

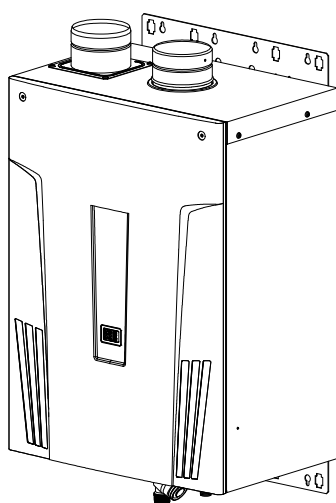
520 (T-H2) and 320 (T-H2S)

Installation Manual and Owner's Guide



ANSI Z21.10.3 and CSA 4.3

520 (T-H2) models
only



Gas Tankless Water Heater

Direct Vent Indoor models (520 Indoor (T-H2-DV),
320 Indoor (T-H2S-DV))

Outdoor models (520 Outdoor (T-H2-OS),
320 Outdoor (T-H2S-OS))

*Suitable for potable water heating and space-heating **

**Please refer to local codes for space-heating compliance.*



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 electric switch, do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

-Installation and service must be performed by a qualified installer, service agency or the gas supplier.

FEATURING

- ENDLESS HOT WATER
- ON DEMAND USAGE
- COMPACT, SPACE SAVING
- ENERGY CONSERVATION
- COMPUTERIZED SAFETY
- NO PILOT LIGHT
- EASY-LINK SYSTEM

If you have any questions, please call or write to:
500 Tennessee Waltz Parkway
Ashland City, TN 37015
Toll Free: 1- 877-737-2840

CONTENTS

Installation Manual

SPECIFICATIONS..... 2

INTRODUCTION..... 3

SAFETY GUIDELINES..... 4

INSTALLATION..... 5

 General..... 6

 Included Accessories..... 6

 Optional items..... 7

 Warning for Installations..... 8

 High-altitude Installations..... 9

 Installation for outdoor models..... 9

 Installation for direct vent indoor models..... 10

 Venting Instructions..... 10

 Gas Supply / Gas Pipe Sizing..... 17

 Water Connections..... 19

 Pressure Relief Valve..... 20

 Condensate drain..... 20

 Electrical Connections..... 22

 Remote Controller Connection..... 23

 Pump Control Connections..... 24

 Pump Control Mode..... 25

 Easy-Link System..... 27

APPLICATIONS..... 31

 Space Heating..... 31

INITIAL OPERATION..... 33

Owner's Guide

OPERATING SAFETY..... 34

NORMAL OPERATION..... 36

 General..... 36

 Temperature settings..... 36

 Flow..... 38

 Freeze Protection System..... 38

 Maintenance and Service..... 39

 Unit Draining and Filter Cleaning..... 39

TROUBLESHOOTING..... 40

 General..... 40

 Error codes..... 42

COMPONENTS DIAGRAM..... 44

PARTS LIST..... 47

OUTPUT TEMPERATURE CHART..... 50

LIMITED WARRANTY..... 51

SPECIFICATIONS

520 (T-H2) and 320 (T-H2S) models

Gas Input	520 (T-H2) models	Natural	Min: 13,000 Btu/h Max: 199,000 Btu/h	
		Propane		
	320 (T-H2S) models	Natural	Min: 13,000 Btu/h Max: 180,000 Btu/h	
		Propane		
Gas Connection		¾" NPT		
Water Connections		¾" NPT		
Condensate Drain Port Connection		½" NPT		
Water Pressure*		15 - 150 psi		
Natural Gas Inlet Pressure		Min. 5.0" WC Max. 10.5" WC		
Propane Inlet Pressure		Min. 8.0" WC Max. 14.0" WC		
Manifold Pressure**	520 Direct Vent Indoor (T-H2-DV)		Natural: 3.2" WC Propane: 5.5" WC	
	520 Outdoor (T-H2-OS)		Natural: 2.7" WC Propane: 4.6" WC	
	320 Direct Vent Indoor (T-H2S-DV)		Natural: 2.5" WC Propane: 4.3" WC	
	320 Outdoor (T-H2S-OS)		Natural: 1.9" WC Propane: 3.6" WC	
Weight		73 lbs. (Direct Vent Indoor models) 71 lbs. (Outdoor models)		
Dimensions		H25.6" x W18.5" x D12.4"		
Ignition		Electric Ignition		
Electric	Supply	120 VAC / 60 Hz		
	Consumption	Operation of the Direct Vent Indoor models	152 W (1.27A)	
		Operation of the Outdoor models	102W (0.85A)	
		Standby	8.2 W (0.07A)	
Freeze-Protection		207 W (1.73A)		

*40 psi or above is recommended for maximum flow.

**The Manifold Pressure is the factory setting and generally should not need adjustment.

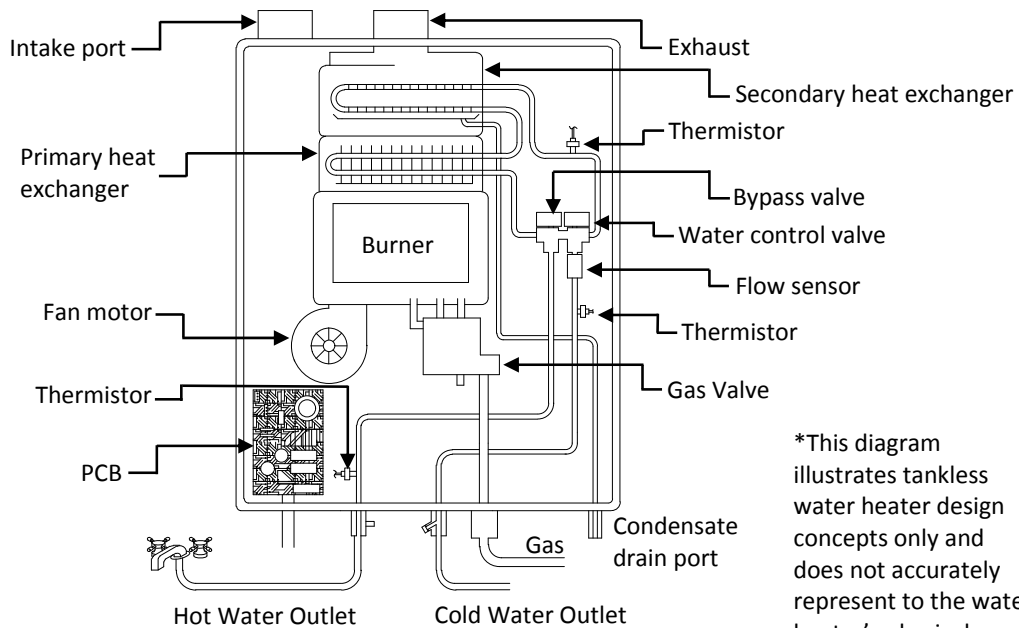
NOTE

- Check the rating plate to ensure this product matches your specifications.
- In accordance with ANZI Z21.10.3, CO emission does not exceed 400 PPM for normal input.

The manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

INTRODUCTION

- This manual provides information necessary for the installation, operation, and maintenance of the water heater.
- The model description is listed on the rating plate which is attached to the side panel of the water heater.
- Please read all installation instructions completely before installing this product.
- If you have any problems or questions regarding this equipment, consult with the manufacturer or its local representative.
- This equipment is an on-demand, tankless water heaters designed to efficiently supply endless hot water for your needs.
- The water heater is **high efficiency models** with an in-built secondary heat exchanger that absorbs latent heat from the exhaust gas.
- The principle behind the water heater is simple:



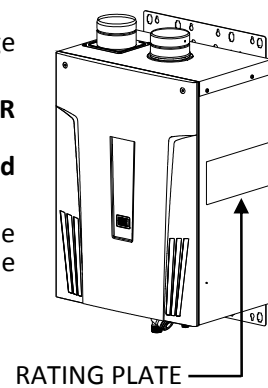
*This diagram illustrates tankless water heater design concepts only and does not accurately represent to the water heater's physical description.

1. A hot water tap is turned on.
2. Water enters the heater.
3. The water flow sensor detects the water flow.
4. The computer automatically ignites the burner.
5. Water circulates through the heat exchanger and then gets hot.
6. The computer will modulate the gas supply valve and water flow to produce the right amount of hot water at the correct temperature.
7. When the tap is turned off, the unit shuts down.

SAFETY GUIDELINES

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or CAN/CSA B149.1 Natural Gas, Propane Installation Code in Canada.
2. Properly ground the unit in accordance with all local codes or in the absence of local codes, with the National Electrical Codes: ANSI/NFPA 70 in the USA or CSA standard C22.1 Canada Electrical Code Part 1 in Canada.
3. Carefully plan where you intend to install the water heater. Please ensure:
 - Your water heater will have enough combustible air and proper ventilation.
 - Locate your heater where water leakage will not damage surrounding areas (please refer to p. 5).
4. Check the rating plate for the correct **GAS TYPE, GAS PRESSURE, WATER PRESSURE and ELECTRIC RATING.**
 *If this unit does not match your requirements, **do not install and consult with the manufacturer.**
5. If any problem should occur, turn off all hot water taps and turn off the gas. Then call a trained technician or the Gas Company or the manufacturer.



WARNING

- Water temperatures over 125°F (52°C) can cause severe burns instantly or death from scalding. The water temperature is set at 120°F (49°C) from the factory to minimize any scalding risk. Before bathing or showering always check the water temperature.



Prohibited

- Do not store or use gasoline or other flammables, vapors, or liquids in the vicinity of this appliance.
- Do not reverse the water and/or gas connections as this will damage the gas valves and can cause severe injury or death. Follow the diagram on p. 19 when installing your water heater:
- Do not use this appliance if any part has been in contact with or been immersed in water. Immediately call a licensed plumber, a licensed gas fitter, or a professional service technician to inspect and/or service the unit if necessary.
- Do not disconnect the electrical supply if the ambient temperature will drop below freezing. The Freeze Prevention System only works if the unit has electrical power. The warranty will not be covered if the heat exchanger is damaged due to freezing. Refer to the section on the Freeze Prevention System on p. 38 for more information.

INSTALLATION

All gas water heaters require careful and correct installation to ensure safe and efficient operation. This manual must be followed exactly. Read the “Safety Guidelines” section at the beginning of this manual.



WARNING

- **Installation and service must be performed by a qualified installer (for example, a licensed plumber or gas fitter), otherwise the warranty will be void.**
- **The installer (licensed professional) is responsible for the correct installation of the water heater and for compliance with all national, state/provincial, and local codes.**

PLEASE READ THIS MANUAL CAREFULLY AND FOLLOW ALL DIRECTIONS.



CAUTION

- **The warranty will not cover damage caused by water quality.**
 - Only potable water or potable water / glycol mixtures can be used with this water heater. Do not introduce pool or spa water, or any chemically treated water into the water heater.
 - Water hardness levels must not exceed 7 grains per gallon (120 ppm) for single family domestic applications or more than 4 grains per gallon (70 ppm) for all other types of applications. Water hardness leads to scale formation and may affect/damage the water heater. Hard water scaling must be avoided or controlled by proper water treatment.
 - Water pH levels must be between 6.5 and 8.5
 - Well water must be treated.
- Although this water heater is designed to operate with minimal sound, **the manufacturer does not recommend installing the unit on a wall adjacent to a bedroom, or a room that is intended for quiet study or meditation, etc.**



WARNING


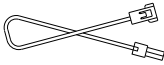


- Locate your heater close to a drain where water leakage will not do damage to surrounding areas. As with any water heating appliance, the potential for leakage at some time in the life of the product does exist. The manufacturer will not be responsible for any water damage that may occur. If you install a drain pan under the unit, ensure that it will not restrict the combustion air flow.
- The water heater is high efficiency products that create condensation. A condensation drain tube must be installed with these models to discharge condensate into a drain outlet. For more information, refer to p. 20.
- **The manufacturer does not recommend installing the Direct Vent Indoor models in an attic due to safety issues.** If you install your Direct Vent Indoor models in an attic:
 - Make sure your unit will have enough combustion air and proper ventilation.
 - Keep the area around you're the water heater clean. When dust collects on the flame sensor, the water heater will shut down on errors.
 - Locate unit for easy access for service and maintenance.
 - A drain pan, or other means of protection against water damage, is required to be installed under the water heater in case of leaks.

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or CAN/CSA B149.1 Natural Gas, Propane Installation Code in Canada.
2. The manifold gas pressure is preset at the factory. It is computer controlled and should not need adjustment.
3. Maintain proper space for servicing. Install the unit so that it can be connected or removed easily. Refer to p. 8, p.9 and p. 10 for proper clearances.
4. The electrical connection requires a means of disconnection, to terminate power to the water heater for servicing and safety purposes.
5. If you will be installing the unit in a contaminated area with a high level of dust, sand, flour, aerosols or other contaminants/chemicals, they can become airborne and enter and build up within the fan and burner causing damage to the unit.
6. Particles from flour, aerosols, and other contaminants may clog the air vent or reduce the functions of the rotating fan and cause improper burning of the gas. Regularly ensure that the area around the unit is dust- or debris-free; regular maintenance is recommended for these types of environment.
7. Do not install the unit where the exhaust vent is pointing into any opening in a building or where the noise may disturb your neighbors. Make sure the vent termination meets the required distance by local code from any doorway or opening to prevent exhaust from entering a building (refer to p. 15).

INCLUDED ACCESSORIES

Check that the installation manual, the communication cable, the product registration card and the PVC adaptor are included with the unit (the adaptor comes with the Direct Vent Indoor models only). For details on how to connect the adaptor, refer to P.14.

<p>1. Manual</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Qty: 1</p>	<p>2. Communication cable 520 (T-H2) models only</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Qty: 1</p>
<p>3. Product Registration Card</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Qty: 1</p>	<p>4. PVC adaptor Direct Vent Indoor models only</p> <div style="text-align: center;">  </div> <p style="text-align: right;">Qty: 1</p>

OPTIONAL ITEMS

1. Temperature Remote Controller: 9007603005 (TM-RE30)



The Temperature Remote Controller has two functions. It allows the output temperature from the water heater to be adjusted within the range of 100 °F to 185 °F, and it also works as a diagnostic tool that will give a concise error code whenever there is a problem with the unit. The temperature options are 100°F, 105°F, 110°F, 115°F, 120°F, 125°F, 130°F, 135°F, 140°F, 145°F, 150°F, 155°F, 160°F, 165°F, 170°F, 175°F, 180°F and 185°F. See the trouble shooting section for information on possible error codes.

2. Pipe cover: 9007606005 (TH-PC02)



The Pipe cover protects the plumbing pipes to the water heater from unexpected adjustments. This pipe cover is fixed to the bottom of the water heater, which hides the plumbing and improves the visual aspects of the whole installation for the water heater.

3. Wall thimble with Termination: 9007608005 (TK-KPWL4) and 9007609005 (TK-KPWH4)



**Louver
Termination
9007608005
(TK-KPWL4)**

**Hood
Termination
9007609005
(TK-KPWH4)**

These terminations are used when venting out through the wall and are compatible with the T-Vent pipe system. These terminations are special stainless steel vents for gas appliances and are UL listed as Category II, III and IV. There are two types of terminations: the Louver termination and the Hood termination. For different wall thicknesses, there are two ranges of lengths available (refer to the venting brochure for details).

Install these vent terminations in accordance with their installation instructions and any applicable local codes.

4. Neutralizer kit: 9007607005 (TH-NT01)



The Neutralizer assembly neutralizes the condensate (acidic water) that forms in the secondary heat exchanger of the water heater.

It connects to the condensate drain port of the water heater by using connectors included with the neutralizer kit. Refer to p. 21 for the details.

WARNING FOR INSTALLATIONS

FOR YOUR SAFETY, READ BEFORE INSTALLATION:

Do not install the heater where water, debris or flammable vapors may get into the flue terminal. This may cause damage to the heater and void the warranty.



Prohibited



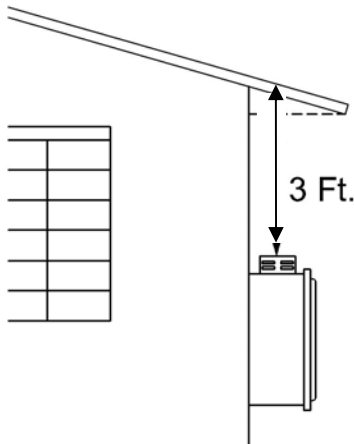
Do not have the vent terminal pointing toward any opening into a building. Do not locate your heater in a pit or location where gas and water can accumulate.



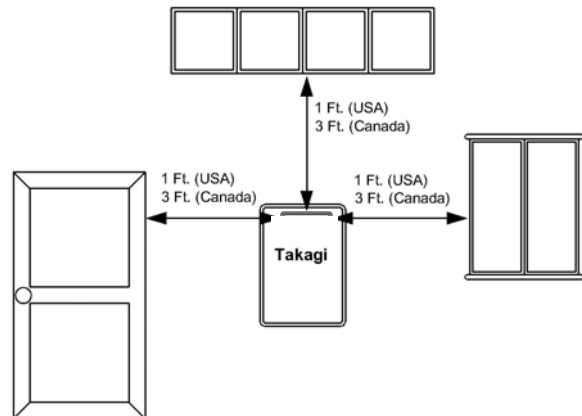
Prohibited



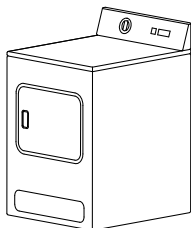
Do not install this water heater under an overhang less than 3 feet from its top or eaves. The area under an overhang must be open to three sides. (Outdoor models only)



Do not install the water heater vent terminator within 1 ft. in the USA of any air intake or building opening, and within 3 ft. in Canada of any air intake or building opening. (Outdoor models only) (Refer to p.15)



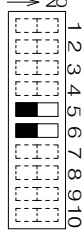


Do not install next to a dryer or any source of airborne debris that can be trapped inside the combustion chamber, unless the system is direct vented.



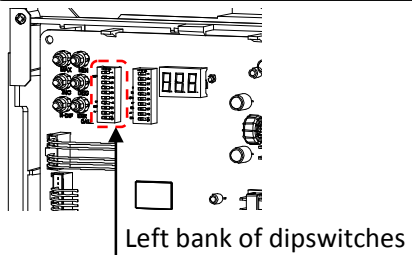
HIGH-ALTITUDE INSTALLATIONS

Check the elevation where your water heater is installed. Set dipswitches shown in the table below depending on the altitude. These dipswitches (No. 5 and No. 6) are on the computer board on the **left bank only**.

Left bank of dipswitches

Altitude	0 to 2,500 ft (DEFAULT)	2,500 to 4,000 ft	4,000 to 5,000 ft	Over 5,000 ft
Switch No.5	OFF	ON	OFF	Consult our Technical Services Department at 1-877- 737-2840
Switch No.6	OFF	OFF	ON	
				


The dark squares indicate the direction the dipswitches should be set to.




! DO NOT adjust any dipswitches on the right bank.

INSTALLATION FOR OUTDOOR MODELS

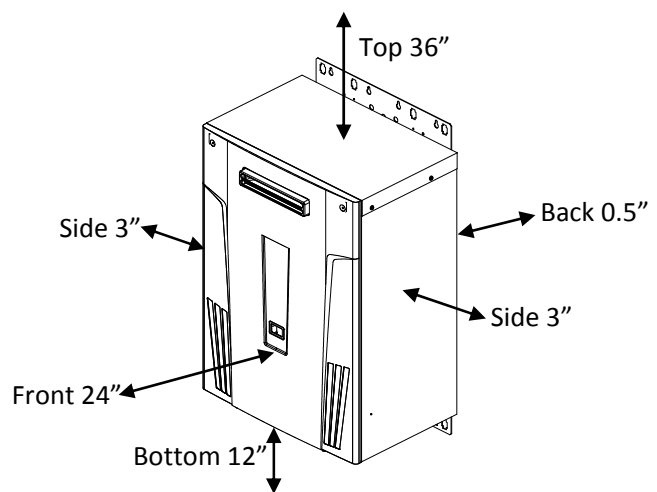
1. Install the Outdoor model only in areas with mild, temperate climates.
2. The Outdoor model shall be wall-mounted or mounted on a stand. Locate the Outdoor model in an open, unroofed area and maintain the following minimum clearances:



- There is a 3" clearance from the left and right sides of the unit to combustible and non-combustible surfaces. However, if any portion or area of the surface is exposed to the exhaust fumes (i.e. directly to the sides of the vent cap), that surface must be at least 24" away.



- Keep the clearances.

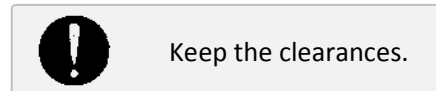
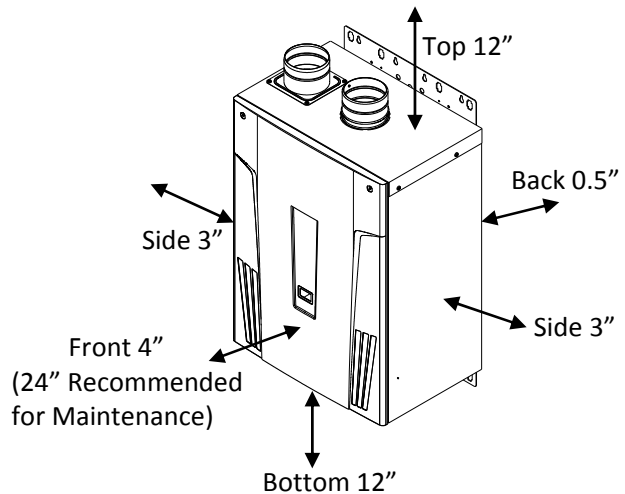


INSTALLATION FOR DIRECT VENT INDOOR MODELS

The Direct Vent Indoor models are equipped with a thermistor and hi-limit switch for the exhaust gas, detecting excess temperatures within the flue and enabling the unit to safely stop operations if needed. These components are always monitoring exhaust gas conditions in order to prevent heat damage to PVC (Plastic) venting if PVC is used.

If the exhaust gas temperature exceeds 140°F, these components will enable the unit to safely stop operations. (For the Outdoor model, these components are not available since there's no exhaust venting required.)

- The Direct Vent Indoor model requires a 4" make-up intake air supply pipe. The intake pipe must be sealed airtight.
- Air supply pipe can be made of ABS, PVC, galvanized steel, corrugated stainless steel, or Category III / IV stainless steel.
- Sidewall venting is recommended for the Direct Vent Indoor model. Vertical venting (roof termination) is acceptable.
- The manufacturer recommends running the exhaust vent and the intake pipe as parallel as possible.
- The PVC adaptor is used to make the connection between the Direct Vent Indoor model vent collar and PVC vent pipe easier and for maintenance purposes.



VENTING INSTRUCTIONS

-General-



Improper venting of this appliance can result in excessive levels of carbon monoxide which can result in severe personal injury or death.



When installing the vent system, all applicable national and local codes must be followed. If you install thimbles, fire stops or other protective devices and they penetrate any combustible or noncombustible construction, be sure to follow all applicable national and local codes.

The Direct Vent Indoor models must be vented in accordance with the section "Venting of Equipment" of the latest edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the United States and/or Section 7 of the CAN/CSA B149.1 Natural Gas and Propane Installation Code in Canada, as well as applicable local building codes.

The use of venting materials approved for Category III/IV appliances is recommended whenever possible. However, the Direct Vent Indoor models may also be vented with plastic pipe materials such as PVC. For details, please refer to the Exhaust Vent (PVC Vent) section on p. 11. Vent installations in Canada which utilize plastic vent systems must use venting that complies with ULC S636.

-Exhaust vent (PVC and ABS vent) -

The Direct Vent Indoor models can be connected with PVC or ABS venting (temperature rated up to 149°F). However, the manufacturer recommends PVC (or ABS) venting certified to ULC S636 standards.

Item	Material	United States	Canada
Exhaust pipe and Fittings	Schedule 40 PVC	ANSI/ASTM D1785	ULC S636 Certified Materials Only
	PVC-DWV	ANSI/ASTM D2665	
	Schedule 40 CPVC	ANSI/ASTM F441	
	Schedule 40 ABS-DWV	ANSI/ASTM D2661	
Pipe Cement/Primer	PVC	ANSI/ASTM D2564	
	CPVC	ANSI/ASTM F493	
	ABS	ANSI/ASTM D2235	
NOTE: Do NOT Use Cellular Foam Core Pipe			

- The maximum length of exhaust vent piping must not exceed 50 ft. for 4" venting and 25 ft. for 3" venting (deducting 5 ft. for each elbow used in the venting system). Do not use more than 5 elbows for 4" venting and 2 elbows for 3" venting.
- When the horizontal vent run exceeds 5 ft., support the vent run at 3 ft. intervals with overhead hangers.

Diameter	Max. No. of Elbow	Max. Vertical and Horizontal (Total) Vent Length
3"	2	25 ft.
4"	5	50 ft.

* For each elbow added, deduct 5 ft. from max. vent length.

No. of Elbows	Max. Vertical or Horizontal Length	
	3" venting	4" venting
0	25 ft.	50 ft.
1	20 ft.	45 ft.
2	15 ft.	40 ft.
5	N/A	25 ft.

Excludes elbow termination, rain caps, or the 3" PVC Concentric Termination

For details on the vent connection to the Direct Vent Indoor models, refer to P.14

-Exhaust vent (Stainless steel vent)-

This is a Category IV appliance and must be vented accordingly. The vent system must be sealed air tight. All seams and joints **without gaskets** must be sealed with high heat resistant silicone sealant or UL listed aluminum adhesive tape having a minimum temperature rating of 160°F. For best results, a vent system should be as short and straight as possible.

- The Direct Vent Indoor models are a Category IV appliance and must be vented accordingly with any 4" vent approved for use with Category III/IV or Special BH type gas vent.
- **The manufacturer recommends the "T-Vent" line manufactured by TAKAGI** (Refer to Takagi's "T-Vent" brochure for details). However, the following are also UL listed manufacturers: ProTech Systems Inc. (FasNSeal), Flex-L Inc., Z-Flex Inc. (Z-Vent III), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).
- **Follow the vent pipe manufacturer's instructions when installing the vent pipe.**

- **Do not common vent this appliance with any other vented appliance** (Do not terminate vent into a chimney. If the vent must go through the chimney, the vent must run all the way through the chimney with Category III / IV approved or Special BH vent pipe).
- The maximum length of exhaust vent piping must not exceed 50 ft. (deducting 5 ft. for each elbow used in the venting system). Do not use more than 5 elbows.
- When the horizontal vent run exceeds 5 ft., support the vent run at 3 ft. intervals with overhead hangars.

Diameter	Max. No. of Elbow	Max. Vertical and Horizontal (Total) Vent Length
4"	5	50 ft.

***For each elbow added, deduct 5 ft. from max. Vent length.**

No. of Elbows	Max. Vertical or Horizontal Length
0	50 ft.
1	45 ft.
2	40 ft.
5	25 ft.

-Vent termination -



Improper installation can cause nausea or asphyxiation, severe injury or death from carbon monoxide and flue gases poisoning. Improper installation will void product warranty.

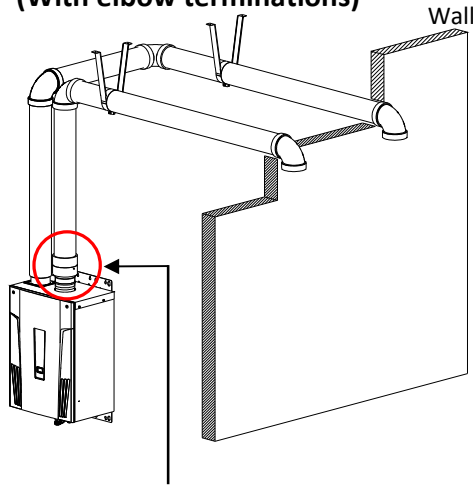
- The vent terminator provides a means of installing vent pipe through the building wall and must be located in accordance with ANSI Z223.1/NFPA 54, or in Canada with CAN/CSA-B149.1 and local applicable codes.
- A proper sidewall direct-vent terminator is recommended when the water heater is vented through a sidewall.

General rules for venting the Direct Vent Indoor models are:

1. Place the water heater as close as possible to the vent terminator.
2. The vent collar of the water heater must be fastened directly to an unobstructed vent pipe or PVC adaptor.
3. Do not weld the vent pipe to the water heater collar.
4. Do not cut the vent collar of the unit.
5. The weight of the vent stack must not rest on the water heater.
6. The vent must be easily removable from the top of the water heater for normal service and inspection of the unit.
7. The water heater vent must not be connected to any other gas appliance or vent stack.
8. Avoid locating the water heater vent terminator near **any air intake devices**. These fans can pick up the exhaust flue products from the water heater and return them to the building. This can create a health hazard.
9. Avoid using an oversized vent pipe or using extremely long runs of the pipe.
10. Locate the vent terminator so that it cannot be blocked by any debris, at any time. Most codes require that the terminator be at least 12 inches above grade, but the installer may determine if it should be higher depending on the job site condition and applicable codes.
11. For rooftop venting, a rain cap or other form of termination that prevents rain water from entering into the water heater must be installed.

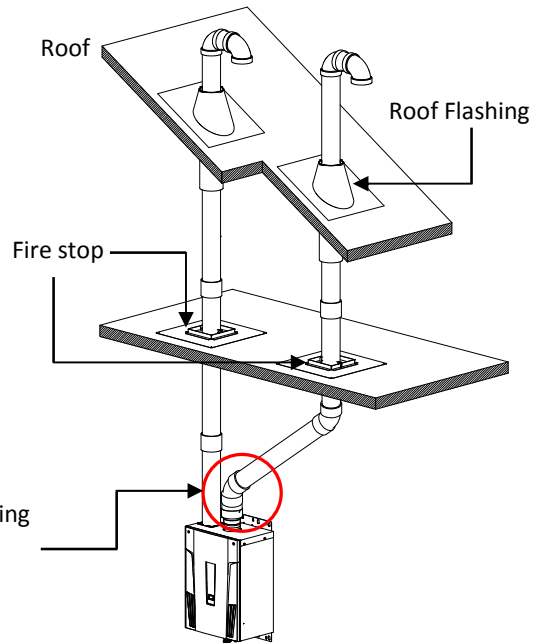
-PVC Venting Illustrations-

**Horizontal Installation Diagram
(With elbow terminations)**

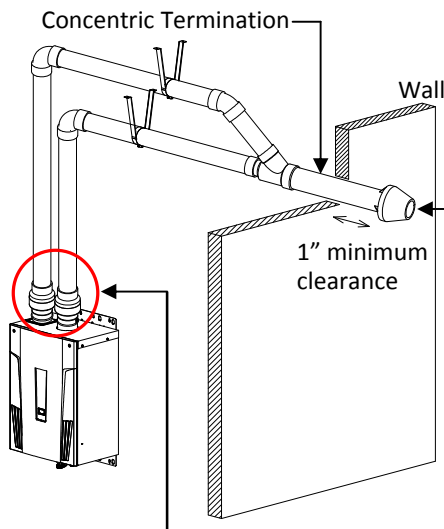


Connection between exhaust vent collar and PVC piping
See the next page for instructions.


Vertical Installation Diagram



**Horizontal Installation Diagram
(With 3" PVC Concentric Termination)**



Connection between exhaust vent collar and PVC piping
See the next page for instructions.



Keep a 1" clearance between wall and the intake section of the concentric termination. See the diagram to the left.

Insert the bird screen included with the termination

How to install PVC venting with the Direct Vent Indoor models

(For Exhaust)

1. Connect the PVC adaptor* directly on the exhaust vent collar of the water heater.
2. Connect a 4" PVC coupler (or 4x3" PVC reducer) to the PVC adaptor.
3. From the coupler (or reducer), continue on the rest of the vent run with 4" PVC pipe (or 3" PVC pipe.)

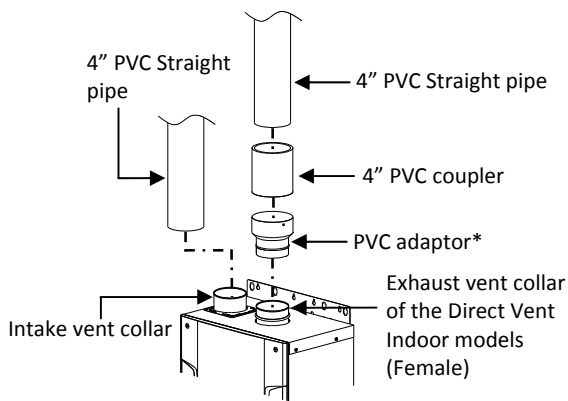
(For Intake: 4" only)

1. Connect a 4" PVC Straight pipe directly on the intake vent collar of the water heater.

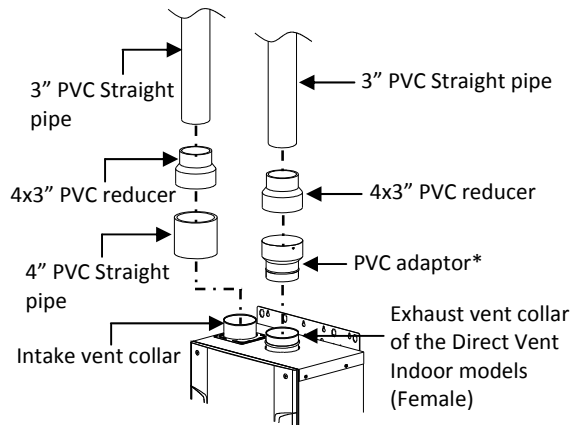
(For Intake: 3" only)

1. Connect a 4" PVC Straight pipe directly on the intake vent collar of the water heater.
2. Connect a 4x3" PVC reducer to the 4" PVC Straight pipe.
3. From the reducer, continue on the rest of the vent run with 3" PVC pipe.

4" vent connection Diagram



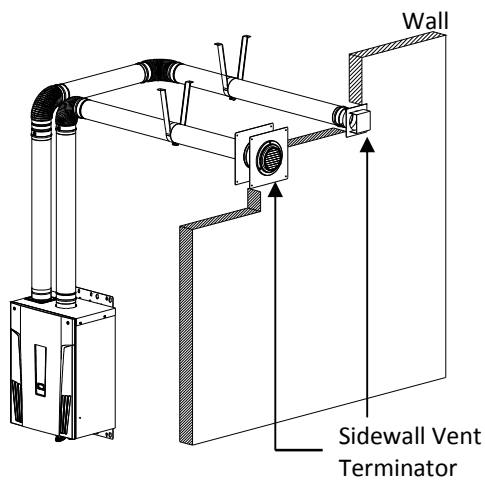
3" vent connection Diagram



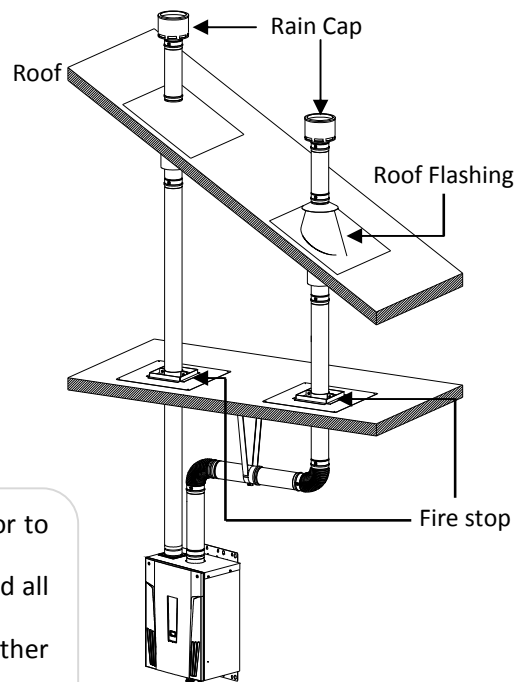
*PVC adaptor is included with the Direct Vent Indoor models.

-Stainless steel Venting Illustrations-

Horizontal Installation Diagram

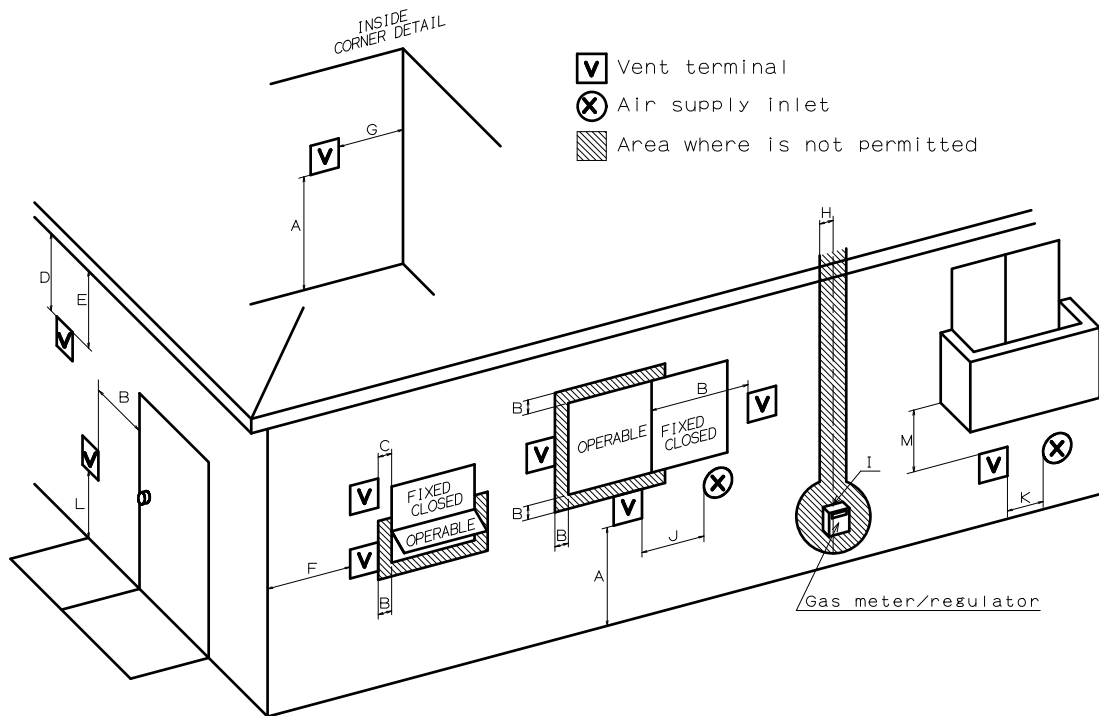


Vertical Installation Diagram



- Regarding the clearances from the exhaust terminator to the air inlet or opening, refer to the next few pages.
- Follow all vent system manufacturer's instructions and all local codes.
- Do not common vent or connect any vent from other appliances to the Direct Vent Indoor models vent.
- Use 4" Category III/IV approved or Special BH, single or double wall stainless steel vent pipe.

-Vent clearances-



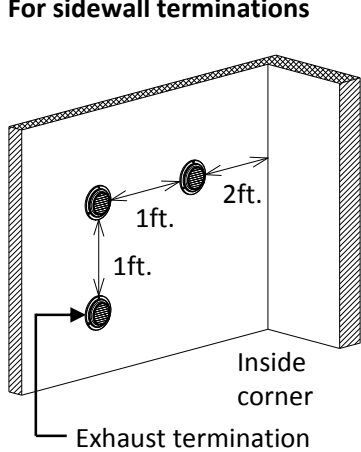
		Canada	U.S.A	
		Direct vent and other than Direct Vent	Direct vent	Other than Direct Vent
A	Clearance above grade, veranda, porch, deck, or balcony.	1 foot	1 foot	1 foot
B	Clearance to window or door that may be opened.	3 feet	1 foot	4 feet from below or side opening. 1 foot from above opening.
C	Clearance to permanently closed window	*	*	*
D	Vertical clearance to ventilated soffit located above the vent terminator within a horizontal distance of 2 feet (61cm) from the center line of the terminator.	*	*	*
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	3 feet	*	*
I	Clearance to service regulator vent outlet.	3 feet	*	*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other application.	3 feet	1 foot	4 feet from below or side opening. 1 foot from above opening.
K	Clearance to mechanical air supply inlet.	6 feet	3 feet	3 feet
L	Clearance above paved sidewalk or paved driveway located on public property.	7 feet	*	7 feet
M	Clearance under veranda, porch deck, or balcony.	1 foot	*	*

*For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/CSA-B149.1, please use clearances in accordance with local installation codes and the requirement of the gas supplier.

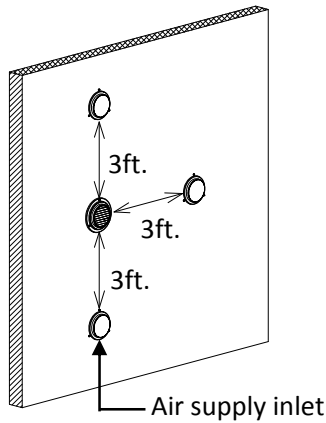
-Additional clearances -

Please follow all local and national codes in regards to proper termination clearances. In the absence of such codes, the following clearances can be used as guidelines. Local codes supersede these guidelines.

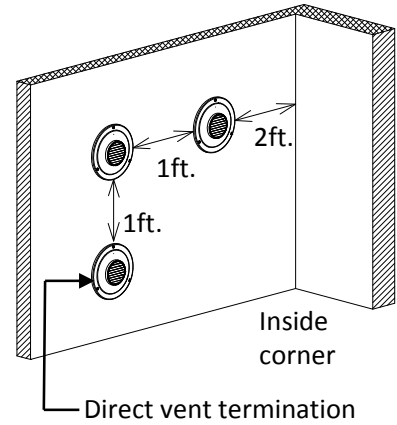
For sidewall terminations



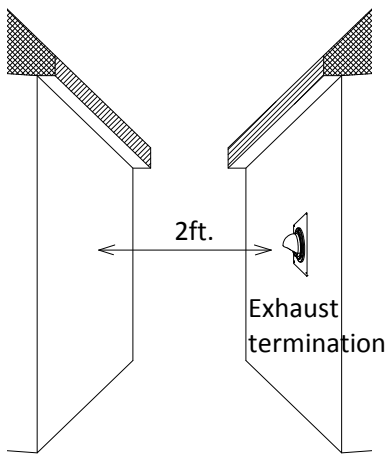
For multiple sidewall exhaust terminations (e.g. multi-unit systems), an exhaust termination must be at least 1 ft. away from another exhaust termination. An exhaust termination must also be at least 2 ft. away from an inside corner (if the adjacent wall is less than 2 ft. of length, the minimum required distance away from the inside corner will be equal to the length of that adjacent wall).



For direct-vent sidewall terminations that use two separate penetrations for the intake and exhaust, distance the intake and exhaust terminations at least 3 ft. away from each other, no matter the orientation.

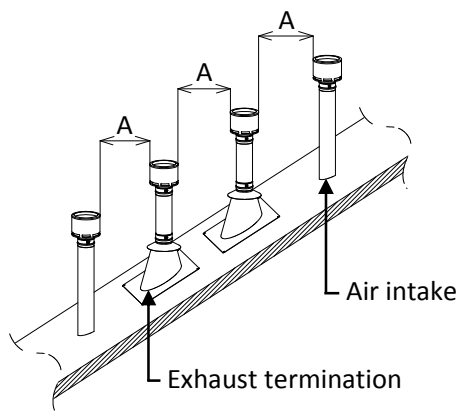


For multiple-unit, direct-vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. away from each other, no matter the orientation. A direct-vent termination must also be at least 2 ft. away from an inside corner (if the adjacent wall is less than 2 ft. of length, the minimum required distance away from the inside corner will be equal to the length of that adjacent wall).

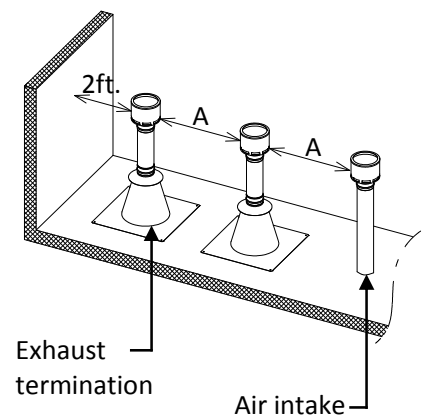


Exhaust and/or direct-vent sidewall terminations should be at least 2 ft. away from an opposite surface/wall. Do not place the termination directly in front of an opening into a building.

For rooftop terminations



A: in accordance with local codes



For multiple-unit rooftop terminations (whether for standard indoor or direct-vent installations) space all exhaust and intake terminations in accordance with local codes. An exhaust termination must be spaced from a wall or surface in accordance with local codes as well. In the absence of such a code, an exhaust termination must be a horizontal distance of at least 2 ft. away from a wall or surface.

GAS SUPPLY AND GAS PIPE SIZING

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the water heater if service is to be performed.
2. Turn the manual gas valve located on the outside of the unit clockwise ↻ to the off position.



WARNING

- Check that the type of gas matches the rating plate first.
- Ensure that any and all gas regulators used are operating properly and providing gas pressures within the specified range shown below. Excess gas inlet pressure may cause serious accidents.
- Conversion of this unit from natural gas to propane or vice versa will void all warranty. Contact your local distributor to get the correct unit for your gas type. **The manufacturer is not liable for any property and/or personal damage resulting from gas conversions.**

- The minimum and maximum inlet gas pressures are:

Gas type	Inlet gas pressure
Natural Gas	Min. 5.0" WC – Max. 10.5" WC
Propane	Min. 8.0" WC – Max. 14.0" WC

- Gas pressure above this specified range for the water heater and/or insufficient gas volume will adversely affect performance. These pressures are measured when the water heater is in full operation.
- Inlet gas pressure must not exceed the above maximum values; gas pressure above the specified range will cause dangerous operating conditions and damage to the unit.
- Until testing of the main gas line supply pressure is completed, ensure the gas line to the water heater is disconnected to avoid any damage to the water heater.

-Gas connections-

1. Install a manual gas shut-off valve between the water heater and the gas supply line.
2. When the gas connections are completed, it is necessary to perform a gas leak test (see below) either by applying soapy water to all gas fittings and observing for bubbles or by using a gas leak detection device.
 - The water heater 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 water heater 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 (3.5kPa).
3. Always purge the gas line of any debris and/or water before connecting to the gas inlet.

NOTICE

Size the gas pipe appropriately to supply the necessary volume of gas required for the water heater using ANSI Z233.1/NFPA 54 in the USA or CAN/CSA B149.1 in Canada or local codes. Otherwise, flow capabilities and output temperatures will be limited.

-Natural Gas Supply Piping-

Maximum Delivery Capacity of Cubic Feet of Gas per Hour of IPS Pipe Carrying Natural Gas of 0.60 Specific Gravity Based on Pressure Drop of 0.5" WC

Based on Energy Content of 1,000 BTU/Cubic Ft.: The water heater requires 199 Cubic Ft./hr for the 520 (T-H2) models, and 180 Cubic Ft./hr for the 320 (T-H2S) models.

Unit: Cubic Feet per Hour

Pipe Size Diameter	Length												
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
¾"	363	249	200	171	152	138	127	118	111	104	93	84	72
1"	684	470	377	323	286	259	239	222	208	197	174	158	135
1 ¼"	1,404	965	775	663	588	532	490	456	428	404	358	324	278
1 ½"	2,103	1,445	1,161	993	880	798	734	683	641	605	536	486	416
2"	4,050	2,784	2,235	1,913	1,696	1,536	1,413	1,315	1,234	1,165	1,033	936	801

-Propane (LP) Gas Supply Piping-

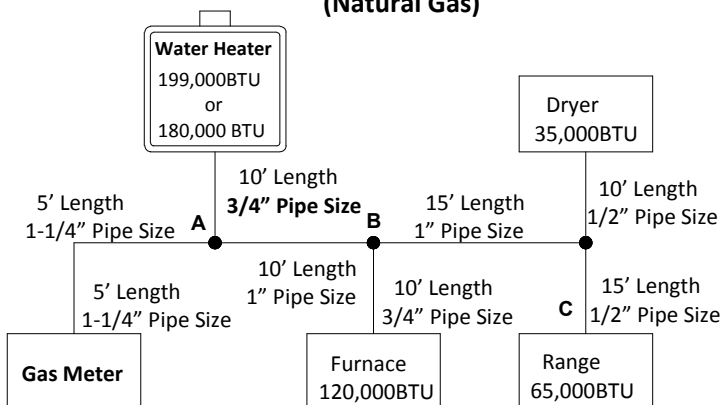
Maximum Capacity of Propane (LP) Gas Based on 11" WC supply pressure at a 0.5" WC pressure drop

Unit: kBtu per Hour

Pipe Size Diameter	Length												
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
¾"	567	393	315	267	237	217	196	185	173	162	146	132	112
1"	1,071	732	590	504	448	409	378	346	322	307	275	252	213
1 ¼"	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511	440
1 ½"	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787	675
2"	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496	1,260

For more information, please see the next page.

Gas Sizing Example (Natural Gas)



Based on Energy Content of 1,000BTU/Cubic Ft:

Divide each appliance's BTU requirement by 1,000BTU to get the appliances Cubic Ft. requirement.

Take into account the distance the appliance is from the gas meter, look in the above gas chart to properly size the line.

For sections of the gas line supplying gas to more than one appliance (Ex: Point A to Point B), add up the cubic ft. requirements of the appliances that are being supplied by that section, and size to the farthest appliance.

For Example: The section from A to B supplies gas to the furnace, range, and dryer. Adding up the BTU requirements and dividing by 1,000 yields a cubic ft. requirement of 220 cubic ft. of gas. The farthest appliance is the range, which is 50 ft. away from the meter. Looking at the above chart, and under the column of 50ft., Section A to B needs to be 1" in order to supply 220 cubic ft.

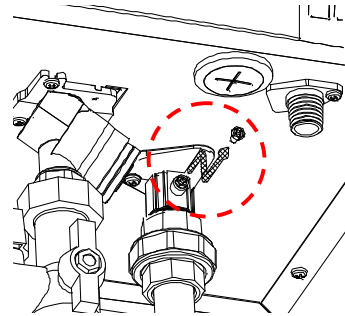
-Measuring inlet gas pressure-



1. Turn off all electric power to the water heater if service is to be performed.
2. Turn the manual gas valve located on the outside of the unit clockwise \curvearrowright to the off position.

The water heater cannot perform properly without sufficient inlet gas pressure. Below are instructions on how to check the inlet gas pressure. **THIS IS ONLY TO BE DONE BY A LICENSED PROFESSIONAL.**

1. Shut off the manual gas valve on the supply gas line.
2. Remove the screw for the pressure port located on the gas inlet of the water heater shown in the diagram to the right.
3. Connect the manometer to the pressure port.
4. Re-open the manual gas valve. Check to see that there are no gas leaks. Open some of the fixtures that use the highest flow rate to turn on the water heater.
5. Check the inlet gas pressure. When the water heater is on maximum burn, the manometer should read from 5.0" to 10.5" WC for Natural gas, from 8.0" to 14.0" WC for Propane.



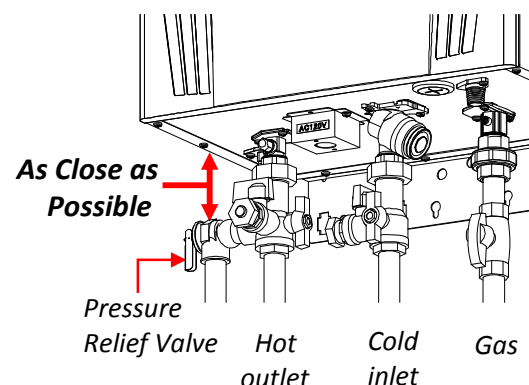
WATER CONNECTIONS



- Do not use this water heater if any part has been submersed under water. Immediately call a licensed professional to inspect the water heater to replace any damaged parts.
- Do not reverse the hot outlet and cold inlet connections to the water heater. This will not properly activate the water heater.

All pipes, pipe fittings, valves and other components, including soldering materials, must be suitable for potable water systems.

1. A manual shut off valve must be installed on the cold water inlet to the water heater between the main water supply line and the water heater.
2. In addition, a manual shut off valve is also recommended on the hot water outlet of the unit. If the water heater is installed within, or subjected to, a closed loop water system, a thermal expansion tank must be installed.
3. **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 heater.**
4. There is a wire mesh filter within the cold inlet to trap debris from entering your heater. This will need to be cleaned periodically to maintain optimum flow.



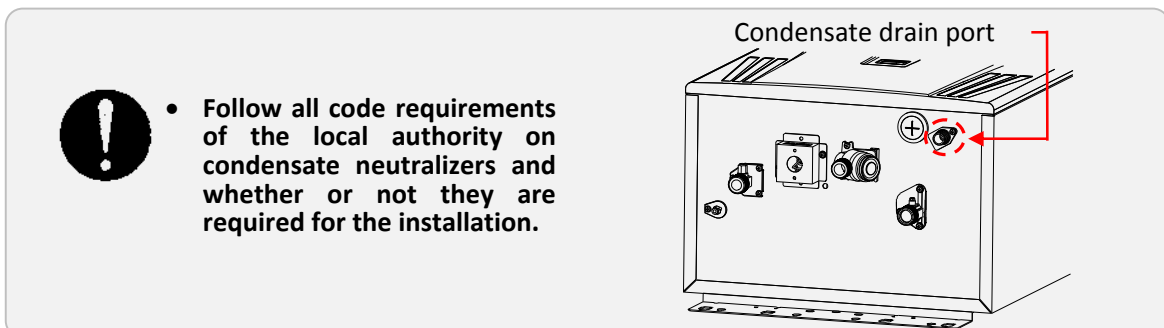
-Pressure relief valve-

The water heater has a high-temperature shut off switch built in as a standard safety feature (called a Hi-Limit switch) therefore a “**pressure only**” relief valve is required.

- This unit does not come with an approved pressure relief valve.
- An approved pressure relief valve must be installed on the hot water outlet.
- The pressure relief valve must conform to ANSI Z21.22 or CAN 1-4.4 and installation must follow local code.
- The discharge capacity must be at least 199,000 BTU/h for the 520 (T-H2) models, and 180,000 BTU/h for the 320 (T-H2S) models.
- The pressure relief valve needs to be rated for a maximum of 150 psi.
- The discharge piping for the pressure relief valve must be directed so that the hot water cannot splash on anyone or on nearby equipment.
- Attach the discharge tube to the pressure relief valve and run the end of the tube to within 6" from the floor. This discharge tube must allow free and complete drainage without any restrictions.
- If the pressure relief valve installed on the water heater discharges periodically, this may be due to a defective thermal expansion tank or defective pressure relief valve.
- The pressure relief valve must be manually operated periodically to check for correct operation.
- No valve must be placed between the relief valve and the water heater.

CONDENSATE DRAIN

- The water heater does not include a built-in condensate neutralizer cartridge for reducing the pH level of condensate water. If local codes dictate that condensate must be neutralized prior to drainage, a condensate neutralizer must be installed. An accessory Neutralizer assembly is sold separately.
- In the absence of applicable local codes and regulations, the manufacturer recommends that condensate be disposed of into a standard drain. Connect a drain tube from the condensate drain port (shown below) located on the bottom of the water heater to a standard drain.



-Condensate Drain Connections-



- Discharge condensate (acidic water) in accordance with all local codes and common safety practices.

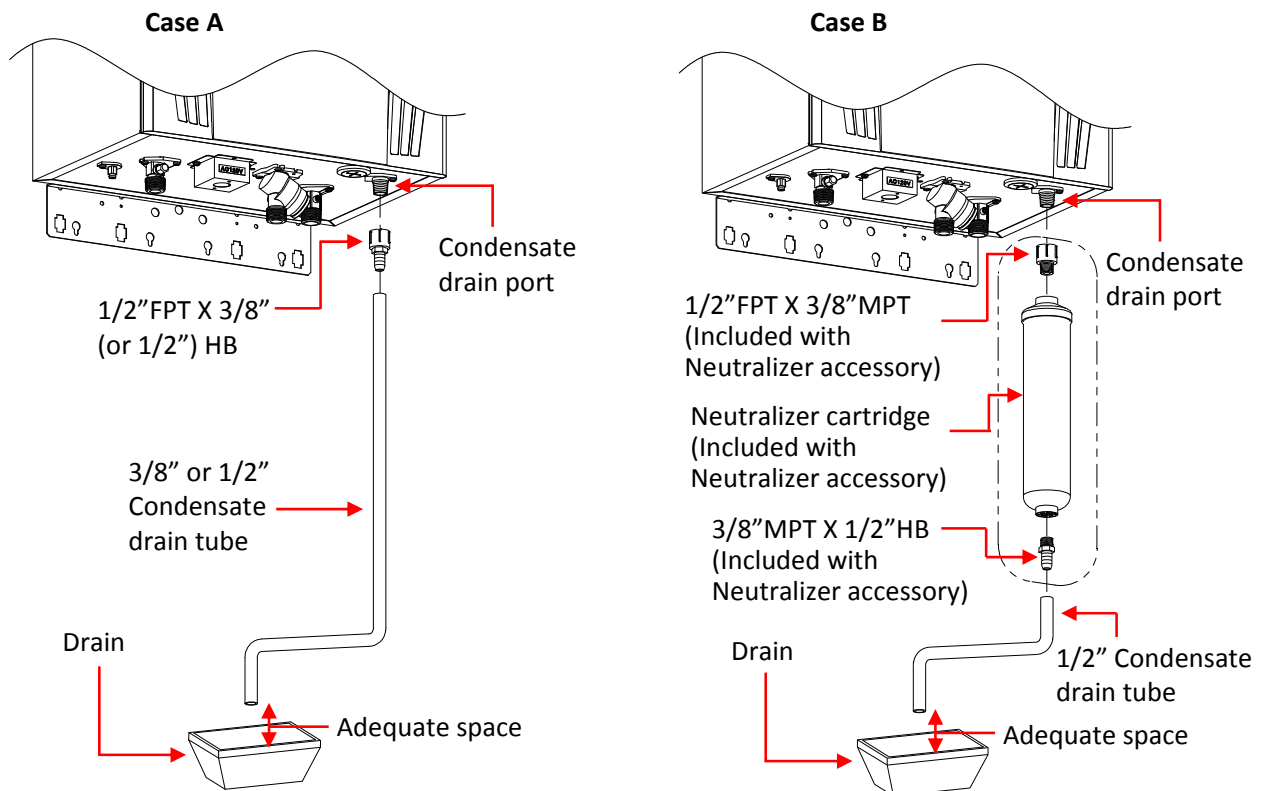
The water heater models are high efficiency condensing water heaters that produce condensate (acidic water). The acidic condensate generated in the secondary heat exchanger can be neutralized by the Neutralizer accessory.

Case A: If a neutralizer is not required

1. Connect a 1/2" FPT X 3/8" (or 1/2") HB Adaptor to the condensate drain port at the bottom of the water heater.
2. Connect a condensate drain tube to the 1/2" FPT X 3/8" (or 1/2") HB Adaptor. The manufacturer recommends the material of the condensate tube be either EPDM or PVC.
3. Leave an adequate amount of space between the end of the drain tube and the actual drain, to facilitate proper drainage.

Case B: If a neutralizer is required (installing the Neutralizer assembly)

1. Connect the 1/2" FPT X 3/8" MPT Adaptor to the condensate drain port at the bottom of the water heater.
2. Connect the Neutralizer to the 3/8" MPT connection of the adaptors. There is a flow direction indicator on the neutralizer. Please orient the neutralizer in the proper direction.
3. Connect a 1/2" drain tube to the other end of neutralizer.
4. Leave an adequate amount of space between the end of the drain tube and the actual drain, to facilitate proper drainage.





WARNING

- The condensate drain is at atmospheric pressure (non-pressurized) and therefore must be allowed to drain freely with gravity only. Please ensure that there are no blockages along the condensate drain tube. **All portions of the condensate drain (neutralizer and drain tube) must be at a lower elevation than the water heater to prevent condensate water from building up inside the heat exchanger.**
- Condensate cannot be effectively neutralized if the neutralizer elements inside the Neutralizer accessory have been completely consumed. If this happens, Condensate will remain acidic and can possibly cause damage to items such as pipes, concrete, etc., if drained improperly.
- The Neutralizer cartridge is designed to last for 3 years before replacement. However, the actual life of the neutralizer may vary, depending on the application and usage. Please ensure that the cartridge is properly replaced before the neutralizer elements have been completely consumed.
- All preventative measures and safety practices must be adhered to when draining condensate. The manufacturer will not be responsible for any damage caused by condensate.
- A drain pan, or other means of protection against water damage, is required to be installed under the water heater in case of leaks.

ELECTRICAL CONNECTIONS



WARNING

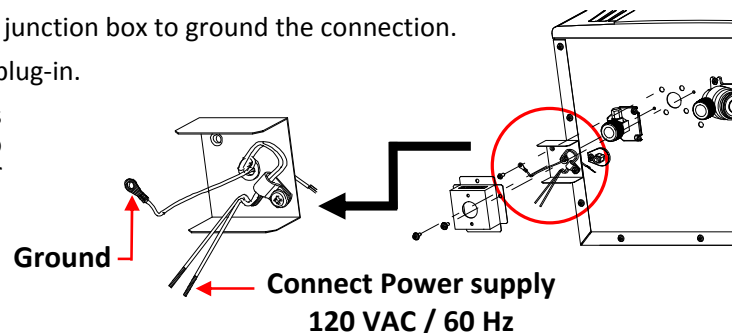
Follow the electrical code requirements of the local authority having jurisdiction. In the absence of such requirements, follow the latest edition of the National Electrical Code ANSI/NFPA 70 in the U.S. or the latest edition of CSA C22.1 Canadian Electrical Code, Part 1, in Canada.



CAUTION

When servicing or replacing parts within the water heater, label all wires prior to disconnection to facilitate an easy and error-free reconnection. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

1. The water heater must be electrically grounded. Do not attach the ground wire to either the gas or the water piping.
2. The water heater requires **120 VAC / 60 Hz electrical power supply that is properly grounded.**
 - A proper disconnect (i.e. on/off switch, power plug, etc.) controlling the main power to the water heater must be provided for service reasons. (Must comply with local codes).
 - Connect the power supply to the water heater exactly as shown in the wiring diagram;
3. A green screw is provided in the junction box to ground the connection.
4. Can be hardwired or wired to a plug-in.
5. The use of a surge protector is recommended in order to protect the unit from power surges.



REMOTE CONTROLLER CONNECTION

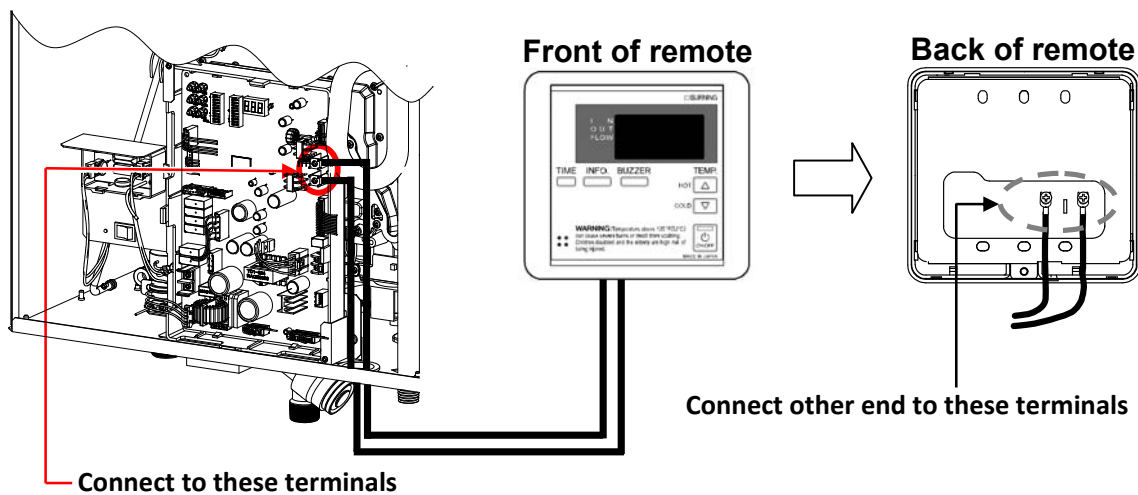
1. Disconnect power supply from the water heater.
2. Take off the water heater's front cover.
3. Locate the remote controller terminal, pictured below (located around the upper right-hand side of the computer board).
4. Open the plastic cover of the remote controller accessory, and then attach the two fork terminals to connector base of the backside the controller with two screws. Make sure the terminals are firmly fixed.
5. Pull the remote's wires through the rubber grommet at the bottom of the water heater's casing.
6. Properly attach the remote's wires to the remote controller terminal on the computer board. (No polarity)

***Do NOT jump or short-circuit the wires or computer will be damaged.**

7. Replace Front Cover securely.
8. Wires used for the remote controller connection must be:
 - Minimum 18AWG wire (No polarity)
 - Maximum 400 feet long

*For detailed connection instructions to the remote controller accessory, refer to the remote controller's Installation Manual.

Remote controller terminal of the water heater



PUMP CONTROL CONNECTIONS

The water heater can be used to control a recirculation pump. **Proper pump control helps to preserve the life of the system and saves energy as well.**

The water heater pump control port is a “**normally open dry contact**”, and therefore needs additional components to properly control a recirculation pump. To control a recirculation pump, connect the pump to the “**Pump connector**” in the water heater as shown in the diagram below. (In an Easy-Link system, connect the pump **ONLY** to the “**PARENT**” unit.) The pump is to be connected using suitable relays shown in the diagram below.

Please make sure the relays are properly rated for the recirculation pump.

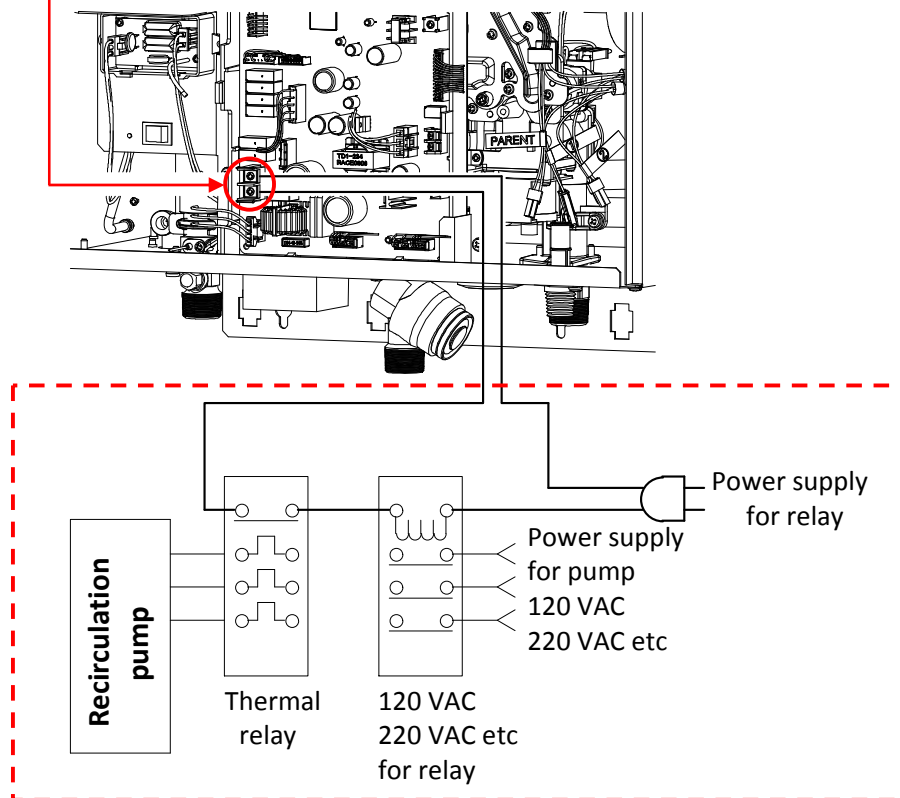
Using the water heater’s internal thermistors as a temperature control, the recirculation pump will only turn on when recirculation is needed.



CAUTION

In an Easy-Link system, the pump must be connected to the “Pump connector” in the “PARENT unit” only. If the pump is connected to any of the “CHILD units”, the pump will not work.

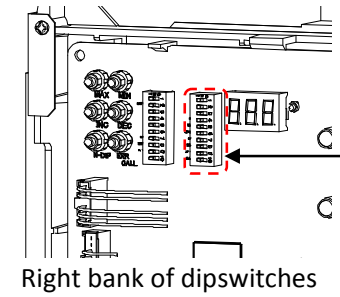
Connect to this “Pump connector”.



These components are **NOT** included with the water heater and are external to the unit. They must be acquired separately.

PUMP CONTROL MODE

The water heater provides the four types of the pump control modes. The pump control modes are selected by changing dipswitch settings. The dipswitches that change the pump control modes are located in the **right bank** of dipswitches in the upper-left quadrant of the computer board in the water heater. (See right.) These 4 modes only affect pumps that are connected to the water heater pump control (p.24)



A) Recirculation Control: No. 5 ON

Feature: Maintaining temperature in a standard recirculation loop, providing hot water in a quicker amount of time.

Function: The pump is only set to run when the temperature of the water in the recirculation loop is more than 9°F below the set temperature of the water heater.

The pump will run for about 1 minute every 30 minutes to determine whether the water temperature in the entire recirculation loop is more than 9°F below the set temperature.

If the water temperature is more than 9°F below the set temperature, the pump will remain running until the water in the loop reaches the set temperature. Otherwise, the pump will stop for another 30 minutes.

If the inlet thermistor of water heaters detects that the water temperature is more than 9°F below the set temperature before those 30 minutes have elapsed, the pump will activate immediately and remain running until the water in the loop reaches the set temperature.

B) Storage Tank Circulation Control: No.6 ON

Feature: This is to ensure a higher rate of recovery for storage tank applications.

Function: The water heater heats the water 5.4°F higher than its set temperature. The circulation pump between the storage tank and the water heater will continually remain running. After set temperature has been reached in the storage tank, the water heater will fire off and limit the water flow rate to less than 2.6 GPM, to continually monitor the temperature throughout the system.

Note: In this mode, the pump will continually remain running.

C) Energy Conserving Recirculation: No.5 and No.6 ON

Feature: Operates similarly to the standard Recirculation Control mode, but saves more energy by limiting the temperature within the recirculation loop.

Function: The temperature of the recirculation loop is never kept above 120°F (49 °C), regardless of the set temperature of the water heater.

D) Normal Control (Default setting): No.5 and No.6 OFF

Feature: This mode provides no special pump control. Pump activation can only be turned ON or OFF by the remote controller.

Function: The pump will run continually all the time as long as there is a power supply to the water heater. The pump will only stop when the remote is turned off. Water in the loop will be maintained at the set temperature of the water heater.

Dipswitch settings for the Pump control modes

Right bank of dipswitches

Pump mode	A) Recirculation Control	B) Storage Tank Circulation Control	C) Energy Conserving Recirculation	D) Normal Control (Default)
Switch No.5	ON	OFF	ON	OFF
Switch No.6	OFF	ON	ON	OFF
↘				

The dark squares indicate the direction the dipswitch should be set to.

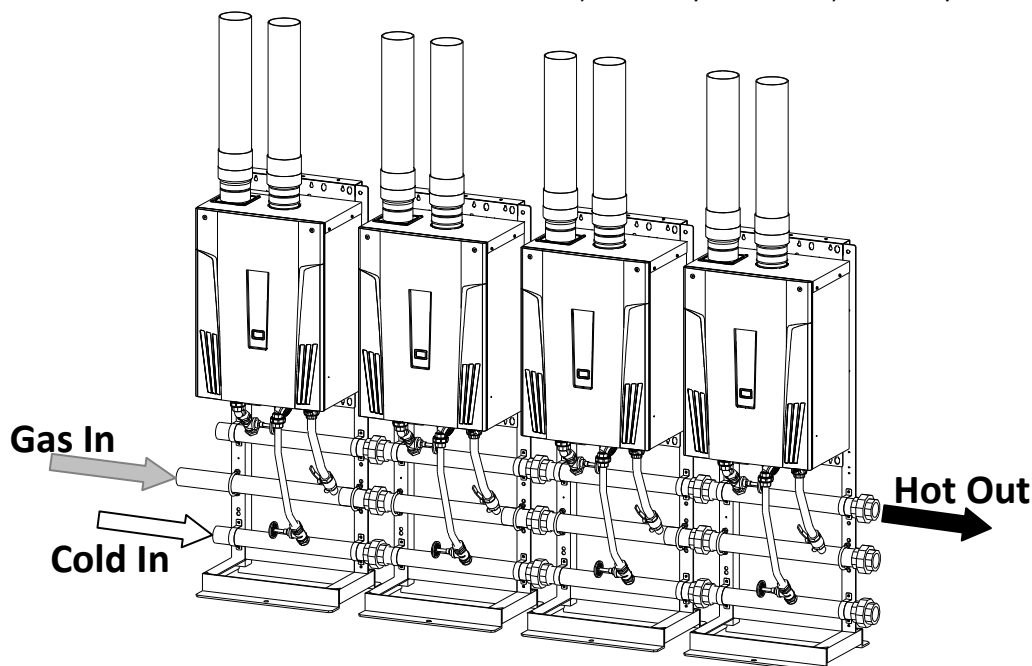
EASY-LINK SYSTEM

Available on the 520 (T-H2) models only **-General-**

The water heater can be connected with other heaters of the **same model** with communication cables to work as a multiple-unit manifold system.

- The Easy-Link system allows up to 4 units to manifold together.
- A communication cable (gray color) comes with each unit.

You can manifold from 2 to 4 units without the need for a multi-system controller. A 4-unit system has full automatic modulation between 13,000 BTU/h and 796,000 BTU/h.



CAUTION

- The Easy-Link system is limited up to **4 units**. If you connect more than 4 units, only the first 4 units will work as a part of the Easy-Link system. The other additional units will not work.
- **The water heater cannot be linked with other different tankless models in an Easy-Link system.**

-Easy-Link Connection Procedures-

1. Verify the set temperatures of all units within the system. Every single water heater must be set to the same set temperature.
2. Select one unit to be the "PARENT" unit.
3. **"PARENT" unit**

Locate the two banks of dipswitches to the left of the 3-digit 7-seg. LED on the computer board of the unit that you select to be the "PARENT" unit. Change dipswitch No. 10 on the **right bank of dipswitches to the ON position**. Do not change any dipswitches on any of the "CHILD" units.

4. Between the "PARENT" and the "CHILD-1" units

Connect the "PARENT connector" of the "PARENT" unit to the "[1] connector" of the "CHILD-1" unit.

5. Between the "CHILD-1" and the "CHILD-2" units

Connect the "[2] connector" of the "CHILD-1" unit to the "[1] connector" of the "CHILD-2" unit.

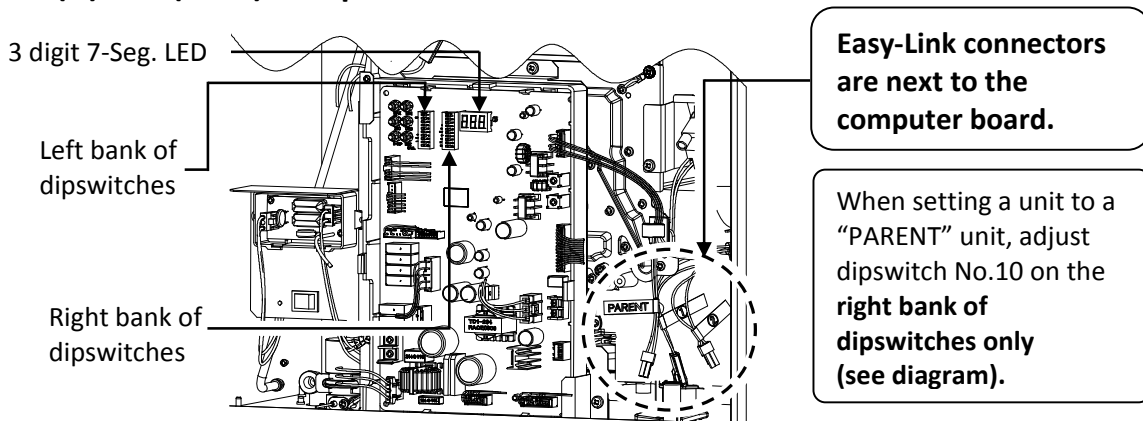
6. Between the "CHILD-2" and the "CHILD-3" units

Connect the "[2] connector" of the "CHILD-2" unit to the "[1] connector" of the "CHILD-3" unit.

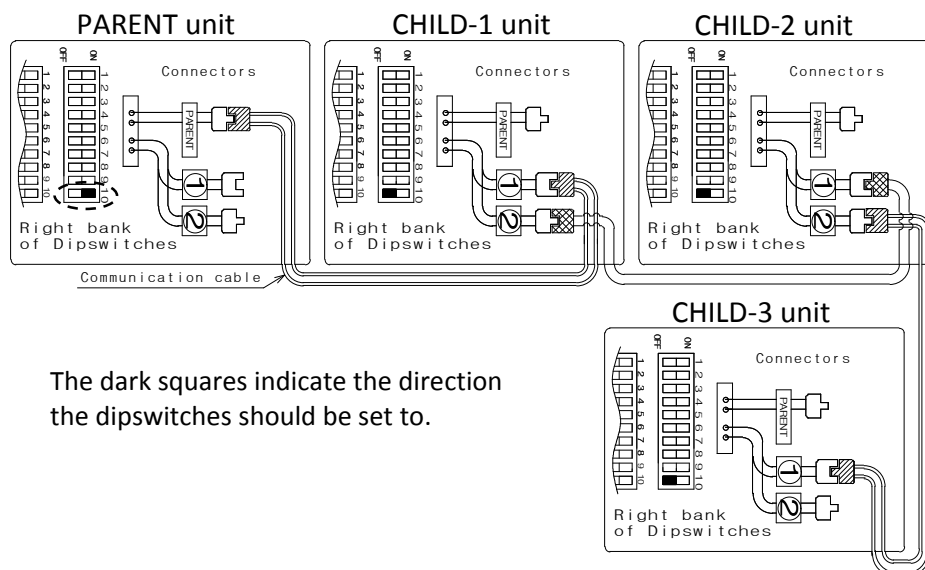
7. Make sure the "3-digit 7-seg. LED" of all the units' computer boards display the unit #. The numbering system automatically allocates the unit # to each water heater in the Easy-Link system, in accordance with the table below.

Parent unit	Unit # : 1
Child units	Unit # : 2, 3 and 4

(A) 520 (T-H2) Computer board



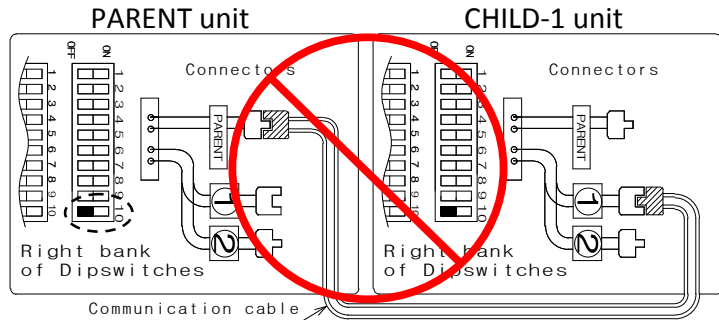
(B) Basic diagram of connections among the 520 (T-H2) models.



(C) Examples of incorrect settings and/or connections

CASE 1:

- Unless you change dipswitch No.10 of the “PARENT” unit to the “ON” position, the system will not work as an Easy-Link system. The units will operate as individual units.

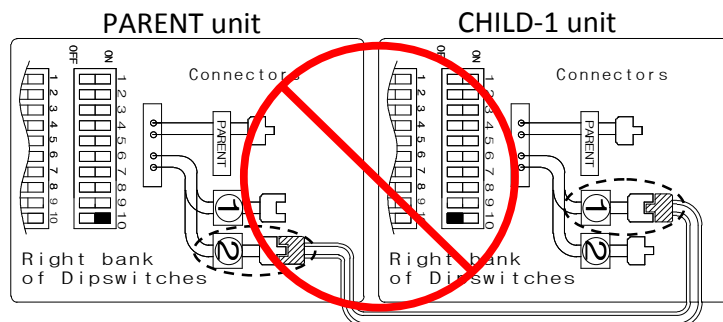
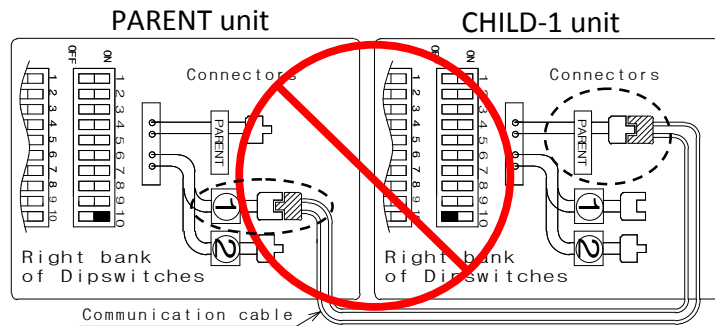


CASE 2:

- If you connect the “[1] (or [2])” connector of the “PARENT” unit to the “PARENT (or [1])” connector of the “CHILD-1” unit, the system will not work as an Easy-link system. The units will operate as individual units.



Wrong connection between the “PARENT” unit and the “CHILD-1” unit

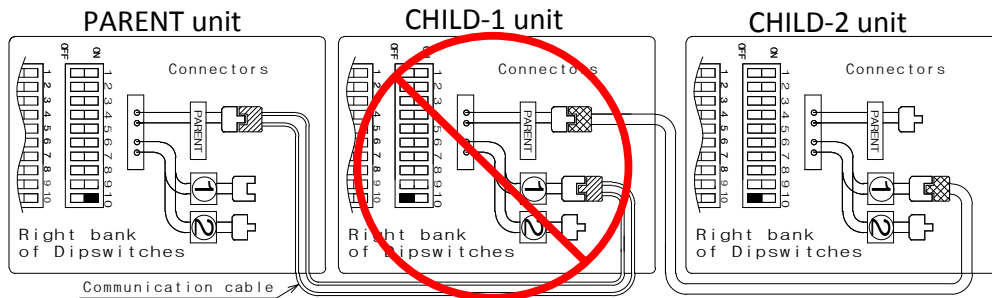


CASE 3:

If you connect the “**PARENT connector**” of the “**CHILD-1**” unit to the “[1] connector” of the “**CHILD-2**” unit, the “**CHILD-2**” unit will operate as an individual unit, and will not be part of the Easy-Link system.



Wrong connection between the “**CHILD-1**” unit and the “**CHILD-2**” unit



WARNING



Prohibited

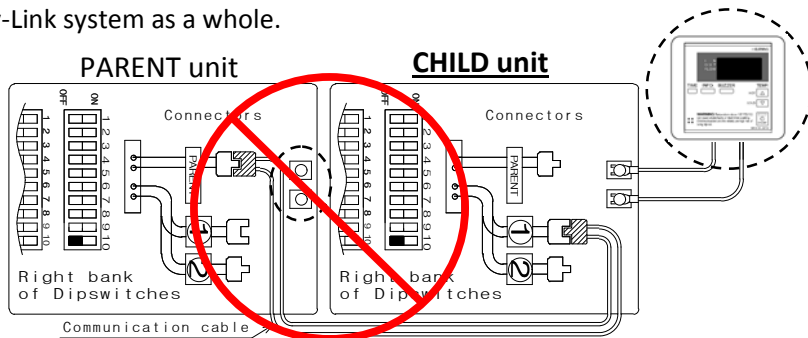
Connecting two “**PARENT connectors**” together from two separate units **may damage the computer board**. The communication cable has a female end and a male end so it’s impossible to have a PARENT -to- PARENT connection with the communication cable. Do not splice or modify connectors.

CASE 4:

- If a remote controller (optional) is used, it has to be connected to the “**PARENT**” unit. If the remote controller is connected to a “**CHILD**” unit, it will only control that particular individual “**CHILD**” unit and will not control the Easy-Link system as a whole.



Remote controller connected to incorrect unit



- The remote controller is not required for the Easy-Link system.
- If running the Easy-Link system without the remote controller, please make sure the temperature settings on ALL the units are set to the same settings. Otherwise, the units may not operate properly.
- If the remote controller is used, the temperature on all the units in the system will automatically be set to the same temperature that is set on the remote.

APPLICATIONS

WARNING-Space-Heating Applications

- In order to purge air in water pipes within a closed-loop system, an air vent and air separator should be installed in to the system. Required circulation flow rates are labeled next to each application diagram. These flow rate requirements must be followed.
- Toxic chemicals used in boiler treatments such as alcohol, glycerol and glycol groups must not be introduced into the system if the system incorporates an open-loop potable water system.
- The water heater can be used to supply potable water and space heating and shall not be connected to any heating system or component(s) previously used with non-potable water where any chemicals were added to the water heating appliances.
- When the system requires water for space heating at temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those other uses in order to reduce scald hazard potential.
- Water temperature over 125 °F (52°C) can cause severe burns instantly or death from scalds.
- Chemicals such as diluted Glycol can be used for radiant floor, Hydro/fan coil air or Baseboard heating only. The diluted solution of glycol must contain between 25 and 55% of Glycol. Be aware that in closed-loop glycol systems, low pressure in the heat exchanger can cause low-temperature boiling, resulting in excessive noise and damage to the water heater. Consult with the glycol maker for specifications prior to use.

-Recirculation-

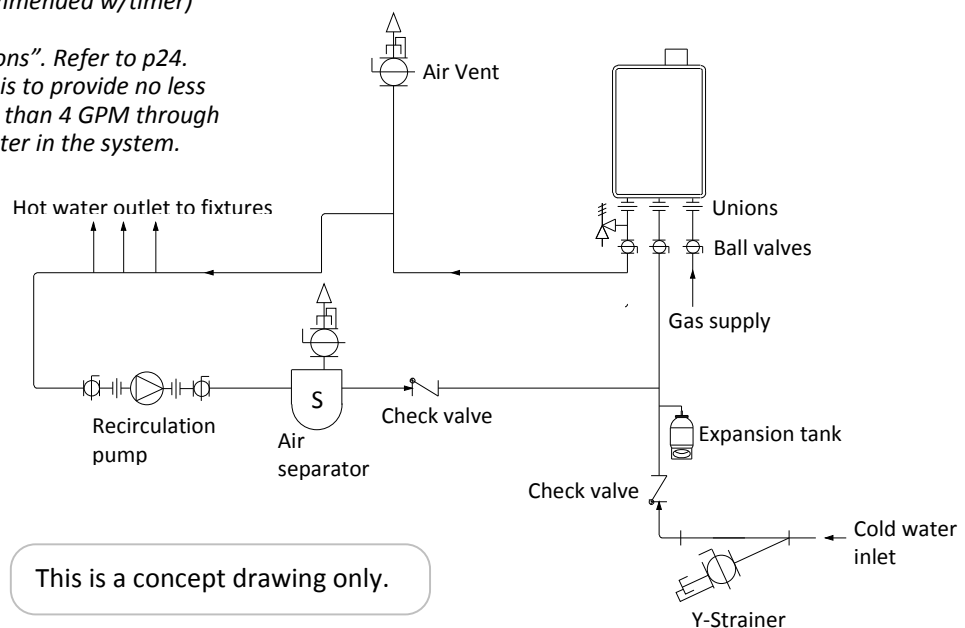
* The recirculation pump is to be controlled by:

-Dual-set aquastat (recommended w/timer)

OR

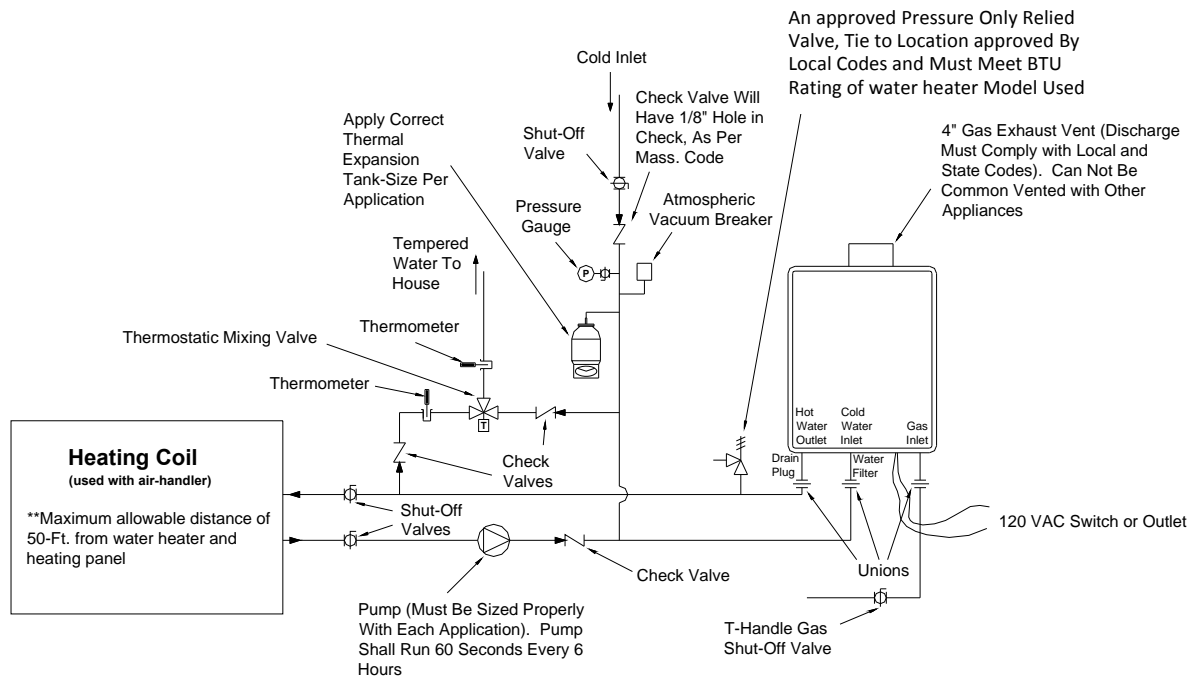
-“Pump Control Connections”. Refer to p24.

* The recirculation pump is to provide no less than 2 GPM and no more than 4 GPM through each activated water heater in the system.



-Dual-purpose hot water heating- (Domestic and Space Heating):

Diagrammatic Layout of Radiant Heating and
Domestic Water Heater Per Mass. Code



* The circulation pump is to provide no less than 2 GPM and no more than 4 GPM through each activated water heater unit in the system.



- **Priority Control Devices** such as a flow switch, an Aquastat or other electronic controller can be used to prioritize the domestic water system over the heating system.
- Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Standard Code, ANSI Z21.10.3.
- This illustration is a concept design only. The reference to the 1/8th hole in check is only for the State of Massachusetts. There are a wide variety of variations to the application of controls and equipment presented. Designers must add all necessary safety and auxiliary equipment to conform to code requirements and design practice. For more details, contact the manufacturer.

INITIAL OPERATION



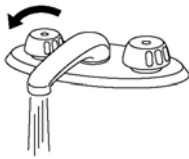

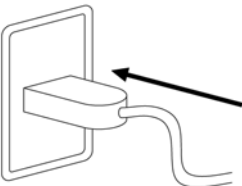
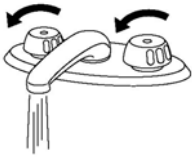
FOR YOUR SAFETY, READ BEFORE OPERATING

- Check the **GAS and WATER CONNECTIONS** for leaks before firing unit for the first time.
- Open the main gas supply valve to the unit using only your hand to avoid any spark. Never use tools. If the knob will not turn by hand, do not try to force it; call a qualified service technician. Forced repair may result in a fire or explosion due to gas leaks.
- Be sure to check for the presence of leaking gas toward the bottom of the unit because some gases are heavier than air and may settle towards the floor.
- Check the **GAS PRESSURE**. Refer to p. 17.
- Do not try to light the burner manually. It is equipped with an electronic ignition device which automatically lights the burner.
- Check for **PROPER VENTING and COMBUSTIBLE AIR** to the water heater.
- Purge the **GAS and WATER LINES** to remove any air pockets.
- Do not use this water heater if any part has been submersed under water. Immediately call a qualified service technician to inspect the water heater and to replace any damaged parts.



IF YOU SMELL GAS:

- Do not try to start the water heater.
- Do not touch any electric switches; 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.

<p>1. Once the above checks have been completed, please clean filter of any debris. Refer to p. 39 for instructions.</p> 	<p>2. Fully open the manual water control valve on the water supply line.</p> 	<p>3. Open a hot water tap to verify that water is flowing to that tap.</p>  <p>Then close the hot water tap.</p>
<p>4. Fully open the manual gas control valve installed.</p> 	<p>5. Turn on the 120 volt 60 Hz power supply to the water heater.</p> 	<p>6. Now you are ready to enjoy hours of endless hot water.</p> 

Owner's Guide

OPERATING SAFETY

FOR YOUR SAFETY READ BEFORE OPERATING

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

- A. This water heater does not have a pilot. It is equipped with an ignition device that automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the water heater area for evidence of leaking gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS.

- Do not try to light any appliance.
 - Do not touch any electric switch, do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas valve knob. Never use tools. If the knob will not turn by hand, don't try to repair it. Call a qualified service technician. Forced or attempted repair may result in a fire or explosion.
 - D. Do not use this water heater if any part has been under water. Immediately call a qualified service technician to inspect the water heater and to replace any damaged parts.

OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above or in the Owners Manual.
2. Turn off all electric power to the water heater.
3. Do not attempt to light the burner by hand.
4. Turn the manual gas valve located on the outside of the unit clockwise ⤵ to the off position.
5. Wait five (5) minutes to clear out any gas. If you then smell gas. STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
6. Turn the manual gas valve located on the outside of the unit counter clockwise ⤴ to the ON position.
7. Turn on all electrical power to the water heater.
8. If the water heater will not operate, follow the instructions "to Turn Off Gas to water heater" and Call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the water heater if service is to be performed.
2. Turn the manual gas valve located on the outside of the unit clockwise ⤵ to the off position.

DANGER



Vapors from flammable liquids will 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.

Keep flammable products:

1. Far away from heater.
2. In approved containers.
3. Tightly closed
4. Out of children's reach

Vapors:

1. Cannot be seen
2. Vapors are heavier than air
3. Go a long way on the floor
4. Can be carried from other rooms to the main burner by air currents

WARNING: Do not install water heater where flammable products will be stored.

Read and follow water heater warnings and instructions. If owner's manual is missing, contact the manufacturer.

WARNING

The outlet hot water temperature of the water heater is factory set at 120 °F (49°C). Use this heater at your own risk. The set outlet water temperature can cause severe burns instantly or death from scalds. Test the water before bathing or showering. Do not leave children or an infirm person in the bath unsupervised.

DANGER



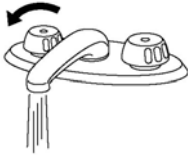
Hot Water Heater temperature over 125 °F (52°C) can cause severe burns instantly or death from scalding. Children, disabled and elderly are at the highest risk of being scalded. Feel water temperature before bathing or showering. Temperature limiting valves are available. Ask a professional person.

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

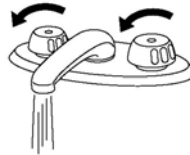
NORMAL OPERATION

GENERAL

1. Open a hot water tap.



2. Mix cold water with the hot to get the correct temperature water.



3. Close the hot water tap.



- Flow rate to activate the water heater : 0.5 gallons per minute at the default set temperature
- Flow rate to keep the water heater running : 0.4 gallon per minute

WARNING

Hot Water temperatures over 125°F can cause severe burns instantly or death from scalding.

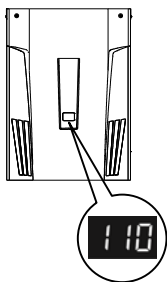
- The outlet hot water temperature of the water heater is factory set at 120°F.
- Feel the water temperature before bathing or showering.



TEMPERATURE SETTINGS

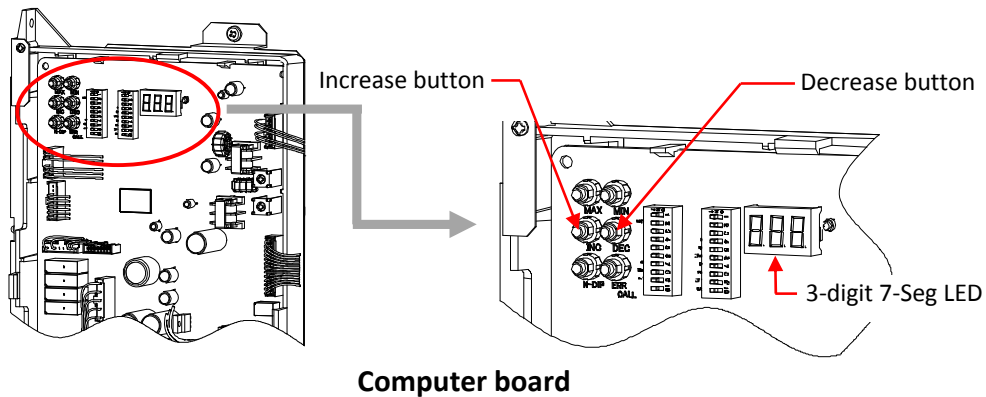
-ON THE WATER HEATER-

On the water heater, changing the temperature setting can be done simply by using the 3-digit 7-seg. LED, and the “Increase” and “Decrease” buttons on the computer board (remote controller is not required)



- The water heater will display the set temperature on the 3-digit 7-Seg. LED on the computer board. This LED is visible through a small window on the unit’s front cover.
- If the remote controller is installed, refer to the remote controller Installation Manual included with the remote for setting temperature.

Figure.1



Temperatures available

(unit:°F)

100	105	110	115	120	125	135	140	145	150	155	160	165	170	175	185
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

- The temperature has been preset at the factory to 120°F (49°C).
- If temperatures other than the ones listed above are required, the remote controller can provide a couple more temperature options. Refer to p. 7 for a list of available temperatures on the remote controller.
- When the flow sensor detects flow higher than 0.5 GPM, a single LED tick mark on the left side of the 3-digit 7-Seg. LED will blink to indicate that the unit is working.

Example: tick mark next to the 110°F set temperature display



<How to set the hot water temperature of the water heater>

1. Take off the water heater’s front cover.
2. Press the either “**Increase**” button or the “**Decrease**” button on the computer board to increase or decrease the set temperature. The 3-digit 7-Seg. LED will display the available set temperatures. (Figure.1)



Set temperature (Example 110°F)

3. Scroll to the desired set temperature.



DO NOT set to 185 °F if you use your water heater in a recirculation system. This will cause damage to the heater and void the warranty.

FLOW

- The flow rate through the water heater is limited to a maximum of 9.0 GPM for the 520 (T-H2) models, and 8.0 GPM for the 320 (T-H2S) models.
- The temperature setting, along with the supply temperature of the water will determine the flow rate output of the unit.
- Please refer to the temperature vs. gallons per minute chart on p. 50 to determine the likely flow rates based on your local ground water temperature and your desired outlet water temperature combination.
- Based on the United States Department of Energy method of testing water heater output, the 520 (T-H2) models is rated for 282 gallons per hour (GPH) or 4.8 gallons per minute (GPM) for Natural Gas, and the 320 (T-H2S) models is rated for 255 gallons per hour (GPH) or 4.3 gallons per minute (GPM) for Natural Gas, when raising the water temperature by 77°F (from 58°F to 135°F).
- Refer to the chart to the right for typical household plumbing fixture flow rates to determine what the water heater can do in a household application.

Household Flow Rates	
Appliance / Use	Flow Rate (GPM)
Lavatory Faucet	1.0
Bath Tub	4.0 – 10.0
Shower	2.0
Kitchen Sink	1.5
Dishwasher	1.5
Washing machine	4.0

Taken from UPC 2006

FREEZE PROTECTION SYSTEM

- This unit comes equipped with heating blocks to protect it against damages associated with freezing.
- For this freeze protection system to operate there has to be electrical power to the unit. Damage to the heat exchanger caused by freezing temperatures due to power loss is not covered under the warranty. In cases where power losses can occur, consider the use of a backup power supply.
- The freeze protection system will activate when the surrounding and/or outside temperatures drop below 36.5°F (2.5°C).
- In any areas subject to freezing temperatures, the manufacturer highly recommends an indoor installation with the Direct Vent Indoor models. In such an installation, freezing issues can only occur if cold air enters through the venting into the heat exchanger, whether by negative pressures within the installation location or by strong outside winds. It is the installer’s responsibility to be aware of these issues and take all preventative measures. The manufacturer will not be responsible for any damage to the heat exchanger as a result of freezing.
- The manufacturer also highly recommends the use of a back flow vent damper to minimize the amount of cold air entering through the exhaust venting when the water heater is off.
- If you will not be using your heater for a long period of time:
 1. Completely drain the unit of water. Refer to p. 39.
 2. Disconnect power to your heater.

This will keep your unit from freezing and being damaged.



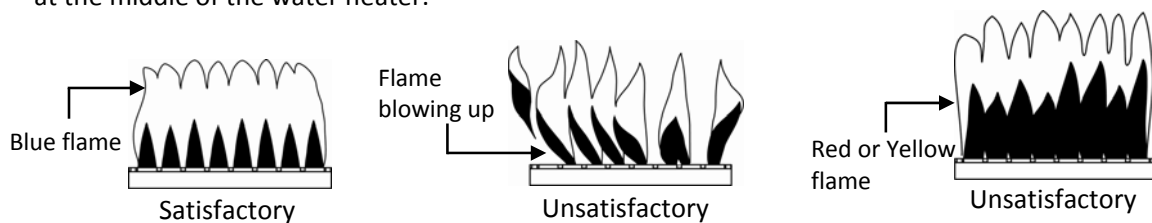
Only pipes within the water heater are protected by the freeze protection system. Any water pipes (hot or cold) located outside the unit will not be protected. Properly protect and insulate these pipes from freezing.

MAINTENANCE AND SERVICE



Turn off the electrical power supply and close the manual gas shutoff valve and the manual water control valve before servicing.

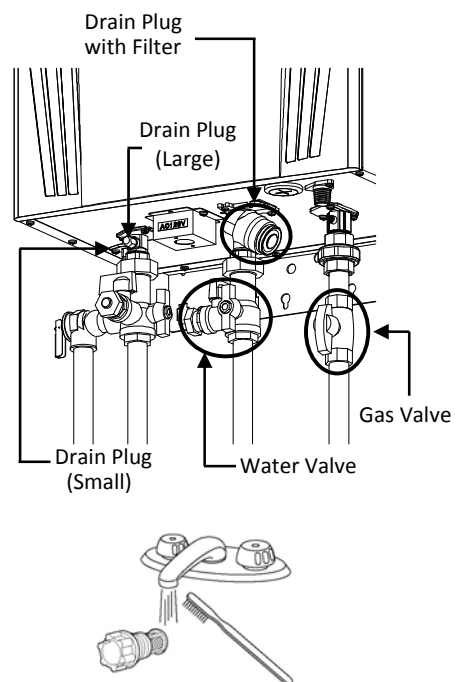
- Clean the cold-water inlet filter. (Refer to diagram below)
- Be sure that all openings for combustion and ventilation air are not blocked.
- The venting system should be checked annually for any leaks, corrosion, blockages or damage.
- The burner should be checked annually for dust, lint, grease or dirt.
- Keep the area around the water heater clear. Remove any combustible materials, gasoline or any flammable vapors and liquids.
- In accordance with all local codes and common safety practices, Water discharged from the pressure relief vane can cause severe burns instantly from scalding. DO NOT touch the pressure relief valve.
- If the relief valve discharges periodically, it 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.
- Visual check of burner flames (see below) through the burner window in the burner assembly located at the middle of the water heater.



The manufacturer recommends having the unit checked once a year or as necessary by a licensed technician. If repairs are needed, any repairs should be done by a licensed technician.

UNIT DRAINING and FILTER CLEANING

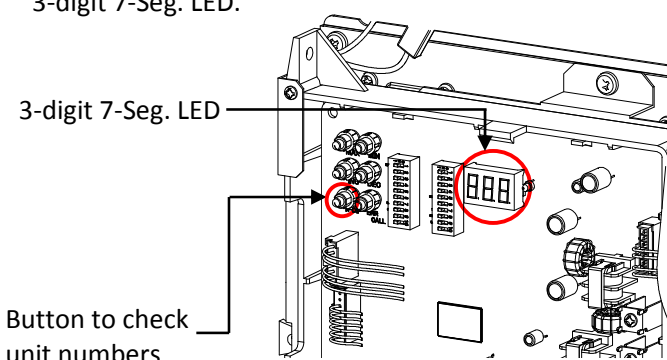
1. Close the manual gas shut off valve.
2. Turn off power to the unit, and then turn on again.
3. Wait 30 seconds, and then turn off power to the unit, yet again.
4. Close the water shut off valve.
5. Open all hot water taps in the house. When the residual water flow has ceased, close all hot water taps.
6. Have a bucket or pan to catch the water from the unit's drain plugs. **Unscrew** the two drain plugs (Large and small) to drain all the water out of the unit.
7. Wait a few minutes to ensure all water has completely drained from unit.
8. **Clean the filter:** Check the water filter located within the cold inlet. With a tiny brush, clean the water filter of any debris which may have accumulated and reinsert the filter back into the cold water inlet.
9. **Securely screw the drain plugs back into place. Hand-tighten only.**



TROUBLESHOOTING

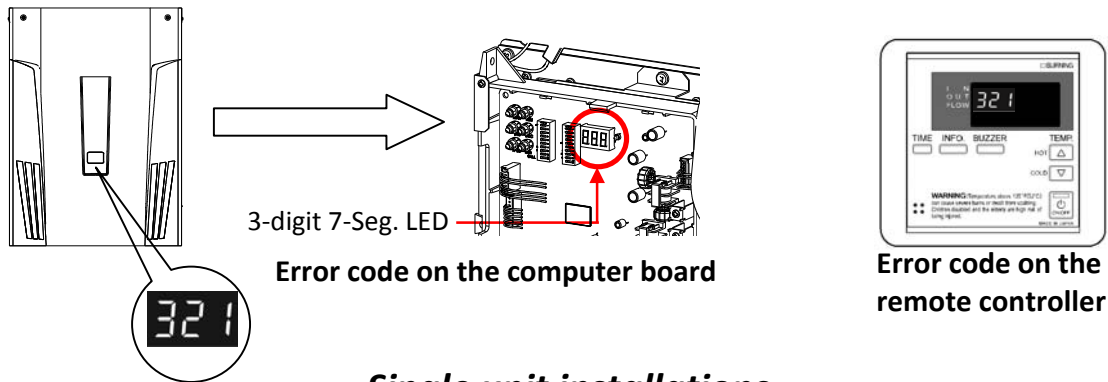
GENERAL

	PROBLEM	SOLUTIONS
-TEMPERATURE and AMOUNT OF HOT WATER-	It takes long time to get hot water at the fixtures.	<ul style="list-style-type: none"> • The time it takes to deliver hot water from the water heater to your fixtures depends on the length of piping between the two. The longer the distance or the bigger the pipes, the longer it will take to get hot water. • If you would like to receive hot water to your fixtures quicker, you may want to consider a hot water recirculation system. (p. 31)
	The water is not hot enough.	<ul style="list-style-type: none"> • Compare the flow and temperature. See the chart on p. 50. • Check cross plumbing between cold water lines and hot water lines. • Is the gas supply valve fully open? (p. 33) • Is the gas line sized properly? (p. 18) • Is the gas supply pressure enough? (p. 17) • Is the set temperature set too low? (p. 36, 37)
	The water is too hot.	<ul style="list-style-type: none"> • Is the set temperature set too high? (p. 36, 37)
	The hot water is not available when a fixture is opened.	<ul style="list-style-type: none"> • Make sure the unit gets 120 VAC / 60 Hz power supply. • If you are using the remote controller, is the power button turned on? • Is the gas supply valve fully open? (p. 33) • Is the water supply valve fully open? (p. 33) • Is the filter on cold water inlet clean? (p. 39) • Is the hot water fixture sufficiently open to draw at least 0.5 GPM through the water heater? (p. 36) • Is the unit frozen? • Is there enough gas in the tank / cylinder? (For Propane models)
	The hot water turns cold and stays cold.	<ul style="list-style-type: none"> • Is the flow rate enough to keep the water heater running? (p. 36) • If there is a recirculation system installed, does the recirculation line have enough check valves? • Is the gas supply valve fully open? (p. 33) • Is the filter on cold water inlet clean? (p. 39) • Are the fixtures clean of debris and obstructions?
	Fluctuation in hot water temperature.	<ul style="list-style-type: none"> • Is the filter on cold water inlet clean? (p. 39) • Is the gas line sized properly? (p. 18) • Is the supply gas pressure enough? (p. 17) • Check for cross connection between cold water lines and hot water lines.

	PROBLEM	SOLUTIONS
- WATER HEATER -	Unit does not ignite when water goes through the unit.	<ul style="list-style-type: none"> • Is the flow rate over 0.5 GPM? (p. 36) • Check for the filter on cold water inlet. (p. 39) • Check for reverse connection and cross connection. • If you use the remote controller, is the power button turned on?
	The fan motor is still spinning after operation has stopped.	<ul style="list-style-type: none"> • This is normal. After operation has stopped, the fan motor keeps running for 35 seconds in order to re-ignite quickly, as well as purge all the exhaust gas out of the flue.
	Unit sounds abnormal while in operation	<ul style="list-style-type: none"> • Contact the manufacturer at 1-877-737-2840.
-Remote controller: 9007606005 (TM-RE30) (OPTIONAL)-	Remote controller does not display anything when the power button is turned on.	<p>Press the ON/OFF button on the remote.</p> <p>If the LED lights up ⇒</p> <ul style="list-style-type: none"> • This is normal. When the unit has not operated for five minutes or more, the display turns off to conserve energy. <p>If the LED does not light ⇒</p> <ul style="list-style-type: none"> • Make sure the unit has power supply. <p>Make sure the connection to the unit is correct.(p. 23)</p>
	An ERROR code is displayed.	<ul style="list-style-type: none"> • Please see p. 42.
-EASY-LINK SYSTEM-	How are the unit numbers assigned?	<ul style="list-style-type: none"> • For an Easy-Link system, the Parent unit is always labeled #1 and all other subsequent Child units are numbered randomly. • To check which numbers are assigned to which Child units, push the button on the computer board of any Child unit as shown below. The unit number will be displayed on the 3-digit 7-Seg. LED. <div style="text-align: right;">  <p>3-digit 7-Seg. LED</p> <p>Button to check unit numbers</p> </div>

ERROR CODES

- The units are self diagnostic for safety and convenience when trouble shooting.
- If there is a problem with the installation or the unit, it will display a numerical error code on the 3-digit 7-Seg. LED on the computer board (visible through a window on the front cover) or remote controller (if installed) to communicate the source of the problem.
- Consult the table on the following page for the cause of each error code.



-Single unit installations-

The 7-Seg LED and remote controller displays the whole 3-digit error code.

Example: If your unit has the “321” error code (inlet thermistor failure)

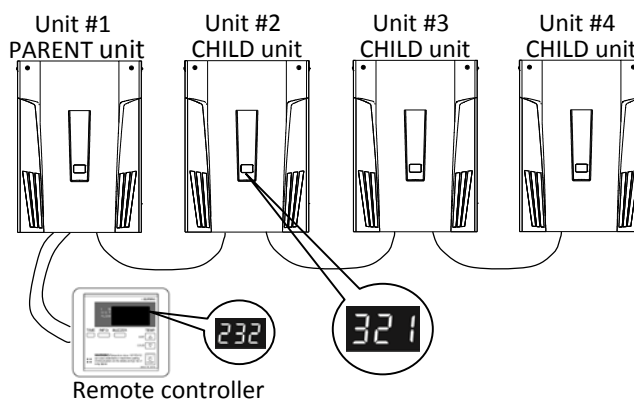
- **Water heater:** It will display “321” on the 7-Seg LED.
- **Remote controller:** It will display “321” on its screen.

-Easy-Link system for the 520 (T-H2) models only-

The 7-Seg LED of the individual unit with the error in question displays the whole 3-digit error code. The remote controller (if installed) displays a 3-digit number which signifies which unit has the error, and what the error code is.

Example: If Unit #2 has the “321” error code (inlet thermistor failure)

- **Water heater #2:** It will display “321” on the 7-Seg LED, just like in the Single Unit example.
- **Remote controller:** It will display “232” on its screen. The first “2” indicates that Unit #2 has the error. The “32” indicates the first two digits of the “321” error code.



-FAULT ANALYSIS OF ERROR CODES-

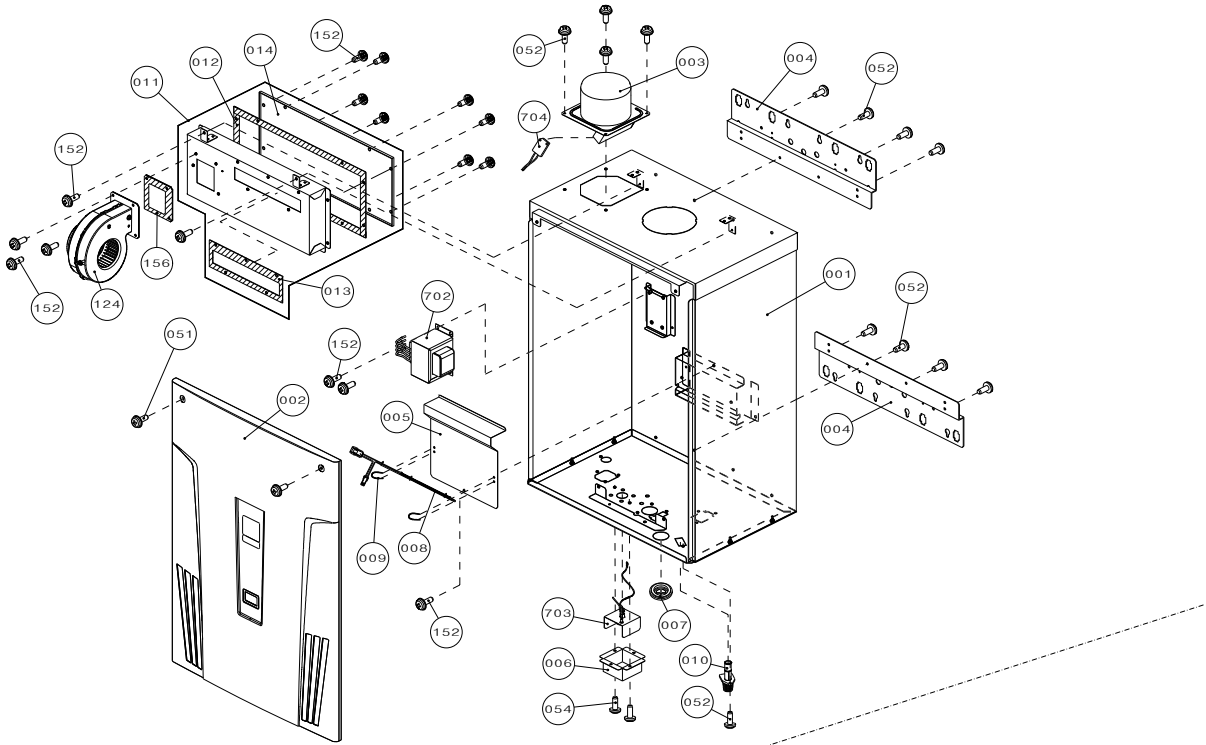
If there is a problem with the installation of the water heater, it will display a numerical error code on the 3-digit 7-Seg. LED of the computer board or the remote controller (if installed) to communicate the source of the problem.

Error Code	Malfunction description	Diagnosis
031	Incorrect dipswitch settings	Check the dipswitch settings on PCB
101	Warning for the "991" error code	Call the manufacturer's Technical Dept. at 1-877-737-2840
111	Ignition failure	Check gas supply
121	Loss of flame	
311	Output thermistor failure	Call the manufacturer's Technical Dept. at 1-877-737-2840
321	Inlet thermistor failure	
331	Mixing thermistor failure	
341	Exhaust thermistor failure (Direct Vent Indoor models only)	
391	Air-fuel Ratio Rod Failure	
441	Flow Sensor Failure (Only Easy-Link system)	
510	Abnormal Main Gas Valve	
551	Abnormal Gas Solenoid Valve	
611	Fan Motor Fault	
621	Exhaust fan motor Fault (Direct Vent Indoor models only)	
631	Abnormal External Pump	
651	Water Control Valve Fault (Flow Adjustment function) (Only Easy-Link system)	
661	Water Control Valve Fault (Bypass valve function)	
701	Computer board Fault	
711	Gas Solenoid Valve drive circuit failure	
721	False Flame Detection	
741	Miscommunication between water heater and remote controller	
761	Miscommunication in Easy-Link (520 (T-H2) models only)	
941	Abnormal exhaust temperature (Direct Vent Indoor models only)	Lower the set temperature
991	Imperfect combustion	Call the manufacturer's Technical Dept. at 1-877-737-2840

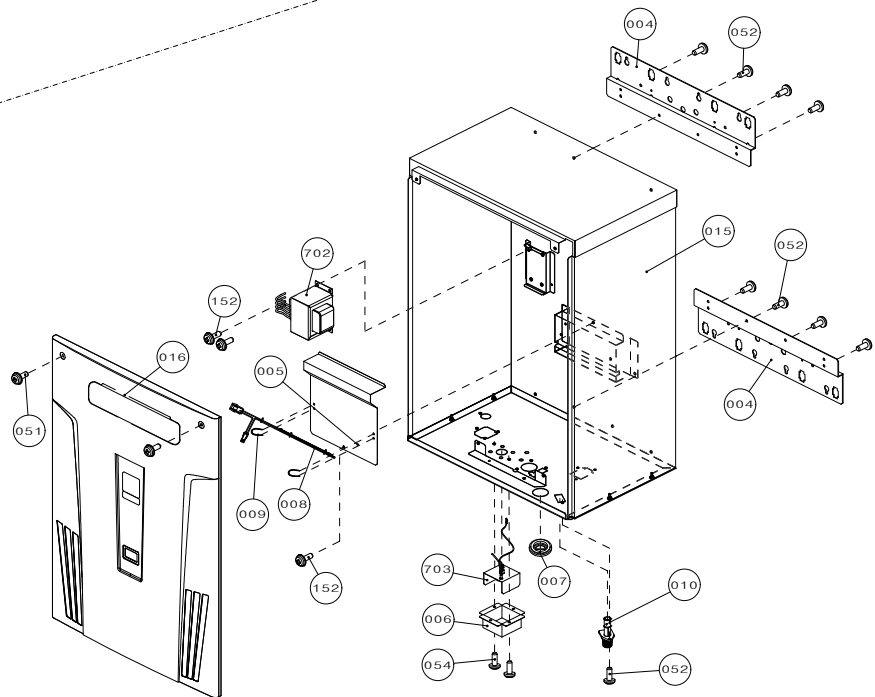
COMPONENTS DIAGRAM

Case assembly

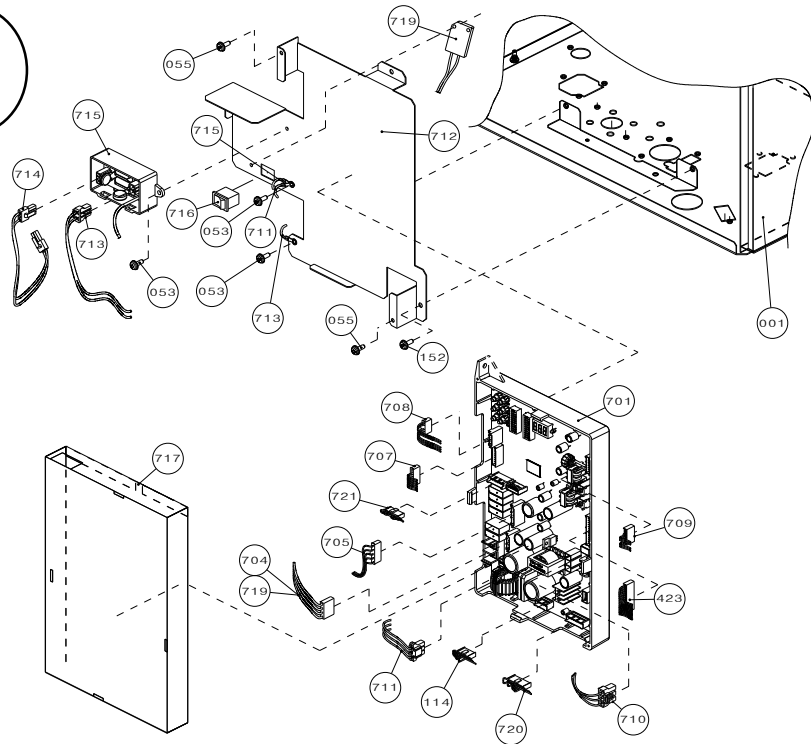
Direct Vent Indoor models



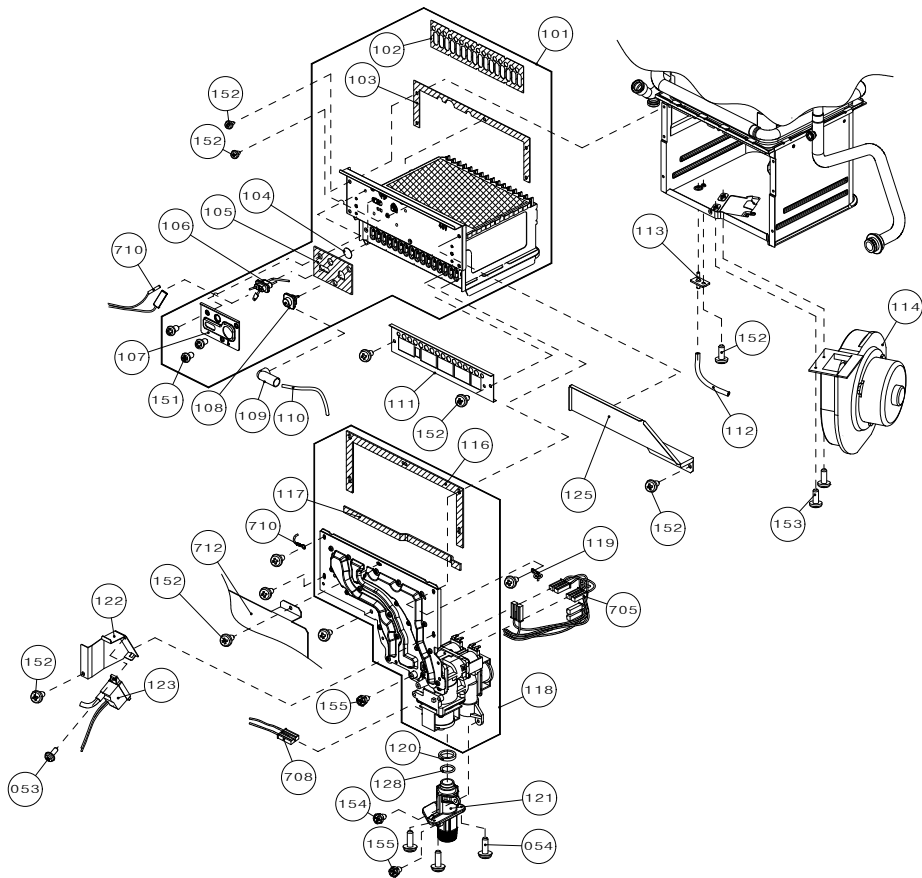
Outdoor models



Computer board assembly



Burner assembly



PARTS LIST

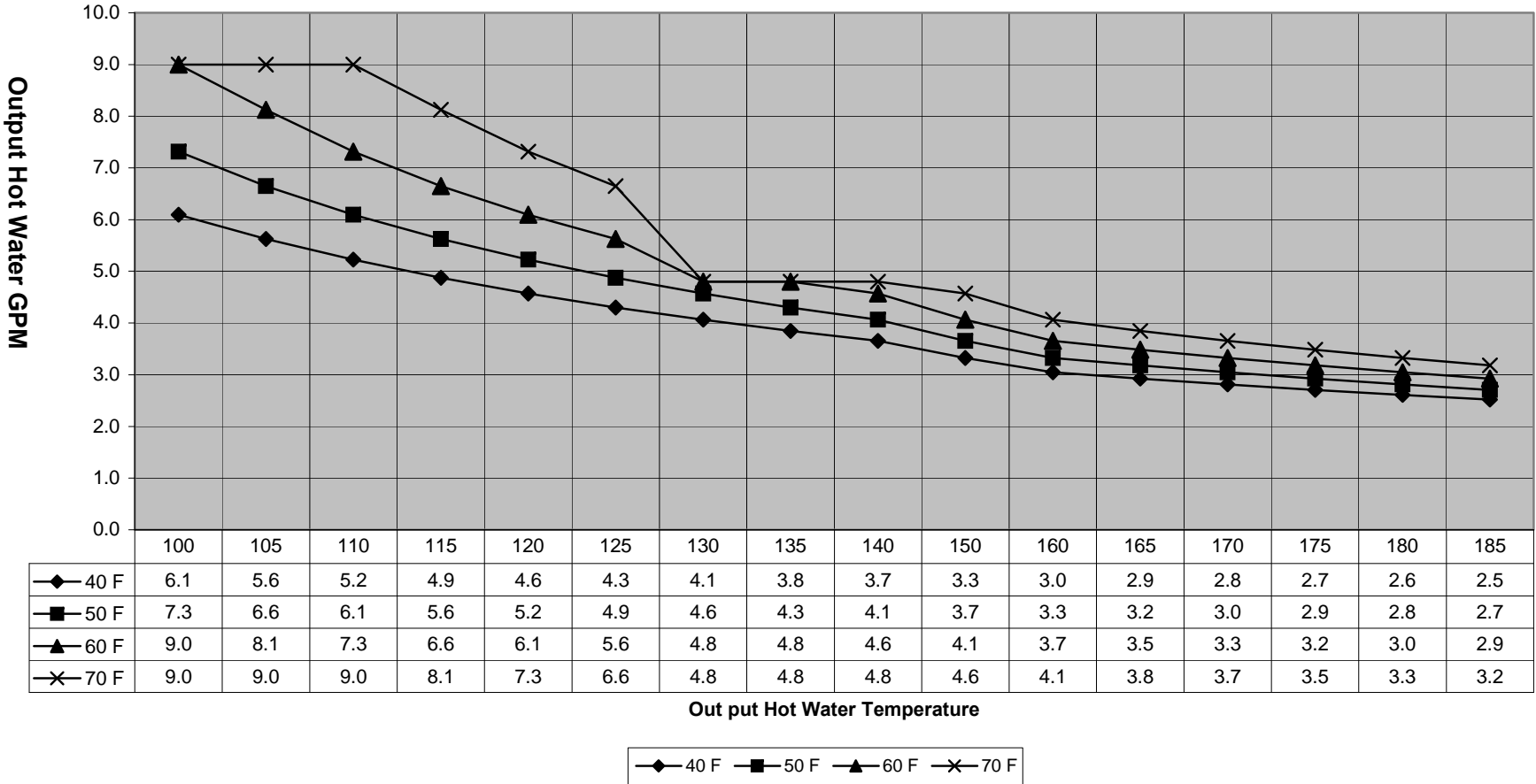
Item#	Description	Part#	
		520 and 320 models	T-H2 and T-H2S models
001	Case assembly for Direct Vent Indoor models	319143-009	EKH5B
002	Front cover for Direct Vent Indoor models	319143-010	EKH5M
003	Intake air port assembly	319143-011	EV00K
004	Bracket	319143-012	EM335
005	Back guard panel	319143-013	EKH5D
006	Junction box	319143-014	EKJ64
007	Rubber bush	319143-015	EX13M
008	Overheat-cut off-fuse for combustion chamber	319143-016	EM484
009	Fastener	319143-017	EKK22
010	Condensate drain port	319143-018	EKH23
011	Duct	319143-019	EKH5K
012	Duct gasket A	319143-020	EKH4G
013	Duct gasket B	319143-021	EKH4K
014	Duct cover plate	319143-022	EKH73
015	Case assembly for Outdoor models	319143-023	EKH5C
016	Front cover for Outdoor models	319143-024	EKH61
051	Screw M4×12 (W/Washer)	319143-025	EW000
052	Screw M4×10 (Coated)	319143-026	EW002
053	Pan screw M4×10	319143-027	EX010
054	Screw M4×10	319143-028	EW02B
055	Pan screw M3×10	319143-029	EW023
101	Burner assembly	319143-030	EKH5W
102	Burner gasket	319143-031	EKK2X
103	Burner holder gasket	319143-032	EKK0G
104	Burner window	319143-033	EKK2V
105	Rod holder gasket	319143-034	EKK2W
106	Flame rod	319143-035	EKK0E
107	Rod holder	319143-036	EKK32
108	Igniter rod	319143-037	EKK0F
109	Rod cap	319143-038	EKN61
110	High voltage igniter cable	319143-039	EKK2M
111	Damper	319143-040	EKH5G
112	Urethane tube	319143-041	EKK2N
113	Pressure port	319143-042	EKK2D
114	Fan motor	319143-043	EKK25
116	Manifold gasket A	319143-044	EKK2Y
117	Manifold gasket B	319143-045	EKK2K
118	Manifold assembly with gas valve assembly LP	319143-046	EKH6T
	Manifold assembly with gas valve assembly NA	319143-047	EKH6U
119	Wire clamp 60	319143-048	EM167
120	Gas inlet ring	319143-049	EKK2Z
121	Gas inlet	319143-050	EKK1E
122	Igniter plate	319143-051	EKK1B
123	Igniter	319143-052	EKN74
124	Fan motor for exhaust	319143-053	EKH5T
125	Heat exchanger protection plate (Front)	319143-054	EX12X
126	Heat exchanger protection plate (Right)	319143-055	EX12Y

Item#	Description	Part#	
		520 and 320 models	T-H2 and T-H2S models
127	Heat exchanger	319143-056	EX12Z
128	O-ring P20 NBR	319143-057	EK042
150	Screw M4×8	319143-058	EW012
151	Pan screw M4×8	319143-059	EW00D
152	Screw M4×10	319143-060	EW003
153	Pan screw M4×12 (W/Washer)	319143-061	EW00H
154	Pan screw M4×10	319143-062	EW006
155	Hex head screw M4×8	319143-063	EW005
156	Flange gasket for fan motor	319143-329	EKH4V
157	Silicon ring	319143-206	EKK3G
401	Heat exchanger assembly for Direct Vent Indoor models	319143-064	EKH5P
402	Silicon ring	319143-065	EKN50
403	Fuse fixing plate 18	319143-066	EKK26
404	Overheat-cut-off fuse	319143-067	EX02A
405	Heater 101	319143-068	EX002
406	Drain port	319143-069	EKH40
407	Filter plug	319143-070	EM222
408	O-ring P25 FKM	319143-071	EZM25
409	Water inlet filter	319143-072	EX006
410	O-ring JASO# 1021 FKM	319143-073	EZN21
411	Water inlet	319143-074	EM404
412	O-ring JASO# 1016 FKM	319143-075	EZN16
413	Heater plate	319143-076	EX021
414	Fastener "16AG"	319143-077	EX01H
415	Outlet heater	319143-078	EKK2P
416	Outlet drain plug	319143-079	EK239
417	O-ring P6 FKM	319143-080	EZM06
418	Mixing thermistor	319143-081	EX00H
419	O-ring P4 FKM	319143-082	EZM04
420	O-ring P16 FKM	319143-083	EZM16
421	Cold pipe	319143-084	EKH74
422	Inlet thermistor	319143-085	EKK38
423	Water control valve	319143-086	EKH32
424	Screw M3×6	319143-087	EW00A
425	Pipe heater fixing plate	319143-088	EKK27
426	Pipe heater 120	319143-089	EKJ47
427	Pan screw M4×6 (W/Washer)	319143-090	EW00L
428	O-ring P15 FKM	319143-091	EZM15
429	Flow sensor	319143-092	EKH33
430	Hot pipe	319143-093	EKH75
431	Joint elbow	319143-094	EX137
432	Hi-limit switch	319143-095	EKN34
433	Output thermistor	319143-096	EKK2T
434	Fastener "4-11"	319143-097	EKH30
435	Water outlet	319143-098	EKJ02
436	O-ring JASO# 1017 FKM	319143-099	EZN17
437	O-ring P14 FKM	319143-100	EZM14
438	Drain tube	319143-101	EKH6H
440	Secondary heat exchanger plate gasket A	319143-102	EKH4H
441	Secondary heat exchanger plate gasket B	319143-103	EKH4J

Item#	Description	Part#	
		520 and 320 models	T-H2 and T-H2S models
442	Hi-limit switch for exhaust	319143-104	EKH6G
443	Fastener "14-22"	319143-105	EKK24
444	Thermistor fixing plate	319143-106	EX13H
445	Secondary heat exchanger plate	319143-107	EKH5N
446	Secondary heat exchanger	319143-108	EKH6X
447	Drain pipe	319143-109	EKH66
448	Secondary heat exchanger inlet pipe	319143-110	EKH78
449	Exhaust thermistor gasket	319143-111	EX13L
450	Fastener "6-15"	319143-112	EX12K
451	Band B	319143-113	EKH1Y
452	Header	319143-114	EX13B
453	Flat heater	319143-115	EX13P
454	3 array heater	319143-116	EX13R
455	O-ring P12 FKM	319143-117	EZM12
456	Heat exchanger assembly for Outdoor models	319143-118	EKH63
457	O-ring P3 EPDM	319143-119	EZM03
458	Secondary heat exchanger drain plug	319143-120	EX13A
459	Exhaust port	319143-121	EX13J
460	Exhaust chamber assembly	319143-122	EKH65
461	Secondary heat exchanger plate	319143-123	EKH62
462	Heater fixing plate 20	319143-124	EKH38
463	Heater fixing plate 16	319143-125	EK031
701	Computer board for 520 (T-H2) models for 320 (T-H2S) models	319143-126 319143-196	EKH4E EKH7W
702	Transformer	319143-127	EM296
703	Junction box inner plate	319143-128	EKJ66
704	Freeze protection and EH-IG wire for Direct Vent Indoor models	319143-129	EKH79
705	Gas valve wire	319143-130	EKH6V
706	Exhaust thermistor assembly	319143-131	EKH6E
707	Thermistors wire	319143-132	EKH6J
708	Proportional gas valve wire	319143-133	EKK12
709	Multi-cable (Only 520 (T-H2) models)	319143-134	EKH6F
710	Flame rod wire	319143-135	EKH69
711	Switch wire	319143-136	EKH6D
712	PCB fixing plate	319143-137	EKH71
713	AC120V wire	319143-138	EKK3C
714	AC120V Transformer connecting wire	319143-139	EKH6C
715	Surge box	319143-140	EKH67
716	AC120V power ON-OFF switch	319143-141	EKK4V
717	PCB cover	319143-142	EKH68
718	Nylon clamp	319143-143	EC00X
719	Freeze protection and EH-IG wire for Outdoor models	319143-144	EKH7A
720	Exhaust fan motor wire	319143-145	EKH6A
721	Exhaust thermistor wire	319143-415	EKH6B

OUTPUT TEMPERATURE CHART

Output Temperature vs. GPM (Max. 9.0 GPM) with Various Ground Water Temperature
 Chart is based on properly sized gas line



*When the set temperature is 130°F or higher, maximum flow rate is limited to 4.8 GPM.

LIMITED WARRANTY

1. General terms of limited warranty:

This limited warranty gives you specific legal rights, and you may also have other rights which vary from State to State. The manufacturer, will honor the warranty to the original retail buyer at the original location only, and it is not transferable. **THIS WARRANTY COVERS ONLY FAILED MECHANICAL AND ELECTRICAL PARTS DUE TO FACTORY DEFECTS UNDER NORMAL USAGE FOR THE PRODUCT’S INTENDED PURPOSES AND WITHIN THE APPLICABLE PERIOD SPECIFIED IN THE FOLLOWING TABLES. ONLY DIRECT DAMAGES SHALL BE RECOVERABLE BY A CLAIMANT UNDER THIS LIMITED WARRANTY AND, IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT, BREACH OF WARRANTY, TORT LIABILITY (INCLUDING NEGLIGENCE), STRICT LIABILITY, INDEMNITY OR OTHERWISE THE MANUFACTURER WILL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR INDIRECT CONSEQUENTIAL DAMAGES INCLUDING PROPERTY DAMAGE, PERSONAL DAMAGES, LOSS OF USE, OR INCONVENIENCE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.**

2. Warranty for models: 520 (T-H2) and 320 (T-H2S) models

[Unit: Year]

Application		HX ⁽¹⁾	Parts	Labor	
Single Family Domestic Hot Water	No Recirculation		12	1 ⁽³⁾	
	On-Demand Recirculation ⁽²⁾				
	w/ Standard Recirculation	Aquastat Control	5		
		Pump Control			
		Timer Only			
No Pump Control (24 hr.)		3	3		
Commercial or Multi-Family Domestic Hot Water	No Recirculation		5	1 ⁽³⁾	
	On-Demand Recirculation ⁽²⁾				
	w/ Standard Recirculation	Aquastat Control	5		
		Pump Control			
		Timer Only			
No Pump Control (24 hr.)		3	3		
Heating ⁽⁴⁾	All Types		5	5	1 ⁽³⁾

(1) Heat exchanger

(2) An on-demand recirculation system is a system that utilizes either a push-button or other type of manual activation (as opposed to automatic activation with a temperature sensor or timer) to activate the circulation pump. An on-demand recirculation system can use either the existing cold water line as the return line or have its own dedicated return line.

(3) Limited Labor Coverage

- The manufacturer will provide for reasonable labor charges associated with warranty repairs or replacements within one (1) year from the date of purchase. The manufacturer will only pay directly to the service provider.
- Warranty service must be performed by an authorized Service Representative. A list of authorized Service Representatives is available upon request.
- All warranty claims and warranty service must be authorized and approved by the manufacturer.

(4) Includes dual-purpose applications (combination heating and domestic).

3. Repair, Replacement or Refund:

The manufacturer or its authorized Service Representative will, at its sole discretion, repair or replace any failed or defective mechanical or electrical parts, or components thereof, or, if the manufacturer or its authorized Service Representative cannot replace said parts, and repair is not commercially practicable, the manufacturer or its authorized Service Representative will refund the purchase price. The manufacturer or its authorized Service Representative may, at its sole discretion, use new, refurbished or reconditioned parts.

4. Limitation on Duration of Implied Warranties:

ANY IMPLIED WARRANTIES ARISING UNDER STATE LAW, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, SHALL IN NO EVENT EXTEND PAST THE EXPIRATION OF ANY WARRANTY PERIOD HEREUNDER. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

5. **THIS WARRANTY WILL NOT COVER THE FOLLOWING:**

- Any product that is not installed by a licensed plumber, gas installer, or contractor.
- Damages due to accidents, abuse, misuse, improper installation, misapplication, or incorrect sizing.
- Damages due to fires, flooding, freezing, electrical surges, or any Acts of God.
- Damages due to unauthorized alterations, attachments, and/or repairs.
- Damages due to a lack of maintenance (e.g. water filter, water treatment system, vent blockage, etc.)
- Any product installed in an improper environment (e.g. corrosive, dusty, chemically contaminated, excessive lint, etc.)
- Freeze damage that occurs without taking proper preventive measures as described in the installation manual
- Condensate damage due to improperly installed or lack of a condensate trap (drain).
- Any product not installed in compliance with all applicable local & state codes, ordinances, and good trade practices.
- Any product sold to or installed in areas outside of the fifty states (and the District of Columbia) of the United States of America and Canada.
- Any product installed in applications that cause the water heater to activate more than 300 times per day (this averages to an activation every 5 minutes in a 24-hour period).
- Any failures that are not due to defects in materials or workmanship (mechanical and/or electrical parts).
- Damages due to improper installation:
 - Gas: incorrect gas pipe sizing, incorrect gas meter sizing, incorrect gas type, and/or gas pressures that fall outside the product's specified range.
 - Water: incorrect water pipe sizing, water pressures that fall outside the product's specified range, recirculation flow rates that fall outside the product's specified range (air removal), and/or lack of proper methods of air removal in a closed-loop, circulation system (see installation manual for details).
 - Electric: supply power voltages that fall outside the product's specified range.
- Damages due to water quality:
 - Introduction of liquids other than potable water or potable water / glycol mixtures into the product.
 - Introduction of pool water, spa water, or any chemically treated water into the product
 - Introduction of hard water measuring more than 7 grains per gallon (120 ppm) for single family domestic applications or more than 4 grains per gallon (70 ppm) for all other types of applications into the product
 - Introduction of untreated or poorly treated well water into the product
 - Introduction of water with pH levels less than 6.5 and greater than 8.5 into the product.