

On-Demand Water Heater Installation Manual and Owner's Guide



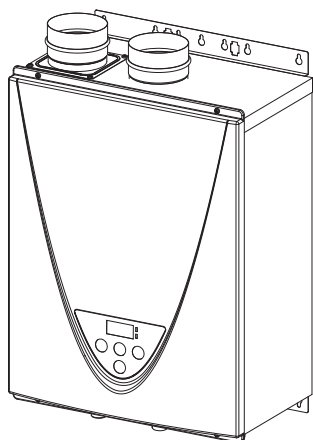
ANSI Z21.10.3 and CSA 4.3



540 (T-H3)
models only

- 240 Indoor (T-H3J-DV)
- 240 Outdoor (T-H3J-OS)
- 340 Indoor (T-H3S-DV)
- 340 Outdoor (T-H3S-OS)
- 540 Indoor (T-H3-DV)
- 540 Outdoor (T-H3-OS)

Models



Gas Tankless Water Heater™

*Suitable for potable water heating and space-heating
Please refer to local codes for space-heating compliance.*

FEATURING

- ENDLESS HOT WATER
- ON-DEMAND USAGE
- COMPACT, SPACE SAVING
- ENERGY CONSERVATION
- COMPUTERIZED SAFETY
- NO PILOT LIGHT
- Satisfies the 2012 SCAQMD Rule 1146.2 for Ultra-Low NOx Emissions
- EASY-LINK SYSTEM AND MULTI-UNIT SYSTEM
(540 (T-H3) models only)



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.

If you have any questions, please
call or write to:

500 Tennessee Waltz Parkway
Ashland City, TN 37015
Toll Free: 1-877-737-2840

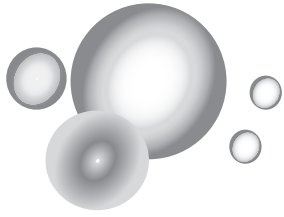
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Installation Manual

CONGRATULATIONS

Congratulations and thank you for choosing our tankless water heater. Before use, we recommend that you read through this safety manual carefully. Please refer to the back of the manual for details about the warranty. Keep this manual for future reference.

If you lose the manual, contact the manufacturer or your local distributor. When you call, please tell us the model number and the serial number of your unit written on the rating plate of the water heater.

SPECIFICATIONS

Model		240 Indoor (T-H3J-DV)	240 Outdoor (T-H3J-OS)	340 Indoor (T-H3S-DV)	340 Outdoor (T-H3S-OS)	540 Indoor (T-H3-DV)	540 Outdoor (T-H3-OS)	
Natural Gas Input (Operating Range)	BTU/h	Min.: 15,000 Max.: 160,000		Min.: 15,000 Max.: 180,000		Min.: 15,000 Max.: 199,000		
Propane Input (Operating Range)	BTU/h	Min.: 13,000 Max.: 160,000		Min.: 13,000 Max.: 180,000		Min.: 13,000 Max.: 199,000		
Gas Connection		3/4" NPT						
Water Connections		3/4" NPT						
Water Pressure*	psi (MPa)	15 - 150 (0.1 - 1)						
Natural gas Inlet Pressure	" W.C. (kPa)	Min. 5.0 (1.24) Max. 10.5 (2.61)						
Propane Inlet Pressure	" W.C. (kPa)	Min. 8.0 (1.99) Max. 14.0 (3.48)						
Manifold Pressure**	Natural Gas	" W.C. (Pa)	1.50 (373)	1.70 (423)	2.45 (610)	2.1 (523)	2.95 (734)	2.70 (672)
	Propane	" W.C. (Pa)	2.10 (523)	1.90 (473)	2.7 (672)	2.55 (635)	3.3 (821)	3.15 (784)
Weight	lbs. (kg)	58 (26.3)	58 (26.2)	58 (26.3)	58 (26.2)	59 (26.8)	59 (26.9)	
Dimensions	inch	H 22.4 x W 17.7 x D 10.7						
	mm	H 570 x W 450 x D 272						
Ignition		Electric Ignition						
Electric Consumption	Supply	VAC / Hz	120 / 60					
	Operation	W / A	72.7 / 0.61		78.2 / 0.65		89.0 / 0.74	
	Standby	W / A	3.1 / 0.03		3.1 / 0.03		4.2 / 0.04	
	Freeze- Protection	W / A	174 / 1.5		174 / 1.5		175 / 1.5	

*40 psi or above is recommended for maximum flow.

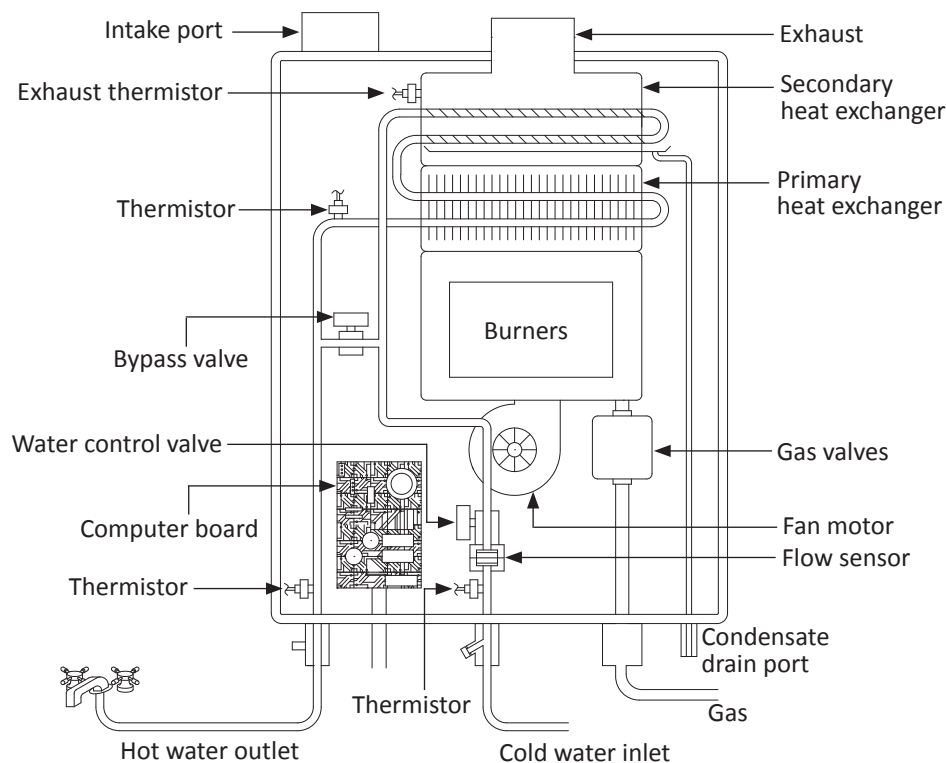
** The Manifold Pressure is the factory setting and generally **should not need adjustment**.

NOTE:

- Check the rating plate to ensure this product matches your specifications.
- In accordance with ANSI 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 obligation.**

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 the manufacturer or its local representative.
- This equipment is an on-demand, tankless water heater designed to efficiently supply endless hot water for your needs.
- These **high efficiency models** have a built-in secondary heat exchanger that absorbs latent heat from the exhaust gas.
- The 240 Indoor (T-H3J-DV), 340 Indoor (T-H3S-DV) and 540 Indoor (T-H3-DV) models are only to be installed indoors. The 240 Outdoor (T-H3J-OS), 340 Outdoor (T-H3S-OS) and 540 Outdoor (T-H3-OS) models are only to be installed outdoors.
- The principle behind tankless water heaters is simple:



*This diagram illustrates tankless water heater design concepts only and does not accurately represent 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 initiates the fan motor and sends a signal to the igniter to create an ignition spark.
5. The gas ignites and flames appear within the burner chamber.
6. Water circulates through the heat exchanger and then gets hot.
7. Using thermistors to measure temperatures throughout the water heater, the computer modulates the gas and water valves to ensure proper output water temperature.
8. When the tap is turned off, the unit shuts down.

SAFETY GUIDELINES

SAFETY DEFINITION



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



Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.



Indicates an imminently hazardous situation which, if not avoided, could result in minor or moderate injury.

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 Canadian 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. 8.)
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.



- 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.
- 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. 25 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 Protection 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 Protection System on p. 47 for more information.

INSTALLATION

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. 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.
3. The manifold gas pressure is preset at the factory. It is computer controlled and should not need adjustment.
4. Maintain proper space for servicing. Install the unit so that it can be connected or removed easily. Refer to the "Clearances" Section on p. 9 for proper clearances.
5. The water heater must be installed in a location where the proper amount of combustible air will be available to it at all times without obstructions.
6. The electrical connection requires a means of disconnection, to terminate power to the water heater for servicing and safety purposes.
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. 20.)
8. Particles from flour, aerosols, and other contaminants may clog the air vent, build up and reduce the functions of the rotating fan, cause improper burning of the gas, or cause damage to the water heater. Regularly ensure that the area around the unit is dust- or debris-free. Regular maintenance is recommended for these types of environment.
9. The 240 Indoor (T-H3J-DV), 340 Indoor (T-H3S-DV), and 540 Indoor (T-H3-DV) are to be installed indoors only. These units 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 ABS, PVC, CPVC, or polypropylene (Plastic) venting if ABS, PVC, CPVC, or polypropylene 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 Indoor model requires a 3" or 4" make-up intake air supply pipe. The intake pipe must be sealed airtight.
 - Air supply pipe can be made of ABS, PVC, CPVC, polypropylene, corrugated stainless steel, or Category III / IV stainless steel.
 - Sidewall venting is recommended for the Indoor model. Vertical venting (roof termination) is acceptable.
 - The manufacturer recommends running the exhaust vent and the intake pipe as parallel as possible.
10. The 240 Outdoor (T-H3J-OS), 340 Outdoor (T-H3S-OS), and 540 Outdoor (T-H3-OS) models only to be installed outdoors and only in the area with mild, temperate climates. 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.



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.
- The manufacturer does not recommend installing the water heater in a pit or location where gas and water can accumulate.
- Do not have the vent terminal pointing toward any operating window, door, or opening into a building.
- Do not install next to any source of airborne debris, such as a clothes dryer, that can cause debris to be trapped inside the combustion chamber, unless the system is direct-vented.
- **The manufacturer does not recommend installing the water heater in an attic due to safety issues.** If you install the water heater in an attic:
 - Make sure the unit will have enough combustion air and proper ventilation.
 - Keep the area around the water heater clean. When dust collects on the flame sensor, the water heater will shut down on an error code.
 - Place the 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.



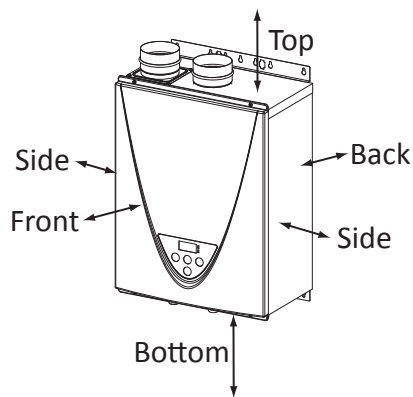
CAUTION

- **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.
- Do not install the unit where water, debris, or flammable vapors may get into the flue terminal.
- Although the 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.**
- 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.

CLEARANCES



Maintain all clearances around the water heater.



Model	Top	Bottom	Front	Back	Sides
240 Indoor (T-H3J-DV) 340 Indoor (T-H3S-DV) 540 Indoor (T-H3-DV)	12 in. (305 mm)	12 in. (305 mm)	4 in.* (102 mm)	0.5 in. (13 mm)	2 in. (51 mm)
240 Outdoor (T-H3J-OS) 340 Outdoor (T-H3S-OS) 540 Outdoor (T-H3-OS)	36 in. (914 mm)	12 in. (305 mm)	24 in. (610 mm)	0.5 in. (13 mm)	2 in. (51 mm)

*24 inches recommended for maintenance.

INCLUDED ACCESSORIES

Check that these items below are included with the water heater.

Installation manual and owner's guide	Temperature remote controller kit* Outdoor models only	Bird screen Indoor models only	Communication cable 540 (T-H3) models only
Qty: 1	Qty: 1	Qty: 2	Qty: 1

*Refer to p.29.

OPTIONAL ITEMS

#	Model	240 Indoor (T-H3J-DV)	240 Outdoor (T-H3J-OS)	340 Indoor (T-H3S-DV)	340 Outdoor (T-H3S-OS)	540 Indoor (T-H3-DV)	540 Outdoor (T-H3-OS)
1.	Temperature remote controller	✓	✓	✓	✓	✓	✓
2.	4" Backflow preventer and F-F adaptor	✓		✓		✓	
3.	Pipe cover	✓	✓	✓	✓	✓	✓
4.	Neutralizer kit	✓	✓	✓	✓	✓	✓
5.	Sidewall vent terminator (Hood) and Wall thimble	✓		✓		✓	
6.	3" PVC concentric termination	✓		✓		✓	

1. Temperature remote controller: 9008172005 (TM-RE40)



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, 175 °F and 185 °F. See the Troubleshooting Section for information on possible error codes.

2. 4" Backflow preventer and F-F adaptor: 9007996005



There are two functions available for this adaptor, which can be connected with the water heater and NovaVent venting line and prevents the backflow of air through the exhaust vent. This helps prevent harmful exhaust gases from entering the home, as well as helping to prevent the unit from freezing in areas where cold air can be blown or drawn into the exhaust system. Install this adaptor in accordance with the installation instructions that are packaged with the adaptor and any applicable codes.

3. Pipe cover: 9008331005 (TH-PC03)



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.

4. Neutralizer kit: 9007607005 (TH-NT01)

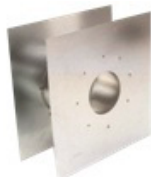


The neutralizer assembly neutralizes the condensate (acidic water) that forms in the secondary heat exchanger of the water heater. It connects to the condensate drain port of the water heater by using connectors included with the neutralizer kit. Refer to p. 27 for the details.

5. Sidewall vent terminator (Hood) and Wall thimble:



Terminator Hood



Wall Thimble

Covering wall thicknesses	Part#
Terminator Hood	9007999005
Wall Thimble 4 - 7 in.	9008345005
Wall Thimble 5 - 10 in.	9008346005
Termination + Thimble 4 - 7 in.	9008004005
Termination + Thimble 5 - 10 in.	9008005005

They are used when venting out through the wall. These terminations are special stainless steel vents for gas appliances and are UL listed as Category II, III and IV. For different wall thicknesses, there are two ranges of lengths available. (Refer to the NovaVent brochure for details.) Install these vent terminations in accordance with their installation instructions and any applicable local codes.

6. 3" PVC concentric termination: 9007611005 (TH-CVPVC33)



Used when terminating direct-vent (sealed combustion) systems, with Indoor models that require a 3 in. (76 mm) intake and a 3 in. (76 mm) exhaust. This concentric termination provides the convenience of only having to make one penetration through a sidewall instead of two separate penetrations for the intake and exhaust piping. The termination includes a bird screen, restricting small animals, pests, and foreign objects from entering into the vent system.

WARNING FOR INSTALLATIONS

FOR YOUR SAFETY, READ BEFORE INSTALLATION:

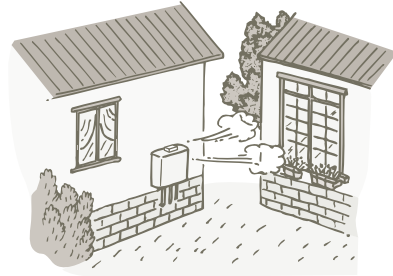
Do not install the heater where water, debris or flammable vapors may get into the flue terminal. This may cause damage to the heater and void the warranty.



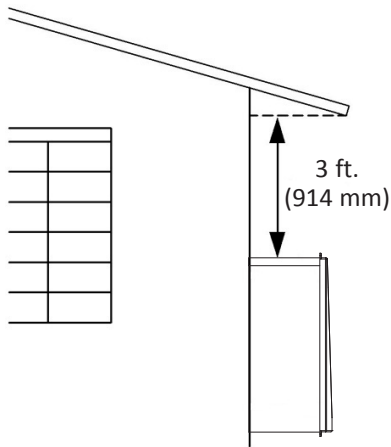
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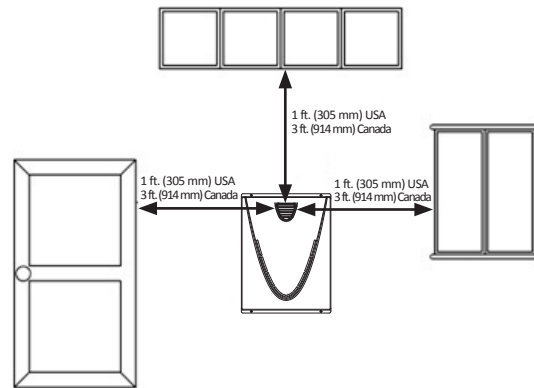
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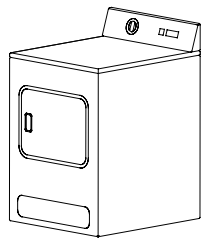
Do not install this water heater under an overhang less than 3 ft. (914 mm) from its top or eaves. The area under an overhang must be open to three sides (Outdoor models only).



Do not install the water heater vent terminator within 1 ft. (305 mm) in the USA of any air intake or building opening, and within 3 ft. (914 mm) in Canada of any air intake or building opening (Outdoor models only, refer to p. 20).













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.

Indoor models

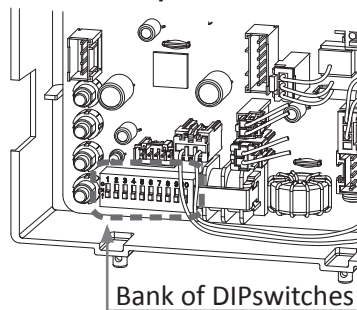
Altitude DIPswitches	0 (DEFAULT)	Up to 2,500 ft	Up to 5,000 ft	Up to 7,500 ft	Up to 10,100 ft
240 (T-H3J) and 340 (T-H3S) models	 No. 3 : OFF No. 4 : OFF No. 5 : OFF	 No. 3 : OFF No. 4 : ON No. 5 : OFF	 No. 3 : OFF No. 4 : OFF No. 5 : ON	 No. 3 : OFF No. 4 : ON No. 5 : ON	 No. 3 : ON No. 4 : ON No. 5 : ON
540 (T-H3) models (Lower bank of DIPswitches)	 No. 2 : OFF No. 3 : OFF No. 4 : OFF	 No. 2 : OFF No. 3 : ON No. 4 : OFF	 No. 2 : OFF No. 3 : OFF No. 4 : ON	 No. 2 : OFF No. 3 : ON No. 4 : ON	 No. 2 : ON No. 3 : ON No. 4 : ON

Outdoor models

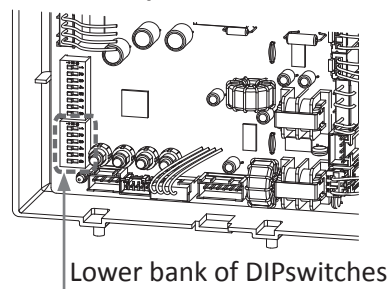
Altitude DIPswitches	0 (DEFAULT)	Up to 2,000 ft	Up to 4,000 ft	Up to 6,000 ft	Over 6,000 ft
240 (T-H3J) and 340 (T-H3S) models	 No. 3 : OFF No. 4 : OFF No. 5 : OFF	 No. 3 : OFF No. 4 : ON No. 5 : OFF	 No. 3 : OFF No. 4 : OFF No. 5 : ON	 No. 3 : ON No. 4 : OFF No. 5 : ON	Consult our Technical Services at 1-877- 737-2840
540 (T-H3) models (Lower bank of DIPswitches)	 No. 2 : OFF No. 3 : OFF No. 4 : OFF	 No. 2 : OFF No. 3 : ON No. 4 : OFF	 No. 2 : OFF No. 3 : OFF No. 4 : ON	 No. 2 : ON No. 3 : OFF No. 4 : ON	

NOTE: The dark squares indicate the direction the DIPswitches should be set to.

**240 (T-H3J) and 340 (T-H3S) models
Computer board**



**540 (T-H3) models
Computer board**



DO NOT adjust any DIPswitches on the upper bank for the 540 (T-H3) models.

VENTING INSTRUCTIONS

For the 240 Indoor (T-H3J-DV), 340 Indoor (T-H3S-DV) and 540 Indoor (T-H3-DV) models

-General-



- Improper venting of this appliance can result in excessive levels of carbon monoxide which can result in severe personal injury or death.
- Improper installation can cause nausea or asphyxiation, severe injury or death from carbon monoxide and flue gases poisoning. Improper installation will void product warranty.



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 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 Indoor models may also be vented with plastic pipe materials such as ABS, PVC, CPVC, or polypropylene. For details, please refer to the Exhaust Vent (ABS, PVC, CPVC, or polypropylene Vent) Section from p. 15. Vent installations in Canada which utilize plastic vent systems must use venting that complies with ULC S636.

General rules for venting water heaters are:

- Place the water heater as close as possible to the vent termination.
- The vent collar of the water heater must be fastened directly to an unobstructed vent pipe.
- Do not weld the vent pipe to the water heater's vent collar.
- Do not cut the vent collar of the unit.
- The vent must be easily removable from the top of the water heater for normal service and inspection of the unit.
- The water heater vent must not be connected to any other gas appliance or vent stack.
- Avoid using an oversized vent pipe or using extremely long runs of the pipe.
- For rooftop venting, a rain cap or other form of termination that prevents rain water from entering into the water heater must be installed.
- 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 approved vent pipe.

General rules for vent terminations:







- Avoid locating the water heater vent termination 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.
- Locate the vent termination so that it cannot be blocked by any debris, at any time. Most codes require that the termination be at least 12 in. (305 mm) above grade, but the installer may determine if it should be higher depending on the job site condition and applicable codes.
- A proper sidewall termination is recommended when the water heater is vented through a sidewall.
- Regarding the clearances from the exhaust termination to the air inlet or opening, refer to p. 20-22.





-DIPswitch settings for Vent length-

<Two-pipe, direct-vent installation>

Refer to p. 16 for details.

Set DIPswitches shown in the tables below depending on the vent length.




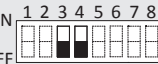
3" venting		
Vent length	240 Indoor (T-H3J-DV) 340 Indoor (T-H3S-DV)	540 Indoor (T-H3-DV) (Upper bank of DIPswitches)
5 to 20 ft (DEFAULT)	ON  OFF No. 6 : ON No. 7 : OFF	ON  OFF No. 3 : ON No. 4 : OFF
21 to 40 ft	ON  OFF No. 6 : OFF No. 7 : OFF	ON  OFF No. 3 : OFF No. 4 : OFF
41 to 70 ft	ON  OFF No. 6 : ON No. 7 : ON	ON  OFF No. 3 : ON No. 4 : ON

4" venting		
Vent length	240 Indoor (T-H3J-DV) 340 Indoor (T-H3S-DV)	540 Indoor (T-H3-DV) (Upper bank of DIPswitches)
5 to 50 ft (DEFAULT)	ON  OFF No. 6 : ON No. 7 : OFF	ON  OFF No. 3 : ON No. 4 : OFF
51 to 100 ft	ON  OFF No. 6 : OFF No. 7 : OFF	ON  OFF No. 3 : OFF No. 4 : OFF

<Single pipe with room-air intake installation>

Refer to p. 17 for details.

Set DIPswitches shown in the table below depending on the vent length.

3" venting		
Vent length	240 Indoor (T-H3J-DV) 340 Indoor (T-H3S-DV)	540 Indoor (T-H3-DV) (Upper bank of DIPswitches)
5 to 45 ft (DEFAULT)	ON  OFF No. 6 : ON No. 7 : OFF	ON  OFF No. 3 : ON No. 4 : OFF
46 to 70 ft	ON  OFF No. 6 : OFF No. 7 : OFF	ON  OFF No. 3 : OFF No. 4 : OFF

-Exhaust vent (ABS, PVC, CPVC, or polypropylene vent)-

The Indoor models can be vented with ABS, PVC, CPVC, or polypropylene (temperature rated up to at least 149 °F). Vent material certified to ULC S636 standards is recommended in the USA. In Canada, plastic venting must be 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	
	Polypropylene	UL-1738	
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 70 ft. (21.3 m) for 3" venting, which depends on the elevation where the water heater is installed, and 100 ft. (30.5 m) for 4" venting (deducting 5 ft. (1.5 m) for each elbow used in the venting system). Do not use more than 5 elbows. See the table below.
- When the horizontal vent run exceeds 5 ft. (1.5 m), support the vent run at 3 ft. (0.9 m) intervals with overhead hangers.

Diameter	Max. No. of Elbows	Max. Vertical and Horizontal (Total) Vent Length
3 in. (76 mm)	5	70 ft. (21.3 m)
4 in. (102 mm)	5	100 ft. (30.5 m)

***For each elbow added, deduct 5 ft. (1.5 m) from max. vent length.**

No. of Elbows	Max. Vertical or Horizontal (Total) Vent Length			
	3" venting			4" venting
	Up to 3,000 ft	Up to 6,000 ft	Up to 10,100 ft	Up to 10,100 ft
0	70 ft. (21.3 m)	40 ft. (12.2 m)	25 ft. (7.6 m)	100 ft. (30.5 m)
1	65 ft. (19.8 m)	35 ft. (10.7 m)	20 ft. (6.1 m)	95 ft. (29.0 m)
2	60 ft. (18.3 m)	30 ft. (9.1 m)	15 ft. (4.6 m)	90 ft. (27.4 m)
5	45 ft. (13.7 m)	N/A	N/A	75 ft. (22.9 m)

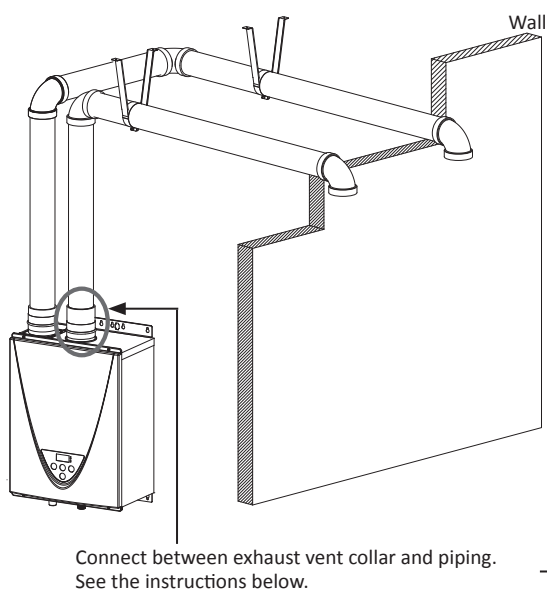
Excludes vent terminators, termination elbows, or rain caps.

For details on the vent connection, refer to p. 16 and p. 17.

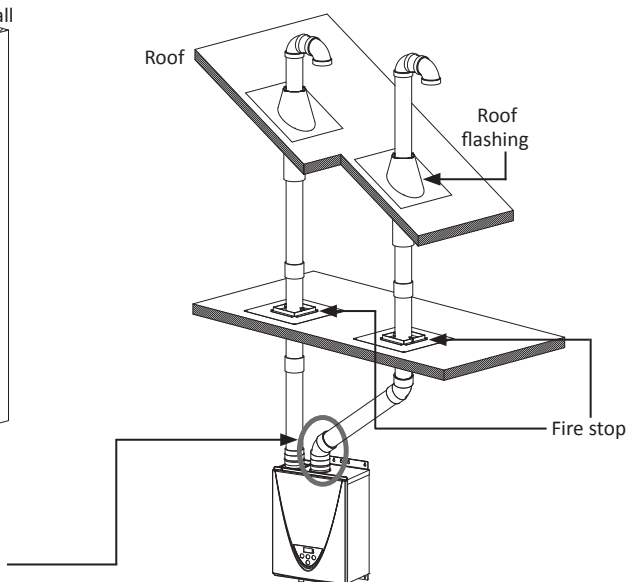
-Two-pipe, direct-vent illustrations-

Typical installations using PVC, ABS, or polypropylene vent

Horizontal Installation



Vertical Installation

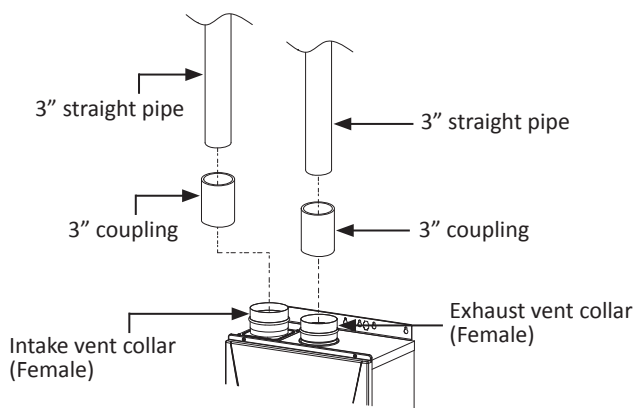


For details of the optional items, refer to the Installation manual for each optional item.

<How to install intake and exhaust venting (two-pipe, direct-vent) with the indoor models>

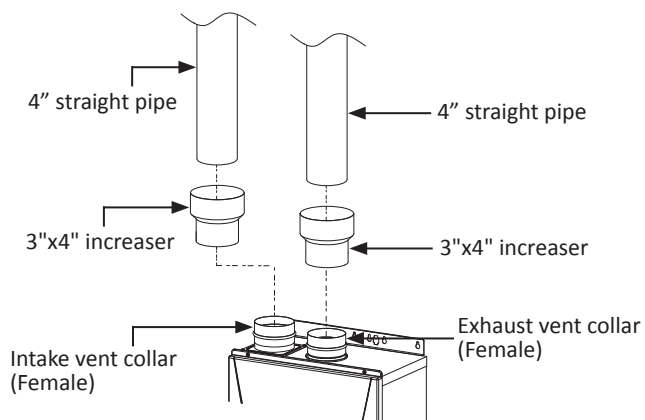
3" vent connection

1. Connect 3" couplings directly on the exhaust and intake vent collar of the water heater.
2. Connect 3" straight pipes to the couplings.



From 3" to 4" vent connection

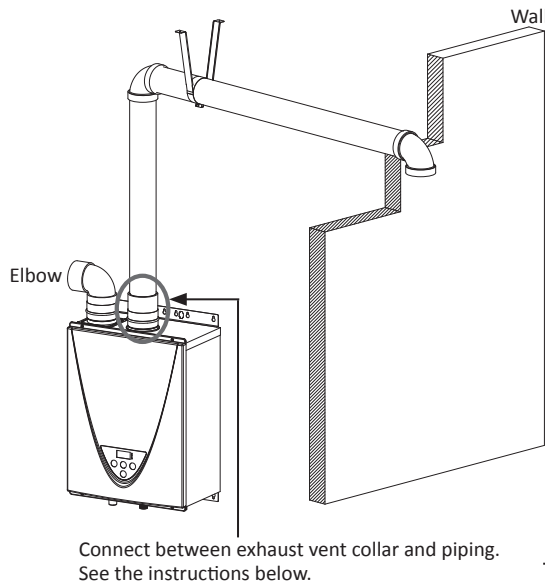
1. Connect 3"x4" increasers directly on the exhaust and intake vent collar of the water heater.
2. Connect 4" straight pipes to the increasers.



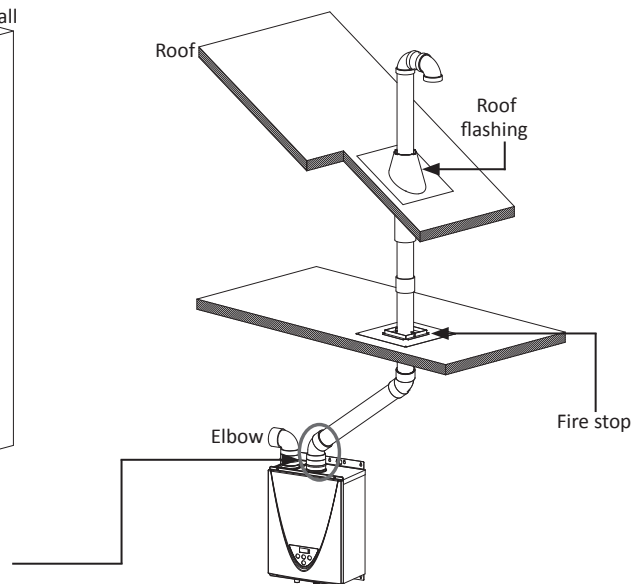
-Single pipe with room-air intake illustrations-

Typical installations using PVC, ABS, or polypropylene vent

Horizontal Installation



Vertical Installation

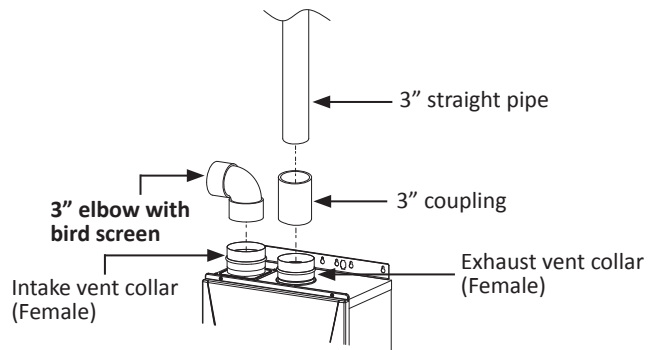


For details of the optional items, refer to the Installation manual for each Optional item.

<How to install single vent with the indoor models>

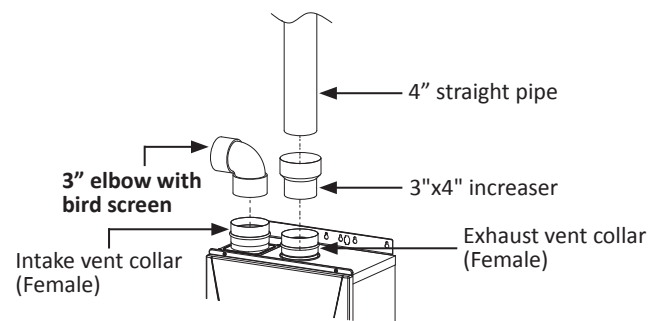
3" vent connection

1. Connect a 3" elbow directly on the intake vent collar of the water heater.
2. Connect a 3" coupling directly on the exhaust vent collar of the water heater.
3. Connect a 3" straight pipe to the coupling.



From 3" to 4" vent connection

1. Connect a 3" elbow directly on the intake vent collar of the water heater.
2. Connect a 3"x4" increaser directly on the exhaust vent collar of the water heater.
3. Connect a 4" straight pipe to the increaser.



-Exhaust vent (Stainless steel vent)-

This is a Category IV appliance and must be vented accordingly. The vent system must be sealed airtight. 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 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 NovaVent line.** However, the following are also UL listed manufacturers: ProTech Systems Inc. (FasNSeal), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).
- **Follow the vent pipe manufacturer’s instructions when installing the vent pipe.**
- The maximum length of exhaust vent piping must not exceed 100 ft. (30.5 m) (deducting 5 ft. (1.5 m) for each elbow used in the venting system). Do not use more than 5 elbows.
- When the horizontal vent run exceeds 5 ft. (1.5 m), support the vent run at 3 ft. (0.9 m) intervals with overhead hangers.

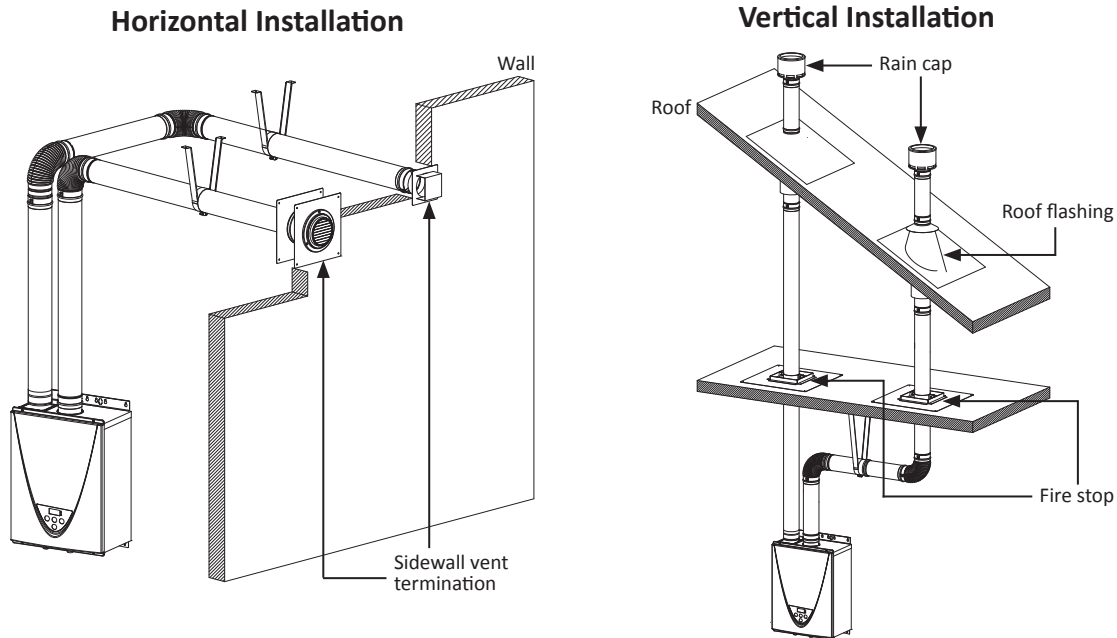
Diameter	Max. No. of Elbows	Max. Vertical and Horizontal (Total) Vent Length
4 in. (102 mm)	5	100 ft. (30.5 m)

***For each elbow added, deduct 5 ft. (1.5 m) from max. vent length.**

No. of Elbows	Max. Vertical or Horizontal Vent Length
0	100 ft. (30.5 m)
1	95 ft. (29.0 m)
2	90 ft. (27.4 m)
5	75 ft. (22.9 m)

Excludes vent terminators, termination elbows, or rain caps.

-Direct-vent and single vent Illustrations-
Typical installations using stainless steel vents



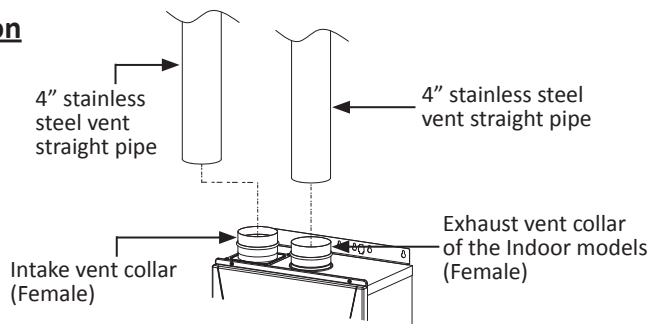
- The diagram above shows direct-vent installations. For single vent installation, connect a 4" elbow directly on the intake vent collar instead of a straight pipe. See the instructions below for the detail.
- For details of the optional items, refer to the Installation manual for each Optional item.

- Regarding the clearances from the exhaust terminal to the air inlet or opening, refer to the next few pages.
- Follow all vent system manufacturer's instructions and all local codes.
- Use 4" Category III/IV approved or Special BH, single or double wall stainless steel vent pipe.

<How to install stainless steel vent with the indoor models>

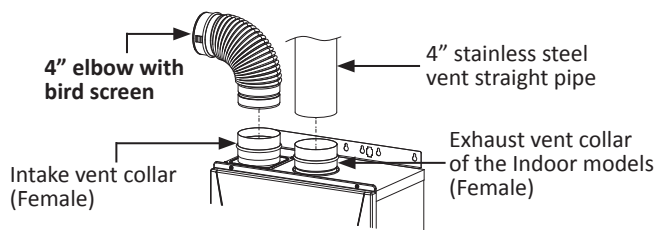
4" vent connection for direct-vent installation

1. Connect 4" stainless steel vent straight pipes directly on the exhaust/intake vent collar of the water heater.

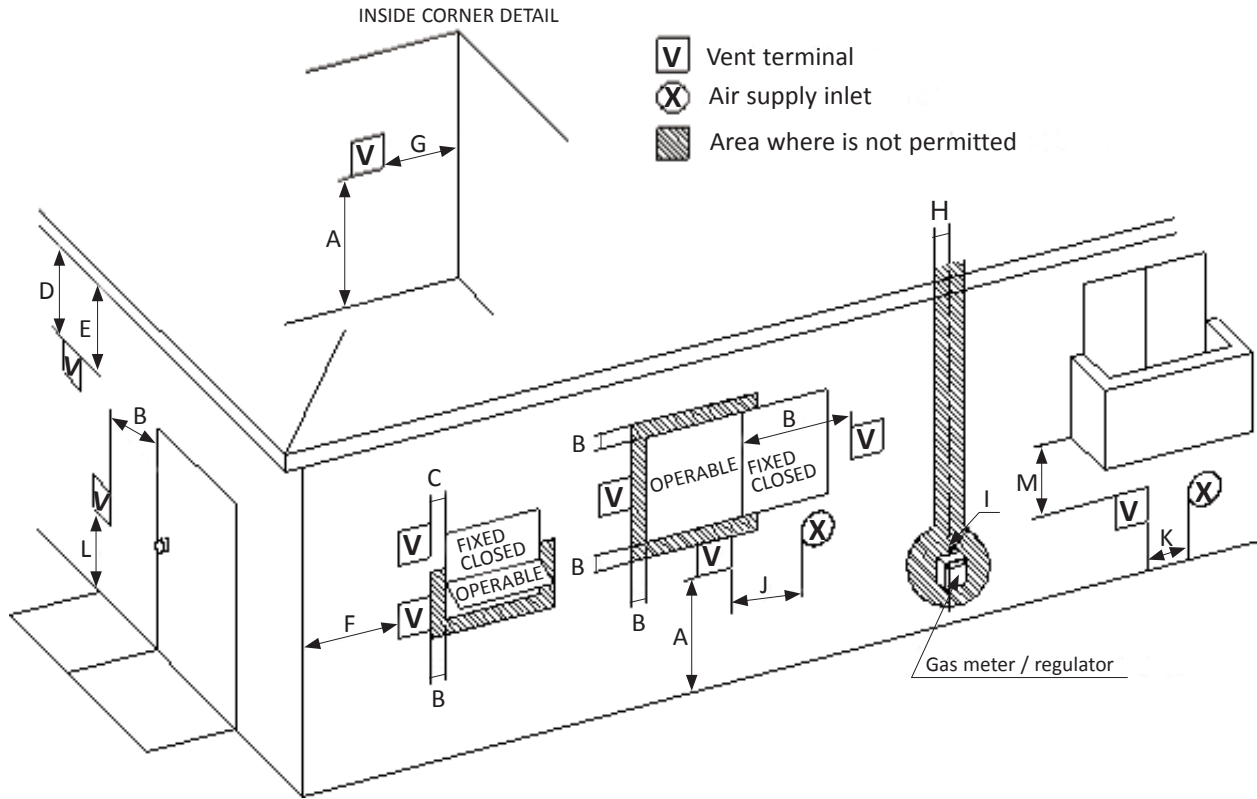


4" vent connection for single vent installation

1. Connect a 4" stainless steel vent straight pipes directly on the exhaust vent collar of the water heater.
2. Connect a 4" elbow directly on the intake vent collar of the water heater.



-Vent termination clearances-



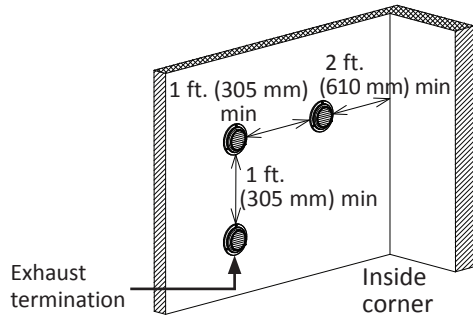
		Canada		U.S.A	
		Direct-vent and other than Direct-vent	Direct-vent	Direct-vent	Other than Direct-vent
A	Clearance above grade, veranda, porch, deck, or balcony	1 foot	1 foot	1 foot	1 foot
B	Clearance to window or door that may be opened	3 feet	1 foot	4 feet from below or side opening. 1 foot from above 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 requirements of the gas supplier.

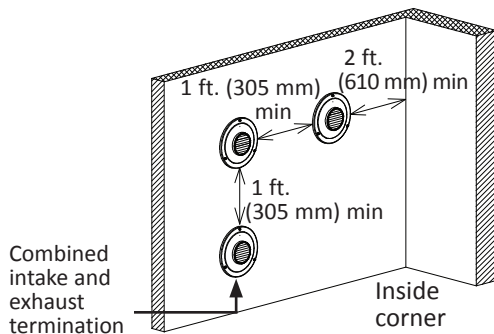
-For sidewall terminations-



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



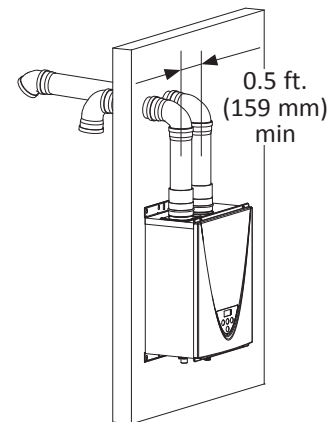
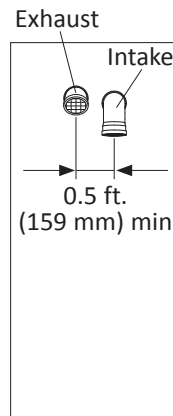
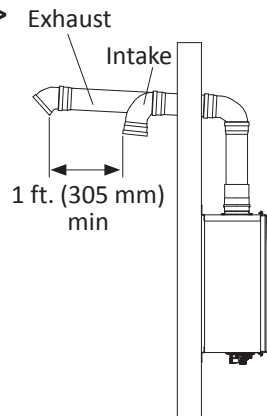
For multiple sidewall exhaust terminations (e.g. Multi-Unit Systems), an exhaust termination must be at least 1 ft. (305mm) away from another exhaust termination. An exhaust termination must also be at least 2 ft. (610 mm) away from an inside corner. (If the adjacent wall is less than 2 ft. (610 mm) of length, the minimum required distance away from the inside corner will be equal to the length of that adjacent wall.)



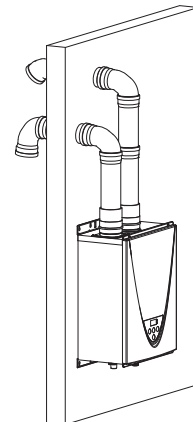
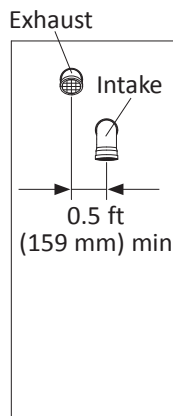
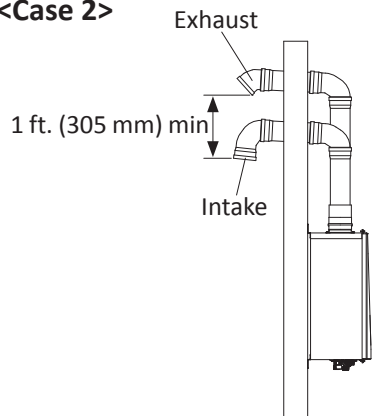
For multiple-unit, direct-vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. (305 mm) away from each other, no matter the orientation. A direct-vent termination must also be at least 2 ft. (610 mm) away from an inside corner. (If the adjacent wall is less than 2 ft. (610 mm) of length, the minimum required distance away from the inside corner will be equal to the length of that adjacent wall.)

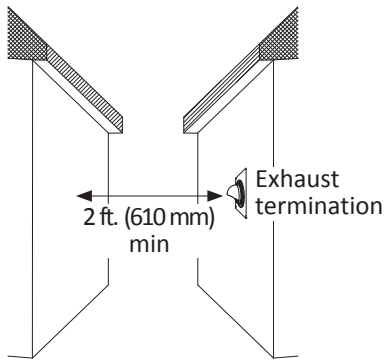
<Case 1>

For direct-vent sidewall terminations that use two separate penetrations for the intake and exhaust, keep the termination clearances shown in the diagrams on the right.



<Case 2>



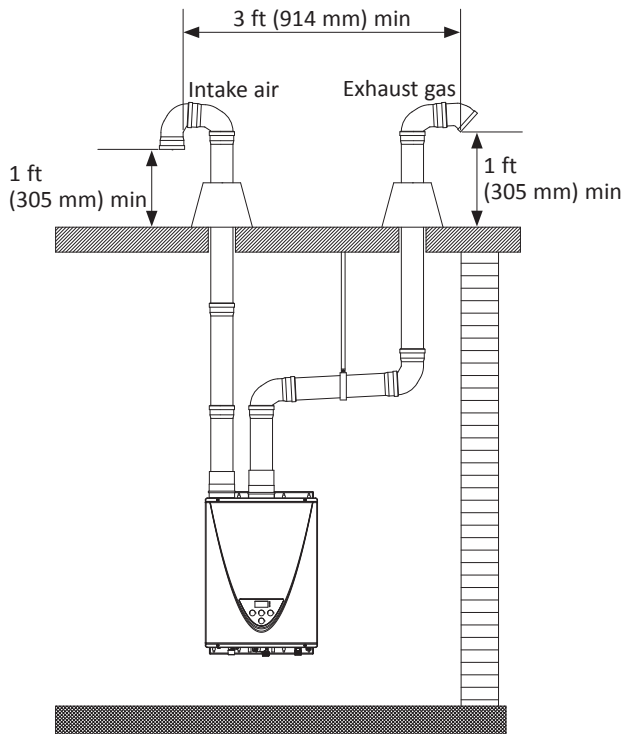
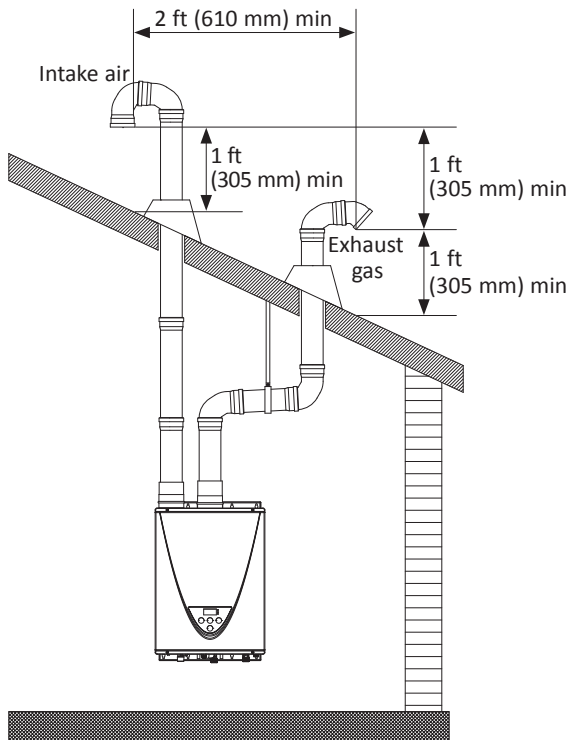


Exhaust and/or direct-vent sidewall terminations should be at least 2 ft. (610 mm) away from an opposite surface/wall. Do not place the termination directly in front of an opening into a building.

-For rooftop terminations-



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



Exhaust terminations must be at least 1 ft. (305 mm) away from any obstructions.

GAS SUPPLY AND GAS PIPE SIZING

-General-



CAUTION

- 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" W.C. (1.24 kPa) – Max. 10.5" W.C. (2.61 kPa)
Propane	Min. 8.0" W.C. (1.99 kPa) – Max. 14.0" W.C. (3.48 kPa)

- Inlet gas pressures that fall outside the range of values listed above may adversely affect the performance of the water heater. 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 shutoff 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 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 (3.5 kPa).
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 Z223.1/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 with 0.60 Specific Gravity Based on Pressure Drop of 0.5" W.C.

Based on Energy Content of 1,000 BTU/Cubic ft.: The water heater requires 160 Cubic ft./hr for the 240 (T-H3J) models, 180 Cubic ft./hr for the 340 (T-H3S) models, and 199 Cubic ft./hr for the 540 (T-H3) models.

Unit: Cubic feet per hour

Pipe Size	Length												
Diameter	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	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 1/4"	1,404	965	775	663	588	532	490	456	428	404	358	324	278
1 1/2"	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

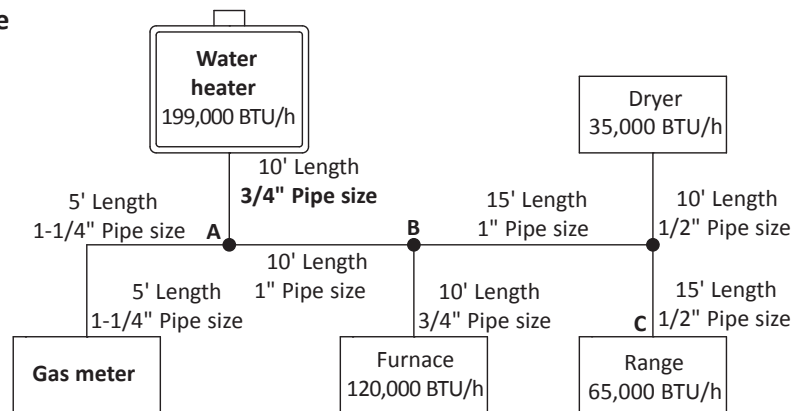
-Propane (LP) Supply Piping-

Maximum Capacity of Propane (LP) Based on 11" W.C. supply pressure at a 0.5" W.C. pressure drop

Unit: kBtu per hour

Pipe Size	Length												
Diameter	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	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 1/4"	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511	440
1 1/2"	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

Gas sizing example (Natural Gas)



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

Divide each appliance's BTU requirement by 1,000 BTU/h 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 50 ft., Section A to B needs to be 1" in order to supply 220 cubic ft.

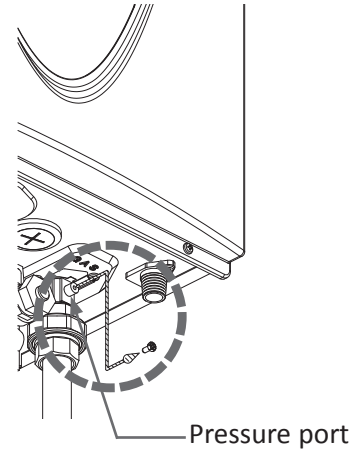
-Measuring inlet gas pressure-



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 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 gas supply line.
2. Remove the screw for the pressure port located on the gas inlet of the water heater shown in the diagram on 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 and minimum burn, the manometer should read from 5.0" to 10.5" W.C. (1.24 to 2.61 kPa) for Natural gas, from 8.0" to 14.0" W.C. (1.99 to 3.48 kPa) for Propane.



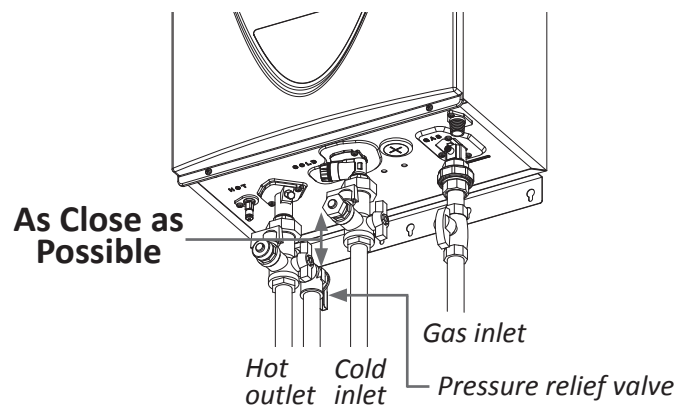
WATER CONNECTIONS



- 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 shutoff 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 shutoff 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. (Refer to p. 48.)



-Pressure relief valve-

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

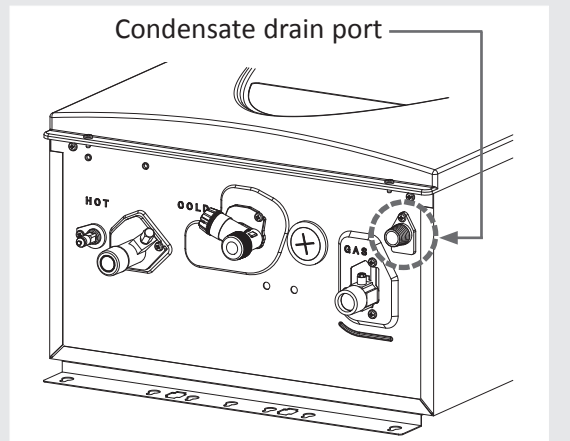
- This unit does not come with an approved pressure relief valve.
- An approved pressure relief valve must be installed on the hot water outlet.
- The pressure relief valve must conform to **ANSI Z21.22** or **CAN 1-4.4** and installation must follow local codes.
- The discharge capacity must be at least 160,000 BTU/h for the 240 (T-H3J) models, 180,000 BTU/h for the 340 (T-H3S) models, and 199,000 BTU/h for the 540 (T-H3) models.
- The pressure relief valve needs to be rated for a maximum of 150 psi (1 MPa).
- 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 in. (152 mm) 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.



Follow all code requirements of the local authority on condensate neutralizers and whether or not they are required for the installation.



-Condensate Drain Connections-



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

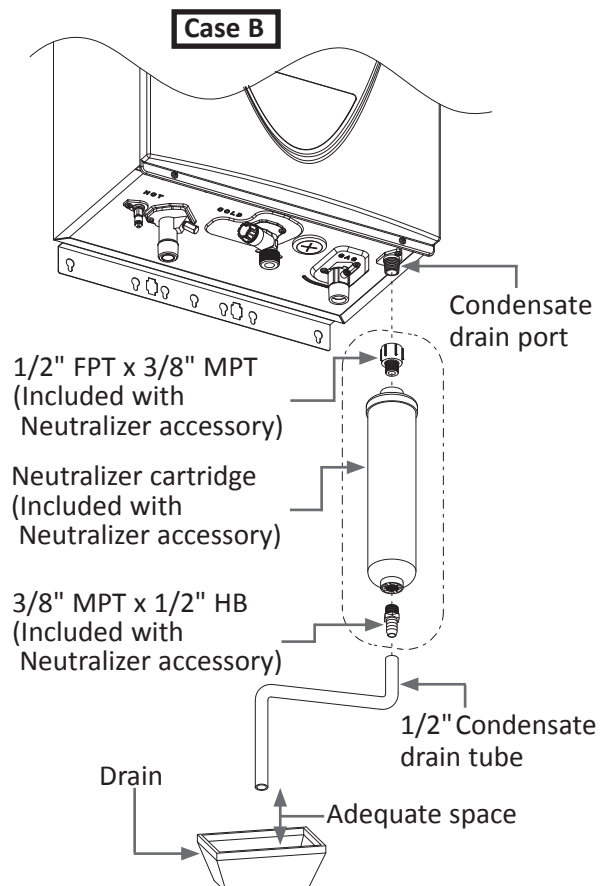
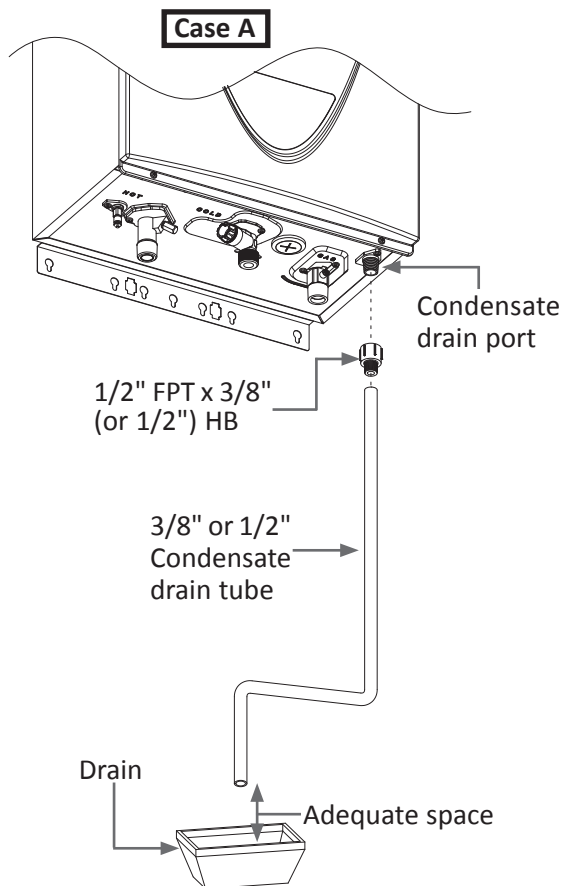
The water heater is a high efficiency condensing water heater that produces condensate (acidic water). The acidic condensate generated in the secondary heat exchanger can be neutralized by the Neutralizer accessory.

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.

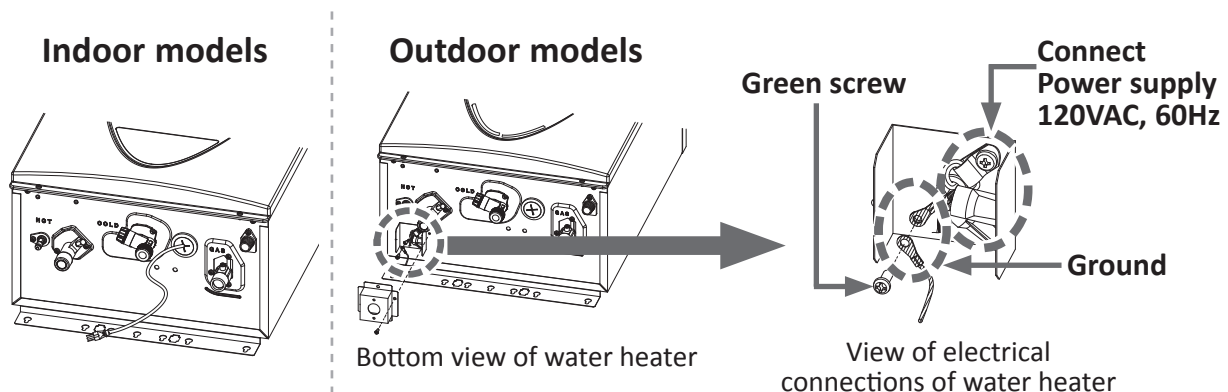


CAUTION

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.

All indoor models come with a power plug instead of a junction box. The following procedure is for outdoor models only.


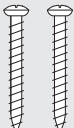

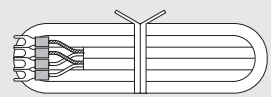
1. The water heater must be electrically grounded. Do not attach the ground wire to either the gas or the water piping.
2. The water heater requires **120 VAC, 60 Hz electrical power supply that is properly grounded.**
 - A proper disconnect (i.e. on/off switch, power plug, etc.) controlling the main 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.



TEMPERATURE REMOTE CONTROLLER

-Outdoor models only-

Check that these items below are included with the remote controller.

Temperature remote controller	Screws	Manual	Remote controller cable
 Qty: 1	 Qty: 2	 Qty: 1	 Qty: 1

-INSTALLATION-



- **This remote controller is NOT waterproof**

Do not install in high temperature environments, steamy conditions (such as a bathroom), outdoors, in direct sunlight, or within the reach of children. Make sure the remote controller does not come into contact with water or oil.

- Do not place the remote control wiring close to other wires from other products.
- Do not extend the remote control wiring more than 400 ft. (122 m).

<Mounting and Wiring the Remote Controller>

1. Take off the “**Back plate**” from the remote controller with a flat head screwdriver. (**Fig. A and B**)
2. Attach the “**Back plate**” on the wall with the two provided screws. (**Fig. B**)

Fig. A

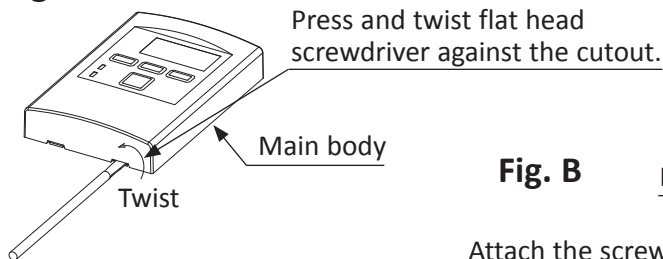
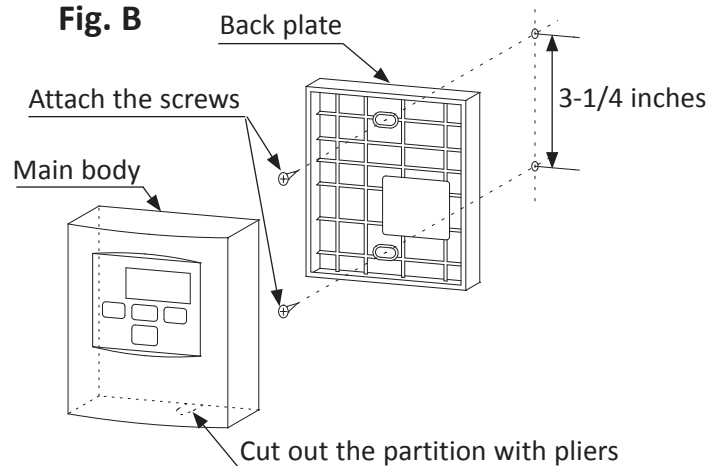
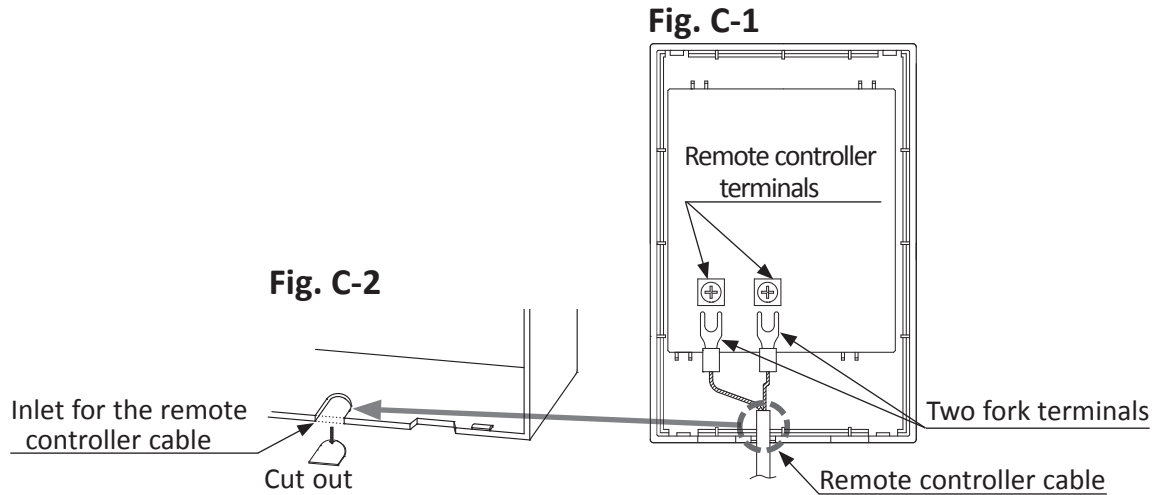


Fig. B



3. Tighten the two "Fork terminals" beneath the two "Remote controller terminal" screws on the back of the main body. (Fig. C-1)
4. Cut out the inlet for the remote controller cable from the bottom of the main body. (Fig. C-2)
5. Place the "Main body" back on the "Back plate", with the "Remote controller cable" running out of the bottom inlet.

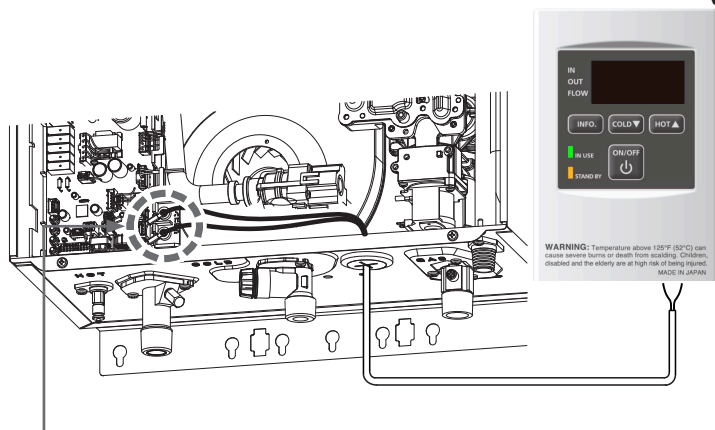


<How to connect the remote controller to the water heater>

1. Disconnect power supply from the water heater.
2. Take off the water heater's front cover.
3. Locate the remote controller terminals, pictured to the next page (located around the lower right-hand side of the computer board).
4. Take off the back plate from the remote controller, and then attach the two fork terminals to connector base on the backside of the remote controller with two screws. Make sure the terminals are firmly fixed.
5. Pull the remote's wires through the hole 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 20 gauge wire (No polarity)
 - Maximum 400 ft. (122 m) long

240 (T-H3J) and 340 (T-H3S) models

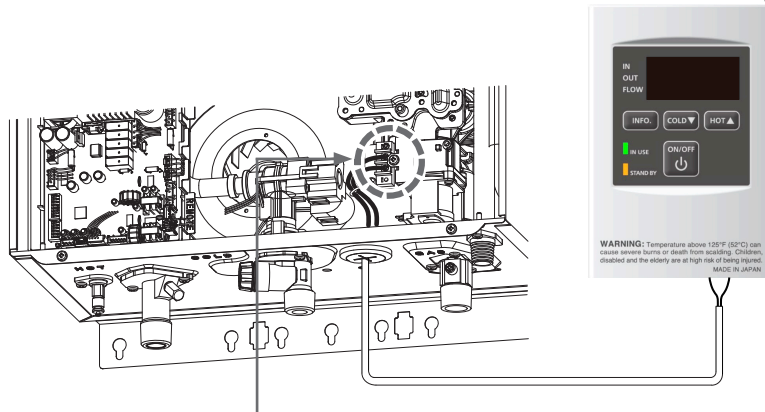
9008172005 (TM-RE40)



Connect other end to these terminals

540 (T-H3) models

9008172005 (TM-RE40)



Connect other end to these terminals

EASY-LINK SYSTEM

(Available on the 540 (T-H3) models only)

-General-

The 540 (T-H3) models water heaters can be connected with allowable heaters (see the table below) 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 540 (T-H3) model.

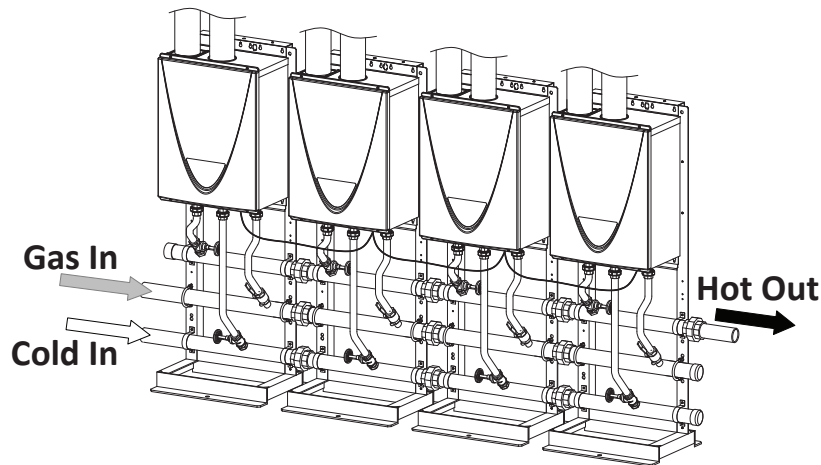
You can manifold from 2 to 4 units without the need for a multi-unit controller. A 4-unit system has full automatic modulation between 13,000 BTU/h (Propane) or 15,000 BTU/h (Natural gas) to 796,000 BTU/h.

Easy-Link connection with allowable heaters

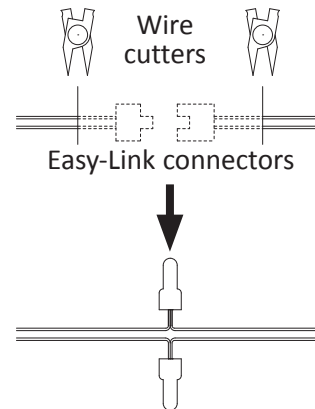
710 models (T-M32 / T-M32 ASME)

520 models (T-H2-DV / T-H2-OS)

540 models (T-H3-DV / T-H3-OS)



Due to the difference in the connector type for the Easy-Link System between the 710 (T-M32) and 540 (T-H3), cut out the connectors for the Easy-Link System and then splice the wires directly together when connecting the 710 (T-M32) and 540 (T-H3) in the Easy-Link System.



- 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.
- **Only listed models on the table above can be combined together as an Easy-Link System with the 540 (T-H3) model. The 540 (T-H3) model cannot be combined together with other models not listed on the table above.**



- When the 540 (T-H3) model is connected to other models listed above as part of an Easy-Link System, contact the manufacturer.
- When the 710 (T-M32) and 540 (T-H3) are connected together in an Easy-Link System, change DIPswitch No.6 on the lower bank of DIPswitches on the 540 (T-H3) model computer board to the "ON" position.

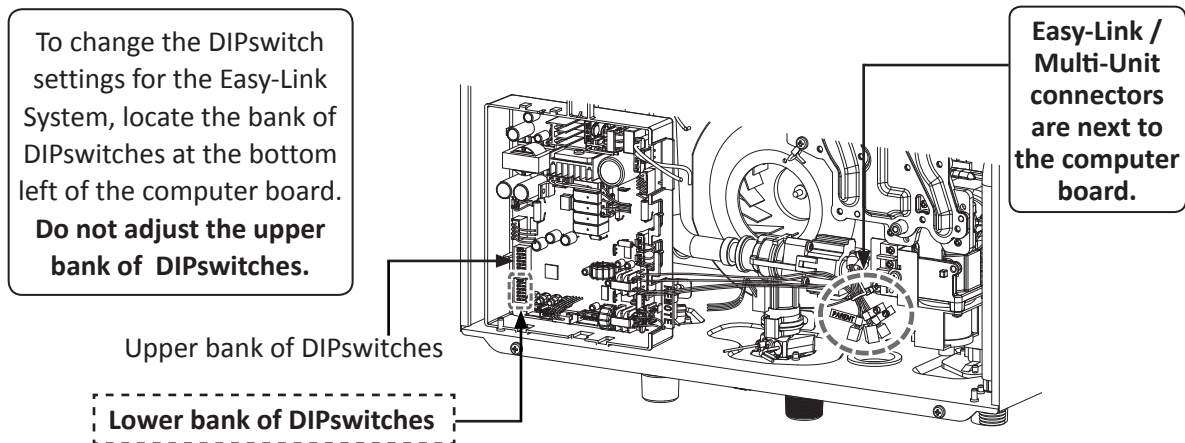
-Easy-Link Connection Procedures-

1. Verify the set temperatures of all units within the system. Every single water heater must be set to the same set temperature.

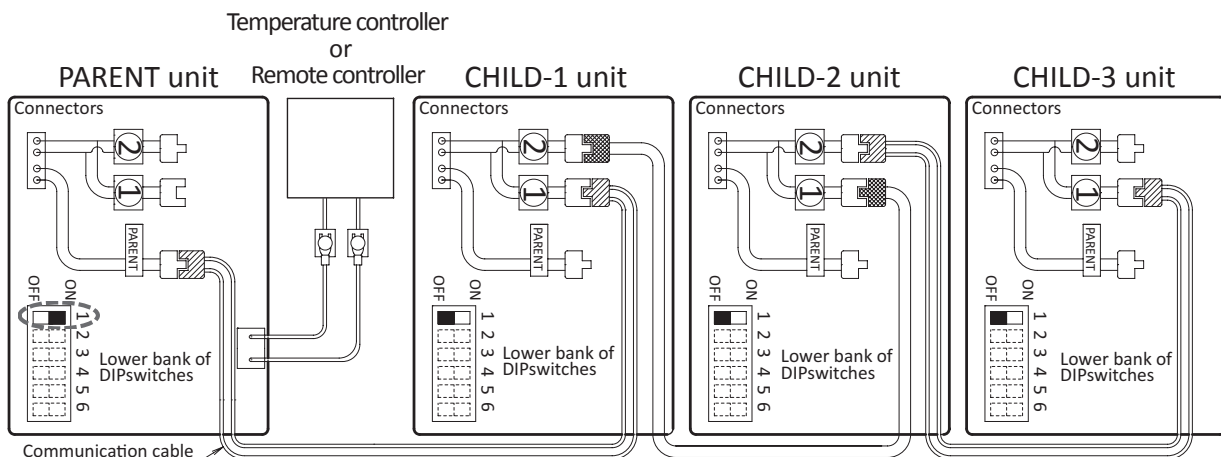
2. Select one unit to be the **“PARENT”** unit.
3. **“PARENT”** unit :
Locate the two banks of DIPswitches at the bottom left of the computer board of the unit that you select to be the **“PARENT”** unit. Change DIPswitch No. 1 on the **lower bank of DIPswitches to the ON position**. See the computer board diagram below. 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 remote controller and/or temperature controller 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.

Type of unit	Unit # of easy-link
Parent	1
Child	2, 3, or 4

(A) 540 (T-H3) model computer board



(B) Basic diagram of connections between the Easy-Link System units



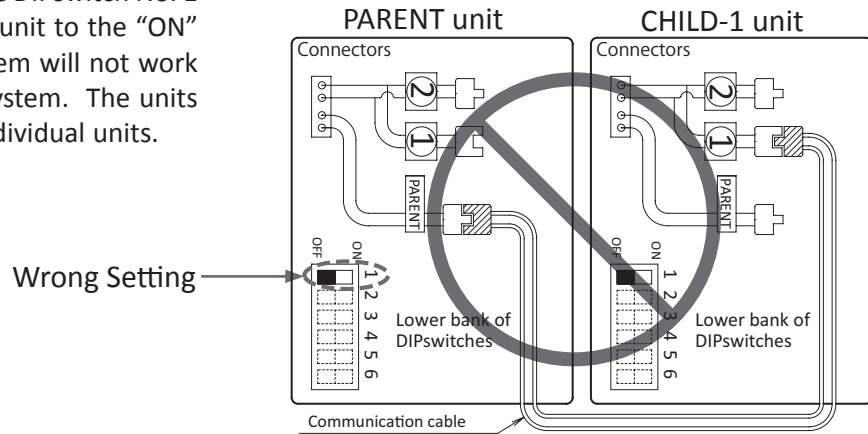
NOTE: The dark squares indicate the direction the DIPswitches should be set to.

NOTICE • Either a temperature controller or a remote controller is required for the Easy-Link System for ease of usage and maintenance.

(C) Examples of incorrect settings and /or connections

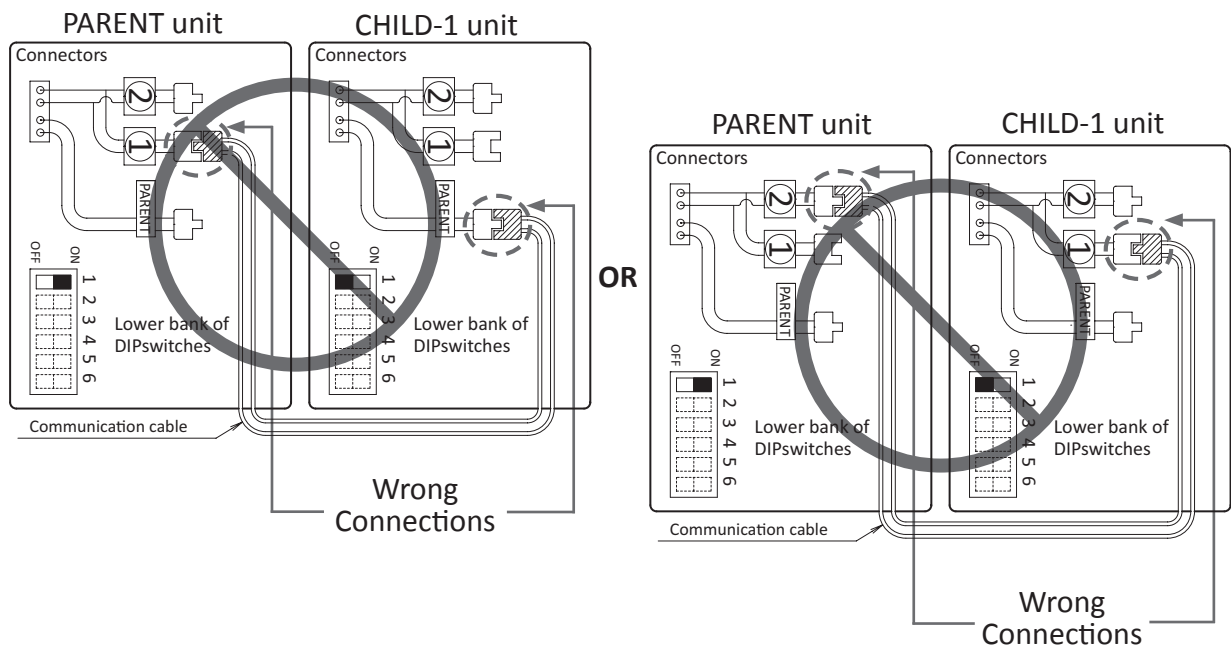
CASE 1: Wrong DIPswitch setting on the "PARENT" unit

- Unless you change DIPswitch No. 1 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.



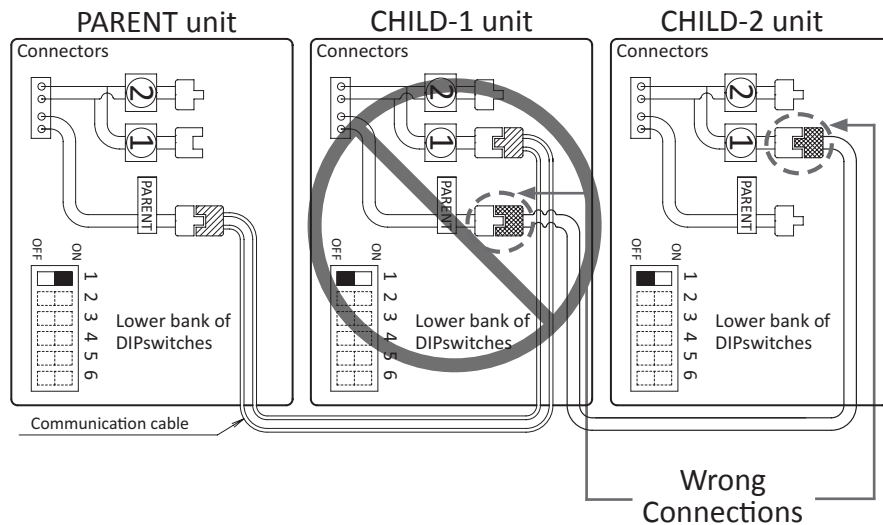
CASE 2: Wrong connections between the "PARENT" unit and the "CHILD-1" unit

- 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.



CASE 3: Wrong connections between the "CHILD-1" unit and the "CHILD-2" unit

- 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.

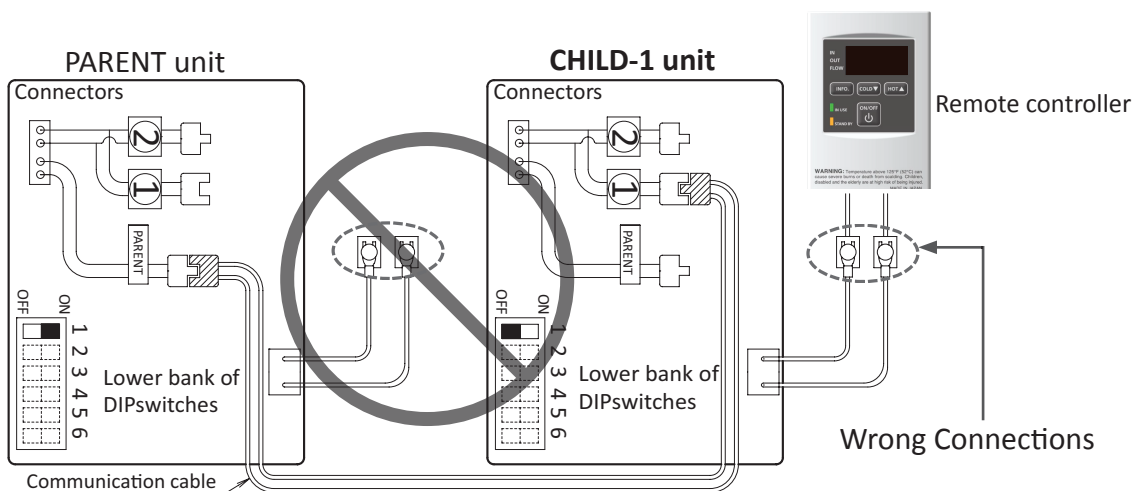


WARNING

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.

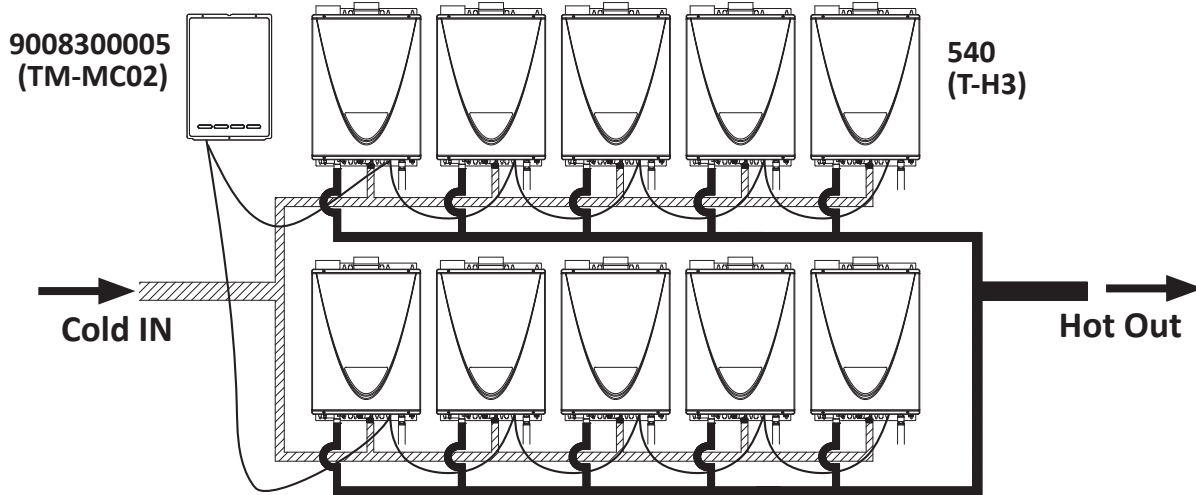
CASE 4: Remote controller connected to incorrect unit

- Either a temperature controller or a remote controller 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.
- The temperature controller of the "CHILD" unit will not control the unit on the system.



MULTI-UNIT SYSTEM

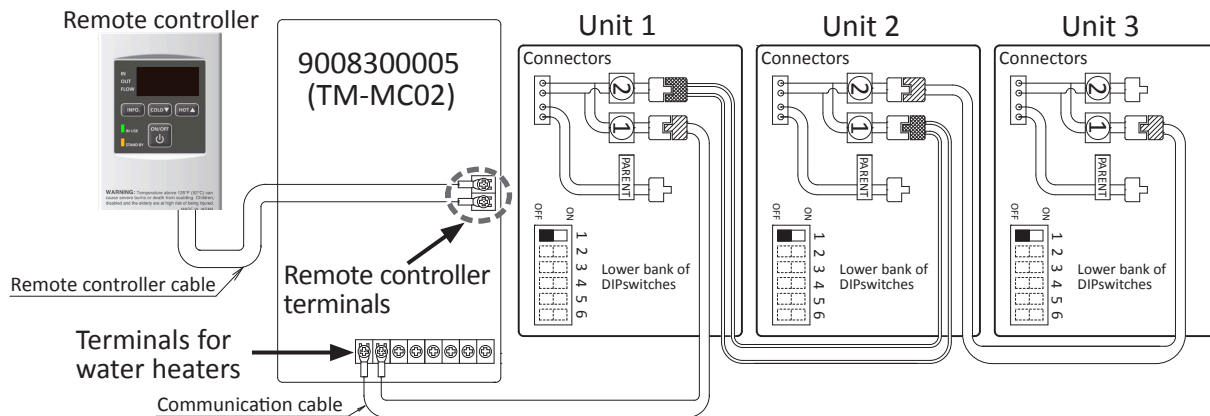
Multiple 540 (T-H3) models can be combined for a Multi-Unit System, along with the multi-unit controller (Part 9008300005 (TM-MC02)). The multi-unit controller can control from 2 units to 20 units for commercial or residential applications. For a 20-unit system, the computer can modulate between the usages of 13,000 BTU/h (Propane) or 15,000 BTU/h (Natural gas) to 4.0 Million BTU/h.



An individual cut-off switch is recommended for each unit in a Multi-Unit System for the purpose of maintenance.

Multi-Unit System connection diagram

Multi-unit controller with the remote controller wiring:



- The dark squares should not need adjustment.
- This is the connection diagram between 540 (T-H3) and multi-unit controller for 2 to 20 water heaters. Above is a sample for 3 water heaters.
- The multi-unit controller automatically allocates the unit # (1-20) to each water heater that is part of the Multi-Unit System.
- In a Multi-Unit System, connect the “[1]” connector and the “[2]” connector with the communication cable (refer to p. 33) or 18 gauge wire cables. The total cable length can be up to 250 ft. (76.2 m) long.



- For detailed instructions on the multi-unit controller, refer to the instructions that are packaged with the multi-unit controller.
- When the 710 (T-M32) and 540 (T-H3) are connected together to the multi-unit controller as a Multi-Unit System, refer to the installation manual of the multi-unit controller for more details.

APPLICATIONS

-Space-Heating Applications-

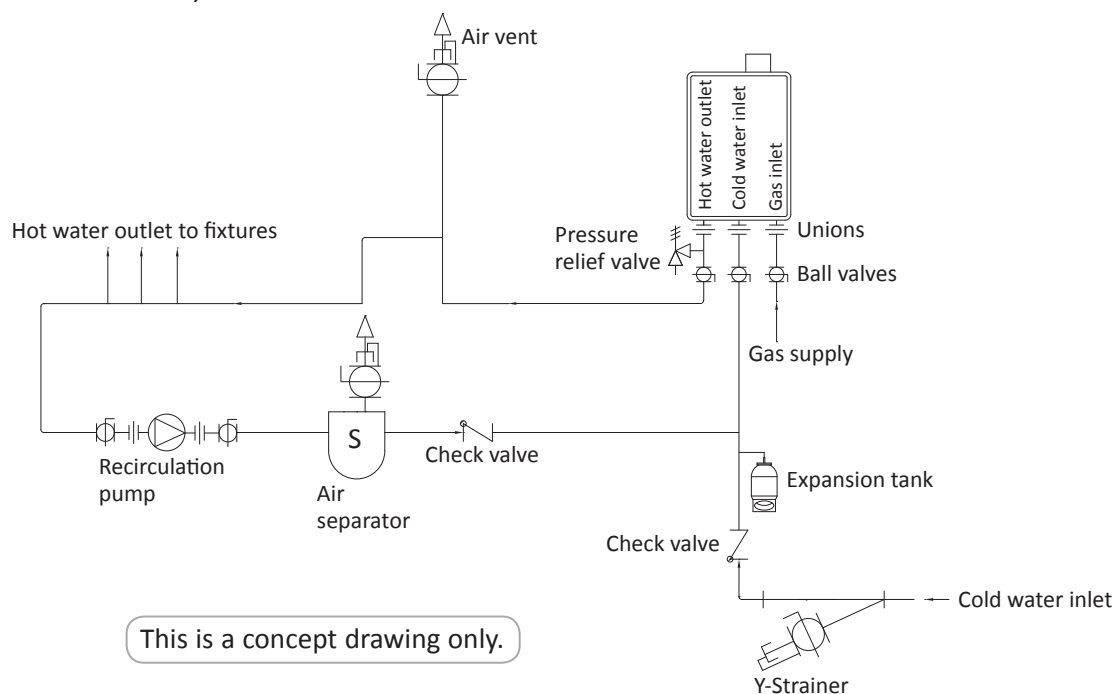


- In order to purge air in water pipes within a closed-loop system, an air vent and air separator should be installed in the system. Required circulation flow rates are labeled next to each application diagram. These flow rate requirements must be followed.
- Toxic chemicals used in boiler treatments 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 scalding.
- 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)

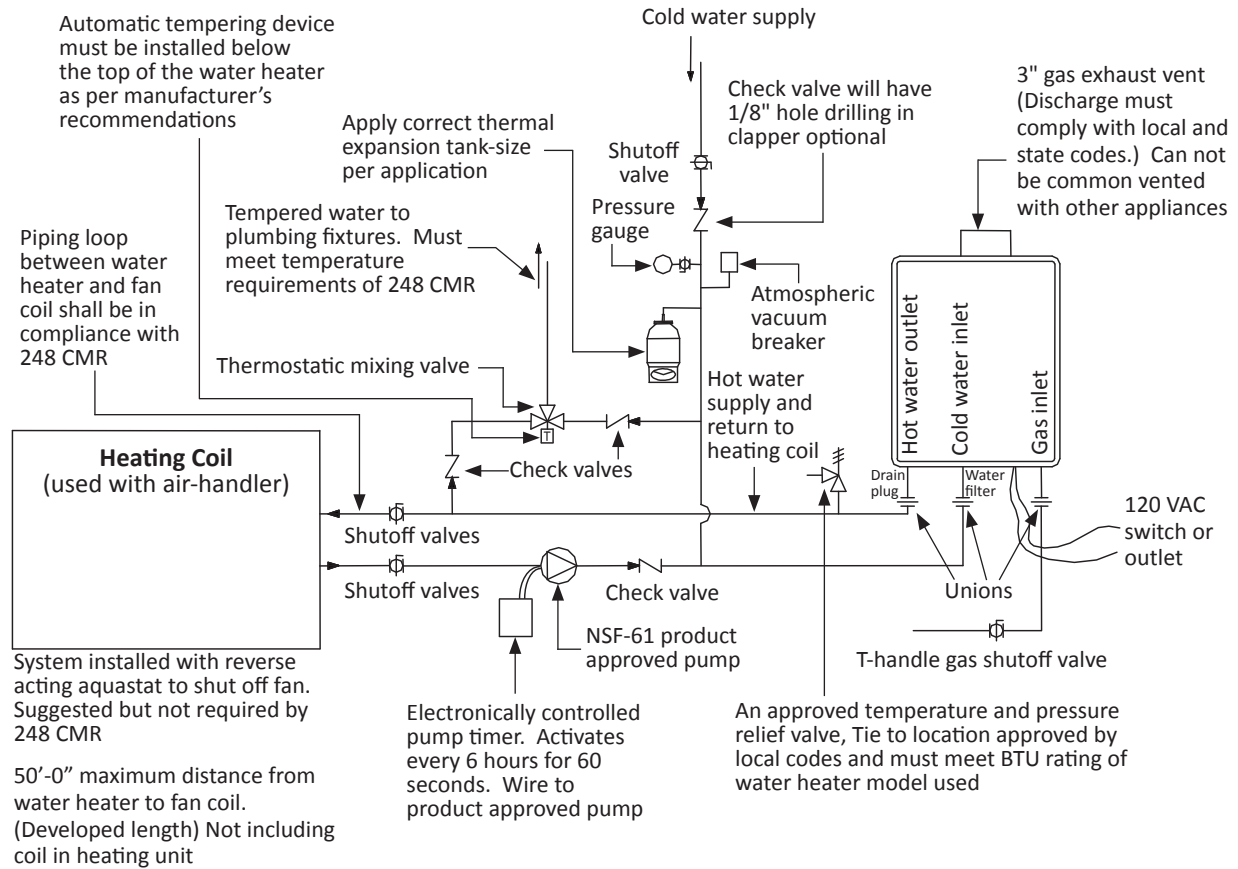
*The recirculation pump is to provide no less than 2 GPM (7.5 L/min) and no more than 4 GPM (15 L/min) through each activated unit in the system.



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

Diagrammatic layout of radiant heating and domestic water heater per mass. code.

All water piping should be insulated in accordance with 780 CMR (Massachusetts energy code)



The recirculation pump is to provide no less than 2 GPM (7.5 L/min) and no more than 4 GPM (15 L/min) through each activated unit in the system.

NOTICE

- **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


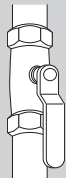


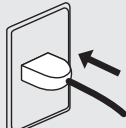
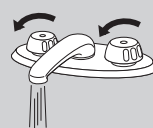
- Check the **GAS and WATER CONNECTIONS** for leaks before firing unit for the first time.
- Open the main gas supply valve to the unit using only your hand to avoid any spark. Never use tools. If the knob will not turn by hand, do not try to force it; call a qualified service technician. Forced repair 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. 25.
- 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.

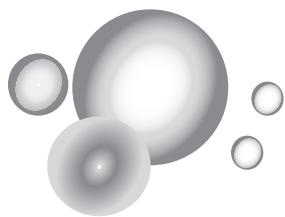


WARNING

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.

	Operation	
1.	Once the above checks have been completed, please clean filter of any debris. Refer to p. 48 for instructions.	
2.	Fully open the manual water control valve on the water supply line.	
3.	Open a hot water tap to verify that water is flowing to that tap. Then close the hot water tap.	
4.	Fully open the manual gas control valve installed.	
5.	Turn on the 120 VAC, 60 Hz power supply to the water heater.	
6.	Now you are ready to enjoy hours of endless hot water.	



Owner's Guide

CONGRATULATIONS

Congratulations and thank you for choosing our tankless water heater. Before use, we recommend that you read through this safety manual carefully. Please refer to the back of the manual for details about the warranty. Keep this manual for future reference.

If you lose the manual, contact the manufacturer or your local distributor. When you call, please tell us the model number and the serial number of your unit written on the rating plate of the water heater.

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 Owner's 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 counterclockwise 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 scalding. Test the water before bathing or showering.

Do not leave children or an infirm person in the bath unsupervised.

DANGER



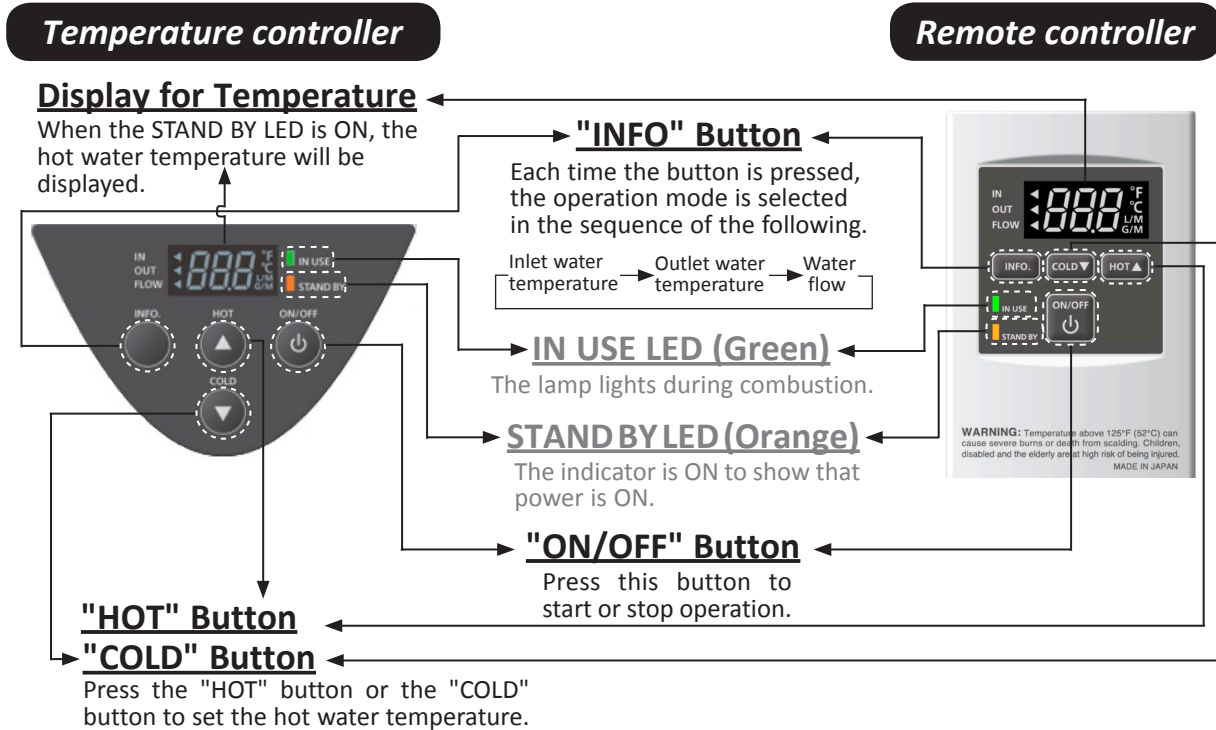
Hot Water Heater temperature over 125 °F (52 °C) can cause severe burns instantly or death from scalding. Children, disabled and the elderly are at the highest risk of being scalded. Feel water temperature before bathing or showering. Temperature limiting valves are available. Ask a professional.

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

TEMPERATURE CONTROLLER and REMOTE CONTROLLER

The illustration below shows an example of the controllers. The exact display may differ from examples.

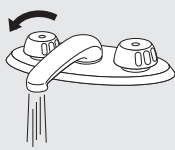


GENERAL

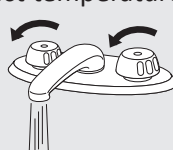


Temperature above 125 °F (52 °C) can cause severe burns or death from scalding. Children, disabled and the elderly are at high risk of being injured.

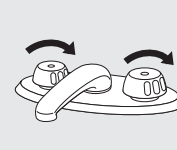
1. Open a hot water tap.



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



3. Close the hot water tap.



NOTICE

- Flow rate to activate the water heater: 0.5 gallon per minute at the default set temperature (1.9 L/min).
- Flow rate to keep the water heater running: 0.4 gallon per minute (1.5 L/min).







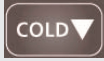







The controllers have an energy saving mode. Five minutes after the water heater stops operating, the backlight of the controllers turns off.

The backlight of the controllers will turn back on once the water heater begins firing again.

TEMPERATURE SETTINGS

-Set temperature-

	Operation	Screen on the controller	
		Temperature controller	Remote controller
1.	Turn on the 120 VAC power supply to the unit (the water heater or the multi-unit controller).		
2.	Press the "ON/OFF" button on the controller in order to turn the controller on.		
3.	When ON, the STAND BY LED is lit.		
4.	It shows the set temperature on its display as shown in the picture on the right. (EX.: 120 °F)	 (EX.: 120 °F)	
5.	Press the "HOT" button or the "COLD" button to set the temperature setting of the unit.	 	 
	(Increasing temperature, example 140 °F to 145 °F) -540 (T-H3) models only- Press the "HOT" button to set 140 °F. Simultaneously press and hold the "HOT" and "INFO" buttons for at least 3 seconds. It shows the 145 °F on its display. The display will be blinking for 10 seconds and set.	 	 

TEMPERATURE TABLE OF CONTROLLER

a) For 240 (T-H3J) and 340 (T-H3S) models

°F	100	105	110	115	120*	125	130	135	140
°C	38	40	43	45	50*	52	55	57	60

b) For 540 (T-H3) models

°F	100	105	110	115	120*	125	130	135	140	145	150	155	160	165	175	185
°C	38	40	43	45	50*	52	55	57	60	63	65	68	70	75	80	85

*Factory setting (Default): 120 °F

NOTICE

This water heater is an on-demand, tankless water heater designed to efficiently supply endless hot water without reference to temperature settings.







WARNING

DO NOT set to 185 °F (85 °C) if you use your water heater in a recirculation system. This will cause damage to the heater and void the warranty. (This temperature setting is only available on the 540 (T-H3) models.)

ADDITIONAL FEATURES



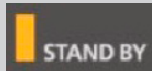



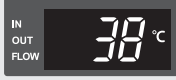
-Information mode-

You can get some information about the water heater condition by pressing the "INFO" button. For more information, follow the procedures below:

	Operation	Screen on the controller	
		Temperature controller	Remote controller
1.	First of all, inlet water temperature will be displayed on the controller by pressing the "INFO" button.		Inlet water temperature (EX.: 60 °F)
2.	Outlet water temperature will be displayed on the controller by pressing the "INFO" button.		Outlet water temperature (EX.: 120 °F)
3.	And then, water flow will be displayed on the controller by pressing the "INFO" button.		Water flow (EX.: 3.5 GPM)
4.	Press the "INFO" button to finish information mode.		

-Unit conversion mode-

The remote controller has a function that can change units of temperature and flow rate from °F to °C and from gallon per minute to liter per minute and vice versa, please follow the procedures below:

	Operation	Screen on the controller	
		Temperature controller	Remote controller
1.	Press the "ON/OFF" button on the controller in order to turn the controller on.		
2.	When ON, the orange LED is lit.		
3.	The previous set temperature will be displayed on the screen.		(EX.: 100 °F)
4.	Press the "INFO" buttons for at least 3 seconds.		
5.	The set temperature should now be displayed in the alternate unit of measurement.		(EX.: 38 °C)



When the water heater is connected with the remote controller, the temperature controller will not operate temperature settings, as only work for the information mode (Indoor models only).

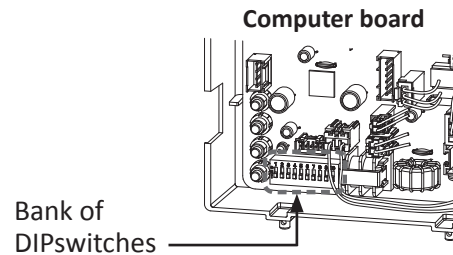
TEMPERATURE SETTINGS ON THE PCB (WITHOUT REMOTE CONTROLLER)

There are 2 preset temperatures (120 °F (49 °C) and 140 °F (60 °C)) that you can select from by changing the DIPswitch settings on the computer board without the remote controller. See the table below. When the remote controller is in normal operation, the set temperature of the remote controller is given priority over the set temperature of the DIPswitch settings.

- The temperature has been preset at the factory to 120 °F (49 °C).

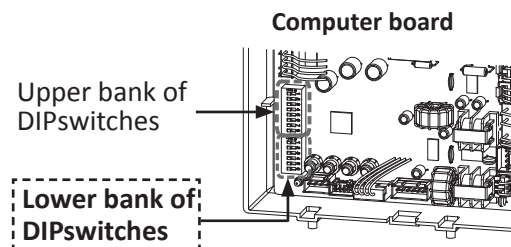
240 (T-H3J) and 340 (T-H3S) models

120 °F (49 °C) DEFAULT	140 °F (60 °C)
ON 1 2 3 4 5 6 7 8 9 10 OFF <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	ON 1 2 3 4 5 6 7 8 9 10 OFF <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
No. 9 : OFF	No. 9 : ON



540 (T-H3) models (Lower bank of DIPswitches)

120 °F (49 °C) DEFAULT	140 °F (60 °C)
ON 1 2 3 4 5 6 OFF <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	ON 1 2 3 4 5 6 OFF <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
No. 5 : OFF	No. 5 : ON



NOTE: Only change the switches with dark squares. The dark squares indicate the direction the DIPswitches should be set to.



- DO NOT adjust the upper bank of DIPswitches for the 540 (T-H3) models.
- Turn off the power supply to the water heater before changing the DIPswitch settings.

FLOW

- The flow rate through the water heater is limited to a maximum of 6.6 GPM (25 L/min) for the 240 (T-H3J) models, 8.0 GPM (30 L/min) for the 340 (T-H3S) models, and 10.0 GPM (38 L/min) for the 540 (T-H3) 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 charts on p. 61 to determine the likely flow rates based on your local ground water temperature and your desired outlet water temperature.
- Based on the United States Department of Energy method of testing water heater output, the water heater is rated for gallons per minute (GPM) (liters per minute (L/min)) for Natural Gas and Propane, when raising the water temperature by 77 °F (43 °C) (from 58 °F to 135 °F (14 °C to 57 °C)). See the chart on the right.
- Refer to the table to the top 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 (US)	L/min
Lavatory Faucet	1.0	3.8
Bath Tub	4.0 – 10.0	15.2 - 37.8
Shower	2.0	7.5
Kitchen Sink	1.5	5.6
Dishwasher	1.5	5.6
Washing machine	4.0	15.2

Taken from UPC 2006

Unit: GPM (L/min)

Model		Flow rate
240 (T-H3J)	Indoor	4.0 (15.1)
	Outdoor	
340 (T-H3S)	Indoor	4.4 (16.7)
	Outdoor	
540 (T-H3)	Indoor	4.9 (18.5)
	Outdoor	

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).
- For the 240 Indoor (T-H3J-DV), 340 Indoor (T-H3S-DV) and 540 Indoor (T-H3-DV) models:
 - In any areas subject to freezing temperatures, the manufacturer highly recommends an indoor installation with an indoor model. 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.
 - The manufacturer also highly recommends the use of a backflow preventer (sold separately) to minimize the amount of cold air entering through the exhaust venting when the water heater is off.
- It is the installer's responsibility to be aware of freezing issues and take all preventative measures. The manufacturer will not be responsible for any damage to the heat exchanger as a result of freezing.
- If you will not be using your heater for a long period of time:
 1. Completely drain the water out of the unit. Refer to p. 48.
 2. Disconnect power to your heater.

This will keep your unit from freezing and being damaged.



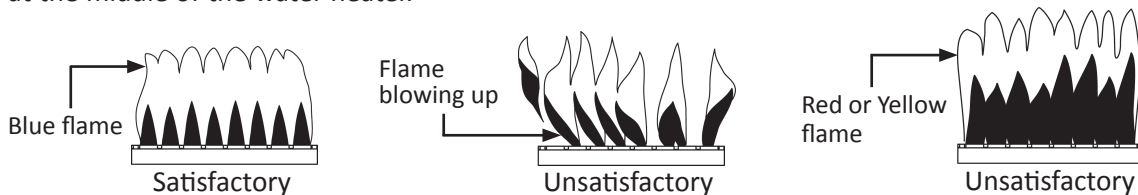
Only pipes within the water heater are protected by the freeze protection system. Any water pipes (hot or cold) located outside the unit will not be protected. Properly protect and insulate these pipes from freezing.

MAINTENANCE AND SERVICE



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

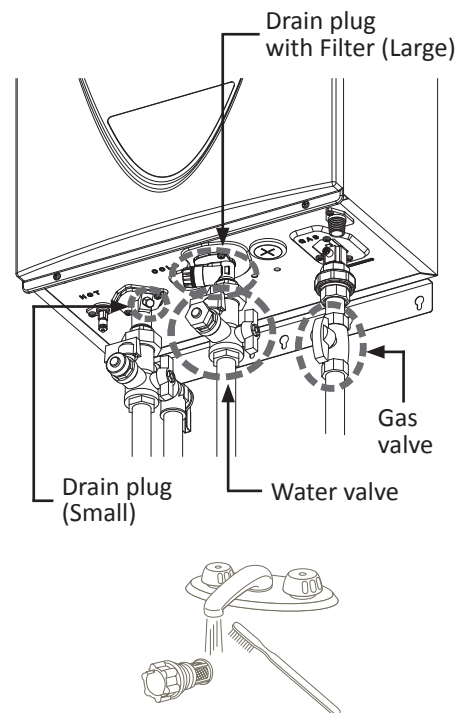
- Clean the cold-water inlet filter. (Refer to the Unit Draining and Filter Cleaning Section in this page.)
- Be sure that all openings for combustion and ventilation air are not blocked.
- The venting system should be checked annually for any leaks, corrosion, blockages or damage.
- The burner should 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 valve 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 shutoff valve.
2. Turn off power to the unit and wait a couple of seconds. Turn on again.
3. Wait 30 seconds, and then turn off power to the unit, yet again.
4. Close the water shutoff 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 the 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

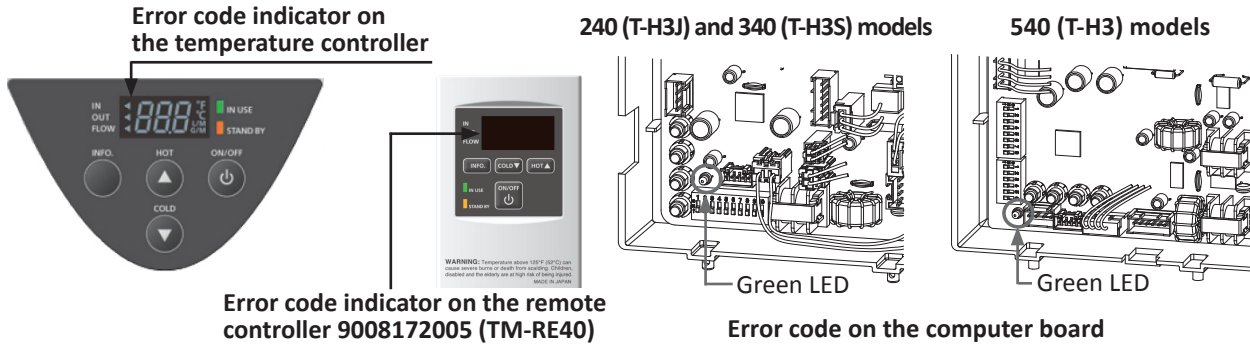
	PROBLEM	SOLUTIONS
TEMPERATURE and AMOUNT OF HOT WATER	It takes long time to get hot water at the fixtures.	<ul style="list-style-type: none"> • The time it takes to deliver hot water from the water heater to your fixtures depends on the length of piping between the two. The longer the distance or the 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. 37)
	The water is not hot enough.	<ul style="list-style-type: none"> • Compare the flow and temperature. See the charts on p. 61. • Check cross plumbing between cold water lines and hot water lines. • Is the gas supply valve fully open? (p. 39) • Is the gas line sized properly? (p. 24) • Is the gas supply pressure sufficient? (p. 25) • Is the set temperature set too low? (p. 43-44)
	The water is too hot.	<ul style="list-style-type: none"> • Is the set temperature set too high? (p. 43-44)
	The hot water is not available when a fixture is opened.	<ul style="list-style-type: none"> • Make sure the unit has 120 VAC, 60 Hz power supply. • If you are using the remote controller and/or temperature controller, is the power button turned on? • Is the gas supply valve fully open? (p. 39) • Is the water supply valve fully open? (p. 39) • Is the filter on cold water inlet clean? (p. 48) • Is the hot water fixture sufficiently open to draw at least 0.5 GPM (1.9 L/min) through the water heater? (p. 43) • Is the unit frozen? (p. 47) • 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. 43) • If there is a recirculation system installed, does the recirculation line have enough check valves? (p. 37) • Is the gas supply valve fully open? (p. 39) • Is the filter on cold water inlet clean? (p. 48) • Are the fixtures clean of debris and obstructions? • Check if the flow rate is too low. (p. 43)
	Fluctuation in hot water temperature.	<ul style="list-style-type: none"> • Is the filter on cold water inlet clean? (p. 48) • Is the gas line sized properly? (p. 24) • Is the supply gas pressure sufficient? (p. 25) • 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 (1.9 L/min)? (p. 43) • Check for the filter on cold water inlet. (p. 48) • Check for reverse connection and cross connection. • If you use the remote controller and/or temperature controller, is the power button turned on? • Check if the inlet temperature is too high.
	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 from 15 to 70 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.
Temperature controller and Remote controller	Controller does not display anything when the power button is turned on.	<ul style="list-style-type: none"> • Make sure the unit is supplied with power. • Make sure the connection to the unit is correct. (p. 30-31) <p>NOTICE: When the unit has not operated for five minutes or more, the display of the controllers turns off to conserve energy.</p> <div data-bbox="641 898 1404 1176" style="text-align: center;"> <p>Temperature controller</p> <p>When the remote controller turned ON, STAND BY LED is lit.</p> <p>STAND BY</p> <p>IN OUT FLOW, INFO, HOT, COLD, ON/OFF, INFO, COLD, HOT, ON/OFF</p> <p><small>WARNING: Temperature above 120°F (52°C) can cause severe burns or death from scalding. Children, disabled and the elderly are at high risk of being injured. MADE IN JAPAN</small></p> </div> <p>Although the controller of the parent unit will display the set temperature at the Easy-Link System, the controller of the child unit will not display the set temperature.</p>
	An ERROR code is displayed.	<ul style="list-style-type: none"> • Please see p. 51-53.
EASY-LINK SYSTEM 540 (T-H3) models only	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 temperature controller of the Child unit and/or the remote controller of the Child unit, if installed. (Refer to p. 32-35.) <div data-bbox="824 1638 1172 1890" style="text-align: center;"> <p>Button to check unit numbers</p> </div>

ERROR CODES

-General-

- The units are self-diagnostic for safety and convenience when troubleshooting.
- If there is a problem with the installation or the unit, the error code will be displayed on the temperature controller and remote controller.
- Consult with the table on the following pages for the description of each error code.



-Single unit Installations-

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

- **Indicator on the temperature controller or Remote controller :** “321” will be displayed on the screen in its entirety.
- **Green LED on the computer board:** The green LED on the computer board will be blinking two times.



-Easy-Link System-

(For the 540 (T-H3) models only)

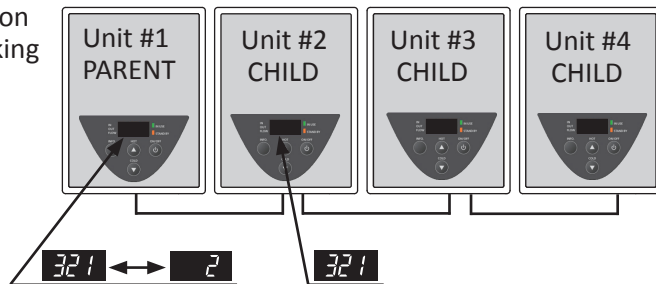
Error codes will be displayed differently with units installed within an Easy-Link System, not only to show what the error code is, but to also indicate which unit within the system has the error code. Below is a sample of how the same error code is displayed in an Easy-Link System.

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

- **Indicator on the temperature controller (Parent unit) or Remote controller :** “321” and “2” will intermittently flash on the display. And it shows that Unit #2 has the error.
- **Unit #2:** “321” will intermittently flash on the display. And the green LED on the computer board will be blinking two times, just like in the single unit example.



- **Unit #3 and #4:** These units will not display anything, as the error code does not pertain to them.



-Fault Analysis of Error Codes-

If the error code is displayed on the computer board of the water heater or remote controller and/or temperature controller, please check the following. After checking, **consult with the manufacturer.**

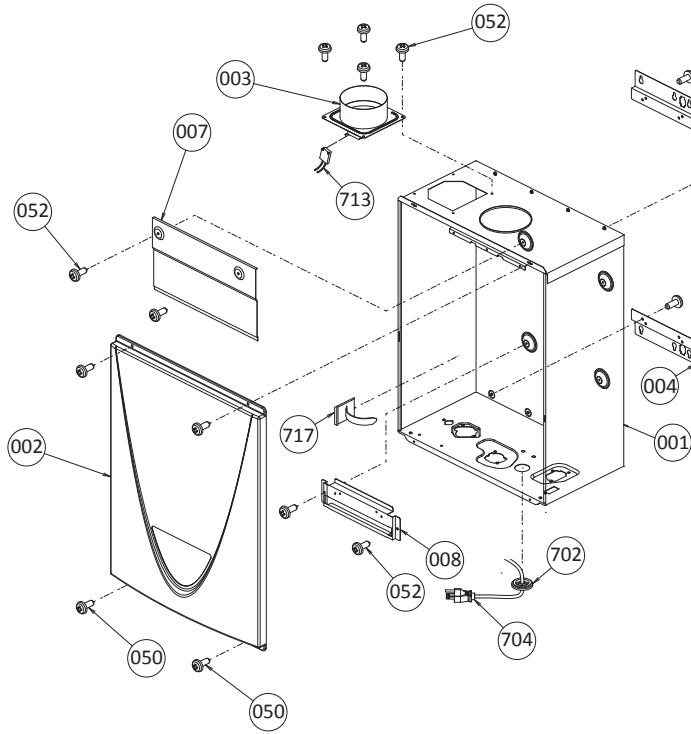
Remote	Green LED	Malfunction description	Diagnosis
031	One Time	Incorrect DIPswitch setting	<ul style="list-style-type: none"> Check the DIPswitch settings on the PCB (Part #701).
101	Five Times	Warning for the "991" error code	<ul style="list-style-type: none"> Check the gas type of the water heater. Check if there is any blockage in the intake air and/or exhaust. If the water heater is installed as a direct-vent system, check whether there is enough distance between the intake air terminal and the exhaust terminal. Check the altitude/elevation of area of where the water heater is installed. Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part #103), especially if the water heater has been installed in a contaminated area.
111	Three Times	Ignition failure	<ul style="list-style-type: none"> Check if the Hi-limit switch (Part #412) is properly functioning. Check for connection/breakage of wires (Part #413, 708, 709, 710, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). Check if there is a buzzing spark ignition sound coming from the burner (Part #101) when water heater prepares for combustion. Listen for the double "clunk" sound coming from gas valve assembly (Part #102) when water heater goes into combustion. Check if there is leaking from heat exchanger (Part #401).
121	Three Times	Loss of flame	<ul style="list-style-type: none"> Check if the Hi-limit switch (Part #412) is properly functioning. Check for connection/breakage of wires (Part #413, 708, 709, 710, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). Check if there is leaking from heat exchanger (Part #401).
311	Two Times	Outlet thermistor failure (240 (T-H3)/340 (T-H3S) models only) Heat exchanger thermistor failure (540 (T-H3) models only)	<ul style="list-style-type: none"> Check for connection/breakage of wires and/or debris on thermistor (Part #407, 408, 411, 715).
321	Two Times	Inlet thermistor failure	
331	Two Times	Outlet thermistor failure (540 (T-H3) models only)	
341	Two Times	Exhaust thermistor failure (Indoor models only)	

Remote	Green LED	Malfunction description	Diagnosis
391	Two Times	Air-fuel ratio rod failure	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #709) and/or soot on the AFR rod (Part #108).
441	Two Times	Flow sensor failure (Easy-Link System only)	<ul style="list-style-type: none"> Check for connection/breakage of wires and/or debris on the flow sensor impeller (Part #402).
510	Six Times	Abnormal main gas solenoid valve	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701).
551	Six Times	Abnormal gas solenoid valve	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701).
611	Four Times	Fan motor fault	<ul style="list-style-type: none"> Check for connection/breakage of wires, dust buildup in the fan motor (Part #103) and/or burn marks on the computer board (Part #701). Check for frozen/corrosion of connectors (Part #103).
651	Four Times	Flow adjustment valve fault (Easy-Link System only)	<ul style="list-style-type: none"> Inspect the flow adjustment valve (Part #402), for connection/breakage of wires, locked motor drive due to scale buildup, and/or water leakage.
661	Four Times	Bypass valve fault (540 (T-H3) models only)	<ul style="list-style-type: none"> Inspect the bypass valve (Part #403), for connection/breakage of wires, locked motor drive due to scale buildup, and/or water leakage.
701	One Time	Computer board fault	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #714).
711	One Time	Gas solenoid valve drive circuit failure	<ul style="list-style-type: none"> Refer to the 111 and 121 error codes.
721	Six Times	False flame detection	<ul style="list-style-type: none"> For indoor models, check if condensate drain is installed on the vent collar of the water heater. Check if there is leaking from heat exchanger (Part #401).
741	N/A	Miscommunication between water heater and remote controller	<ul style="list-style-type: none"> Check the model type of the remote controller. Inspect the connections between the water heater and remote controller. Check the power supply of the water heater.
751	N/A	Miscommunication between water heater and temperature controller (Indoor models only)	<ul style="list-style-type: none"> Inspect the connections between the water heater and temperature controller. Check the power supply of the water heater.
761	N/A	Miscommunication in Easy-Link System	<ul style="list-style-type: none"> Check if the connections between the parent unit and the child units are correct. Refer to p. 32-35.
941	Five Times	Abnormal exhaust temperature (Indoor models only)	<ul style="list-style-type: none"> Check if the set temperature is higher than 140°F (60°C) and the system is Recirculation.
991	Five Times	Imperfect combustion	<ul style="list-style-type: none"> Check the gas type of the water heater. Inspect the environment around the water heater. Determine how long the unit has been installed. Check the altitude/elevation of the area of where the water heater is installed. Check if there is any blockage in the intake air and/or exhaust. If the water heater is installed as a direct-vent system, check whether there is enough distance between the intake air terminal and the exhaust terminal. Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part #103), especially if the water heater has been installed in a contaminated area.

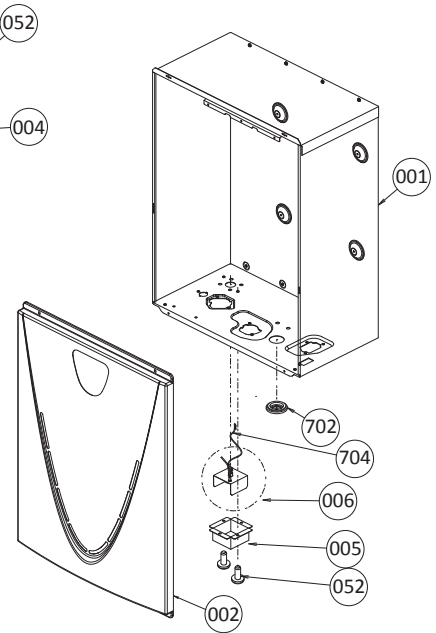
COMPONENTS DIAGRAM

Case assembly

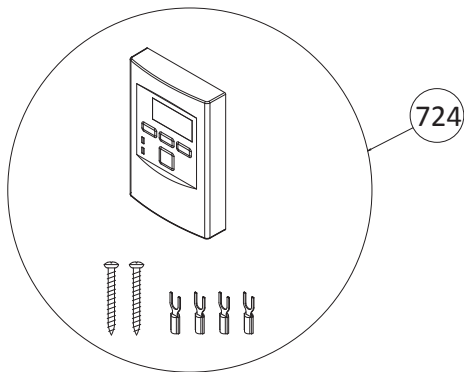
Indoor models



Outdoor models

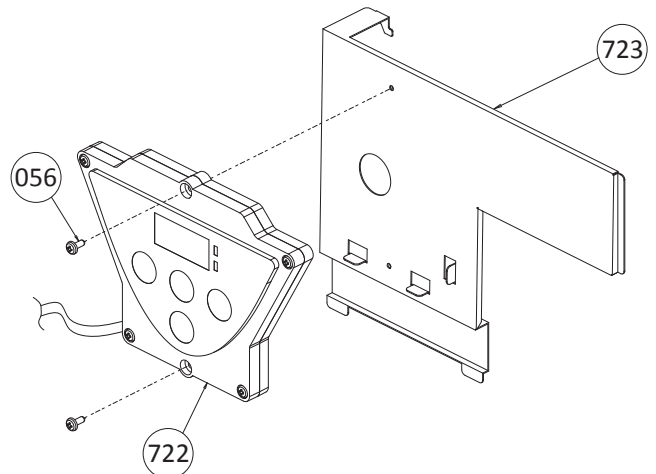


Temperature remote controller



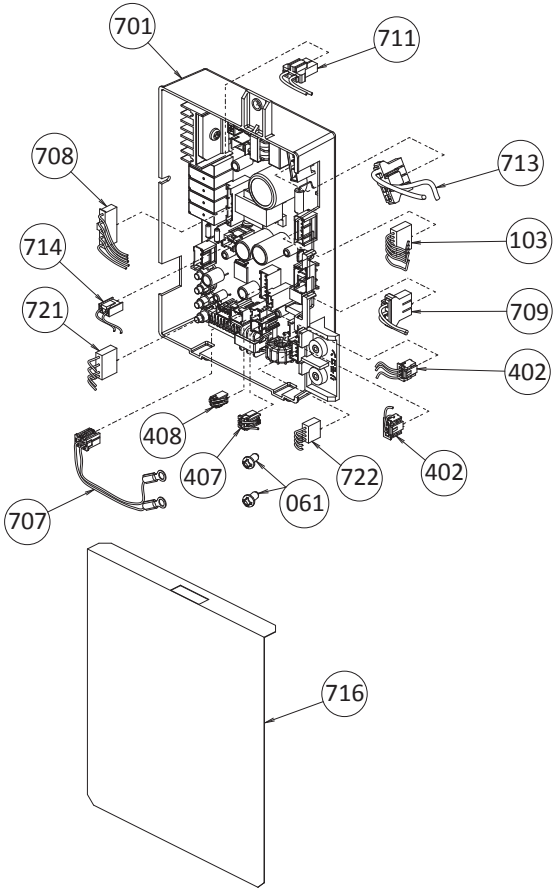
Temperature controller

Indoor models

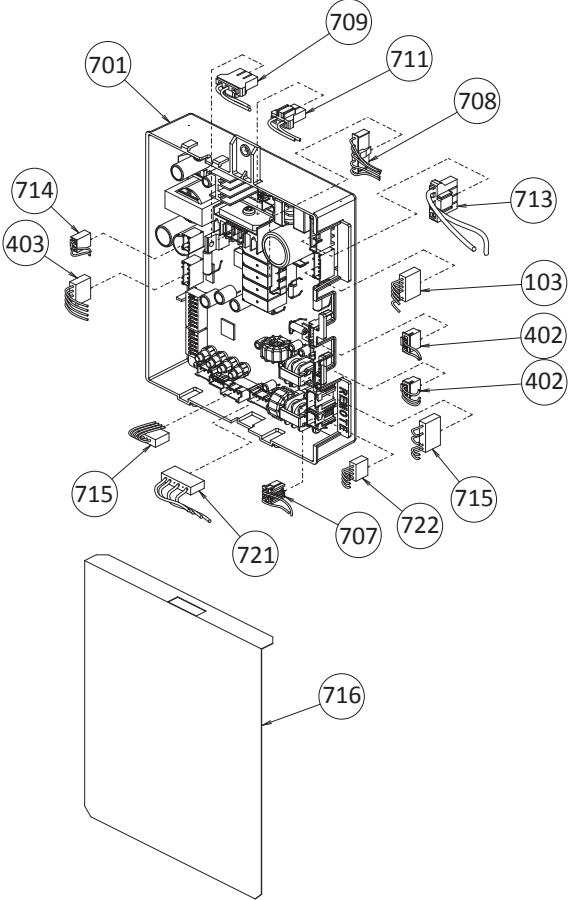


Computer board assembly

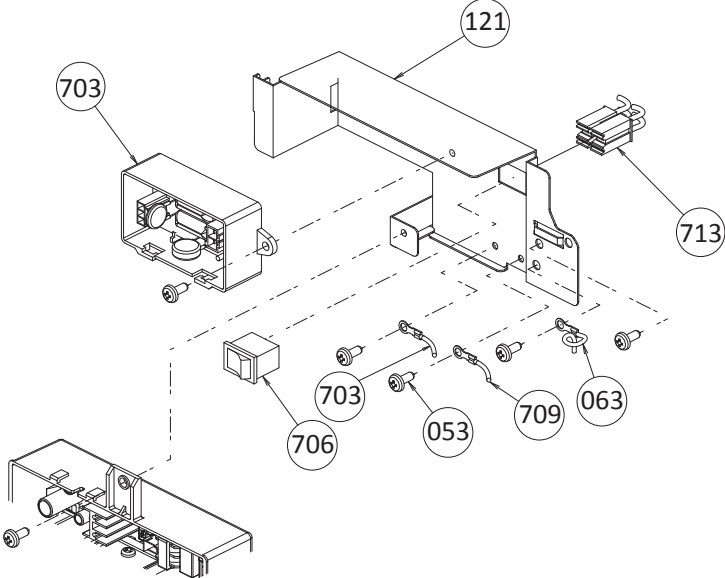
**240 (T-H3J) and
340 (T-H3S) models**



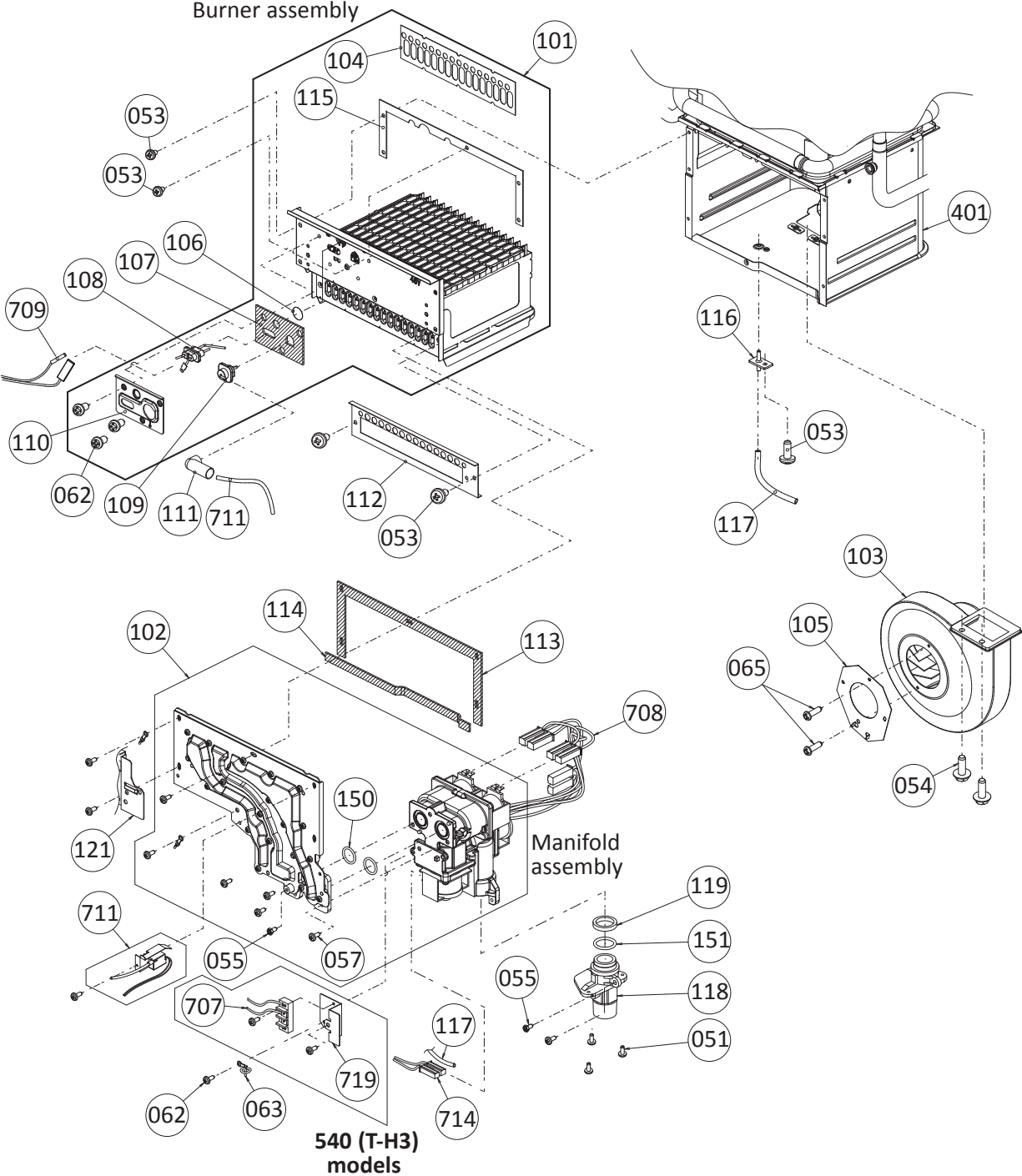
540 (T-H3) models



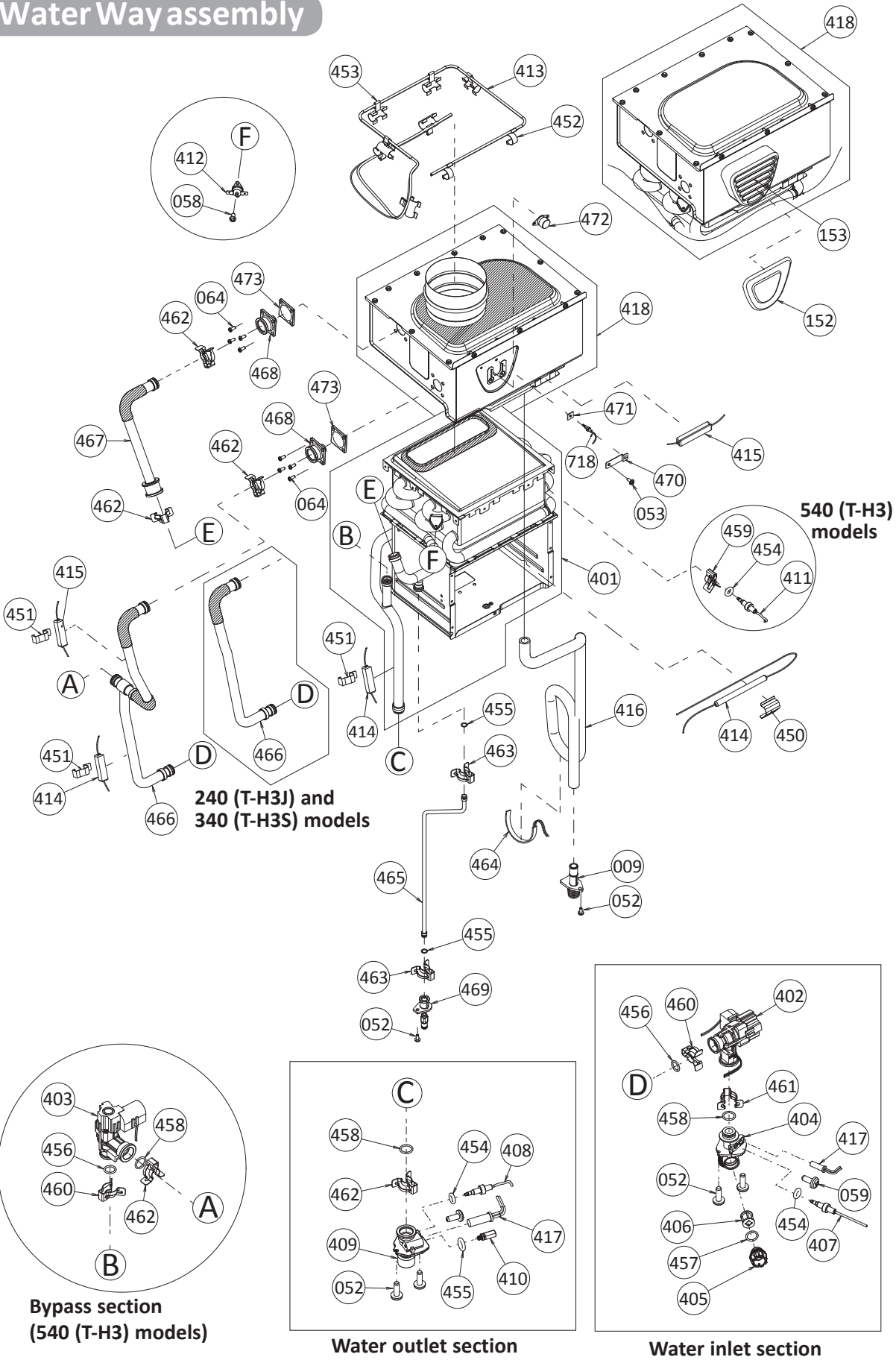
Surge box assembly



Burner assembly



Water Way assembly



PARTS LIST

Item #	Description	Part #	
		240, 340 and 540 models	T-H3J, T-H3S and T-H3 models
001	Case assembly for Indoor models for Outdoor models	N/A N/A	EK159 EK164
002	Front cover for 240 and 340 Indoor (T-H3J-DV and T-H3S-DV) for 240 and 340 Outdoor (T-H3J-OS and T-H3S-OS) for 540 Indoor (T-H3-DV) for 540 Outdoor (T-H3-OS)	319143-505 319143-506 319143-507 319143-508	EK187 EK188 EK158 EK174
003	Intake air port assembly	319143-509	EK170
004	Bracket	N/A	EK162
005	Junction box	319143-510	EK190
006	Power supply cord assembly	319143-511	EK171
007	Back guard panel	319143-512	EK161
008	Chamber fixing plate	319143-513	EK160
009	Condensate drain port	319143-018	EKH23
050	Screw M4×12 (W/Washer)	319143-025	EW000
051	Screw M4×10 (W/Washer)	319143-325	EW001
052	Screw M4×10 (Coated)	319143-026	EW002
053	Screw M4x10	319143-060	EW003
054	Hex head screw M4×12 (W/Washer)	319143-326	EW004
055	Hex head screw M4x8	319143-063	EW005
056	Pan screw M4x20	N/A	EW018
057	Tap tight screw M4x12 FEZN	319143-201	EKK31
058	Screw M3x6	319143-087	EW00A
059	Screw M4x6	319143-328	EW009
060	Screw M4x12	320273-306	EKK37
061	Screw M3x6	N/A	EK191
062	Pan screw M4x8	319143-059	EW00D
063	Wire clamp 60	319143-048	EM167
064	Screw M4x10	N/A	EK230
065	Screw M3x6 SUS3	319143-330	EW00B
101	Burner assembly	319143-514	EK192
102	Manifold with gas valve assembly LP Manifold with gas valve assembly NA	319143-515 319143-516	EK181 EK182
103	Fan motor for Indoor models Fan motor for Outdoor models	319143-443 319143-043	EK109 EKK25
104	Burner gasket	319143-031	EKK2X
105	Fan damper for Indoor models	319143-282	EM381
106	Burner window	319143-033	EKK2V
107	Rod holder gasket	319143-034	EKK2W
108	Flame rod	319143-517	EK193
109	Igniter rod	319143-037	EKK0F
110	Rod holder	319143-036	EKK32
111	Rod cap	319143-038	EKN61
112	Burner damper LP Burner damper NA	319143-518 319143-519	EK183 EK169
113	Manifold gasket A	319143-044	EKK2Y
114	Manifold gasket B	319143-045	EKK2K
115	Burner holder gasket	319143-032	EKK0G

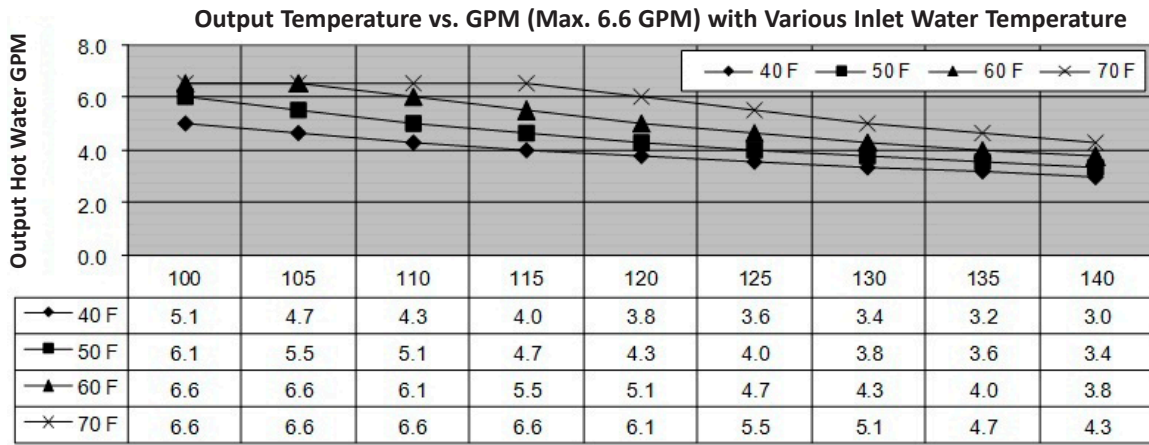
Item #	Description	Part #	
		240, 340 and 540 models	T-H3J, T-H3S and T-H3 models
116	Pressure port	319143-042	EKK2D
117	Combustion chamber tube	319143-344	EX019
118	Gas inlet	319143-455	EK117
119	Gas inlet ring	319143-342	EX00D
121	Surge box plate	319143-522	EK163
150	O-ring P18 NBR (Black)	319143-350	EZP18
151	O-ring P20 NBR (Black)	319143-057	EK042
152	Silicon ring for Outdoor models	319143-523	EK157
153	Exhaust port for Outdoor models	319143-524	EK177
401	Primary heat exchanger assembly for 240 (T-H3J) and 340 (T-H3S) models	319143-547	EK252
	Primary heat exchanger assembly for 540 (T-H3) models	319143-548	EK250
402	Flow adjustment valve / Flow sensor	319143-463	EK129
403	Bypass valve for 540 (T-H3) models	319143-464	EKD58
404	Water inlet	319143-193	EKK1U
405	Inlet drain plug	319143-197	EKK2B
406	Inlet water filter	319143-198	EKK2C
407	Inlet thermistor for 240 (T-H3J) and 340 (T-H3S) models	319143-214	EKK4J
	Inlet thermistor for 540 (T-H3) models	319143-465	EK137
408	Outlet thermistor for 240 (T-H3J) and 340 (T-H3S) models	319143-529	EK207
	Outlet thermistor for 540 (T-H3) models	319143-190	EKK1A
409	Water outlet	319143-530	EK208
410	Outlet drain plug	319143-199	EKK2E
411	Heat exchanger thermistor for 540 (T-H3) models	319143-096	EKK2T
412	Hi-Limit switch for 240 (T-H3J) and 340 (T-H3S) models	319143-228	EM212
	Hi-Limit switch for 540 (T-H3) models	319143-095	EKN34
413	Overheat-cut-off fuse	319143-149	EK333
414	Pipe heater	319143-531	EK209
415	Inlet heater for Indoor models	319143-532	EK210
	Inlet heater for Outdoor models	319143-533	EK211
416	Drain tube	319143-534	EK231
417	Inlet heater	319143-468	EK105
418	Secondary heat exchanger for Indoor models	319143-549	EK251
	Secondary heat exchanger for Outdoor models	319143-550	EK256
450	Pipe heater fixing plate	319143-088	EKK27
451	Heater fixing plate 16	319143-125	EK031
452	Fuse fixing plate 18	319143-066	EKK26
453	Fuse fixing plate 14	319143-146	EK029
454	O-ring P4 FKM	319143-082	EZM04
455	O-ring P6 FKM	319143-080	EZM06
456	O-ring P14 FKM	319143-100	EZM14
457	O-ring P15 FKM	319143-091	EZM15
458	O-ring P16 FKM	319143-083	EZM16
459	Fastener "4-11"	319143-097	EKH30
460	Fastener "14-22"	319143-105	EKK24
461	Fastener "16A"	319143-226	EM192

Item #	Description	Part #	
		240, 340 and 540 models	T-H3J, T-H3S and T-H3 models
462	Fastener "16-25A"	319143-205	EKK39
463	Fastener "6-15"	319143-112	EX12K
464	Flat heater	319143-535	EK217
465	Drain tube	319143-536	EK218
466	Cold pipe for 240 (T-H3J) and 340 (T-H3S) models for 540 (T-H3) models	319143-537	EK219
		319143-538	EK220
467	Stainless heat exchanger out pipe	319143-539	EK222
468	Header connection	319143-540	EK226
469	Drain port	319143-541	EK228
470	Thermistor fixing plate	319143-106	EK13H
471	Exhaust thermistor gasket	319143-111	EK13L
472	Hi-limit switch for exhaust	319143-104	EKH6G
473	Gasket	319143-542	EK229
701	Computer board for 240 (T-H3J) models for 340 (T-H3S) models for 540 (T-H3) models	319143-543	EK186
		319143-544	EK175
		319143-545	EK176
702	Rubber grommet	320273-511	EX00B
703	Surge box	320273-128	EK280
704	120 VAC wire for Indoor models for Outdoor models	319143-427	EK146
		319143-546	EK143
706	120 VAC Power ON-OFF switch	319143-141	EKK4V
707	Remote controller wire for 240 (T-H3J) and 340 (T-H3S) models for 540 (T-H3) models	319143-490	EK189
		319143-491	EK165
		319143-492	EK168
708	Gas valve wire	319143-493	EK166
709	Flame rod wire	319143-493	EK166
711	Igniter assembly	319143-479	EK153
713	Switch wire with thermostat for Indoor models for Outdoor models	319143-496	EK184
		319143-497	EK185
714	Proportional gas valve wire	319143-498	EM167
715	24V cables for 540 (T-H3) models	319143-499	EK179
716	Computer board cover	319143-191	EKK1M
717	Cable clamp for Indoor models	319143-500	EX13C
718	Exhaust thermistor for Indoor models	319143-131	EKH6E
719	Remote fixing plate for 540 (T-H3) models	319143-484	EK152
721	Exhaust Hi-limit switch wire	319143-501	EK180
722	Temperature controller for Indoor models	319143-502	EK173
723	Fixing plate	319143-503	EK178
724	Temperature remote controller	319143-485	ER014

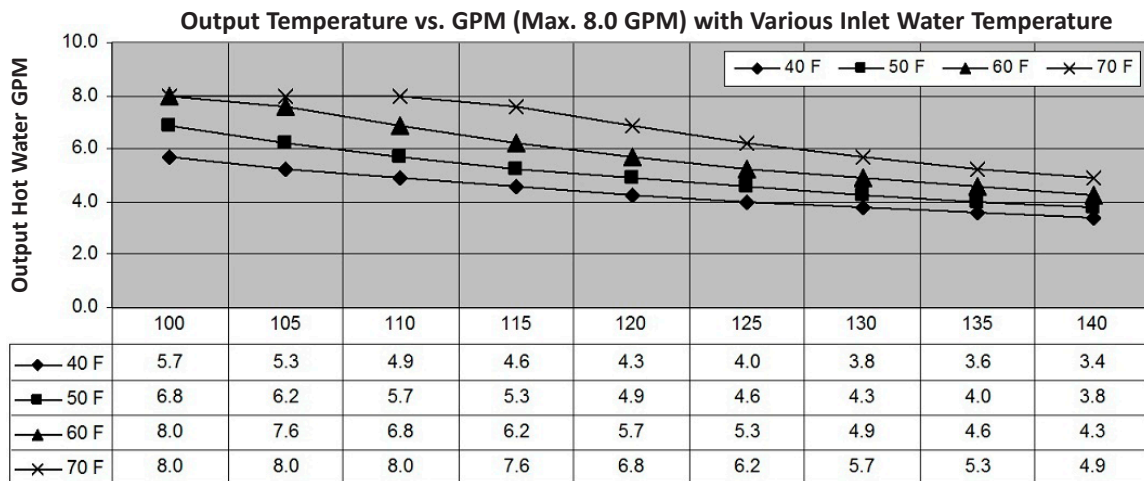
OUTPUT TEMPERATURE CHART

Chart is based on properly sized gas line

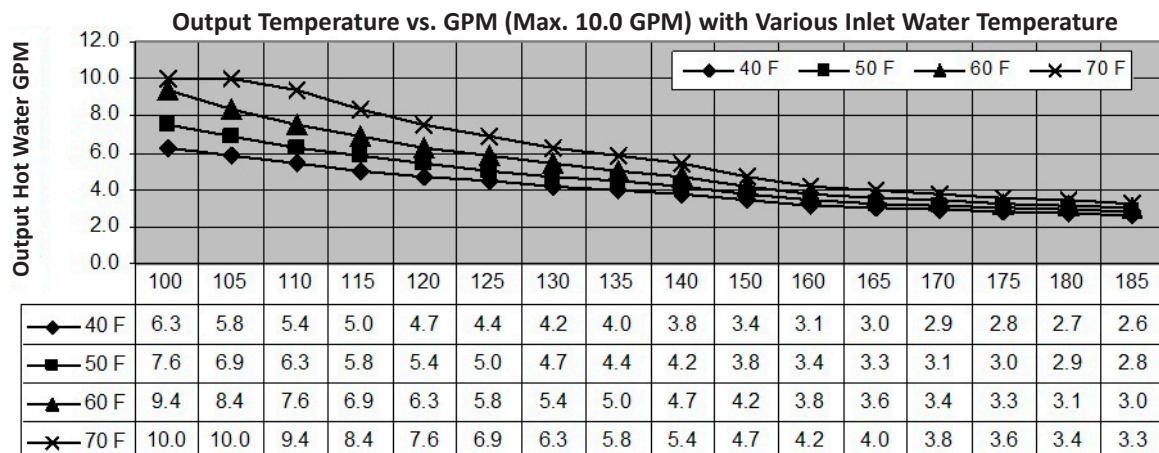
240 (T-H3J) models



340 (T-H3S) models



540 (T-H3) models



*When the set temperature is 130 °F (55 °C) or higher, maximum flow rate is limited to 8.0 GPM.

LIMITED WARRANTY

- The manufacturer warrants this product against defects in materials or workmanship as described in this document if installed within the United States or Canada. 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.

- Warranty for all models:

Application Type	Heat Exchanger	[Unit: Year]	
		Parts	Labor ⁽¹⁾
Single Family Domestic Hot Water	15 ⁽²⁾⁽³⁾	5	1
Commercial or Multi-Family Domestic Hot Water	10 ⁽²⁾⁽³⁾		
Heating	10 ⁽³⁾⁽⁴⁾		

(1) 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.

(2) Includes recirculation and storage tank applications with proper circulation pump control (e.g. aquastat and/or timer).

- Lack of a proper pump control will reduce the heat exchanger and parts warranty to 3 years.

(3) In all applications, the total of length of operation time must be less than 3,000 hours for the 240 (T-H3J) and 340 (T-H3S) models, and less than 9,000 hours for the 540 (T-H3) model.

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

- 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, within the United States or Canada, 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 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.

- 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.

- 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 & provincial 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.
