00_FC (Fahrenheit/Celsius)]

This mode is for changing temperature and flow rate units on the Operation Display.
To change the setting: Press and hold the Δ or ▽ button for approximately 5 seconds.
°F→°C: Δ button, °C→°F: ▽ button

(Default setting = 1: F)

NOTE This function will appear within the first 10 minutes of connecting electrical power and before pressing the ON/OFF button.

[I:01_HCt (Heating Control Type)] (page 53,57)

This mode is for changing heating control type.

(Default setting = 1: St)

[I:02_tHS (Type of Heating System)] (page 53-56)

This mode is for choosing Type of Heating System, when [I:01_HCt] setting is “2:or”.
There are 6 typical Heating Systems that are available.
For these 6 heating types the low and high temperature points are pre-programmed.
(See ranges to the below)
If “2:AH” is selected, additional steps are needed to be programmed, see [I:08_Air].
To use custom low and high temperature points, select “7:CU” and follow [I:08_Hot], [I:04_Lot], [I:05_HHt] and [I:06_HLt] to set custom low and high temperature points.

<table>
<thead>
<tr>
<th>LOW [°F (°C)]</th>
<th>HIGH [°F (°C)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:Ft</td>
<td>120 (49)</td>
</tr>
<tr>
<td>2:AH</td>
<td>140 (60)</td>
</tr>
<tr>
<td>3:CI</td>
<td>100 (38)</td>
</tr>
<tr>
<td>4:Lr</td>
<td>80 (27)</td>
</tr>
<tr>
<td>5:rF</td>
<td>80 (27)</td>
</tr>
<tr>
<td>6:rA</td>
<td>120 (49)</td>
</tr>
<tr>
<td>7:CU</td>
<td>80 (27) or more</td>
</tr>
</tbody>
</table>

(Default setting = 1: Ft)

NOTE When [I:01_HCt] setting is “1:St” or “3:EC”, this function will not appear.
[I:03_Hot (Highest Outdoor Temperature)]
(page 53)

This should be set to the highest average outdoor temperature during the winter season.
(not the highest possible outdoor temperature.)

settings:
[Min Set-point + 10°F (5°C)] or more 110°F (43°C)
( Default setting = 70°F (21°C) )

[I:04_Lot (Lowest Outdoor Temperature)]
(page 53)

This should be set to the lowest average outdoor temperature during the winter season.
(not the lowest possible outdoor temperature.)

settings:
-4°F (-20°C) or more [Max Set-point - 10°F (5°C)]
( Default setting = 20°F (-7°C) )

[I:03_Hot] and [I:04_Lot] are for changing the highest and the lowest outdoor temperature range. You can set the Highest Outdoor Temperature [I:03_Hot] and the Lowest Outdoor Temperature [I:04_Lot], when [I:02_tHS] “7:CU” is selected.

NOTE When [I:02_tHS] setting is “7:CU”, [I:03_Hot] and [I:04_Lot] functions will appear.

[I:05_HHt (Heating High Temp Range)]
(page 53,57)

settings:
[Min Set-point + 30°F (17°C)] or more 180°F (82°C)
( Default setting = 180°F (82°C) )

[I:06_HLt (Heating Low Temp Range)]
(page 53,57)

settings:
80°F (27°C) or more [Max Set-point - 30°F (17°C)]
( Default setting = 100°F (38°C) )

[I:I:05_HHt] and [I:06_HLt] are for changing the heating high temperature range and low temperature range. You can change the Highest Set Temperature [I:05_HHt] and the Lowest Set Temperature [I:06_HLt] by adjusting the numbers on the display.

If [I:01_HCt] “2:or” is selected then the settings for [I:05_HHt] and [I:06_HLt] will be overridden by [I:02_tHS] settings. (except below)

If [I:02_tHS] “7:CU” is selected then the settings for [I:05_HHt] will be the heating high temperature range and [I:06_HLt] will be heating low temperature range.
[I:07_bSt (Boost Timing)]

This setting is to increase the set temperature during unit cold start up if the actual room temperature doesn’t reach the thermostat set temperature quick enough, the Boost time function will increase the set temperature of the Combi Boiler by 10°F (5°C) after the selected Boost time setting has passed.

Example:
- Room thermostat set at 72°F, Combi Boiler set temp at 140°F, and Boost time function set to 30 min.
- If the room temperature does not reach 72°F within 30 min then the Combi Boiler will increase its set temp from 140°F to 150°F.

settings:
- OFF (Boost Timing is deactivated.)
- ON (Time before starting the boost operation.)

(Default setting = OFF)

NOTE When [I:01_HCt] setting is “2:or” or “3:EC”, this function will appear.

[I:08_Air (Air Handler)] (page 51)

This function needs to be turned “on” if an Air Handler is being used as a heating type. The Air Handler function is designed to stop the Air Handler’s pump and fan operation when the Combi Boiler’s operation is not suitable for the Air Handler.

settings:
- OFF (When an air handler is not used.)
- ON (When an air handler is used.)

(Default setting = OFF)

[I:09_EPP (External Pump)] (page 51)

This setting can activate or deactivate the terminals in the Combi Boiler for an External Pump (secondary pump) on the circuit board.

settings:
- OFF (When an external pump is not used.)
- ON (When an external pump is used.)

(Default setting = OFF)

[I:10_rFt (Re Fire Time)]

This function is to set up the interval time in Heating Mode to prevent inconsistent heating. If the selected time passes and the Combi Boiler’s inside temperature drops, this function will automatically reignite the burner in the Combi Boiler.

settings: 0 - 20 min

(Default setting = 0 min)

[I:11_Pot (Pump Overrun Time)]

This mode is to control how long the pump will run after the heating demand is satisfied. This setting is to prevent unnecessary running of the pump and extend the life of the pump.

settings: OFF, 1 - 40 min

(Default setting = OFF)

[I:12_bFt (Differential Burner OFF Temperature)]

settings: 0 - 27°F (0 - 15°C)

(Default setting = 13°F (7°C))

[I:13_bot (Differential Burner ON Temperature)]

settings: 5 - 27°F (3 - 15°C)

(Default setting = 18°F (10°C))

When the internal temperature of the Combi Boiler is too high or low the unit will stop burning or start burning.

Burner OFF Temperature = Heating Set Temperature + [I:12_bFt]
Burner ON Temperature = Heating Set Temperature - [I:13_bot]
[I:14_HPS (Heating Water Pressure Setting)]

This function is to control the water pressure on the heating side of the Combi Boiler. This will insure there is enough water inside the Combi Boiler to operate correctly.

When using the external water feeder, set to the proper pressure for the external waterfeeder. If not, the Combi Boiler may shut down frequently.

Water Refilling Pressure
= Setting Pressure - 4 PSI
Water Refilling Stop Pressure
= Setting Pressure + 2 PSI

settings: 12 - 26 PSI

(Default setting = 12 PSI)

[I:15_AFA (Auto Feeder Activation)]

This setting can activate or deactivate the Auto Feeder.

If the heating system does not require the Auto Feeder operation, set [I:15_AFA] OFF and plug the Auto Feeder Water Inlet Connection.

To change the setting: Press and hold the △ or ▽ button for approximately 2 seconds. (ON→OFF: △ button, OFF→ON: ▽ button)

settings:
ON (The Auto Feeder is activated.),
OFF (The Auto Feeder is deactivated.)

(Default setting = ON)

[I:16_dHP (DHW / Space Heating Priority)]

This mode is for choosing the Combi Boiler operation “Simultaneous use of DHW & Heating” or “DHW Priority”.

This Combi Boiler can operate DHW / Heating at the same time.*

But if a heating system is not suitable for simultaneous use of DHW & Heating, set [I:16_dHP] “2:dH”.

To change the setting: Press and hold the △ or ▽ button for approximately 2 seconds. (“1:St”→“2:dH”: △ button, “2:dH”→“1:St”: ▽ button)

* Depend on the conditions (refer to pages 64-65).

[I:17_dHt (DHW Wait Time)]

This setting is when the duration of the Combi Boiler maintains the DHW supply mode after a DHW demand.
(The circulation pump will keep running and if necessary, burner will ignite.)

With the DHW Wait Time is enabled, a faster DHW supply may be available when there is a subsequent DHW demand.

settings: OFF, 1 - 30 min

(Default setting = OFF)

[I:18_Clr (Setting Clear)]

This setting may be used to reset all the parameters in installer mode to their factory default settings. (Except [I:00_FC] setting.)

Press and hold the △ button for approximately 5 seconds to reset all parameters. (The ▽ button cannot accept.)

settings: OFF, ON

( Default setting = OFF)
Using DHW and Heating at the same time

This Combi Boiler is designed for using DHW and Heating at the same time. Simultaneous operations are not always available and suitable. It depends on DHW and Heating setting temperatures. Contact Pavilion for more information about simultaneous use for DHW and Heating. (Phone #: 1-855-443-8468)

[Simultaneous Operation Flow]

NOTE  When the DIP switch #2 is ON, Heating temperature setting is increased up to approximately 30°F during simultaneous operation. Damage caused by increasing Heating temperature is not covered by the Pavilion Limited Warranty. Check whether for the hydronic heating appliance and plumbing are acceptable it.
Below charts show simultaneous operation is available or not. By default, the Combi Boiler has been set to the “①” area. When adjusting the DIP switch #2 to ON, the Combi Boiler will be set the “①+②” area. This adjustment allows the Combi Boiler to operate somewhat more flexible.

If [I:01_HCt] is set to [2:or] or [3:EC], the Combi Boiler operates simultaneously DHW and Heating automatically by increasing the heating supply temperature.

<Relationship between simultaneous operation and setting temperatures on below Charts>

<table>
<thead>
<tr>
<th>Setting Temperature</th>
<th>Mark on Charts</th>
<th>DIP Switch #2 Setting</th>
<th>simultaneous operation Available or Unavailable</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHW 120°F</td>
<td></td>
<td>OFF</td>
<td>Available</td>
</tr>
<tr>
<td>Heating 170°F</td>
<td></td>
<td>ON</td>
<td>Available</td>
</tr>
<tr>
<td>DHW 130°F</td>
<td></td>
<td>OFF</td>
<td>Unavailable</td>
</tr>
<tr>
<td>Heating 90°F</td>
<td></td>
<td>ON</td>
<td>Unavailable</td>
</tr>
<tr>
<td>DHW 110°F</td>
<td></td>
<td>OFF</td>
<td>Unavailable</td>
</tr>
<tr>
<td>Heating 130°F</td>
<td></td>
<td>ON</td>
<td>Available</td>
</tr>
</tbody>
</table>

<Relationship between simultaneous operation and temperature settings>

* The “③” area is unavailable for simultaneous operation.
* When DHW setting temperature is under 107°F (42°C), Faucet Water Outlet Temp equals DHW setting temperature.

[DIP Switch Adjustment]

Disconnect power and turn ON DIP switch #2 if the Combi Boiler operates using area “①+②” in simultaneous operation.

* DIP switch #2 turned on.
13 Setting Temperature

How to Set Heating Temperature

The following Heating Temperature Setting can be changed when the “Outdoor Reset Control” is disabled (Refer to page 53-56).

1. The **ON/OFF button** is ON.

2. Press the **TEMP button** once.

3. Set the temperature using the **/ buttons**.
   - To return to the home screen, press the **BACK button** or let panel sit for approximately 20 seconds.

   How to Set DHW Temperature

   **DANGER**
   - When changing the temperature, make sure to confirm with the customer that the temperature of the Hot Water will be very high and that there is a risk of scalding.
   - Hot water temperatures over 125°F (52°C) can cause severe burns instantly or death from scalding.
   - To ensure outlet temperatures do not exceed 120°F at faucets, a mixing valve must be installed.

   1. The **ON/OFF button** is ON.

   2. Press the **TEMP button** twice.

   (e.g.: 100°F)
   - The current “DHW Temperature Setting” and “DHW Icon” will be blinking.
   - Initial factory setting is 110°F (40°C in °C mode).

   3. Set the temperature using the **/ buttons**.
      - To return to the home screen, press the **BACK button** or let panel sit for approximately 20 seconds.

Temperature Setting Range

<table>
<thead>
<tr>
<th></th>
<th>°F Mode</th>
<th>°C Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DHW</strong></td>
<td>90-140°F (In 5°F intervals) (11 Options)</td>
<td>32°C, 35°C, 37°C-48°C (In 1°C intervals), 50°C, 55°C, 60°C (17 Options)</td>
</tr>
<tr>
<td>Heating</td>
<td>100-180°F (In 1°F intervals) (81 Options)**</td>
<td>40-82°C (In 1°C intervals) (43 Options)**</td>
</tr>
</tbody>
</table>

* When you use Quick Connect Multi System, temperature setting range is changed to below.
  °F Mode: 100-140°F (In 5°F intervals)
  °C Mode: 37-48°C (In 1°C intervals), 50°C, 55°C, 60°C

** Heating Temperature range depends on Installer Mode Setting (I:05_HHt, I:06_HLt).
14 Service Reminder

The Combi Boiler is equipped with a Service Reminder to announce for maintenance. The factory default of this Service Reminder is “OFF”. The customer or installer needs to set the Service Reminder to ON or OFF.

How to select the Service Reminder

1. The ON/OFF button is OFF. The Operation Display must be off.

2. Press the MAINTENANCE button.
   Select 2:di using the △/▽ buttons, and then press the ENTER button.
   • The “Diagnostic Mode” screen appears.

3. When entering the “Diagnostic Mode”, display will change to
   ![1 sec ECC]

4. When display shows d:01 after 1sec. ECC, press the △/▽ buttons to navigate d:03 SER in the “Diagnostic Mode”.

5. Select d:03 SER, and then press the ENTER button to enter the function.

6. Press the △/▽ buttons to change the parameter value.
   ![OF]
   • OFF(default), 6, 12, 18, 24, 30, 36, 42, 48, 54, 60 months.

7. Press the ENTER button to save the settings and to exit the function.

8. To exit the “Diagnostic Mode”, press the BACK button.
   • When the set time period has been reached, the Error Code 88 will flash on the Operation Display. When the code 88 appears, press the ON/OFF button 5 times in 5 seconds. The Service Reminder will be reset.
15 Setting the DIP Switches

The location of DIP switch bank

The DIP switch bank is placed on the circuit board.

How to change the DIP switches

1. Disconnect the electrical power to the Combi Boiler before changing the DIP switches.*
2. Open the front cover of the Combi Boiler (4 screws).
3. Adjust the DIP switches.
4. Close the front cover of the Combi Boiler (4 screws).
5. Reconnect the electrical power to the Combi Boiler.

* Failure to perform this step will result a “73” code displayed on the Operation Display and a cease in operation. If this occurs, disconnect, then reconnect the electrical power to the Combi Boiler to reset the system.

DIP Switch Listing

[For using 2 in. SV Conversion Kit]

Turn ON DIP switch #3.

[For installing at an altitude of 2,000 ft (610 m) or higher]

Change DIP switch #5 and #6 by following the table below.

<table>
<thead>
<tr>
<th>High elevation adjustment</th>
<th>DIP switches #5</th>
<th>DIP switches #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2,000 ft (0-610 m)</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2,001-4,000 ft (611-1,219 m)</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>4,001-7,000 ft (1,220-2,134 m)</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>7,001-10,000 ft (2,135-3,048 m)</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

[For adjusting to accommodate longer vent runs]

- When using PVC/CPVC/PP material

Change DIP switch #7 and #8 by following the table below.

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switches #7</th>
<th>Maximum equivalent vent length*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>&lt; 50 ft (15 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>50 ft (15 m) – 75 ft (22.5 m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switches #7</th>
<th>Maximum equivalent vent length*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>Exhaust vent: V (Vertical) + H (Horizontal): &lt; 50 ft (15 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air Intake: &lt; 50 ft (15 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>Exhaust vent: V (Vertical) + H (Horizontal): 50 ft (15 m) – 75 ft (22.5 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air Intake: &lt; 75 ft (22.5 m)</td>
</tr>
</tbody>
</table>

* The maximum vent length includes elbows.

[When using flexible pipe for chimney]

Change DIP switch #7 by following the table below.

(DuraVent® - Flex Through Chimney w/ Air Intake (Only 3 in.))

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switches #7</th>
<th>Maximum equivalent vent length*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>Flexible pipe: 1 ft (0.3 m) Rigid pipe: 1 ft (0.3 m) 90° elbow: 5 ft (1.5 m) 45° elbow: 3 ft (0.9 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>Flexible pipe: 1 ft (0.3 m) Rigid pipe: 1 ft (0.3 m) 90° elbow: 5 ft (1.5 m) 45° elbow: 3 ft (0.9 m)</td>
</tr>
</tbody>
</table>

* The maximum vent length includes elbows.

(Centrotherm® - Flex Through Chimney w/ Air Intake (Only 3 in.))

<table>
<thead>
<tr>
<th>Vent length condition</th>
<th>DIP switches #7</th>
<th>Maximum equivalent vent length*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short length</td>
<td>○</td>
<td>Exhaust vent: V (Vertical) + H (Horizontal): &lt; 50 ft (15 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air Intake: &lt; 50 ft (15 m)</td>
</tr>
<tr>
<td>Long length</td>
<td>●</td>
<td>Exhaust vent: V (Vertical) + H (Horizontal): 50 ft (15 m) – 75 ft (22.5 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air Intake: &lt; 75 ft (22.5 m)</td>
</tr>
</tbody>
</table>

* The maximum vent length includes elbows.
16 Trial Operation

The installer should test operate the Combi Boiler, explain to the customer how to use the Combi Boiler, and give the owner this manual before leaving the installation.

Trial Operation

**DANGER**
There is a scald potential if the setting temperature is too high.

Should overheating occur, or the gas supply fail to shut off, turn off the manual control valve to the appliance.

* **NOTE**
  - White smoke may be noticed from the exhaust vent during cold weather. This is not a malfunction of the Combi Boiler.
  - If the Combi Boiler does not operate normally, refer to “Troubleshooting” in the Owner’s Guide.

1. Heating Side (Auto Feeder Process)
   1) Turn on the power to the Operation Display.
   2) The unit starts auto feeder process for heating when the heating water pressure is less than [I:14_ HPS (default: 12psi)- 4psi].
   3) Once heating water pressure reaches to a certain pressure, the pump will operate to bleed the air from the heating loop.
   4) The unit will repeat auto feeder process for heating and the unit will stop the trial run when the heating water pressure reaches to [I:14_ HPS (default: 12psi)].

   * The Operation Display will display the following rotational patterns during the auto feeder process.

```
= = = = = =
↑ ↑ ↑ ↑
= = = = = =
```

   * If error code 57 appears on the Operation Display after finishing auto feeder process, the Combi Boiler is not filled with water enough to operate. When error code 57 appears, press the **ON/OFF button** twice and start auto feeder again.

2. DHW Side
   1) Open a hot water fixture to confirm that water is available, and then close the fixture.
   2) Open the gas supply valve.
   3) Turn on the power supply on the Operation Display (the Power indicator will turn on).

3. Open a hot water fixture and confirm that the Flame symbol comes on, and that hot water is being produced.

   **NOTE**
   - If an error code “11” appears on the Operation Display, air may be trapped in the gas line.
   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.
   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

4. Check that the hot water temperature changes by changing the temperature setting.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.

**NOTE** If an error code “11” or “F11” appears on the Operation Display, air may be trapped in the gas line.

   1) Close a hot water fixture.
   2) Turn the Combi Boiler off and then back on.

   3) Reopen a hot water fixture.

   4) If necessary, repeat until the air is completely purged from the gas line.
If error codes “11”, “12”, and “90” appear, check the following contents.

[“11”: Ignition failure, “12”: Flame loss]
• Check that the gas supply line is appropriately sized.
• Check that the gas supply pressure is within the ranges required in this manual.
• Check that the gas supply matches the type indicated on the Combi Boiler’s rating plate.
• Air may be left in the gas piping. Cycle the power ON/OFF.
• Check that the settings of all DIP switches are appropriate.

[“90”: Combustion abnormality]
• Check that the air supply / exhaust vent for blockage.
• Check that the gas supply pressure is within the ranges required in this manual.
• Check that the condensate piping is not frozen or clogged.
• Check that the condensate piping is in a downward slope.
• Check that the settings of all DIP switches are appropriate.

Handling after trial operation
• Explain the “Important Safety Information”, “Operation Procedures” and “Follow-up Service” according to the Owner’s Guide supplied with the Combi Boiler.
• If the Combi Boiler will not be used immediately, close off all gas and water shut off valves, drain all of the water out of the Combi Boiler and the plumbing system to prevent the Combi Boiler and system from freezing, and bleed the gas out of the gas line. Refer to the procedure for preventing damage from freezing in the Owner’s Guide.

NOTICE
Freezing is not covered by the Pavilion Limited Warranty.

[Procedure to follow after step 4 for both installation of a single Combi Boiler and installation with a Quick Connect Multi-System]
5. • Make sure that there are no obstructions blocking the condensate drain line from discharging condensate.
• Be sure to check that condensate is freely flowing from the condensate drain piping. Condensate will begin flowing out of the Combi Boiler within 15 minutes after operation has started.
6. After the trial operation, clean the filter in the cold water inlet according to the procedure as follows.

1) Close the hot water valve and the water supply valve.
2) With a bucket ready, remove the water drain valve.
   **NOTE** Approximately 0.13 gallon (0.5 L) of water will drain out.
3) Clean the water filter with a brush under running water.
4) Reattach the water drain valve (with water filter).
   **NOTE** Do not to lose the O-Ring.
5) Open the hot water valve and the water supply valve.
   Check that water does not leak from the water drain valve.
**Lighting Instructions**

**WARNING**

A fire or explosion may result if these instructions are not followed, which may cause lose of life, personal injury or property damage.

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

1. Read the safety information in the installation manual or on the front of the Combi Boiler
2. Turn off all electrical power to the Combi Boiler.
3. Do not attempt to light the burner by hand.
4. Turn the gas control manual valve (external to the Combi Boiler) clockwise to the off position.
5. Wait five minutes to clear out any gas. If the smell of gas remains, stop, and follow the instructions on page 3 of Owner’s Guide.
6. Turn the gas control manual valve counterclockwise to the on position.
7. Turn on the electrical power to the Combi Boiler.
8. The Combi Boiler will now operate whenever hot water is called for. If the Combi Boiler will not operate, follow the shutdown instructions and call a service technician.

**Shutdown Instructions**

1. Stop any water demand.
2. Turn off the electrical power.
3. Turn the gas control manual valve clockwise to the off position.

---

**Trial Operation**
# 17 Checklist After Installation

After installing the Combi Boiler, review the following checklist. You should be able to answer “Yes” to all of the items in the checklist. If you answer NO to any item, installation is not complete. Review the appropriate sections to complete the installation. If you have additional questions or need assistance with installation, contact Pavilion Customer Center at 1-855-443-8468.

### Choosing an Installation Location *(See page 13 - 16)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
| Make sure that the Combi Boiler is not installed in the following places.  
• Places where gasoline, benzene and adhesives are handled  
• Places in which corrosive gases (ammonia, chlorine, sulfur, ethylene compounds, acids) are present in the air  
• Places dust or debris will accumulate |  |

### Installation Clearances *(See page 16)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that the Combi Boiler meets the required clearances.</td>
<td></td>
</tr>
</tbody>
</table>

### Installation of the Combi Boiler *(See page 17 - 18)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that the condensate container is filled with water.</td>
<td></td>
</tr>
</tbody>
</table>

### Venting the Combi Boiler *(See page 19 - 35)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
| Make sure that required combustion air is supplied to the Combi Boiler.  
Make sure using vent materials approved for use with category IV appliances.  
Make sure that there is no leakage or loose connection in the venting system.  
Make sure that the vent length is within the requirement.  
Make sure that bird screen(s) is installed on the vent termination.  
Make sure that the termination meets the clearance requirements.  
When using a horizontal section, make sure that the horizontal vent slope is 1/4 in. upwards for every 12 in. (300 mm) toward the termination.  
Make sure that the intake pipe and exhaust pipe are properly installed.  
Make sure that the vent system comforms with local codes, state codes, or national codes as ANSI/NFPA and CSA. |  |

### Connecting the Gas Supply *(See page 36 - 39)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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</thead>
</table>
| Make sure that the gas type is compatible with the type indicated on the Combi Boiler’s rating plate.  
Clean out any debris from the gas piping before connecting the Combi Boiler.  
Make sure that the gas piping size is appropriate.  
Make sure that the inlet gas pressure is within the specified range.  
Make sure that there are no leaks from the Combi Boiler and its gas connection. |  |

### Connecting the Heating Supply *(See page 44 - 48)*

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>
| Make sure that heating system pressure is 12 to 30 psi at the Combi Boiler outlet.  
Make sure that no water leakage from heating supply pipe, heating return pipe and all of connections.  
Make sure that the backflow preventer is installed as required by local codes.  
Make sure that expansion tank is installed. And check precharged pressure should equal the system fill pressure for the Combi Boiler. |  |
<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make sure that air separator is installed.</td>
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<tr>
<td>Make sure all of the air is removed from the heating system.</td>
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<tr>
<td><strong>Connecting the DHW pipe (See page 40 - 43)</strong></td>
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<tr>
<td>Clean out metal powder, sand and dirt from the water piping before connecting the Combi Boiler.</td>
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<tr>
<td>Make sure to check and test the water quality to see if water treatment is necessary.</td>
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<tr>
<td>Make sure that the water supply pressure is 15 to 150 psi (103.4 to 1034 kPa).</td>
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<tr>
<td>Make sure that there is no water leakage from the cold water supply pipe and the hot water supply pipe.</td>
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<tr>
<td>Make sure that the pressure relief valve is installed.</td>
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<tr>
<td>Make sure that the cold water supply line and the hot water supply line are properly connected to the Combi Boiler.</td>
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<tr>
<td>Make sure that appropriate heat insulation measures are taken according to regional climate. (e.g. wrapping with heat insulation materials, using electric heaters)</td>
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<tr>
<td><strong>Connecting the Condensate Drain (See page 48 - 49)</strong></td>
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<tr>
<td>Make sure that the condensate drain piping is connected.</td>
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<tr>
<td>Make sure that corrosion resistant material is used for the condensate drain piping.</td>
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<tr>
<td>Make sure that the size of the condensate drain piping is 1/2 in or larger.</td>
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<tr>
<td>Make sure that the condensate drain piping slopes towards the inside floor drain or condensate pump.</td>
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<tr>
<td>Make sure that the end of the condensate drain pipe is open to the atmosphere.</td>
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<tr>
<td>Make sure that the condensate has been treated before disposal as necessary. (when required by local code or when the condensate could cause damage)</td>
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<tr>
<td>Make sure that measures are taken to prevent the condensate drain lines from freezing. (e.g. insulation material, heat tape or electric heater)</td>
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<tr>
<td><strong>Connecting Electricity (See page 50 - 58)</strong></td>
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</tr>
<tr>
<td>Make sure that the electrical supply is 120 VAC at 60 Hz.</td>
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<tr>
<td>Make sure the grounding resistance is less than 100 Ω.</td>
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<tr>
<td><strong>Setting the DIP Switches (See page 68)</strong></td>
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<tr>
<td>Make sure that all DIP switches are set correctly.</td>
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<tr>
<td><strong>Trial Operation (See page 69 - 71)</strong></td>
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<tr>
<td>Open a hot water fixture, make sure the BURNER ON indicator or the Flame indicator is displayed on the Operation Display and hot water is present at the fixture.</td>
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<tr>
<td>Clean the filter in the cold water inlet after the trial operation.</td>
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<tr>
<td>If the Combi Boiler will not be used immediately, do the following.</td>
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<tr>
<td>• Close all gas and water shutoff valves.</td>
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<tr>
<td>• Drain all the water in the Combi Boiler and the plumbing system.</td>
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<tr>
<td>• Disconnect the electrical power to the Combi Boiler.</td>
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<tr>
<td>Explain the “Important Safety Information”, “Operation Procedures” and “Follow-up Service” according to the Owner’s Guide to the customer.</td>
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<tr>
<td><strong>Quick Connect Multi-System Installation (See page 51-52, 79)</strong></td>
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<tr>
<td>Make sure that the Water Heater’s Remote Controller is disconnected*.</td>
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<tr>
<td>* Quick Connect Multi System is operated by Combi Boiler’s Operation Display.</td>
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</tbody>
</table>
18  Plumbing Applications

18.1 General Requirements

1. This drawing is meant to show system piping concept only. Installer is responsible for all equipment and detailing required by local codes.
2. All closely spaced tees shall be within 4 pipe diameters or max 12 in. center to center spacing.
3. A minimum of 6 pipe diameters of straight pipe shall be installed upstream and downstream of all closely spaced tees.
4. The minimum pipe size of DHW piping should be 3/4” diameter and Heating piping should be 1” in diameter.
5. Piping shown is Primary/Secondary. System flow (secondary loop) must be greater than the appliance’s primary loop flow.
6. Install a minimum of 12 diameters of straight pipe upstream of all circulators.
7. In a valve-based system, each heating zone has a zone valve which opens when that zone calls for heat. Each zone thermostat is wired to its corresponding zone valve. Contacts in the zone valves provide a signal to the appliance to operate when there is a call for heat.
8. Unit is equipped with built-in primary pump for the heating loop. This pump is sized to ensure proper flow rate through the appliance heat exchanger and related piping. On long pipe runs, it is recommended to keep the pump at maximum speed (setting 3). DO NOT lower it from the factory default.
9. Install a backflow preventer valve in the make-up water supply to the unit as required by local codes.
10. Do not install an external pump upstream an expansion tank in heating supply pipe.
11. The expansion tank must be sized in accordance with the water volume of the system as well as the firing rate of the appliance. The tank precharge pressure should equal the system fill pressure for best operation.

* Equip a cap (1/2 in.) with the Auto Feeder Water Inlet Connection when piping has not been connected to the Auto Feeder Water Inlet Connection (refer to pages 47, 63 [I:15_AFA]).

18.2 Only install Combi Boiler as a Water Heater (Install Heating in the future)

This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes. Refer to page 51 for electrical wiring instructions.
This drawing is meant to show system piping concept only. Installer is responsible for all equipment & detailing required by local codes. Refer to page 51 for electrical wiring instructions.
18.5 Air Handler

The Combi Boiler can control the operation of an Air Handler when thermostat is used in combination with the Air Handler. The Air Handler function is designed to stop the Air Handler’s pump and fan operation when the Combi Boiler’s operation is not suitable for the Air Handler.

* In order to set up the Air Handler, from Installer Mode [I:08_Air] should be activated. (Refer to page 62)

Refer to page 51 for electrical wiring instructions.
18.6 Recirculation System

* When the pump for the recirculation system is operating, there may be cases when the Heating Mode can not operate. It depends on the relationship between the Domestic Hot Water Temperature and the Heating Temperature.

*1 Size the pump to provide a maximum of 2 GPM (7.5 L/min) through the system at 10 ft (3m) of head plus piping losses. Adjust the flow using a globe valve and verify the flow rate with the maintenance monitors.

*2 An Aquastat must be used to control the pump.

*3 Set the Aquastat to 10°F below the DHW Temperature Setting. An aquastat is the minimum pump control requirement in order to maintain the full recirculation warranty.

*4 It is recommended that the use of Service Valve Kit with Pressure Relief Valve with the installation. The kit includes an integrated shut-off and service valve with unions and a pressure relief valve.

* The heating might not operate in some conditions during recirculation.

Be sure to make sure the following requirement when install the recirculation system.

• Insulate the DHW Supply and Return pipe completely to prevent the recirculation operation continuously.
18.7 Quick Connect Multi System Installation

- The Quick Connect Multi System allows the installation of two units together utilizing only the Quick Connect Cord. Unit’s MAX Btuh must be same in order to quick connect. e.g. When installing PV199DV (GHQ-C3201WX-FF PB US), you must install UT199DV (GQ-C3260WX-FF PB US).

- The Quick Connect Cord is 6 ft. (2m) long. Install the units 3-18 in. (75-457 mm) apart from each other to ensure the cord will be able to reach between the units. (See Typical Plumbing diagram). (If the distance between the two units is too great, not only will the cord not be able to reach, but the water temperature may also become unstable because of the difference in pipe length between the two units).

**System Diagram**

**NOTE** This system is operated by the Combi Boiler’s Operation Display. Don’t connect the remote controller to the water heater. The UT199DV remote controller (Included Accessory) will be required to troubleshoot, make sure the customer keeps the remote for future use.

- **Typical Plumbing**

  Make this distance as short as possible. The hot water temperature will become unstable as the pipe length increases.

  - Insulate the hot water piping to prevent heat loss. Insulate and apply heating materials to the cold water supply piping to prevent heat loss and freezing of pipes when exposed to excessively cold temperatures.
19 Maintenance

19.1 Periodic Check

- Check the following to ensure proper operation of the Combi Boiler periodically.
- Also check the items of maintenance described in the Owner’s Guide.

[Venting System]
- The venting system must be examined periodically by a qualified service technician to check for any leaks or corrosion.
- Do not obstruct the flow of combustion and ventilation air.

[Burner]
- Check the burner flame periodically for a proper blue color and consistency.
- If the flame does not appear normal, the burner may need to be cleaned by a qualified service technician.

[Pressure relief valve]
- Operate the pressure relief valve once a year to ensure that it is functioning properly and there is no obstruction. Turn the power off to the Combi Boiler before opening the pressure relief valve, and make sure that water draining out of the valve will not cause any damage.
- If the pressure relief valve discharges periodically, it may be due to thermal expansion in a closed water system. Contact the water supplier or a local plumbing inspector on how to correct this situation. Do not plug the pressure relief valve.

[Water filter]
- Check and clean the filter inside of cold inlet (DHW inlet) connection.

**NOTICE**

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.
19.2 Procedure for Flushing the Plate Heat Exchanger

**NOTE** This procedure is only intended for use by a qualified service professional or authorized Service Representative. Any unauthorized use of this procedure may result in voiding the Pavilion Limited Warranty. Contact Pavilion Customer Center at 1-855-443-8468 for additional support.

To prevent damage to the Plate Heat Exchanger from Scale Build-up, the Plate Heat Exchanger needs to be flushed* to remove the Scale Build-up.

**Damage to the Combi Boiler due to Scale Build-up is not covered by the Combi Boiler’s warranty.**

* Connect the blue connector marked “FLUSH” for flushing near the Circuit Board when flushing the Plate Heat Exchanger.

**NOTE** The Combi Boiler must remain connected to the electrical power when flushing the Plate Heat Exchanger.

The preparation of the flushing system

1. Close the gas supply valve.
2. Close the Domestic Water Inlet valve (V1) and the Domestic Water Outlet valve (V2).
3. Connect the one drain hose (H1) to the drain valve (V3), and then the other to the circulating pump.
4. Connect the drain hose (H2) to the circulating pump.
5. Connect the drain hose (H3) to the drain valve (V4).
6. Pour 1 gallon of “Calcium, Lime and Rust Removal Product” and 1 gallon water into the bucket. It is recommended “Calcium, Lime and Rust Removal Product” for flushing.
7. Place the both drain hoses (H2 and H3) into the bucket filled with the flushing solution.
8. Open the both drain valves (V3 and V4).

**Service Valve Kit with Pressure Relief Valve** is necessary for flushing the Plate Heat Exchanger.

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**Maintenance**

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For Single Unit

[Procedure 1. Flushing the Plate Heat Exchanger]
1. Open the front cover.
2. Connect the blue connector* marked “FLUSH” for flushing near the Circuit Board.

* The connector color is blue and labeled “FLUSH”.

3. Then the code “CCC” is displayed on the Operation Display.
4. Turn on the circulating pump to circulate the flushing solution through the Combi Boiler for 1 hour at a rate of 1.5 gallons per minute or more.
5. CCC
   The code “C60” is displayed on the Operation Display when the Combi Boiler detects the flow of the flushing solution.
   When 1 minute passes, the code “C60” will change to “C59” on the Operation Display.
   When 1 hour passes, the code “C00” is flashing on the Operation Display.
   Do not disconnect the blue connector marked “FLUSH” for flushing.

   NOTE Check whether the reverse connection of the hose (H1) and (H3) if the display number will not change. In that case, the flow rate of the flushing solution may be under 1.5 GPM.

6. Turn off the circulation pump.

[Procedure 2. Cleaning the Plate Heat Exchanger]
The flushing solution needs to be rinsed and cleaned out of the Combi Boiler. Below is the way to rinse and clean the flushing solution.
1. Remove both drain hoses (H2 and H3) from the bucket. And then place the drain hose (H3) into the sink or outside to drain.
2. Close the drain valve (V3) and then open the Domestic Water Inlet valve (V1). Do not open the Domestic Water Outlet valve (V2).
3. Clean the Combi Boiler with fresh water for 3 minutes or more. (Needs to have enough time to clean the Combi Boiler.)
4. Close the drain valve (V4) and then remove the drain hose (H3) from the drain valve (V4).
5. Remove the drain hose (H1) from the drain valve (V3).
6. Disconnect the blue connector marked “FLUSH” for flushing.

   The code “C00” goes out on the Operation Display.

7. Close the front cover.
8. Open the gas supply valve and Domestic Water Outlet valve (V2).
9. Check for correct operation of the Combi Boiler.
For Quick Connect Multi-System

1. Open the front covers.
2. Connect the blue connector marked “FLUSH” for unit needing to be flushed.
   (The unit is isolated from Quick Connect Multi System when the blue connector marked “FLUSH” for flushing is connected. Not need to disconnect the Quick Connect Cord.)

3. Then the code **CCC** or **FCC** is displayed on the Operation Display.
   - “CCC” is displayed when the Combi Boiler’s blue connector is connected.
   - “FCC” is displayed when the Water Heater’s blue connector is connected.
4. Turn on the circulating pump to circulate the flushing solution through the units for 1 hour at a rate of 1.5 gallons per minute or more.
5. **CCC** or **FCC**
   - The code “C60” is displayed on the Operation Display when the Combi Boiler detects the flow of the flushing solution.
   - When 1 minute passes, the code “C60” will change to “C59” on the Operation Display.
   - When 1 hour passes, the code “C00” is flashing on the Operation Display.
   - Do not disconnect the blue connector marked “FLUSH” for flushing.
   (e.g. The display when the both units are flushed at the same time)

6. Turn off the circulation pump.
7. Rinse and clean the flushing solution out of the units in accordance with [Procedure 2]”.
   (See the “Procedure 2.1-2.5”.)

   **NOTE** For Water Heater, place a bucket under the unit to drain water from the “Water Drain Valve”. Carefully unscrew the “Water Drain Valve” to rinse flushing solution out of the unit for about 10 seconds. Then close the “Water Drain Valve”.

8. Disconnect the blue connector marked “FLUSH” for flushing. The Code “C00” goes out on the Operation Display.
9. Close the front covers.
10. Open the gas supply valves and water outlet valves.
11. Check for correct operation of the unit.