



HYBRID WATER HEATER

Installation Manual

Model
| VH-199



Keep this manual near the water heater for future reference whenever maintenance or service is required.



Certified to
NSF/ANSI 5 & 372



* Lead Free

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

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

- The installation must conform with local codes or, in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CSA B149.1, Natural Gas and Propane Installation Code.
- When applicable, the installation must conform with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280 and/or CAN/CSA Z240 MH Series, Mobile Homes.

Safety Information

The following safety symbols are used in this manual for user's safety. Read this manual carefully and follow all instructions to avoid property damage, fire, explosion, personal injury, or death.

 **Danger** Indicates an imminently hazardous situation which, if not avoided, will result in severe injury or death.

 **Warning** Indicates a potentially hazardous situation which, if not avoided, will result in injury or death.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

 **Danger**

If you smell gas:

- Do not try to light any appliance.
- Do not touch any electrical switches or use landline phones.
- From a neighbor's phone, call your gas provider and follow their instructions.
- If you cannot reach your gas provider, call the fire department.

Do not use or store flammable products, such as gasoline, solvents, or adhesives in the same room or area as the water heater.

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

Avoid using hot water over 125°F.

- Water temperature over 125°F can cause severe burns or death from scalding.
- Children, the disabled and the elderly are at highest risk of being scalded.
- Test water before bathing or showering.

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



Warning

- **Do not store combustibles, such as papers or laundry, near the water heater or venting system.**
Failure to do so may result in fire or explosion.
- **Do not store or use gasoline or other flammable liquids near this water heater.**
Failure to do so may result in fire or explosion.
- **Do not store or use compressed gases, such as hair sprays or spray paints, near the water heater or venting system, including the vent termination.**
Failure to do so may result in fire or explosion.
- **Do not remove the front cover unless the power to the water heater is turned off or disconnected.**
Failure to do so may result in electric shock.
- **Do not touch the internal components of the water heater or the power cord with wet hands.**
Failure to do so may result in electric shock.
- **Do not operate the water heater with the front cover opened.**
Failure to do so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage, personal injury, or death.
- **Do not operate the water heater without proper venting.**
Failure to do so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage, personal injury, or death.



Caution

- **Do not use the water heater for anything other than its intended purpose, as described in this manual.**
Failure to do so may result in property damage, personal injury, or death.
- **Do not turn on the water heater unless the water and gas supplies are fully opened.**
Failure to do so may damage the water heater.
- **Do not use unapproved replacement or accessory parts.**
Failure to do so may result in improper or dangerous operation and will void the manufacturer's warranty.
- **Label all wires prior to disconnection when servicing controls.**
Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.
- **Do not place anything in or around the vent terminals that could obstruct the air flow in or out of the water heater.**
Failure to do so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage, personal injury, or death.
- **This water heater has been approved for use in the USA and Canada only.**
Using the water heater in any other country will void the manufacturer's warranty.

Important Note for the State of Massachusetts

From Massachusetts Rules and Regulations 248 CMR 5.08:

- (a) For all side wall horizontally vented gas fuelled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied.
 - 1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fuelled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed, in addition, the installing plumber or gas fitter shall observe that a battery operated or hard-wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fuelled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard-wired carbon monoxide detectors.
 - a. In the event that the side wall horizontally vented gas fuelled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
 - b. In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.
 - 2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed as IAS certified.
 - 3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fuelled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
 - 4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fuelled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.089(2)(a) 1 through 4.
- (b) **EXEMPTIONS.** The following equipment is exempt from 248 CMR 5.089(2)(a) 1 through 4.
 - 1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
 - 2. Product Approved side wall horizontal vented gas fuelled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.
- (c) **MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED.** When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:
 - 1. Detailed instructions for the installation of the venting system design or the venting system components; and
 - 2. A complete parts list for the venting system design or venting system.
- (d) **MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.** When the manufacturer of a Product Approved side wall horizontally vented gas fuelled equipment does not provide the parts for venting the fuel gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer.
 - 1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and
 - 2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.
- (e) A copy of all installation instructions for all Product Approved side wall horizontally vented gas fuelled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

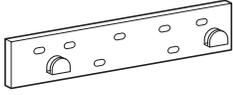
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General Information

Included Items

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



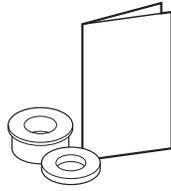
Wall mounting bracket



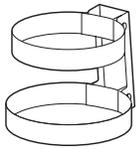
Tapping screws & anchors



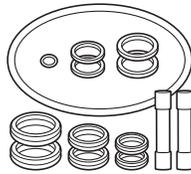
Installation and User manual



Gas conversion kit



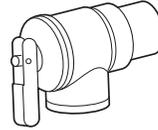
Vent clip



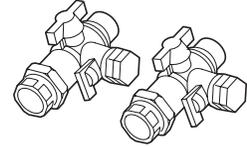
Spare parts

Optional Accessories

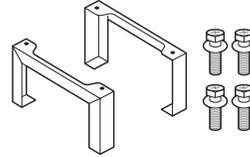
The following optional accessories are not included with the water heater, but may be necessary for the installation. Check the need for any of the following optional accessories before installation.



Pressure relief valve



Plumb easy valve set



Water heater stand

Notice

If there is a missing item, please contact Technical Support at 1-800-761-0053.

Specifications

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

Item		VH-199
Heat Capacity (Input) (0–2,000 ft)	Natural Gas	38,000–199,000 BTU/H
	Propane Gas	38,000–199,000 BTU/H
High Altitude for Canada (Input) (2,000–4,500 ft)	Natural Gas	38,000–180,000 BTU/H
	Propane Gas	38,000–180,000 BTU/H
Thermal Efficiency	Natural Gas	94
	Propane Gas	97
Flow Rate (DHW)	35°F (19°C) Temp Rise	10.8 GPM (41 LPM)
	45°F (25°C) Temp Rise	8.2 GPM (31 LPM)
	77°F (43°C) Temp Rise	4.8 GPM (18 LPM)
Dimensions (W x H x D)		18.1" x 27.6" x 13.6" (460 mm x 700 mm x 345 mm)
Weight		92 lbs (42 kg)
Installation Type		Indoor wall-hung or stand
Venting Type		Forced draft direct vent
Ignition		Electronic ignition
Water Pressure (Max.)		150 psi
Natural Gas Supply Pressure		3.5"–10.5" WC
Propane Gas Supply Pressure		8"–13" WC
Natural Gas Manifold Pressure (Min. – Max.) High Altitude Manifold pressure		-0.02" WC – -0.70" WC -0.02" WC – -0.65" WC
Propane Gas Manifold Pressure (Min. – Max.) High Altitude Manifold pressure		-0.02" WC – -0.15" WC -0.02" WC – -0.12" WC
Reserve Tank		3 Gallons (11 Liters)
Minimum Flow Rate		0.1 GPM (0.4 LPM)
Connection Sizes	Cold Water Inlet	3/4" NPT
	Hot Water Outlet	3/4" NPT
	Gas Inlet	3/4" NPT
Power Supply	Main Supply	120V AC, 60 Hz / use less than 5 AMP
Maximum Power Consumption		95 W
Materials	Heat Exchangers	Stainless steel
Venting	Exhaust	2" or 3" PVC, CPVC, Polypropylene 2" or 3" Special gas vent type BH (Class II, A/B/C)
	Intake	2" or 3" PVC, CPVC, Polypropylene 2" or 3" Special gas vent type BH (Class II, A/B/C)
	Vent Clearances	0" to combustibles
Safety Devices		Flame rod, APS, Over heat preventer, Exhaust temperature high limit sensor, Power surge fuse

Rating Plate



The gas type and electricity voltage must match the rating plate. Using a different gas type and electricity voltage will cause the water heater to malfunction.

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



			
<small>Certified to NSFANSI 5.1.PT2</small>			
Direct Vent Automatic Instantaneous Water Heater <i>/ Chauffe-eau Automatique Instantané à Ventilation Directe</i> For Indoor or Manufactured Home(Mobile Home) Installation <i>/ Pour l'installation à l'intérieur ou dans des maisons préfabriquées(maisons mobiles)</i>			
VESTA, DS, INC. 2711 LBJ Freeway, Suite#320 Farmers Branch, Texas75234 Tel / Tél : 1-800-761-0053 Model / Modèle : VH - 199 Type of Gas / Type de gaz: Natural Gas / Gaz naturel BTU/h Input : Min. 38,000 ~ Max. 199,000 / <i>Entrée BTU / h</i> Recovery Rate : 251 Gallons/Hour(Δ90°F) / <i>Taux de récupération</i> Inlet Gas Pressure : Min. 3.5 ~ Max. 10.5 inches W.C / <i>pression de gaz dans l'orifice</i> Manifold Gas Pressure : Min. -0.02 ~ Max. -0.7 inches W.C / <i>pression de gaz dans le collecteur</i> Orifice Size : 0.3 for NG, 0.24 for LP inches / <i>dimension des injecteurs</i> Electrical Rating : AC 120 Volts 60Hz less than 5 Ampere / <i>Spécifications électriques</i> Max. Water pressure : Min. 15 psi ~ Max. 150 psi / <i>Pression d'eau maximale</i> Suitable for water(potable) heating only. / <i>Convient uniquement pour l'eau chaude.</i> Orifices necessary for LP conversion are provided. / <i>Les ports nécessaires pour la conversion LP sont fournis</i>			
FOR YOUR SAFETY / POUR VOTRE SÉCURITÉ Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. / <i>Ne stockez pas ou n'utilisez pas d'essence ou d'autres vapeurs ou liquides inflammables autour de cet appareil ou d'appareils similaires.</i>			
<small>ANSI Z21.10.3/CSA 4.3-2015</small>			
This appliance must be installed in accordance with local codes or, in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSAB149.1, Natural Gas and Propane Installation Code. / <i>Cet appareil doit être installé conformément aux codes locaux ou, en l'absence de codes locaux, au National Fuel Gas Code ANSI Z223.1/NFPA 54 ou au Code d'installation du gaz naturel et du propane CSA B149.1.</i> This appliance must be installed in accordance with the Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280 or the Canadian standard CSA Z240 MH Series, Manufactured Homes. / <i>Cet appareil doit être installé conformément à la norme Manufactured Home Construction and Safety Standard, Title 24 CFR, Part 3280 ou à la norme canadienne CSA Z240 Série MH, Maisons préfabriquées.</i>			
<small>If the appliance is installed without air intake pipe, the category is IV. *This water heater requires a special venting system. Refer to the installation instructions for parts list and method of installation.</small>			
REQUIRED CLEARANCES TO COMPUSTIBLES <i>/ Distance nécessaire aux matériaux combustibles</i> Minimum Clearances from Compustible or Non-combustible Construction <i>/ Distance minimale entre tout matériau combustible et construction incombustible</i>			
Clearance / Distance	Indoor Install / installation intérieure		
Top of heater/Haut du chauffe-eau	12 inches		
Back of heater/Arrière du chauffe-eau	0.6 inches		
Front of heater/Avant du chauffe-eau	6 inches		
Side of heater/Côtés du chauffe-eau	2 inches(L), 6 inchs(R)		
Bottom of heater/Fond du chauffe-eau	6 inches		
PRODUCT NUMBER / NUMÉRO DE PRODUIT : SERIAL NUMBER / NUMÉRO DE SÉRIE : MADE IN KOREA / <i>Fabriqué en Corée</i>			

Warning Label

Before the operation, check the warning label located on the side of the water heater to ensure that check the operating precautions and operating procedures of the water heater.

DANGER



Flammable vapors

Vapors from **flammable** liquids **explode** and catch fire causing death or severe burns. Do not use or store **flammable** products such as gasoline, solvents or adhesives in the same room or area near the water heater.

Les vapeurs des **liquides inflammables** **explosent**, s'enflamment et entraînent la mort ou des brûlures graves. Ne pas utiliser ni stocker des produits **inflammables**, comme de l'essence, des solvants ou des adhésifs, dans la même pièce que le chauffe-eau, ni près de celui-ci.

Keep flammable products:

Gardez les produits **inflammables**:

1. Far away from heater. / Très loin du chauffe-eau.
2. In approved containers. / Dans des récipients approuvés.
3. Tightly closed. / Dans des récipients fermés hermétiquement.
4. Out of children's reach. / Hors de la portée des enfants.

Vapors. Les vapeurs:

1. Cannot be seen. / Sont invisibles.
2. Go up as they rise. / Sont plus lourdes que l'air.
3. Go a long way on the floor. / Se propagent sur une grande distance.
4. Can be carried from other rooms to the main burner by air currents. / Peuvent être transportés à partir d'autres pièces à l'aide de courants d'air.

CAUTION



Hotter water increases the risk of scald injury. Before changing temperature setting, see instruction manual.

De l'eau plus chaude augmente le risque de brûlure. Voir la notice d'instructions avant de modifier le réglage de la température.

WARNING: California Proposition 65 states chemical substances known to the state to cause cancer, birth defects, death, serious illness or other reproductive harm. This product may contain such substances, but their origin from fuel combustion (gas, oil) or components of the product itself.

A temperature and pressure relief valve is installed as complying with the standard for Relief Valve and Automatic Gas Shutoff Devices for Hot Water Supply System, ANSI Z21.22, shall be installed at the time of installation of the heater in the location specified by the manufacturer. Local codes shall govern the installation of relief devices for safety operation of the water heater. The relief valve must not be removed or plugged. Une vanne de décharge de pression et de température réglementaire, conformément aux normes relatives aux vannes de décharge et aux dispositifs d'arrêt automatique de gaz pour le système d'alimentation en eau chaude ANSI Z21.22, doit être installée lors de l'installation du chauffe-eau, à un emplacement spécifié par le fabricant. L'installation des dispositifs de décharge doit respecter les règlements locaux afin de garantir un fonctionnement sécurisé du chauffe-eau. La vanne de décharge ne doit être ni débranchée ni bouchée.

- This appliance must be installed in accordance with local codes or, in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1 / NFPA 54 or the CSA B149.1, Natural Gas and Propane Installation Code.
- Cet appareil doit être installé selon les règlements locaux, ou en l'absence de tels règlements, selon le National Fuel Gas Code, ANSI Z223.1 / NFPA 54, ou les Codes d'installation du gaz naturel et du propane, CSA-B149.1.
- This water heater is provided with a pressure relief valve. For safe operation of the water heater, the relief valve(s) must not be removed from its designated point of installation or plugged.*
- Ce chauffe-eau est équipé d'une soupape de décharge. Pour assurer le fonctionnement sécuritaire du chauffe-eau, ne pas retirer ni boucher cette soupape de décharge.*
- Be carefully to avoid contact with hot water coming out of the pressure relief valve and to prevent water damage when you operate the relief valve.
- Veillez à éviter tout contact avec l'eau chaude qui s'échappe de la soupape de surpression et à éviter d'endommager l'eau lorsque vous actionnez la soupape de surpression.
- The water heater shall not be connected to any heating system or component(s) previously used with a nonpotable water heating appliance.
- Le chauffe-eau ne doit jamais être relié à un système de chauffage ou à des composants précédemment utilisés sur un appareil de chauffage pour l'eau non potable.
- Toxic chemicals, such as used for boiler treatment, shall not be introduced into the potable water heater used for space heating.
- Les produits chimiques toxiques, utilisés pour le traitement des chaudières, ne doivent jamais être introduits dans le chauffe-eau pour l'eau potable, utilisé pour le chauffage d'espace.
- The manual gas shut off valve is not provided as an additional content of the water heater. However, the manual gas shut off valve must be installed between the unit and the gas supply pipe by the installer.
- La soupape d'arrêt de gaz manuelle n'est pas fournie avec les composants du chauffe-eau. Cependant, une soupape d'arrêt de gaz manuelle doit être installée par un installateur agréé, entre l'appareil et le tuyau d'alimentation en gaz.
- When installed in a manufactured home (mobile home), the screen for openings specified shall be of metal with no less than 1/4 in (6.4mm) mesh. When using non-direct venting for manufactured home (mobile home), provide two openings to allow for circulation of combustion air as specified by ANSI Z223.1/NFPA 54 or CAN/CGA B-149.1.
- * Indoor make up air provided at minimum free area of 1 ft² per 1,000 BTU/H
- * Indoor make up air provided at minimum free area of 1 per 1,000 BTU/H
- * Recommended vent material: PVC schedule 40.
- Lors de l'installation dans une maison préfabriquée (maison mobile), l'écran pour les ouvertures spécifiées doit être en métal avec un maillage d'au moins 6,4 mm (1/4 po). Fournissez deux ouvertures pour permettre la circulation de l'air de combustion, comme précisé par la norme ANSI Z223.1 / NFPA 54 ou CAN / CGA B-149.1.
- * Si de l'air de compensation extérieur est fourni, une zone libre d'au moins 1p2' par 1,000BTU/H
- * Matériau de ventilation recommandé: PVC de diamètre 40.

FOR YOUR SAFETY READ BEFORE OPERATING / Pour votre sécurité lisez avant d'allumer

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

AVERTISSEMENT: Quoiqu'on ne respecte pas à la lettre les instructions dans la présente notice risque de déclencher un incendie ou une explosion entraînant des dommages, des blessures ou la mort.

The water heater does not use a pilot light. It is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand. Cet appareil n'utilise ni bougie ni allumeur manuel. Respectez les instructions relatives à l'installation.

NE OPERATE the unit until all around the water heater area the ventilation is adequate. Do not try to modify the fan because some gas heavier than air and will settle on the floor. Avant d'allumer le chauffe-eau, vérifiez tout d'abord de l'appeler pour vérifier si vous avez de la place. Restez à l'écart du chauffe-eau car certains gaz sont plus lourds que l'air et peuvent s'accumuler au niveau du sol.

WHAT TO DO IF YOU SMELL GAS / QUE FAIRE SI VOUS SENTEZ UN OUEUR DE GAZ

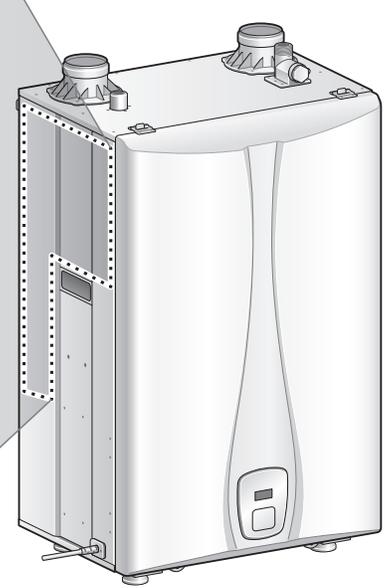
1. Do not touch any electrical switch. Do not use any phone in your building.
2. Do not touch any electric switch; do not use any phone in your building.
3. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
4. If you cannot reach your gas supplier, call the fire department. Si vous ne pouvez pas appeler le fournisseur de gaz, appelez le service des incendies.
5. Use only your normal method of lighting gas. Do not use matches, lighters, or other devices to light the burner. Do not use any open flame to light the burner. Do not use any matches, lighters, or other devices to light the burner. Do not use any open flame to light the burner. Do not use any matches, lighters, or other devices to light the burner.
6. Do not use the water heater. If you have been using an improperly installed or qualified service technician to inspect the water heater and to replace any damaged parts, it will be safe to use again only if the installing contractor, after a thorough inspection, has approved the unit for use.

OPERATING INSTRUCTIONS / Instructions d'allumage

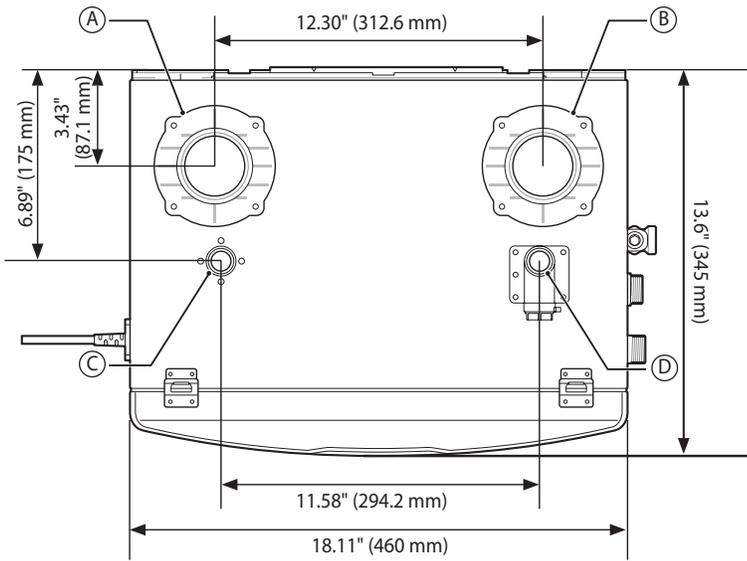
1. STOP! Read the safety information above on the label. ARRÊTEZ! Lisez les informations de sécurité ci-dessus sur l'étiquette.
2. Set the thermostat to lowest setting. Réglez le thermostat au plus bas.
3. Turn off all electric power to the appliance. Coupez l'alimentation électrique de l'appareil.
4. Do not attempt to light the burner by hand. Do not attempt to light the burner manually.
5. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the OFF position.
6. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the FULL ON position.
7. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) counter-clockwise to the FULL OFF position.
8. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the FULL ON position.
9. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the FULL ON position.
10. Set the thermostat to desired setting. Réglez le thermostat à la position désirée.
11. The appliance will not operate. Follow the instructions "To Turn Off Gas to Appliance" and call your service technician or gas supplier. Si l'appareil ne fonctionne pas, suivez les instructions "Couper le gaz à l'appareil" et appelez votre technicien d'entretien ou le fournisseur de gaz.

TO TURN OFF GAS TO APPLIANCE / Comment couper l'admission de gaz de l'appareil

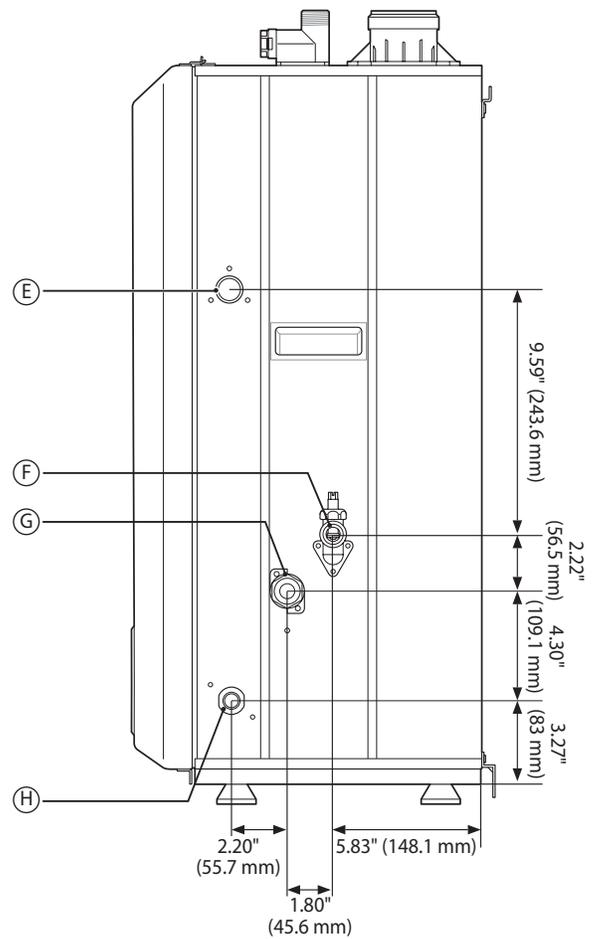
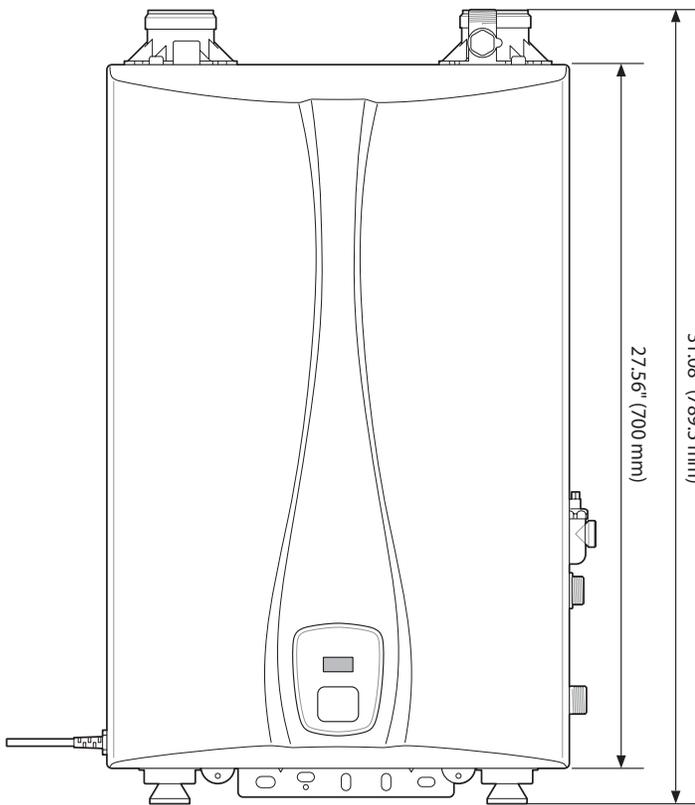
1. Set the thermostat to lowest setting. Réglez le thermostat au plus bas.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the FULL OFF position.
4. Turn the gas control manual shut off valve (installed on the gas supply line external to the unit) clockwise to the FULL OFF position.



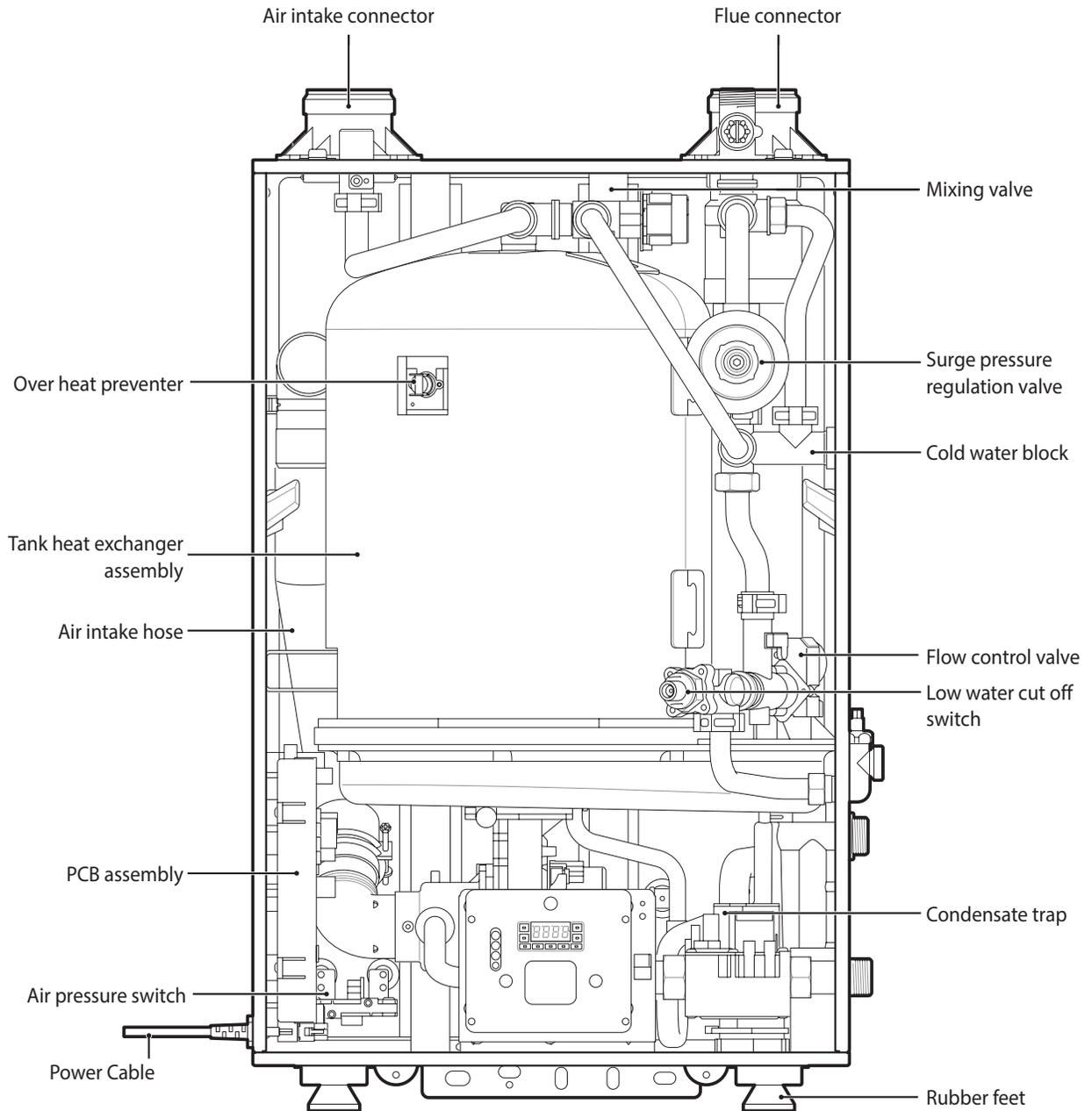
■ Dimensions

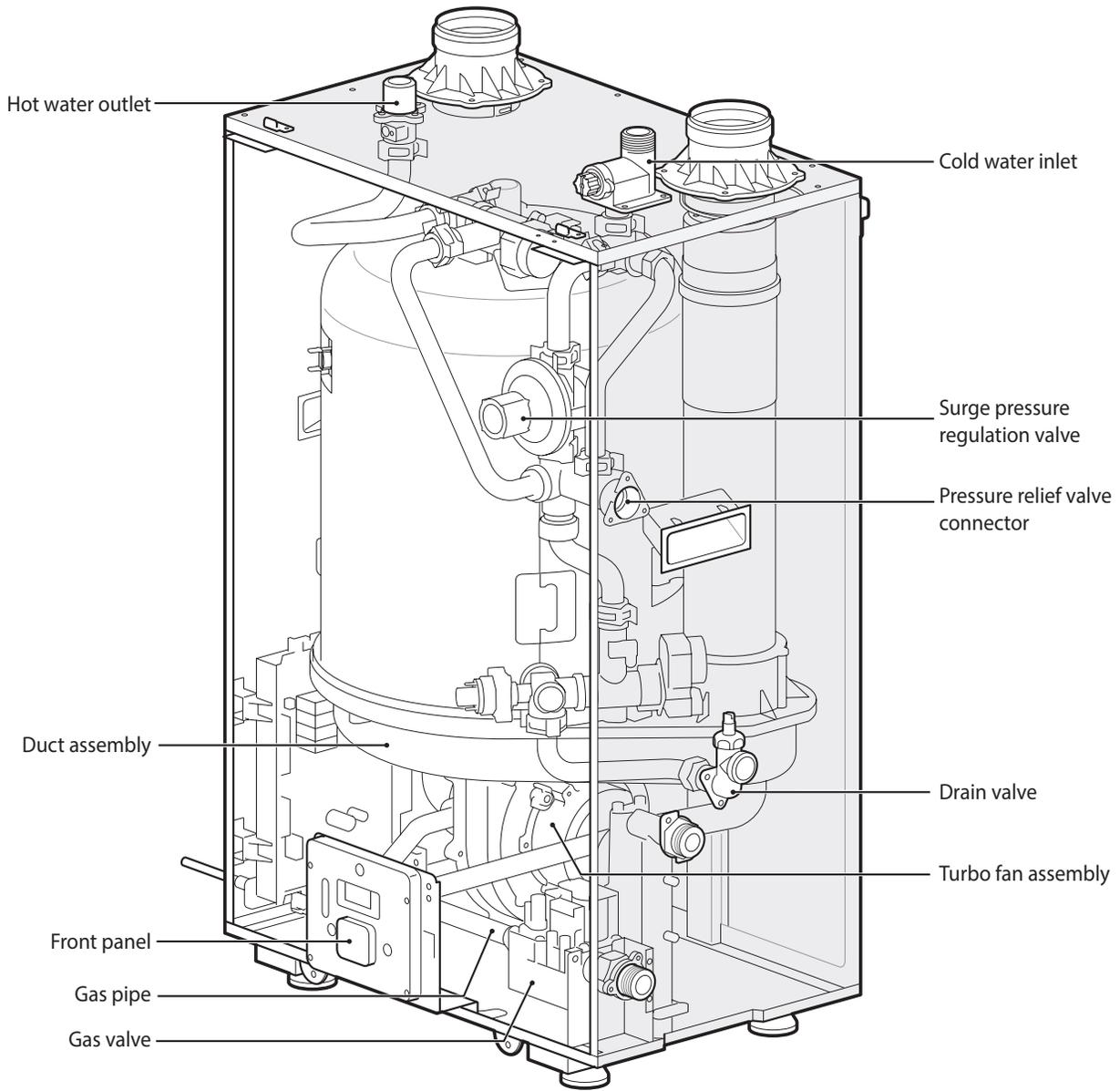


	Description	Diameter
(A)	Air intake connector	2"
(B)	Flue connector	2"
(C)	Hot water outlet	3/4"
(D)	Cold water inlet	3/4"
(E)	Pressure relief valve connector	3/4"
(F)	Drain valve	3/4"
(G)	Condensate outlet	3/4"
(H)	Gas inlet	3/4"



Components





Installing the Water Heater

■ Installer Qualifications

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

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

■ Compliance Requirements

- National electrical code.
- National fuel gas code, ANSI Z223.1/NFPA 54 and/or CSA B149.1, natural gas and propane installation codes.
- Local, state, provincial, and national codes, laws, regulations, and ordinances.

■ Location

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

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

● Access to utilities

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

● Humidity and contact with water

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

● Water quality

Water quality can have an impact on appliance longevity and may void the manufacturer's warranty.

To maintain the water heater properly, ensure that your water meets EPA quality standards. The following table shows the maximum contaminant levels allowed, based on the EPA National Secondary Drinking Water Regulations (40 CFR Part 143.3). If you suspect that your water is contaminated in any way, stop using the water heater and contact an authorized technician or licensed professional.

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

● Drainage

A significant amount of condensate is produced during the water heater operation. Install the water heater near a suitable drain and where damage from a possible leak will be minimal. Installing the water heater without a drain will void the warranty. For more information about condensate drainage, refer to "Condensate Drain" on page 21.

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

● Venting and ventilation

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

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

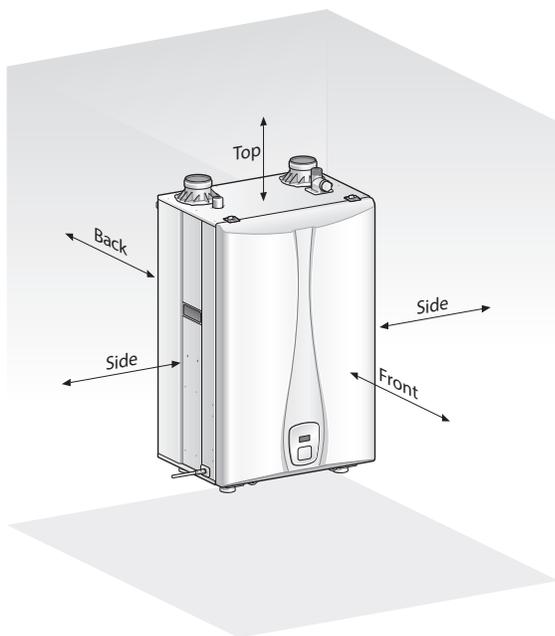
- Maintain a minimum clearance of 4 feet (1.2 meters) from heating and cooling vents.
- Maintain proper clearances from any openings in the building.
- Install the water heater with a minimum clearance of 12 inches (300 mm) above an exterior grade or as required by local codes.

- Install the exhaust vent in an area that is free from obstructions and does not allow the exhaust to accumulate.
- Do not enclose the vent termination.
- Do not install the water heater where moisture from the exhaust may discolor or damage walls.
- Do not install the water heater in bathrooms, bedrooms, or any other occupied rooms that is normally kept closed or that is not adequately ventilated.

For more information about venting, refer to "Installing a Vent" on page 23.

Clearances

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



Clearance From	Wall Mounting	Floor Mounting
Top	12 inches (305 mm) min.	12 inches (305 mm) min.
Back	0.6 inches (15 mm) min.	0.6 inches (15 mm) min.
Front	6 inches (152 mm) min.	6 inches (152 mm) min.
Left Side	2 inches (51 mm) min.	2 inches (51 mm) min.
Right Side (gas Piping)	6 inches (152 mm) min.	6 inches (152 mm) min.
Bottom	6 inches (152 mm) min.	6 inches (152 mm) min.

Clean, debris and chemical-free combustion air

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

Calibration mode

The installation circumstances can be changed depending on the elevation and pipe length. To maintain constant heat capacity, run the Calibration Mode after installing the water heater. For more information about Calibration Mode, refer to "Calibration Mode" on page 35.

Position



Do not mount the water heater to unsubstantial flooring or unreinforced dry wall.

The water heater can be mounted either on the floor or to the wall. For easy installation, use the mounting bracket to mount the water heater to standard wall studs. If the strength of the wall is insufficient and or if the framing is non-standard or uneven, reinforce the area before installation. If the floor is uneven or not rigid enough to support the water heater, level and reinforce the floor. Avoid installation in unstable locations as the water heater will make some operational noises while it is running.



Notice

Consider vent length and surrounding circumstances when mounting the water heater.

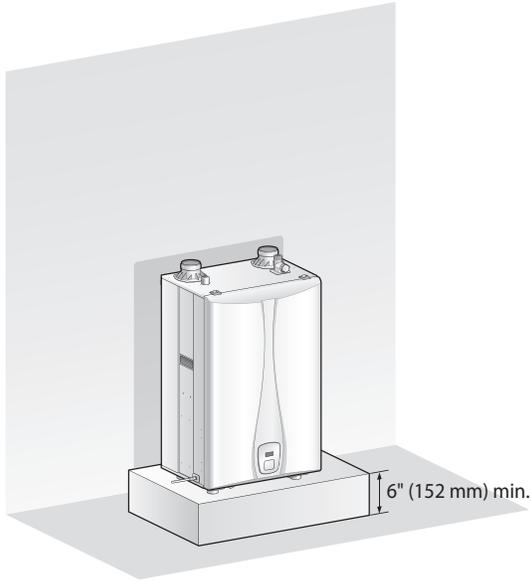
High Altitude

The instructions shall address derating at altitudes above 2000 ft (610 m); e.g., water heater input ratings are based on sea level operation and need not be changed for operation up to 2000 ft (610 m) elevation. For operation at elevations above 2000 ft (610 m), input ratings should be reduced at the rate of 4 percent for each 1000 ft (305 m) above sea level. High Altitude The instructions shall address derating at altitudes above 2000 ft (610 m); e.g., water heater input ratings are based on sea level operation and need not be changed for operation up to 2000 ft (610 m) elevation. For operation at elevations above 2000 ft (610 m), input ratings should be reduced at the rate of 4 percent for each 1000 ft (305 m) above sea level.

● Mounting on the floor

To mount the water heater on the floor:

- 1 Check that the floor is even and rigid enough to support the water heater.
- 2 Place the water heater 6" (150 mm) above the floor and level the rubber feet for balance.

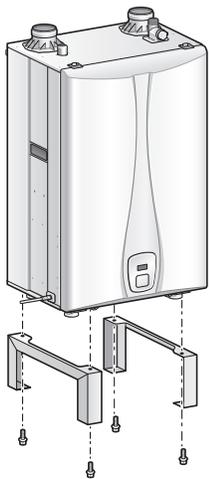


Notice

- To prevent vibration and reduce operational noise, mount the water heater on the floor in front of the wall and use the mounting bracket to affix the water heater to the wall.
- For more information about how to use the mounting bracket, refer to "Mounting to the wall" on page 15.

Water heater stand for commercial food service

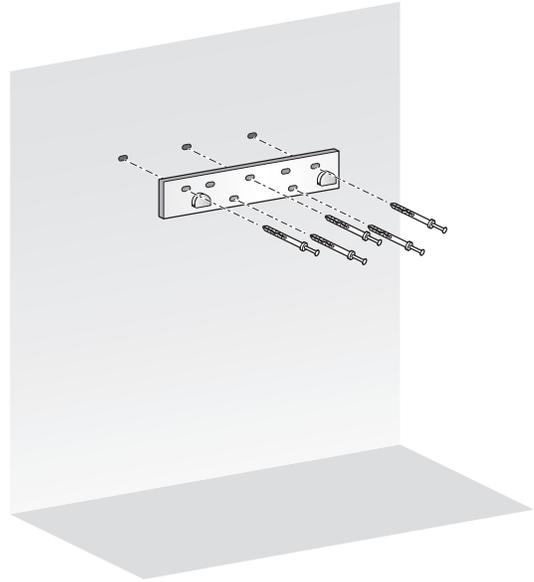
Per ANSI/NSF-5, standing directly on a hard surface is not an acceptable installation method. The unit must be elevated at least 6" (152 mm) off the floor. This mounting clearance provides access for clearing any possible debris or accumulated water seepage that may occur beneath the unit.



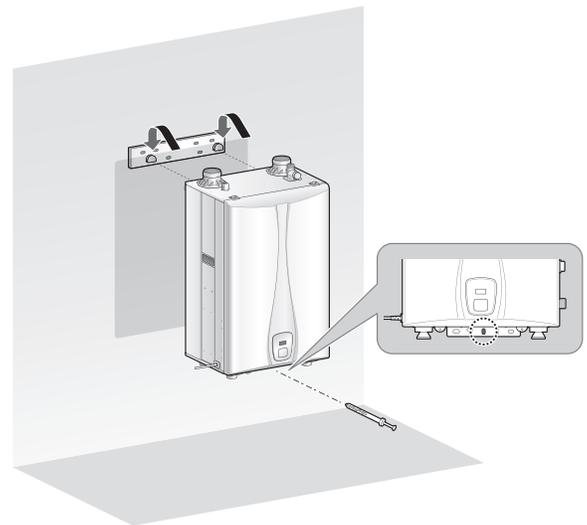
● Mounting to the wall

To mount the water heater to the wall:

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



- 3 Align the grooves on the back of the water heater with the tongues on the mounting bracket and hang the water heater from the bracket.



Connecting the Gas Supply

Gas Pipe Sizing Tables

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

Natural gas

Table 1. For less than 6" WC supply pressure.

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

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

Table 2. For 6" WC or greater supply pressure.

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

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

Liquid propane gas

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

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

Gas Piping



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



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

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

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

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

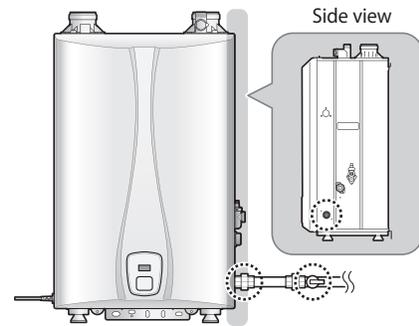
To connect the gas supply:

- 1 Determine the gas type and pressure by referring to the rating plate.
- 2 Perform a pressure test on the main gas supply line.
- 3 Purge the gas line of any debris.
- 4 Determine the proper type and size for the gas line. Refer to the gas pipe sizing tables on page 16.
- 5 Install a union.
- 6 Install a manual gas shut off valve on the gas supply line within easy reach of the appliance.



- Improper installation of the manual gas shut-off valve may result in property damage, personal injury or death.
- Only a licensed professional, in accordance with the ANSI Z21.1/CSA 9.1, should install the manual gas shut-off valve.

7 Connect the gas supply line.

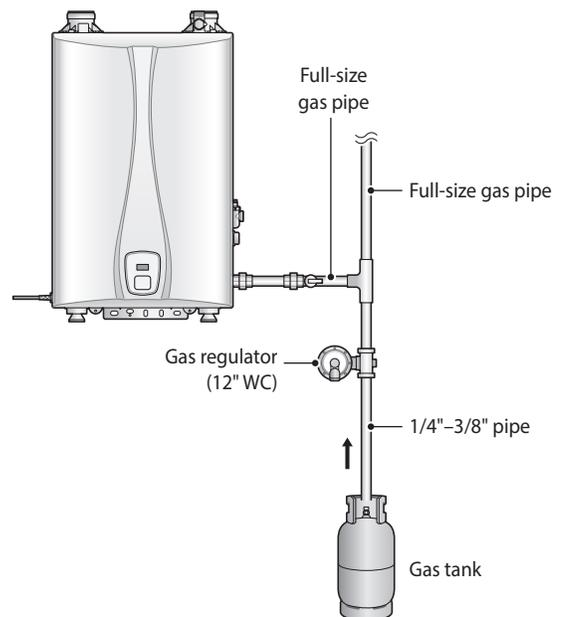


8 Check for gas leaks at all joints.

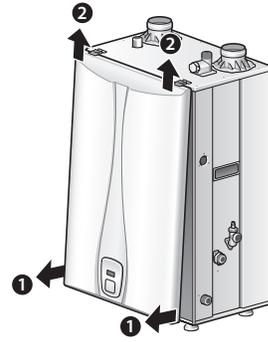
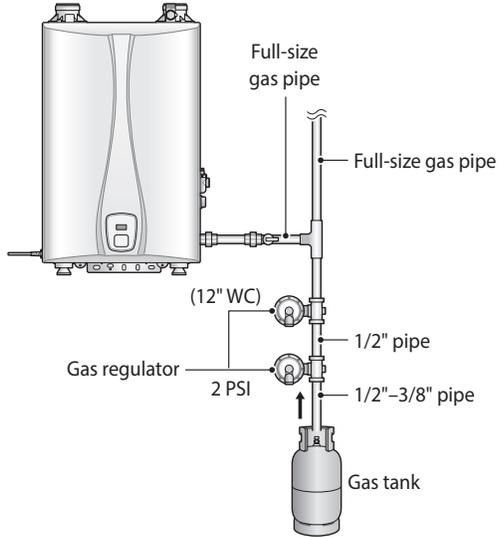
Notice

- Tighten the water heater connection valves with care to avoid damage.
- Apply gas leak detection solution to all gas fittings.
- The minimum internal diameter required for any appliance connector is $\frac{3}{4}$ ".
- When using flexible gas lines, ensure that the pipe's inner diameter and connector is sufficient to supply the required BTUs. Also, ensure that the flexible line has no crimps or tight bends in it, as this will restrict gas flow.
- To facilitate any future maintenance or service, the installation of a union on the gas supply line close to the water heater is recommended.

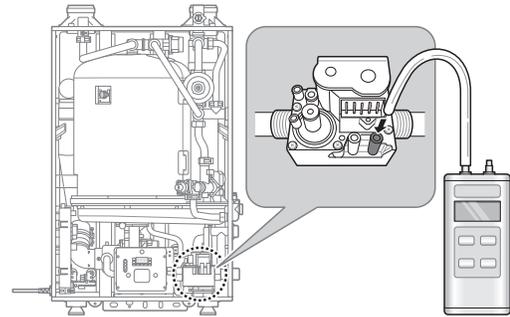
- The following is a LP gas piping example for the single regulator system



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



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



Inlet Gas Pressure



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

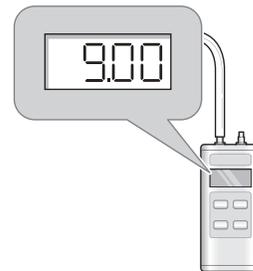
- The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psi (3.5 kPa).
- The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psi (3.5 kPa).
- The inlet gas pressure must be maintained between 3.5" and 10.5" WC for natural gas and between 8" and 13" WC for liquefied propane.

To measure the inlet gas pressure:

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



- Re-open the manual gas shut-off valve and check for leaks.
- Open multiple fixtures that have high flow rates, such as bathtub and shower faucets, to ramp up the water heater to its maximum firing rate.
- When the water heater reaches its maximum firing rate, check the inlet gas pressure reading on the manometer. The gas pressure must fall within the ranges specified in "Inlet Gas Pressure" on page 18.



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

Connecting the Water Supply

Water Piping



Warning

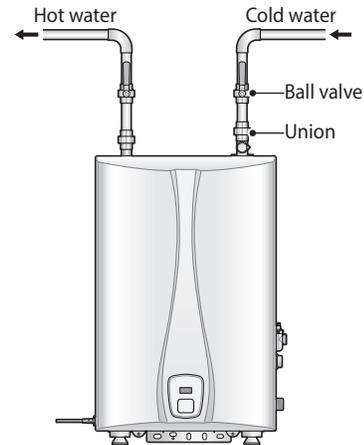
- Before installing the water heater, flush the water line to remove all debris, and after installation is complete, purge the air from the line. Failure to do so may cause damage to the water heater.
- Do not use lead, PVC, iron or any piping which has been treated with chromates or other chemicals.
- Do not use this water heater if any part has been immersed in water. Immediately call a licensed professional to inspect the water heater and replace any damaged parts.
- Do not reverse the hot outlet and cold inlet connections to the water heater. This will cause the water heater to not operate properly.
- Make sure to install a mixing/tempering valve in your water system in order to protect against injury. When it is required by your local plumbing code or regulation, you must install a mixing/tempering valve accordingly.

The water fittings on the water heater are 3/4". If the installation site has only 1/2" plumbing throughout, it is not necessary to upsize the water lines to 3/4", if you are installing a single water heater. When installing multiple water heaters, the number of water heaters and pipe sizing required will depend on the total hot water demand. For information about pipe sizing for multiple water heaters, refer to "Piping sizes" on page 42.

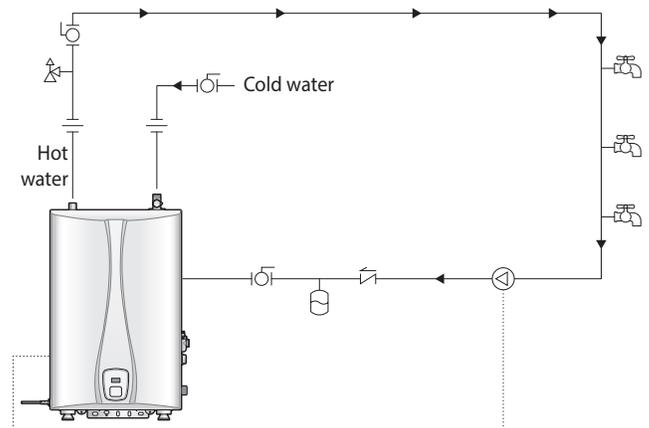
When connecting the water supply, follow these guidelines:

- Use only pipes, fittings, valves, and other components (such as solder), that are approved for use in potable water systems.
- Tighten the water heater connection valves with care to avoid damage.
- Use unions and manual shut-off valves on the cold water inlet, DHW outlet, and recirculation water inlet.
- Strive to make the hot water piping system as short as possible, so as to deliver hot water to the fixtures more quickly and reduce heat loss.
- To conserve water and energy, insulate all water piping—especially the hot and recirculation water lines. Never cover the drain or pressure relief valve. If the water heater is installed in a closed water supply system, such as one having a backflow preventer in the cold water supply line, means shall be provided to control thermal expansion. Contact the water supplier or local plumbing inspector for information about how to control this situation.
- Install a pressure meter on the inlet. If this is not done, local boiling will occur inside the water heater causing abnormal sounds and decreasing the durability of the heat exchanger.
- After installing the water heater, clean the inlet water filter that is located inside the cold water inlet, and then test the water heater for proper flow and inspect for leaks. Instruct the water heater owner that the filter must be cleaned periodically to maintain proper water flow.
- When all plumbing work is completed, check for leaks and take corrective action before proceeding.

- The following is a water piping example for the water heater:



- The following is a recirculation system piping example for the water heater (external pump):

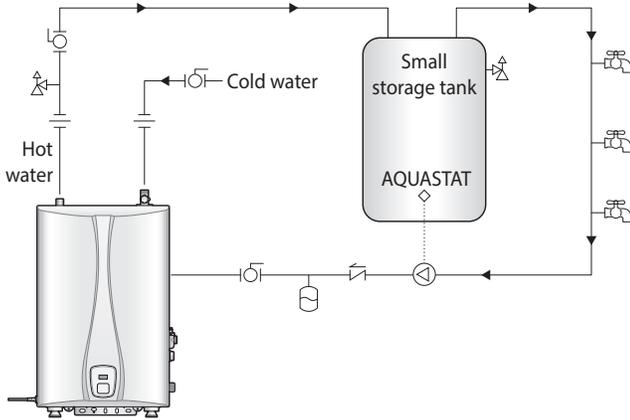


- | | |
|-----------------------|------------------|
| Ball valve | Circulation pump |
| Union | Check valve |
| Pressure relief valve | Faucet |
| Expansion tank | |

Notice

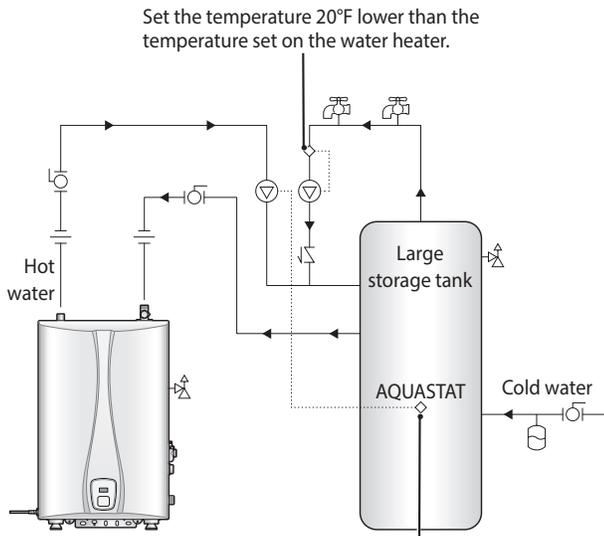
- When using a recirculation mode, by keeping the water in the hot water supply pipe hot, you can get instant hot water when you turn the tap on. On the other hand, there will be some minor efficiency loss, as a result of the water heater maintaining a steady temperature within the circulation loop, although in many cases, higher gas usage will be compensated for by lower water usage.
- To use the external pump, connect the external pump and PCB by using the external pump connector.
- Power consumption of the external pump must be lower than 150W.

- The following is a single water heater with storage back up for small volume usage:



- | | |
|-------------------------|--------------------|
| ○ Ball valve | ⊙ Circulation pump |
| Union | ⊢ Check valve |
| ⊕ Pressure relief valve | ⊕ Faucet |
| ⊕ Expansion tank | |

- The following is a single water heater with storage back up for large volume usage:



- | | |
|-------------------------|--------------------|
| ○ Ball valve | ⊙ Circulation pump |
| Union | ⊢ Check valve |
| ⊕ Pressure relief valve | ⊕ Faucet |
| ⊕ Expansion tank | |

Pressure Relief Valve



Warning

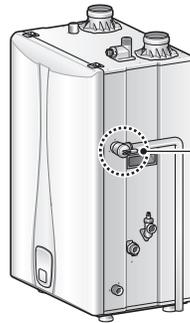
Improper installation of the pressure relief valve may result in property damage, personal injury, or death. Follow all instructions and guidelines when installing the pressure relief valve. Only a licensed professional should install the valve.



Caution

The pressure relief valve must conform to the current edition of ANSI Z21.22 or CAN 1-4.4 and installation must follow local codes.

This water heater does not come with an approved pressure relief valve. To complete the installation of the water heater, you must install an approved 3/4", maximum 150 PSI pressure relief valve on the pressure relief valve connector.



Pressure relief valve
- Cash acme FWL-2, 3/4in
- Available set pressures -150psi

* It is recommended to install the valve as shown in the image so that it does not interfere with the gas valve joint.



Notice

In recirculating system, install the pressure relief valve on the hot water outlet. The pressure relief valve should be placed as close to the water heater as possible. No other valve should be placed between the pressure relief valve and the water heater.

When installing the valve, follow these guidelines:

- Ensure that the discharge capacity of the pressure relief valve is equal to or greater than the maximum pressure rating of the water heater.
- Ensure that the maximum BTU/H rating on the pressure relief valve is equal to or greater than the maximum input BTU/H rating of the water heater.
- Direct the discharge piping of the pressure relief valve so that hot water will not splash on any person or equipment near by.
- Attach the discharge line to the pressure relief valve and run the end of the line to within 6-12" (150-300mm) of the floor.
- Ensure that the discharge line will allow free and complete drainage with no restriction. Do not install a reducing coupling or other restriction on the discharge line.
- If the relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the relief valve.
- The pressure relief valve must be manually operated periodically to check for correct operation.
- Be carefully to avoid contact with hot water coming out of the pressure relief valve and to prevent water damage when you operate the relief valve.

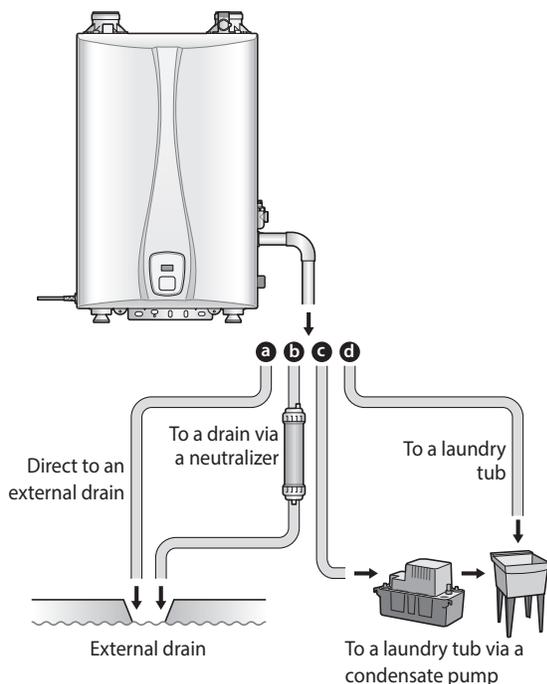
Condensate Drain



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

The VST water heater creates condensation when it operates. This condensation has an acidic pH of 3-5. Follow all local codes and regulations when disposing of condensate from the water heater. We recommend draining the condensate into a laundry tub, as the alkali in laundry detergent will neutralize the acid in the condensate. However, other suitable waste drain locations may be used according to local codes.

Before connecting the condensate drain, choose one of the following disposal options:



- (A) From the water heater directly into an external drain.
 (B) From the water heater, through a neutralizing agent, and then into an external drain.

Notice

- If you choose this option, the neutralizing agent must be replaced periodically. Depletion of the neutralizing agent will vary, based on the usage rate of the water heater. During the first year of operation, the neutralizer should be checked every few months for depletion and replaced as needed.

- (C) From the water heater into a condensate pump, and then into a laundry tub.

Notice

A pump can be used when there is a long distance between the water heater and the laundry tub or when the bottom of the water heater is lower than the top of the laundry tub.

- (D) From the water heater into a laundry tub.

Notice

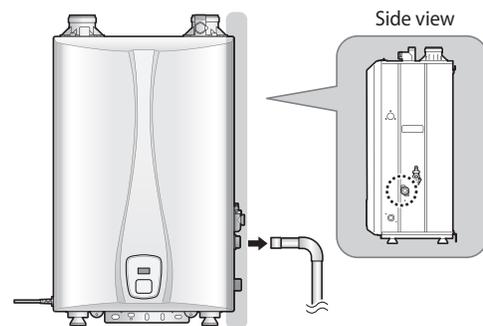
The bottom of the water heater must be higher than the top of the laundry tub to use this option. The condensate line must have a negative slope to drain properly.

To connect the condensate drain:

- 1 Connect a drain line to the water heater.

Notice

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



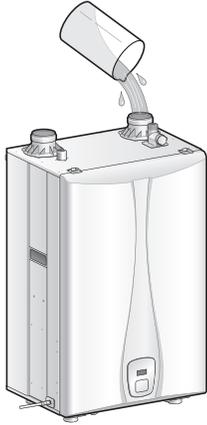
- 2 Place the free end of the drain line into an appropriate drain.

Notice

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

■ Condensate Trap

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



Installing a Vent (For indoor installation only)

* If the exhaust temperature exceed 149°F (65°C), it must be vented schedule 40 or 80 CPVC or approved polypropylene.



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

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

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

Vent Type

All water heaters are prepared at the factory to be direct vent (sealed combustion) water heaters that draw all of their required combustion air directly from outside the building. VST recommends direct air vent installations whenever possible to avoid back drafting cold air through the water heater. VST recommends direct air vent installations when installing the water heater in your attic to get fresh air into the water heater. If you cannot use a direct vent, ensure that an ample supply of make-up air is available in the installation location. VST also recommends installing a new vent system with this appliance. If reusing an existing vent system, thoroughly inspect it for punctures, cracks, or blockages prior to connecting it to the water heater. When using non-direct venting, must provide two openings as specified in the table on page 24.

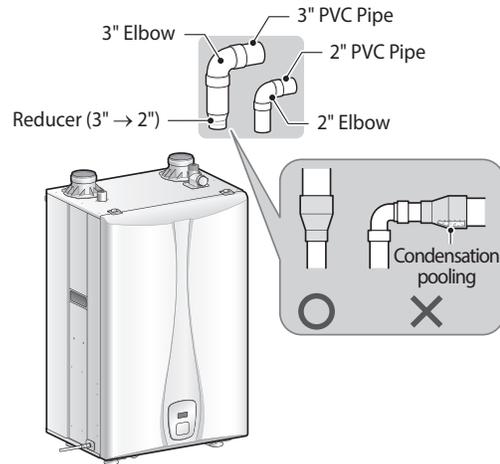
Direct

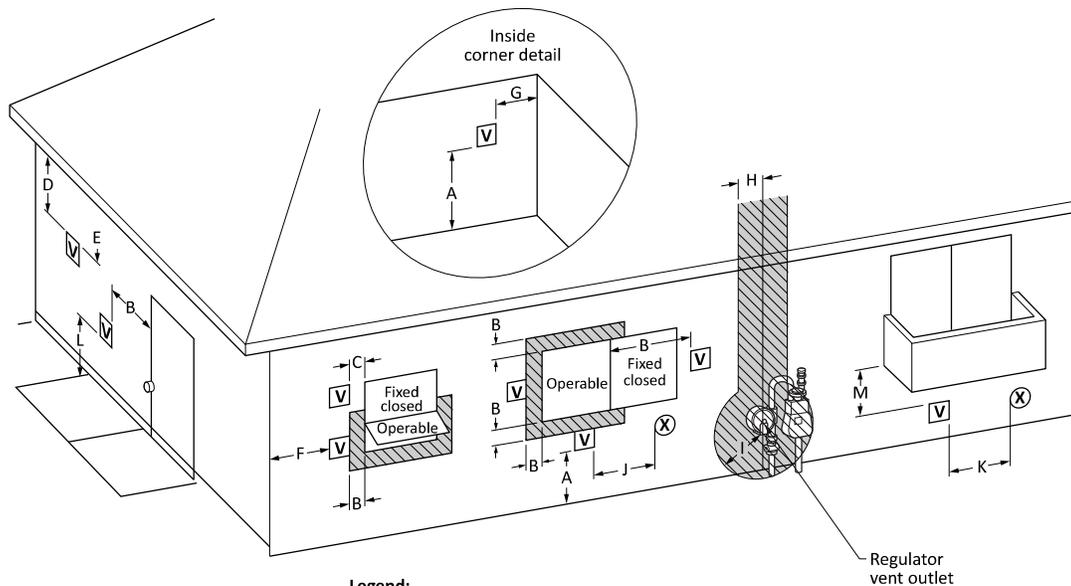
The water heater uses 2" or 3" diameter exhaust and 2" or 3" diameter intake air ducts. To ensure the draw of air directly from and exhaust of air directly to the outside of the building, create an airtight seal from the water heater collar to the vent termination. Intake materials can be made of ABS, PVC, CPVC, PP, galvanized steel, corrugated aluminum or any other similar materials. If you use a corrugated material, ensure that there is not inadvertent crimping of, or damage to, the intake air pipe.

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

To use direct venting for the water heater:

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





Legend:

V = Vent terminal

X = Air supply inlet

= Area where terminal is not permitted

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

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.

3) A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

4) Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor.

[*] For clearances not specified in ANSI Z223.1 / NFPA 54 or CSAB149.1, one of the following shall be indicated:

a) A minimum clearance value determined by testing in accordance with section 2.20, or;

b) A reference to the following footnote:

"Clearance in accordance with local installation codes and the requirements of the gas supplier."

● Non-direct

If, at any time, the installation location could experience negative pressure, there is a possibility of back-drafting cold air through the water heater's heat exchanger. This situation could lead to the freezing of the heat exchanger and malfunction of the water heater. However, building codes in most jurisdictions disallow negative pressures in residences. In a home with a well-balanced air supply, the heat exchanger should not be in danger of freezing. Because the cause of back-drafting is not considered a manufacturing problem, any freezing damage which occurs from back-drafting will not be covered by the VST warranty. If there is any question about the possibility of back-drafting in the installation location, use a direct venting system for the water heater. When installed in a manufactured home (mobile home), all combustion air must be supplied from the outdoors as described on page 23. When using non-direct venting, maintain non-direct vent clearances shown on page 29 as required by ANSI Z21.10.3 and the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and CAN/CSA B149.1 Natural Gas and Propane Installation Code.

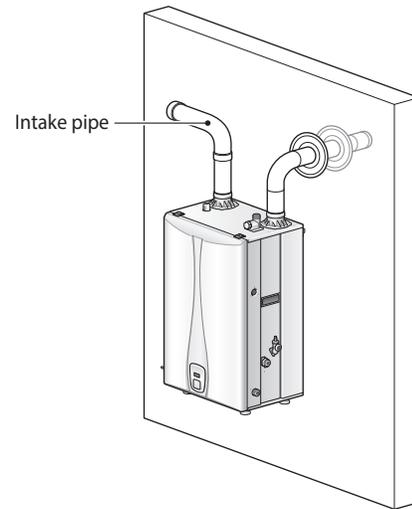
For other than a direct vent appliance, the appliance must be located as close as practicable to a chimney or gas vent.

If the appliance is installed without air intake pipe the category is IV.

"This water heater requires a special venting system. Refer to the installation instructions for parts list and method of installation."

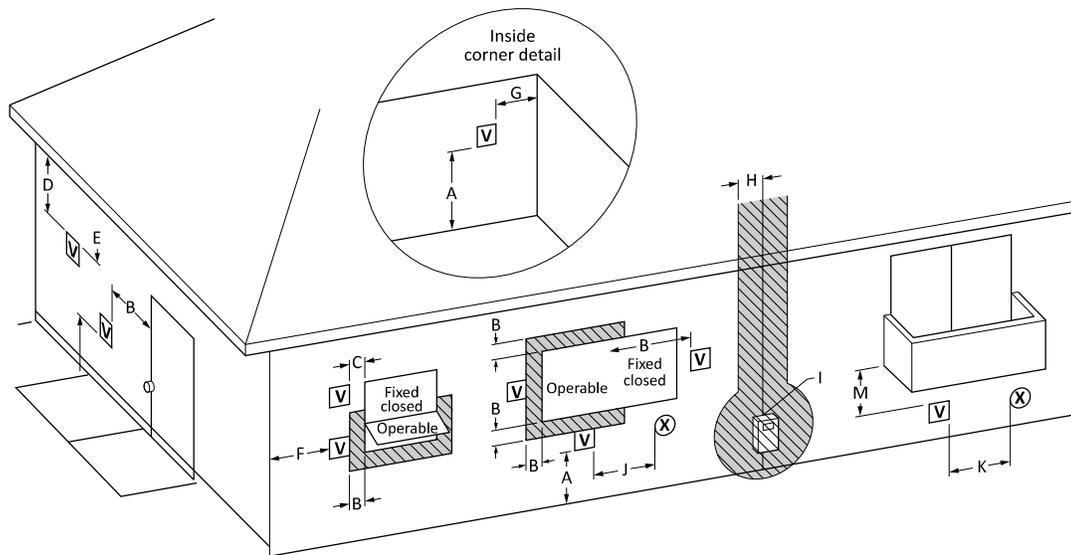
To use non-direct venting for the water heater:

- Insert the elbow into the intake air duct.



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

	VH-199
Maximum Input (BTU/H)	199,900
If outdoor make up air is provided, a minimum free area of 1 in ² , per 4,000 BTU/H	50 in ² 10" (W) x 5" (H) or 8" round
If indoor make up air is provided, a minimum free area of 1 in ² per 1,000 BTU/H	199 in ² 14 1/4" (W) x 14 1/4" (H)



Legend:

-  = Vent terminal
-  = Air supply inlet
-  = Area where terminal is not permitted

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

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.

3) A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.

4) Permitted only if veranda, porch, deck or balcony is fully open on a minimum of two sides beneath the floor.

[*] For clearances not specified in ANSI Z223.1 / NFPA 54 or CSAB149.1, one of the following shall be indicated:

a) A minimum clearance value determined by testing in accordance with section 2.20, or;

b) A reference to the following footnote:

"Clearance in accordance with local installation codes and the requirements of the gas supplier."

Vent Pipe Materials



Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic venting systems is prohibited. Covering non-metallic vent fittings with thermal insulation is prohibited.

Venting requirements differ in the USA and Canada. Consult the following chart or the most recent edition of ANSI Z223.1/NFPA 54 or CAN/CGA B149.1, as well as all applicable local codes and regulations when selecting vent pipe materials. Do not use cellular core-based pipe materials for the exhaust vent.

Locale	Recommended Vent Materials
USA	<ul style="list-style-type: none"> PVC Schedule 40 (solid core) CPVC Schedule 40 or 80 (solid core) Approved Polypropylene
Canada*	<ul style="list-style-type: none"> Type BH Special Gas Vent Class IIA (PVC) Type BH Special Gas Vent Class IIB (CPVC) Type BH Special Gas Vent Class IIC (Polypropylene)

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

Vent Length

The maximum vent length when using 2" exhaust ducts is 50'. The maximum vent length when using 3" vent ducts is 100'. The intake duct length can be of equal length to the exhaust duct length. Both maximum lengths are reduced by the number of elbows used, as shown in the following table:

Vent Size	Maximum Length	Maximum # of Elbows	Equivalent Lengths
2"	50' (15 m)	5	Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> Each 90° elbow equates to 8 linear feet (2.4 m) of vent Each 45° elbow equates to 4 linear feet (1.2 m) of vent
3"	100' (30 m)	6	Reduce the maximum vent length accordingly for each elbow used: <ul style="list-style-type: none"> Each 90° elbow equates to 5 linear feet (1.5 m) of vent Each 45° elbow equates to 3 linear feet (0.9 m) of vent



Notice

- The maximum length does not include any elbows.
- If using a concentric termination as shown on page 30, count this as 8 linear feet (2.4 m) of vent.

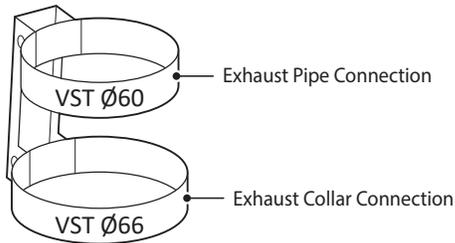
Connecting the Vent Clip



Caution

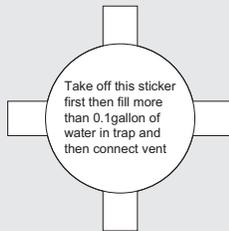
To connect the exhaust vent firmly onto unit use the provided Vent Clip Connection. Check vent clip size and adjust accordingly before installation.

Vent Clip Connection

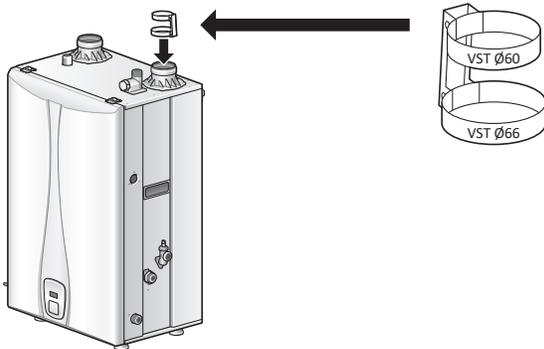


Notice

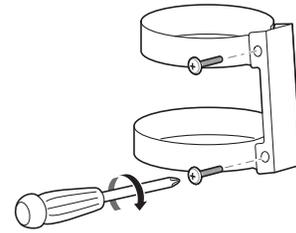
Please ensure sticker covering Exhaust Connector is removed and condensation trap has been primed (See condensate trap for instructions)



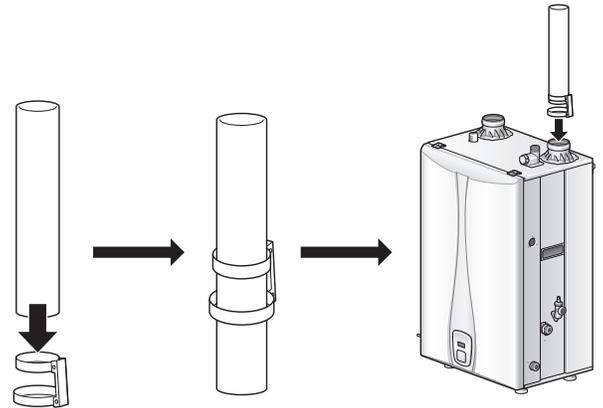
- 1 Attach vent clip to Exhaust Connector on unit, check diagram for proper position.



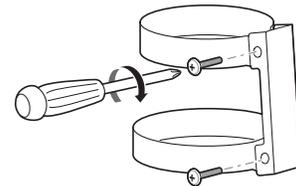
- 2 Tighten vent clip to exhaust collar of unit; Ensure band on vent clip is labeled VSTØ66.



- 3 Connect Exhaust Pipe to the unit, ensure vent pipe runs through the clip and is securely seated with gasket located in the collar.



- 4 Tighten vent clip to exhaust pipe; Ensure band on vent clip is labeled VSTØ60.



Notice

Glue is not required between Exhaust Pipe and Exhaust Collar of unit. Press Exhaust vent firmly in collar, existing gasket will seal exhaust pipe to the unit. If needed use silicone instead of glue for easier service ability.

Vent Termination

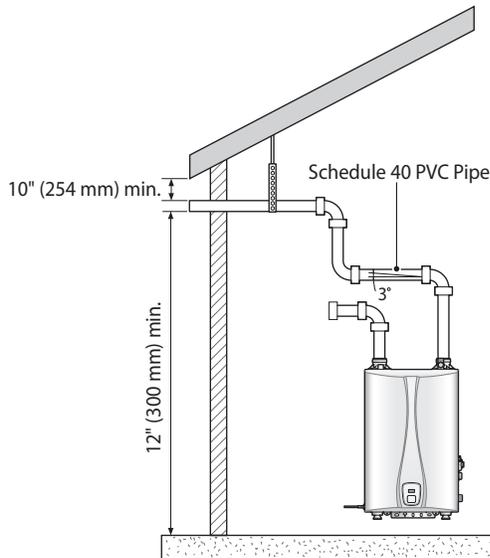


Caution

- Air intake must be protected from any debris.
- When connecting the air intake connector and the flue connector with the vent, connecting parts must be sealed with PVC, glue and high temp silicon.
- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.

Determine what type of vent termination is appropriate for the installation location and situation before installing the water heater. The following subsections describe some venting configurations, but do not include all possible options.

Single-pipe sidewall venting



Caution

- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.

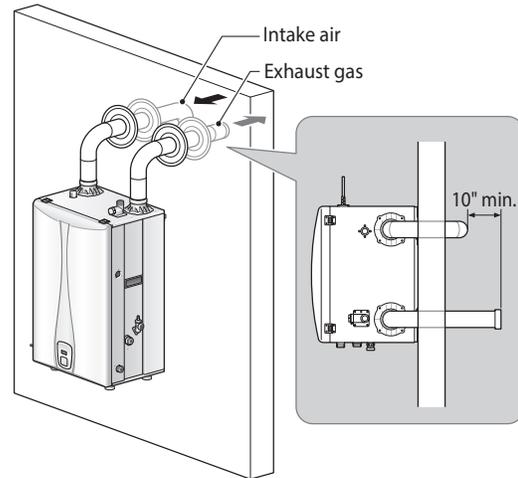


Notice

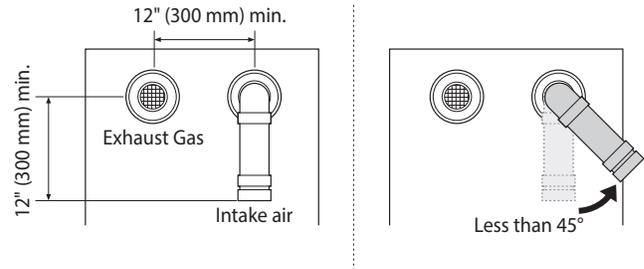
Single-pipe venting requires that adequate combustion air be provided in end-use installations per NFPA 54 C.9.3.2.

Two-pipe sidewall venting

Internal view



External view



Caution

- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.



Notice

It is recommended to install the intake air vent terminal as far from the exhaust gas vent terminal as possible.



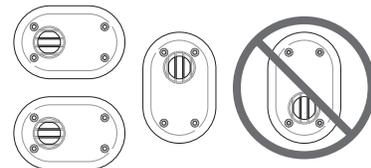
Caution

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

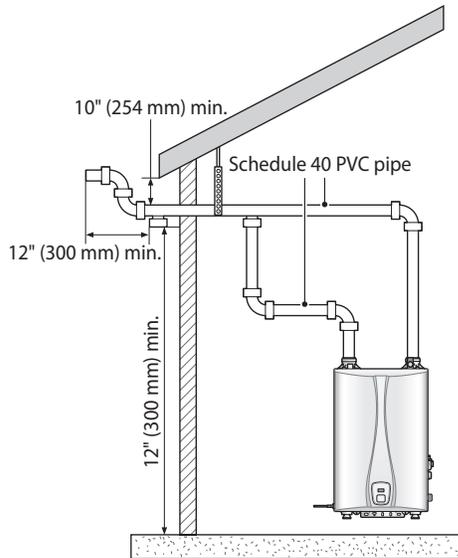
The following terminations can also be used:

IPEX Low Profile Termination Kits:

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



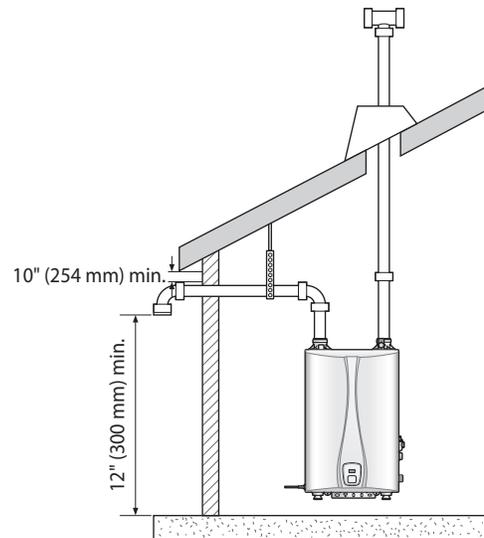
Snorkel flue



Caution

- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.

Non-concentric sidewall venting



Caution

- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.



Notice

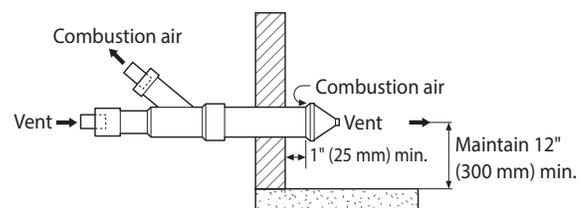
Air is drawn from a different location at a minimum of 12" (300mm) from the exhaust termination. Try to minimize the length of the intake air pipe with this venting.

Concentric sidewall venting

The following terminations can also be used:

DuraVent PolyPro Horizontal Concentric Termination Kit.

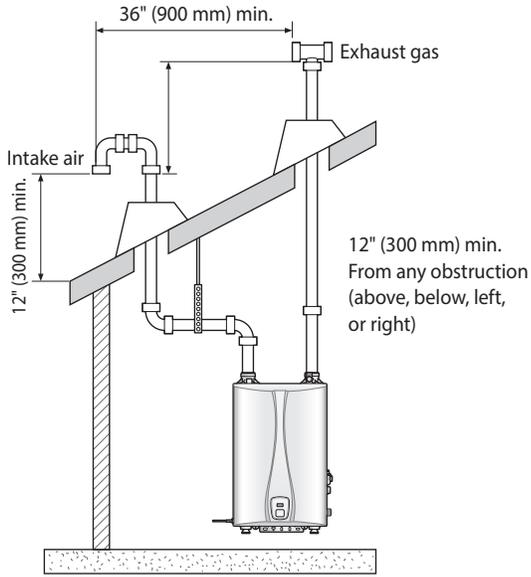
- 2 in x 4 in Concentric Vent Kit #2PPS-HK
- 3 in x 5 in Concentric Vent Kit #3PPS-HK



Caution

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

Two-pipe vertical venting



Caution

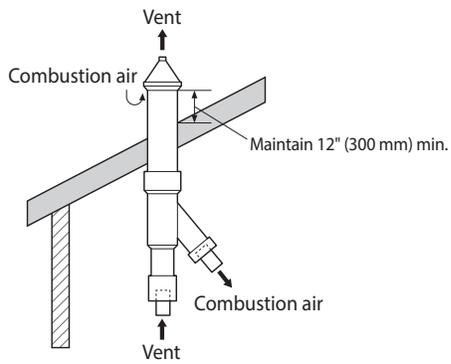
- Maintain 12" (300 mm) min. (18" (450 mm) min. for Canada) clearance above highest-anticipated snow level. Maximum of 24" (600 mm) above roof.
- Install a bird screen at the end of the intake air pipe and exhaust pipe.



Notice

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

Concentric roof venting

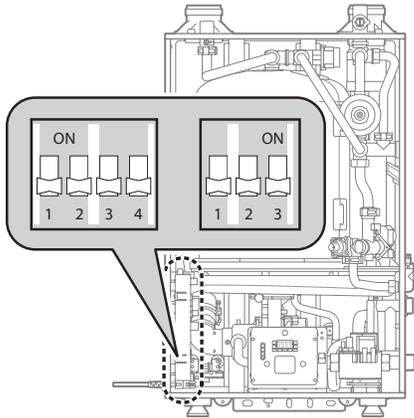


Caution

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

Setting the DIP Switches (for Cascade System)

The water heater has a DIP switch on the main circuit board (PCB). There are two sets of DIP switches that control the cascade system of the water heater. Set the DIP switches appropriately, depending on the installation environment.



4-switch panel

Switch	Function
	Natural Gas
	Propane Gas
	Program
	Maximum heat capacity operation
	Minimum heat capacity operation

3-switch panel

Switch	Function
	Assigning No 1 unit
	Assigning No 2 unit
	Assigning No 3 unit
	Assigning No 4 unit
	Assigning No 5 unit
	Assigning No 6 unit
	Assigning No 7 unit
	Assigning No 8 unit

Connecting the Power Supply



Warning

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

When connecting the power supply, follow these guidelines:

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

Calibration Mode



After installing the water heater you must proceed to Calibration Mode before using the water heater.

In Calibration Mode, the water heater calculates the load according to the installation circumstances (altitude, vent) and self adjust the heat capacity by itself.

To use the Calibration Mode:

- 1 Connect the power supply.
- 2 Press the  button.
- 3 Open more than two faucets and dispense approximately 4 gallons (15 liters) of water.
- 4 Check that the  icon is turned on.



Notice

Temperature is set to 98°F (37°C) by default.

- 5 Touch the  button and increase the temperature higher than 140°F (60°C).



- 6 Touch the  button and turn off the water heater.



- 7 Touch the  button and the MODE button simultaneously for more than 5 seconds. "CAL1" appears on the digital display and start flashing.



- 9 After the heat capacity adjustment is finished, "CAL1" disappears from the digital display. Close all faucets.



- 8 "CAL 1" flashes for about 6 minutes. When "CAL1" is flashing, it means the heat capacity is adjusting.



Installation Checklist

After the water heater installation, examine the following checklist. If you are not able to answer "Yes" to all of the items in the checklist, review the appropriate sections. To troubleshoot any operational problems, refer to "Troubleshooting" in the User's Manual.

If there are additional questions or if you need assistance, contact technical support at 1-800-761-0053.

Location	Check
Is the make-up air supply free from corrosive elements and flammable vapors?	<input type="checkbox"/>
Is the water heater clear of combustible materials?	<input type="checkbox"/>
Is the gas control valve accessible for servicing?	<input type="checkbox"/>
Have you maintained the proper service and maintenance clearances?	<input type="checkbox"/>

Gas connection	Check
Have you tested all the fittings for leaks?	<input type="checkbox"/>
Does the gas supply match the gas type specified on the water heater's rating plate?	<input type="checkbox"/>
Is the gas supply pressure adequate as the gas supply pressure specified in the water heater's rating plate?	<input type="checkbox"/>
Does the installation conform with local codes or, in the absence of local codes, the National Fuel Gas Code ANSI Z223.1/NFPA 54?	<input type="checkbox"/>
Does the gas line have an inner diameter of at least 1/2"?	<input type="checkbox"/>

Water connection	Check
Is the water supply pressure sufficient (greater than 40 PSI)?	<input type="checkbox"/>
Have you verified that the cold water line and the hot water line do not intersect and have you tested for leaks?	<input type="checkbox"/>
Is the approved pressure relief valve installed properly?	<input type="checkbox"/>
Have you verified that there are no products installed which exceeds the maximum pressure specified in the water heater's rating plate?	<input type="checkbox"/>

Venting	Check
Is the distance between the exhaust vent terminal and the intake air vent terminal far enough, and more than the distance specified in the manual?	<input type="checkbox"/>
Are the air intake and exhaust connections on the flue and vent lines correctly sealed?	<input type="checkbox"/>
Have you checked venting for leaks?	<input type="checkbox"/>
Are all vent runs properly supported?	<input type="checkbox"/>
Is the vent termination properly supported?	<input type="checkbox"/>
Have you explained to the owner importance that vent termination not be blocked?	<input type="checkbox"/>
Have you run the "Calibration Mode"?	<input type="checkbox"/>

Others	Check
Is the front panel working properly?	<input type="checkbox"/>
Have you filled the condensate trap with fresh water?	<input type="checkbox"/>
Have you explained how to operate the water heater, safety guidelines, maintenance, and warranty to the owner?	<input type="checkbox"/>
Have you delivered the manuals directly?	<input type="checkbox"/>

Appendix

Gas Conversion

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



Danger

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



Warning

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

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

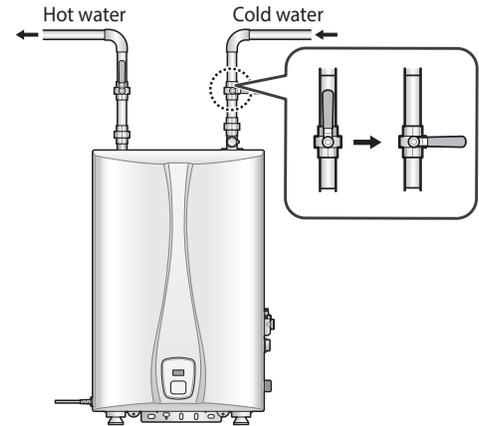
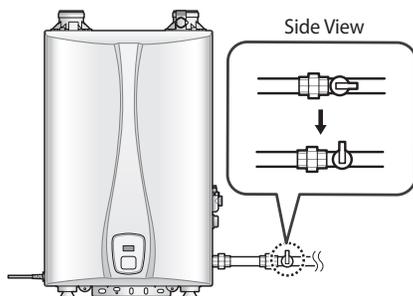
In Canada: The conversion shall be carried out in accordance with the requirements of the provincial authorities having jurisdiction and in accordance with the requirements of the CAN B149.1 and CAN1 B149.2 Installation Codes.

Included Items :

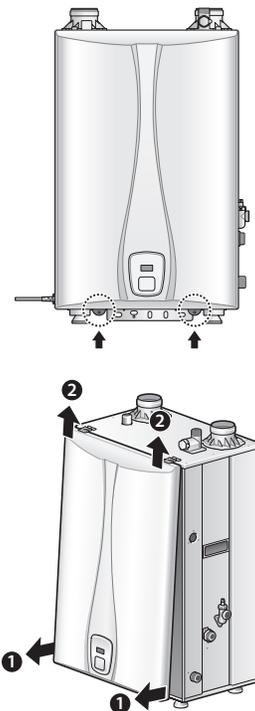
- LP Orifice
- 3/4" Packing
- Conversion Manual
- Conversion sticker

To convert the gas:

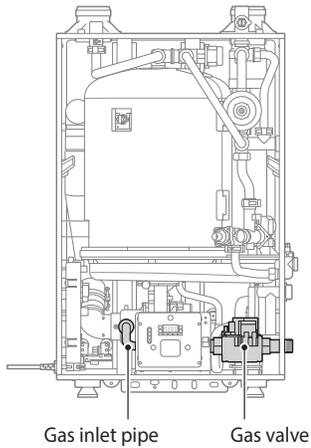
- 1 Turn off the manual gas shut off valve and the water supply to the water heater.



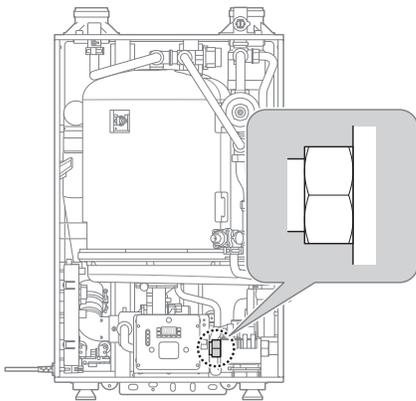
- 2 Remove the water heater front cover by loosening the 2 Phillips screws securing it to the case.



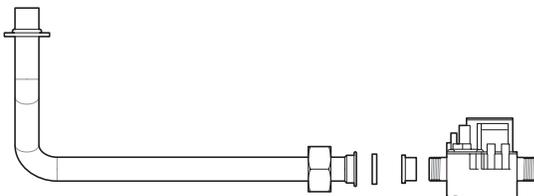
- 3** Once the front cover is removed, place it in a safe location to prevent accidental damage. With the internal components exposed, locate the gas inlet pipe and the gas valve near the bottom side of the water heater.



- 4** Loosen the nut connecting the gas inlet pipe to the gas valve.



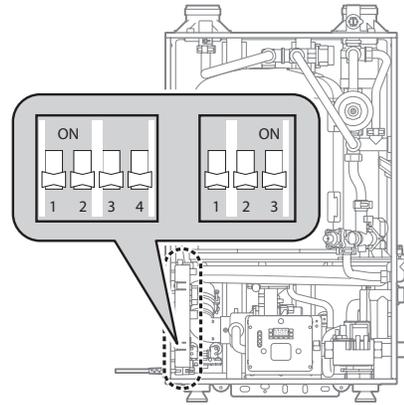
- 5** Once the gas inlet pipe is detached from the gas valve, replace the old orifice piece and the packing with the new part for use with LP gas. Ensure that the orifice is properly seated inside the port.



- 6** Replace the gas inlet pipe to its original position and tighten the nut to secure the gas connections.

Check the gas leakage before operating the water heater.
Turn on the gas and water supply to the water heater.

- 7** Set the dip switch according to the supplied gas type.



Switch	Function
	Natural Gas
	Propane Gas
	Maximum heat capacity operation
	Minimum heat capacity operation



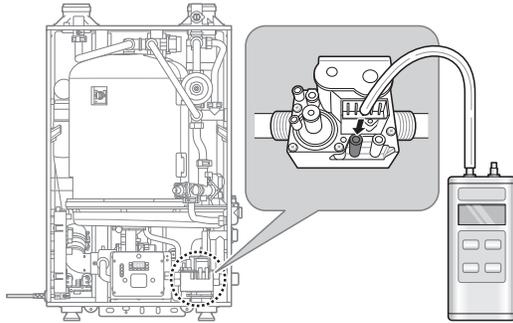
Be sure to turn off the power before changing the DIP switch setting.



Notice

For more information about setting the DIP switches, refer to "Setting the DIP Switches (for Cascade System)" on page 36.

- 8** Loosen the screw indicated in the figure below and connect a manometer to the pressure port. Reset the manometer to zero before use.

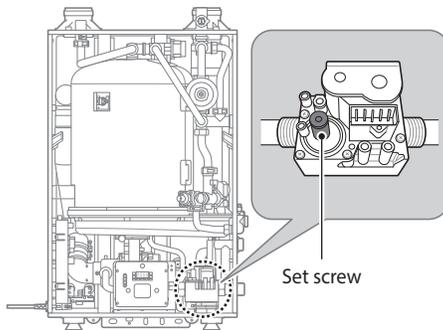


- 9** Set the DIP switch to minimum heat capacity operation.
- 10** Fully open several hot water fixtures and if the pressure value at low fire is not within the value listed in the table, the gas valve set screw will need to be adjusted. If adjustment is necessary, locate the set screw. Using a 5/32" or 4 mm Allen wrench, turn the set screw no more than 1/4 turn clockwise to raise or counterclockwise to lower the pressure value.



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

Type	Manifold Pressure
	VH-199 (min)
NG	-0.02" – -0.01" WC
LPG	-0.02" – -0.01" WC



- 11** Set the DIP switch to maximum heat capacity operation.



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

- 12** While the maximum heat capacity operation, do not adjust the gas valve set screw and check if the gas orifice is properly installed and abnormality in combustion.



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

- 13** When the gas conversion is completed, attach the conversion sticker to the top of the rating plate.

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

This appliance has been converted to Propane fuel /
Cet appareil a été converti au propane
Orifice Size / injecteur
Min. 6.0mm to Max. 6.1 mm
Inlet Gas Pressure / Pression d'entree du gaz
Min. 8.0 to Max. 13.0" WC
Manifold Pressure /
Pression à la tubulure d'alimentation
Min. -0.02 to Max. -0.70(199)" WC
Input (Btu/hr) / Débit calorifique
Min. 38,000 to Max. 199,000(199)
Conversion Kit No. 2110299

Conversion Sticker

Notice

Please refer to page 7 on this manual for manifold pressure of each model.

Cascade System

When installing a cascade system, carefully consider the design of the system and the features of the installation location. Follow all local codes and regulations, as well as all guidelines for installing the water heater. The following sections describe additional considerations that are specific to installing a cascade system. Read the following sections carefully before designing or installing the system.

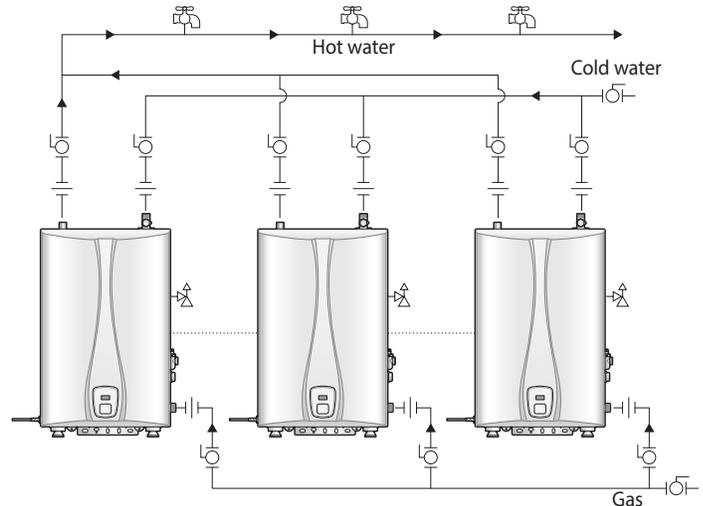
Piping sizes

When plumbing a cascade system, consider the following pipe diameters and flow rates (note that flow rates above 6.6 ft/s may cause pipe erosion). These specifications may vary depending on installation conditions.

Qty	$\Delta T=54^{\circ}\text{F}$ Flow Rate (GPM)	Water Velocity (ft/s)	Pipe Diameter (mm/in)	
1	6.82	4.53	20A	3/4"
2	13.64	5.32	25A	1"
3	20.46	5.25	30A	1 1/4"
4	27.28	4.94	40A	1 1/2"
5	34.10	6.19	40A	1 1/2"
6	40.92	4.26	50A	2"
7	47.74	4.97	50A	2"
8	54.56	5.69	50A	2"

Water supply

Several options are available for plumbing a cascading system of water heaters. The options shown here are examples only. The setup you choose will vary depending on the installation location, local building codes, and other factors. Follow all applicable regulations when installing a cascade system.



-  Ball valve
-  Union
-  Pressure relief valve
-  Expansion tank
-  Circulation pump
-  Check valve
-  Faucet

Notice

The recommended minimum recirculation flow rate for each water heater is 2 GPM.

Communication cables

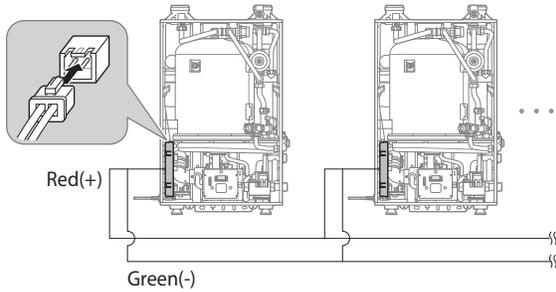


To avoid electric shock, turn off the water heater while connecting the wires.

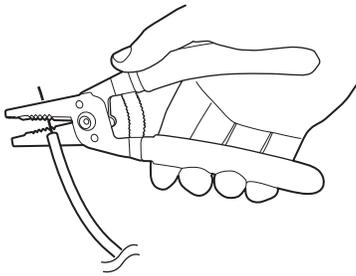
Up to 8 water heaters can be connected with cascade communication cables.

To connect the cascade communication cables:

- 1 Connect the cascade communication cable connector to the connector socket on the PCB assembly.



- 2 Remove the plastic insulation from opposite ends of the cascade communication cable.

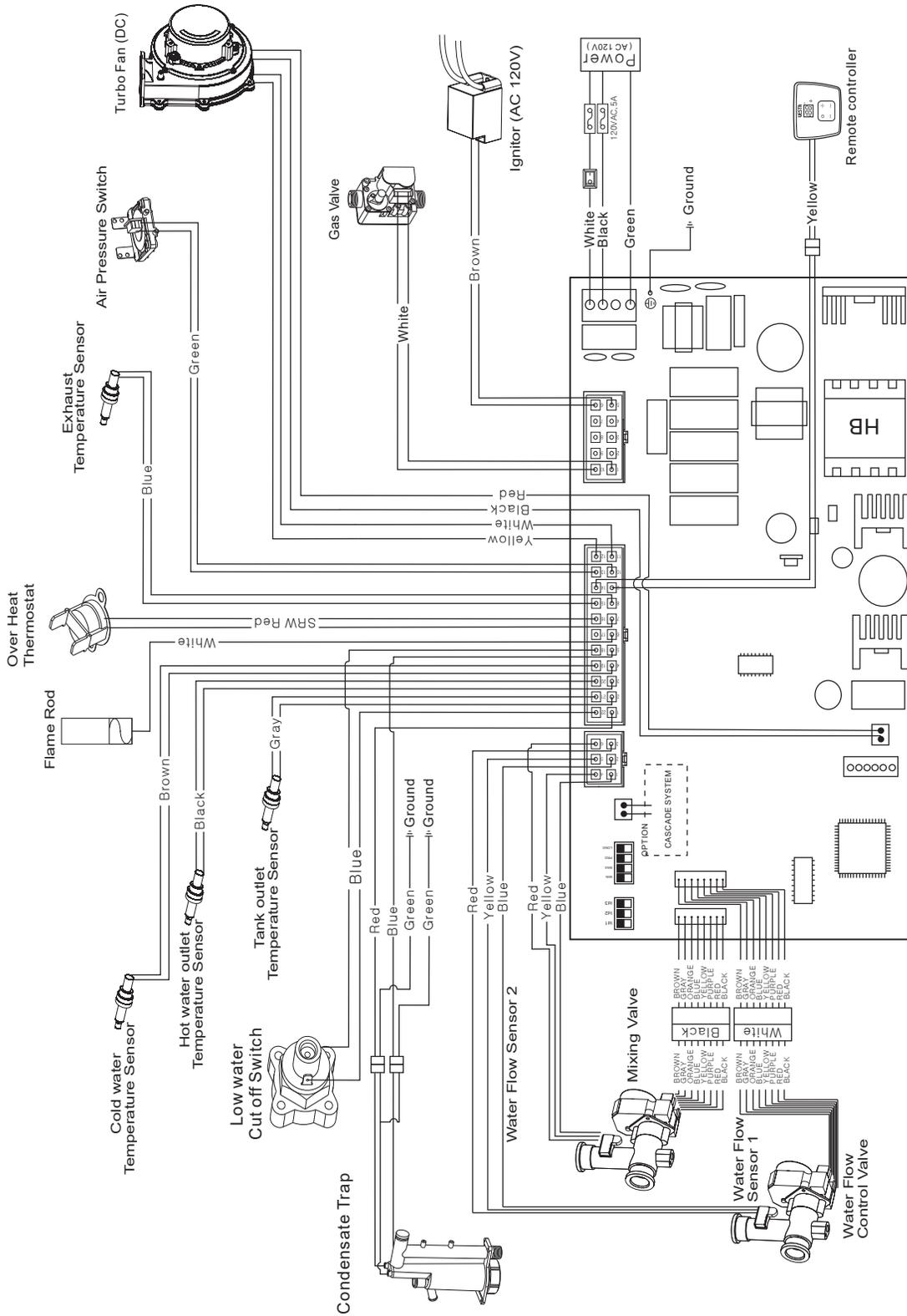


- 3 Connect the cascade communication cables by matching the colors (red, green).

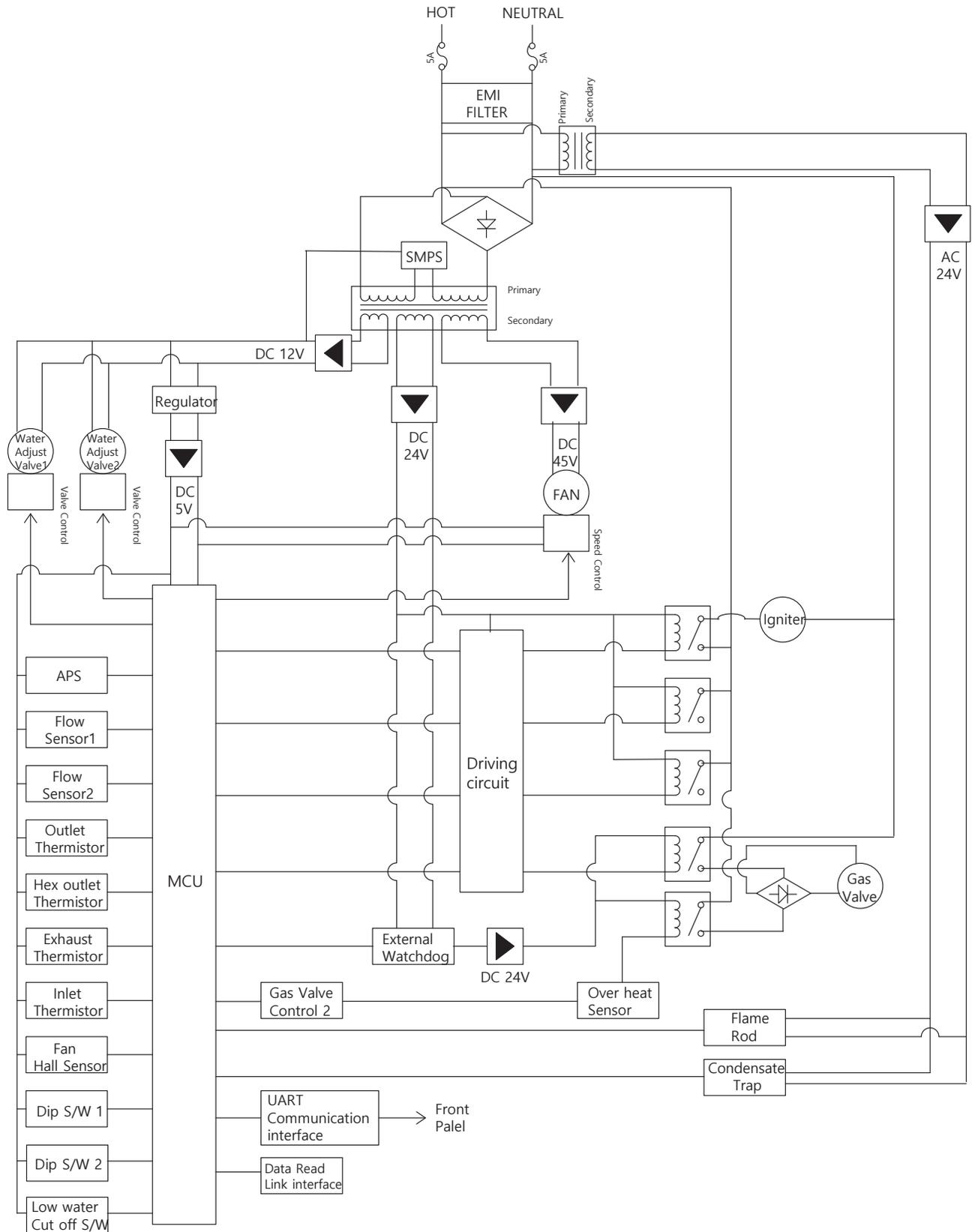
Notice

Set the DIP switches after connecting the cascade communication cables. For more information about setting the DIP switches, refer to "Setting the DIP Switches (for Cascade System)" on page 33.

Wiring Diagram

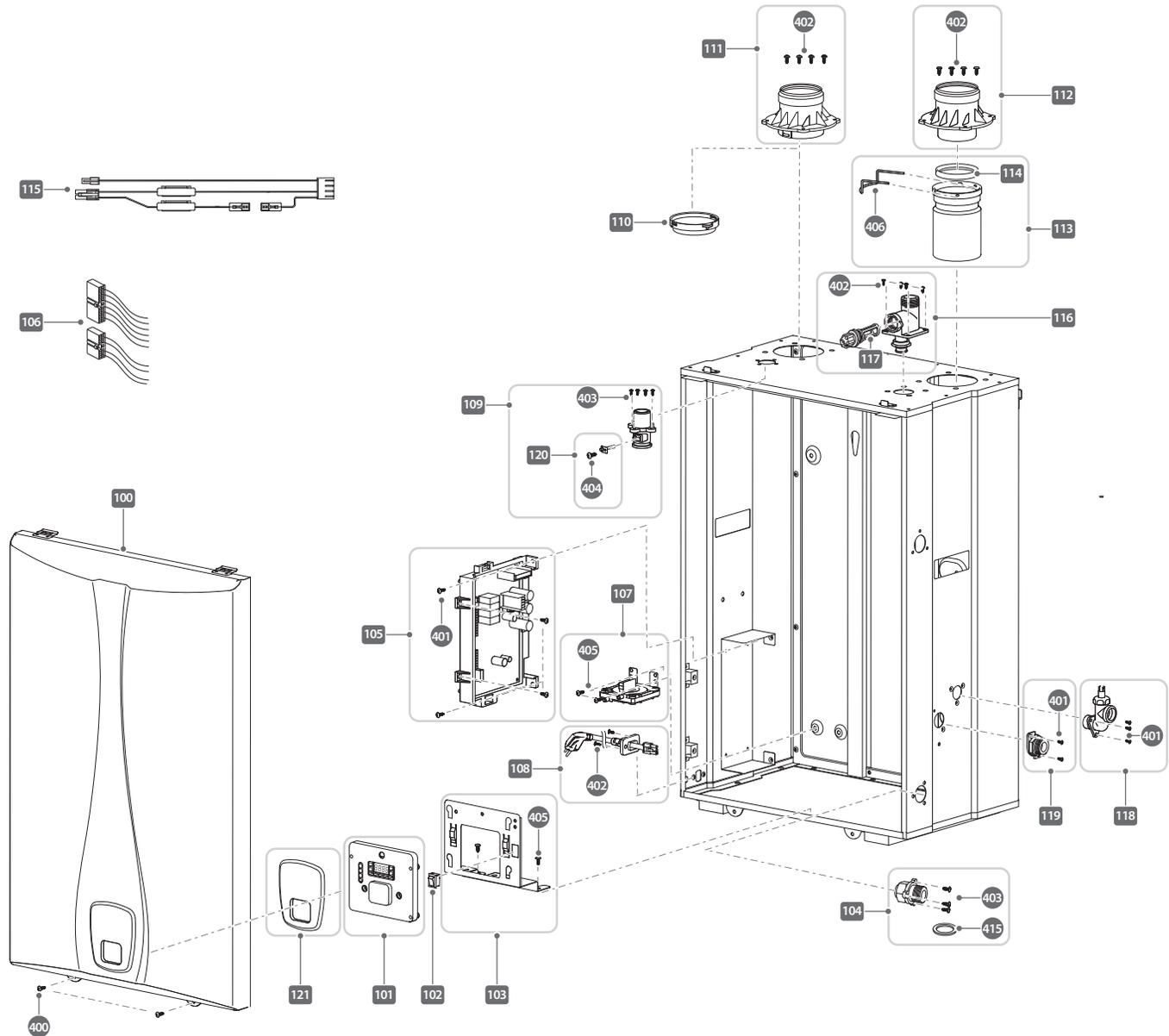


Ladder Diagram



Component Assembly Diagrams and Parts Lists

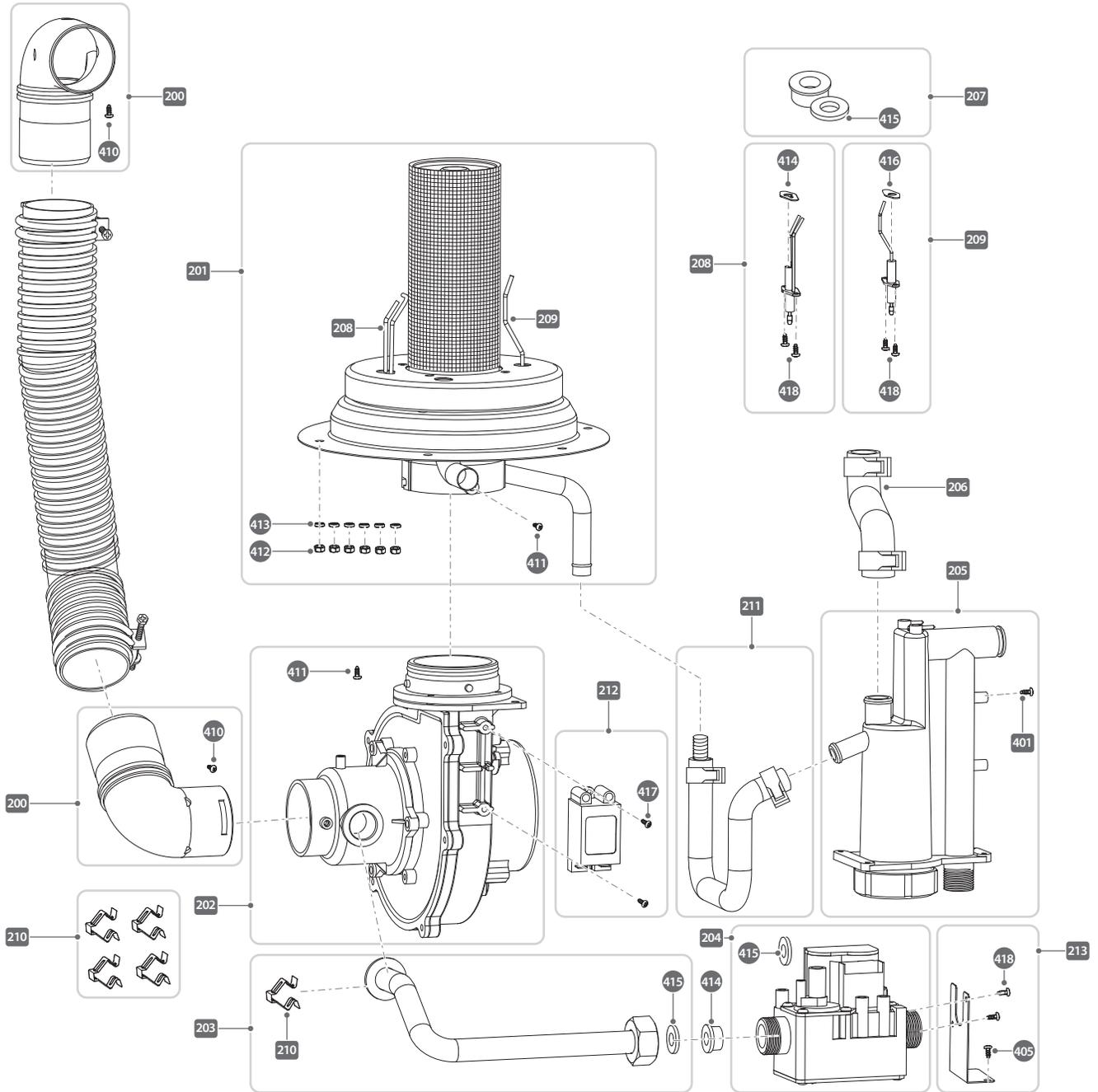
■ Case Parts



NO	Part NO	Part Name
100	2010590S	Front cover, VH-199
101	2081091S	R/C (VH)
102	2080736	Switch, Main Power Supply
103	3011810S	Bracket, RC
104	3030272S	Nipple, Gas (VH)
105	2081086S	PCB, VH-199
106	3130679	Wire Harness, VH
107	2100353S	Switch, Air Pressure (VH-199)
108	3130755S	Cord, Power (VRC, VRB, VH)
109	3030227S	Nipple, Hot Water (VH-199)
110	3040604	Filter, Air Intake
111	2110303S	Intake Adapter (VR)
112	2110304S	Exhaust Adapter (VR)
113	3040687S	Connector, Vent Adapter (VH)
114	3080235	O-ring, Flue sealing
115	3130752	Wire, Connector (VH, Power&PCB)
116	2060363S	Nipple, Coldwater (VRP, VH)
117	3040671	Filter, Cold water
118	2060356S	Valve, Drain (VH)
119	3040579	Nipple, Condensate trap (VH-199)
120	3130862S	Thermistor, Outlet (VH)
121	3040673	R/C Cover (VH)

NO	Part NO	Part Name (Individual order not available)
400	3100044	M4X12 Screw
401	3100121	Ø 4X10 Tapping screw
402	3100132	Ø 4X12 Tapping Screw(T/H)
403	3100183	M5X9 Screw
404	3100174	M4X6 Screw
405	3100227	M4X9 Screw
406	3120139	Clip, Vent adapter

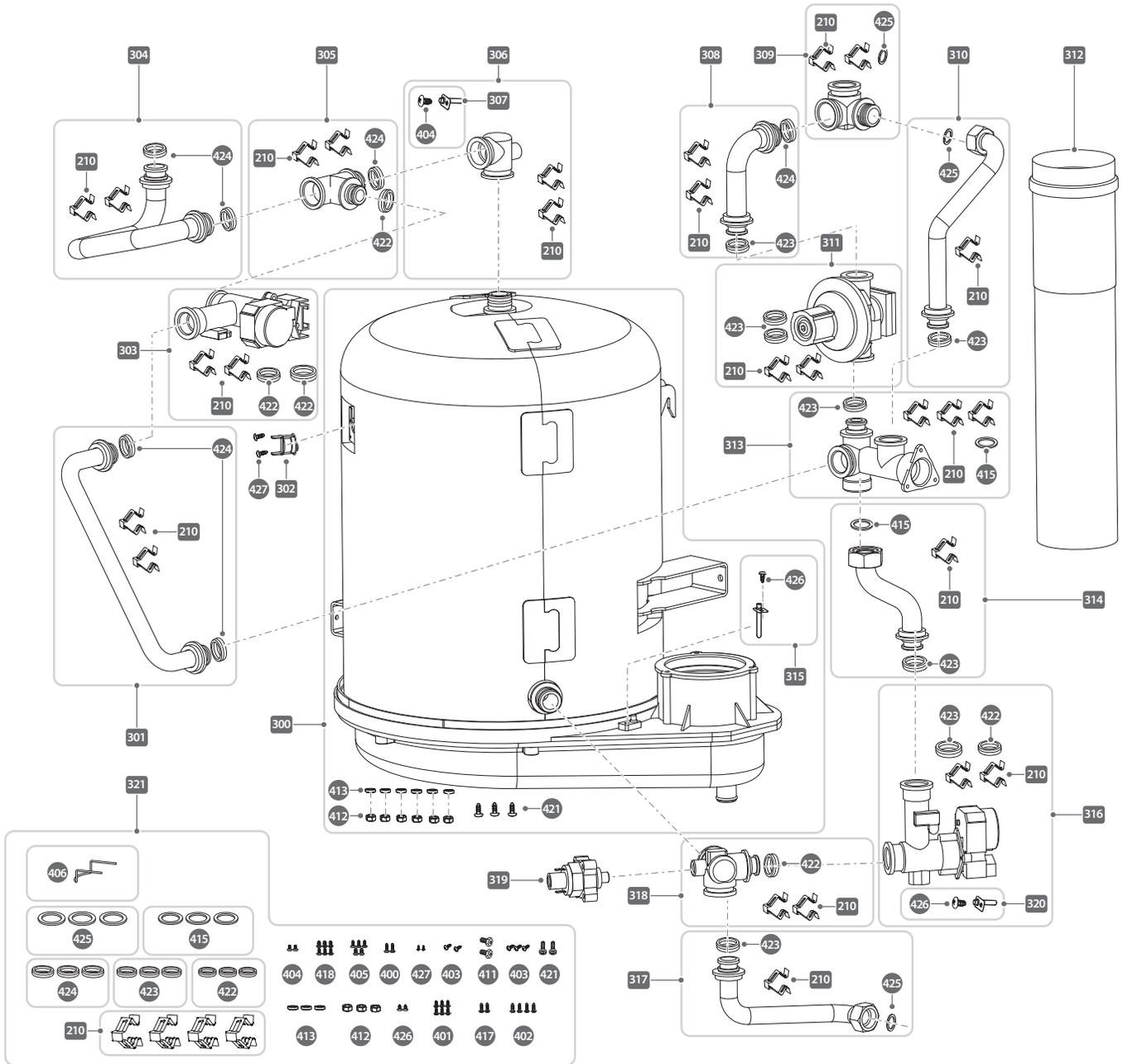
Flue Parts



NO	Part NO	Part Name
200	3040590S	Elbow, Intake
201	2020419S	Burner, Metal Fiber (VH)
202	2100362S	Fan (VH)
203	2091035S	Pipe, Gas Connector (VH)
204	2030291S	Valve, Gas (VH)
205	2060339S	Trap, Condensate (VH)
206	3080223	Hose, Condensate BLK
207	3011653S	Orifice, (VH/NG)
	2110299	Orifice, (VH/LP)
208	2020406S	Spark Plug (VH)
209	2020407S	Flame Rod (VH)
210	3011010	Clip, Joint (16A)
211	2060375S	Hose, Condensate (VH)
212	2080979S	Ignition Transformer (VH)
213	3011809S	Bracket, Gas valve (VH)

NO	Part NO	Part Name (Individual order not available)
410	3100123	Ø 4X8 Tapping Screw
411	3100146	M5X10 Screw
412	3100177	M5, Nut
413	3100195	Ø 5.5, Washer
414	3090363	Gasket, Spark Plug
415	3080176	Packing (3/4")
416	3090362	Gasket, Flame Rod
417	3100212	Ø 4X12 Tapping Screw (P/H)
418	3100184	M4X8 Screw

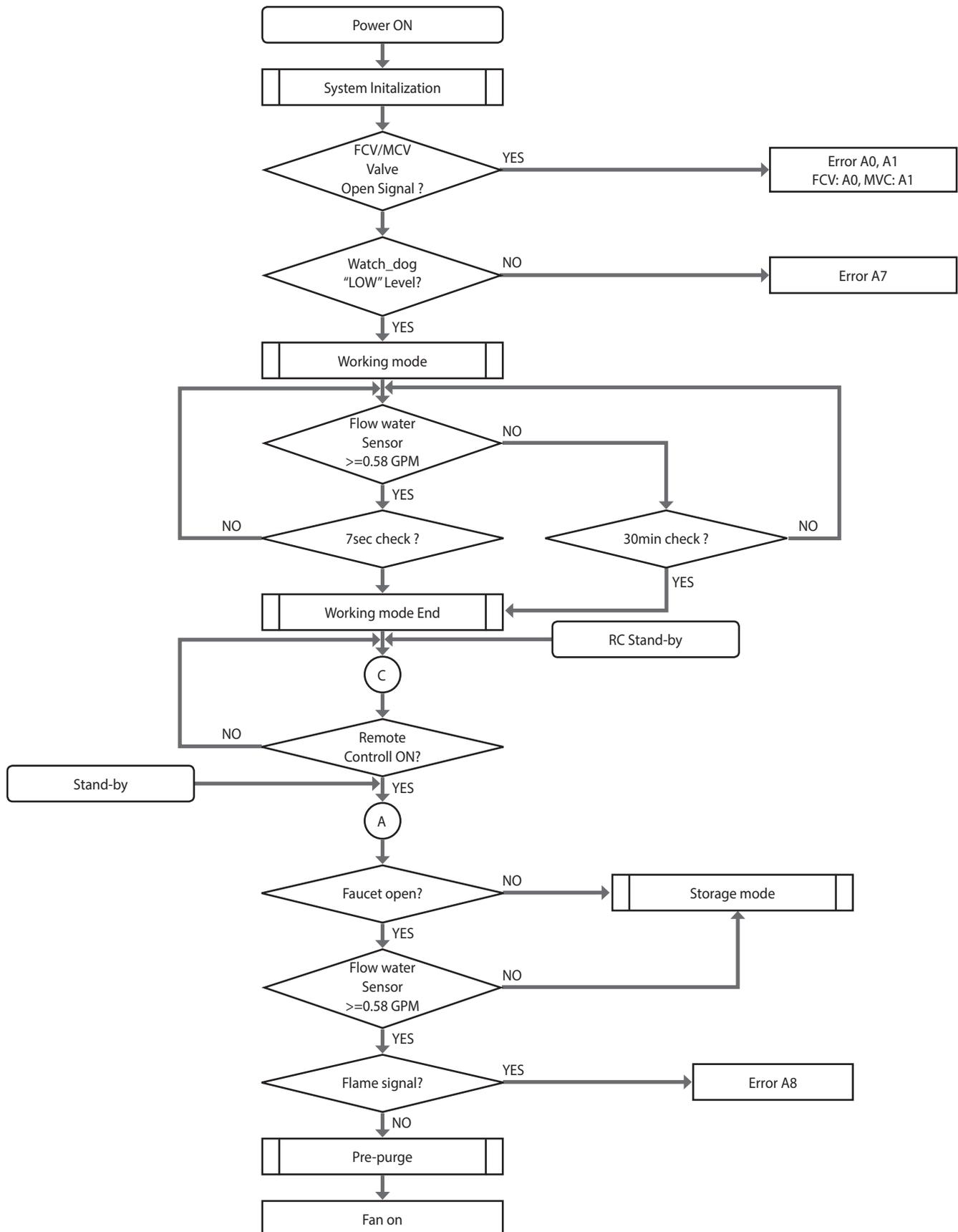
Water Parts



NO	Part NO	Part Name
300	2130515S	Heat Exchanger / Duct (VH)
301	2091016S	Pipe, Mixing (VH)
302	2081084S	High Limit Switch (VH)
303	2060384S	Valve, Mixing (VH)
304	2091092S	Pipe, Outlet (VH)
305	3030226S	Connector, Outlet Mixing T
306	3030228S	Connector, Tank T
307	3130861S	Thermistor, HX (VH)
308	2091120S	Pipe, Cold Water Elbow
309	3030251S	Connector, Cold Water Inlet 3Way
310	2091121S	Pipe, By-Pass (VH)
311	2060357S	Valve, Surge Pressure Regulator
312	2100326	Pipe, Exhaust
313	3030253S	Connector, By-Pass T
314	2091093S	Pipe, FCV Inlet Pipe
315	3130751S	Thermistor, Exhaust Gas (VR)
316	2060383S	Valve, Flow Control (VH)
317	2091036S	Pipe, Drain
318	3030252S	Connector, Tank Inlet
319	2060338	Switch, Water Pressure (Low water cut off)
320	3130380S	Thermistor, Cold Water Inlet (VH)
321	2110336S	Kit, Screw/Packing/Clip (VH)

NO	Part NO	Part Name (Individual order not available)
421	3100194	M5X12 Screw
422	3080157	Packing, P15 Back Up Ring
423	3080142	Packing, P16 Back Up Ring
424	3080140	Packing, P18 Back Up Ring
425	3080043	Packing (1/2")
426	3100033	Ø 4X8 Tapping Screw
427	3105002	M3X6 Screw

Normal Operating Sequence



OPERATING INSTRUCTIONS

/ Instructions d'allumage

1. STOP! Read the safety information above on the label. / ARRÊTEZ! Lisez les informations de sécurité ci-dessus sur l'étiquette.
2. Set the thermostat to lowest setting. / Réglez le thermostat au plus bas.
3. Turn off all electric power to the appliance. / Coupez l'alimentation électrique de l'appareil.
4. Do not attempt to light the burner by hand. / Ne pas essayer d'allumer le brûleur manuellement.
5. Turn the gas control manual valve(installed on the gas supply line external to the unit) clockwise to the position.
/ Tournez la vanne de contrôle du gaz manuelle (installée sur la conduite d'alimentation en gaz externe de l'unité) dans le sens des aiguilles d'une montre jusqu'à la position.
6. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on warning label. If you don't smell gas, go to the next step.
/ Attendez cinq (5) minutes pour laisser échapper tout gaz. Si vous sentez une odeur de gaz, ARRÊTEZ! Suivez «B» dans les consignes de sécurité ci-dessus sur cette étiquette. Si vous ne sentez pas de gaz, passez à l'étape suivante.
7. Turn the gas control manual valve(installed on the gas supply line external to the unit) counterclockwise to the full ON position.
/ Tournez la soupape de contrôle du gaz manuelle (installée sur la conduite d'alimentation en gaz à l'extérieur de l'unité) dans le sens contraire des aiguilles d'une montre jusqu'à la position ON complète.
8. Turn on all electric power to the appliance. / Mettez l'alimentation électrique de l'appareil.
9. Wait unit default temperature (120 °F) is displayed. Set desired water temperature. Turn on hot water faucet.
/ La température par défaut de l'unité de secours (120 °F) est affichée. Réglez la température de l'eau désirée. Allumez le robinet d'eau chaude.
10. Set the thermostat to desired setting. / Réglez le thermostat à la position désirée.
11. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.
/ Si l'appareil ne fonctionne pas, suivez les instructions «Pour couper le gaz de l'appareil» et appelez votre technicien d'entretien ou fournisseur de gaz.

TO TURN OFF GAS TO APPLIANCE

/ Comment couper l'admission de gaz de l'appareil

1. Set the thermostat to lowest setting. / Réglez le thermostat au plus bas.
2. Turn off all electric power to the appliance if service is to be performed.
/ Coupez l'alimentation électrique de l'appareil si le service doit être exécuté.
3. Turn the gas control manual valve(installed on the gas supply line external to the unit) clockwise to the full OFF position.
/ Tourner la soupape de commande manuelle du gaz (installée sur la conduite d'alimentation en gaz externe de l'unité) dans le sens des aiguilles d'une montre jusqu'à la position OFF complète.

Memo



Memo



VESTA. DS, Inc.

2711 LBJ Fwy Suite#320, Farmers branch, TX 75234

For Technical Support

1-800-761-0053

www.vestahws.com

Ver. 4.0