

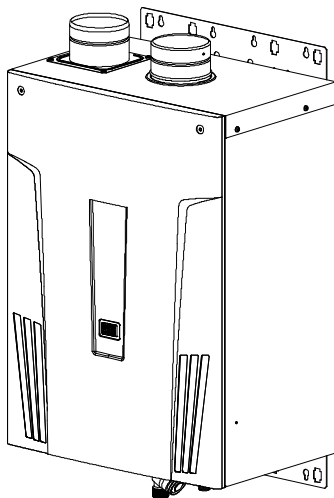
520 *Direct Vent Indoor and Outdoor Models*

On-Demand Condensing Water Heater

Installation Manual and Owner's Guide



ANSI Z21.10.3 and CSA 4.3



Gas Tankless Water Heater

520 Direct Vent Indoor and Outdoor Models

*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
- EASY-LINK SYSTEM

WARNING

This product must be installed and serviced by a licensed plumber, a licensed gas fitter, or a professional service technician. Improper installation and/or operation, or installation by an unqualified person, will void the warranty.

WARNING

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

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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SPECIFICATIONS

520 Indoor and Outdoor

Natural Gas Input (Operating Range)		Min: 13,000 Btu/h Max: 199,000 Btu/h	
Propane Input (Operating Range)		Min: 13,000 Btu/h Max: 199,000 Btu/h	
Gas Connection		¾" NPT	
Water Connections		¾" NPT	
Condensate Drain Port Connection		½" NPT	
Water Pressure		15 - 150 psi*	
Natural Gas Inlet Pressure		Min. 5.0" WC Max. 10.5" WC	
Propane Inlet Pressure		Min. 8.0" WC Max. 14.0" WC	
Manifold Pressure of the 520 Indoor		Natural: 3.2" WC Propane: 5.5" WC	
Manifold Pressure of the 520 Outdoor		Natural: 2.7" WC Propane: 4.6" WC	
Weight		73 lbs. (520 Indoor) 70 lbs. (520 Outdoor)	
Dimensions		H25.6" x W18.5" x D12.4"	
Ignition		Electric Ignition	
Electric	Supply	120 VAC / 60 Hz	
	Consumption	Operation of the 520 Indoor	152 W (1.27A)
		Operation of the 520 Outdoor	102W (0.85A)
		Standby	8.2 W (0.07A)
		Freeze- Protection	207 W (1.73A)

*40 psi or above is recommended for maximum flow

NOTE

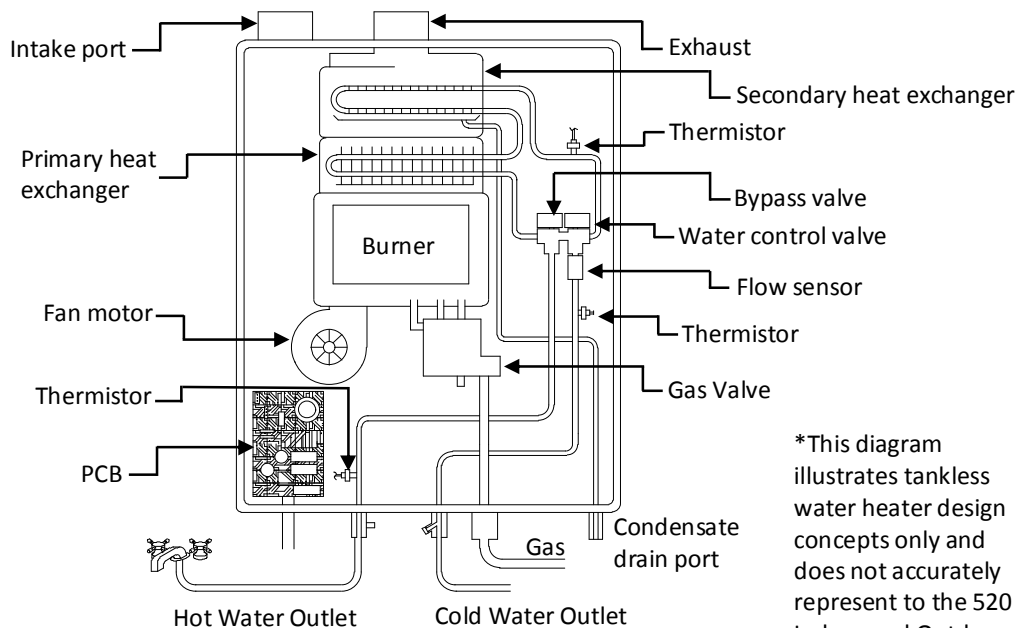
*Check the rating plate to ensure this product matches your specifications.

*In accordance with ANZI Z21.10.3, CO emission does not exceed 400 PPM for normal input

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

INTRODUCTION

- This manual provides information necessary for the installation, operation, and maintenance of the 520 Indoor and Outdoor.
- The model description is listed on the rating plate which is attached to the side panel of the water heater.
- Please read all installation instructions completely before installing this product.
- If you have any problems or questions regarding this equipment, consult with the manufacturer or its local representative.
- The 520 Indoor and Outdoor are on-demand, tankless water heaters designed to efficiently supply endless hot water for your needs.
- The 520 Indoor and Outdoor are **high efficiency models** with an in-build secondary heat exchanger that absorbs latent heat from the exhaust gas.
- The principle behind the 520 Indoor and Outdoor Water Heater is simple:



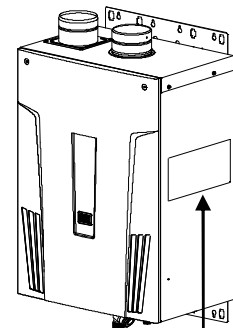
*This diagram illustrates tankless water heater design concepts only and does not accurately represent to the 520 Indoor and Outdoor physical description.

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

SAFETY GUIDELINES

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or CAN/CSA B149.1 Natural Gas, Propane Installation Code in Canada.
2. Properly ground the unit in accordance with all local codes or in the absence of local codes, with the National Electrical Codes: ANSI/NFPA 70 in the USA or CSA standard C22.1 Canada Electrical Code Part 1 in Canada.
3. Carefully plan where you intend to install your 520 Indoor and Outdoor Water Heater. Please ensure:
 - Your water heater will have enough combustible air and proper ventilation.
 - Locate your heater where water leakage will not damage surrounding areas (please refer to p. 5).
4. Check the rating plate for the correct **GAS TYPE, GAS PRESSURE, WATER PRESSURE and ELECTRIC RATING**.
 *If this unit does not match your requirements, **do not install and consult with the manufacturer**.
5. If any problem should occur, turn off all hot water taps and turn off the gas. Then call a trained technician or the Gas Company or the manufacturer.



RATING PLATE

WARNING

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



Prohibited

- Do not store or use gasoline or other flammables, vapors, or liquids in the vicinity of this appliance.
- Do not reverse the water and/or gas connections as this will damage the gas valves and can cause severe injury or death. Follow the diagram on p. 19 when installing your water heater:
- Do not use this appliance if any part has been in contact with or been immersed in water. Immediately call a licensed plumber, a licensed gas fitter, or a professional service technician to inspect and/or service the unit if necessary.
- Do not disconnect the electrical supply if the ambient temperature will drop below freezing. The Freeze Prevention System only works if the unit has electrical power. The warranty will not be covered if the heat exchanger is damaged due to freezing. Refer to the section on the Freeze Prevention System on p. 39 for more information.

INSTALLATION

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



- **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 your 520 Indoor or Outdoor Water Heater and for compliance with all national, state/provincial, and local codes.**

PLEASE READ THIS MANUAL CAREFULLY AND FOLLOW ALL DIRECTIONS.



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




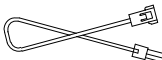


- Locate your heater close to a drain where water leakage will not do damage to surrounding areas. As with any water heating appliance, the potential for leakage at some time in the life of the product does exist. The manufacturer will not be responsible for any water damage that may occur. If you install a drain pan under the unit, ensure that it will not restrict the combustion air flow.
- The 520 models are high efficiency products that create condensation. A condensation drain tube must be installed with these models to discharge condensate into a drain outlet. For more information, refer to p. 20.
- **The manufacturer does not recommend installing the 520 Indoor models in an attic due to safety issues.** If you install your 520 Indoor models in an attic:
 - Make sure your unit will have enough combustion air and proper ventilation.
 - Keep the area around you're the water heater clean. When dust collects on the flame sensor, the water heater will shut down on errors.
 - Locate unit for easy access for service and maintenance.
 - A drain pan, or other means of protection against water damage, is required to be installed under the water heater in case of leaks.

GENERAL

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

INCLUDED ACCESSORIES

Check that the installation manual, the communication cable, the product registration card and the PVC adaptor are included with the unit (the adaptor comes with the 520 Indoor model only).
For details on how to connect the adaptor, refer to P.14.

1. Manual  Qty: 1	2. Communication cable  Qty: 1
3. Product Registration Card  Qty: 1	4. PVC adaptor (520 Indoor model only)  Qty: 1

OPTIONAL ITEMS

1. Temperature Remote Controller: 9007603005



The Temperature Remote Controller has two functions. It allows the output temperature from the 520 to be adjusted within the range of 100 °F to 185 °F, and it also works as a diagnostic tool that will give a concise error code whenever there is a problem with the unit. The temperature options are 100°F, 105°F, 110°F, 115°F, 120°F, 125°F, 130°F, 135°F, 140°F, 145°F, 150°F, 155°F, 160°F, 165°F, 170°F, 175°F, 180°F and 185°F. See the trouble shooting section for information on possible error codes.

2. Pipe cover: 9007606005



The Pipe cover protects the plumbing pipes to the 520 Indoor and Outdoor models from unexpected adjustments. This pipe cover is fixed to the bottom of the water heater, which hides the plumbing and improves the visual aspects of the whole installation for the water heater.

3. Wall thimble with Termination: 9007608005 and 9007609005



**Louver
Termination
9007608005**



**Hood
Termination
9007609005**

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

4. Neutralizer kit: 9007607005



The Neutralizer assembly neutralizes the condensate (acidic water) that forms in the secondary heat exchanger of the 520 models.

It connects to the condensate drain port of the 520 models by using connectors included with the neutralizer kit. Refer to p. 21 for the details.

WARNING FOR INSTALLATIONS

FOR YOUR SAFETY, READ BEFORE INSTALLATION:

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



Prohibited



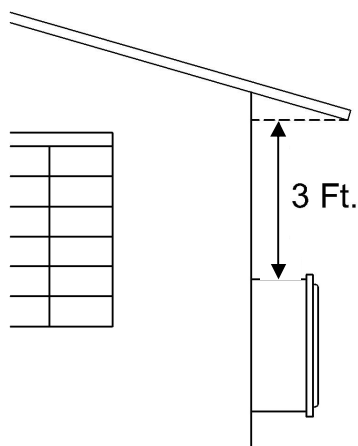
Do not have the vent terminal pointing toward any opening into a building. Do not locate your heater in a pit or location where gas and water can accumulate.



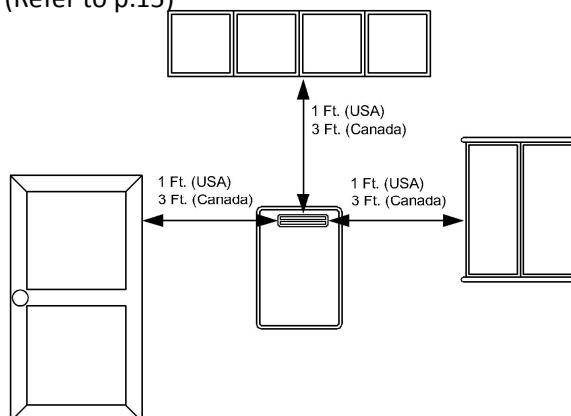
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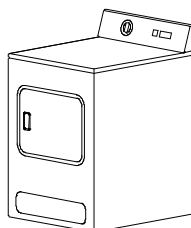
Do not install this water heater under an overhang less than 3 feet from its top or eaves. The area under an overhang must be open to three sides. (520 Outdoor only)



Do not install the water heater vent terminator within 1 ft. in the USA of any air intake or building opening, and within 3 ft. in Canada of any air intake or building opening. (520 Outdoor only) (Refer to p.15)



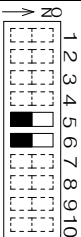
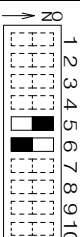

Do not install next to a dryer or any source of airborne debris that can be trapped inside the combustion chamber, unless the system is direct vented.



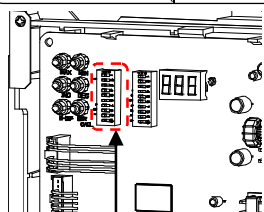
HIGH-ALTITUDE INSTALLATIONS

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

Left bank of dipswitches

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

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



Left bank of dipswitches



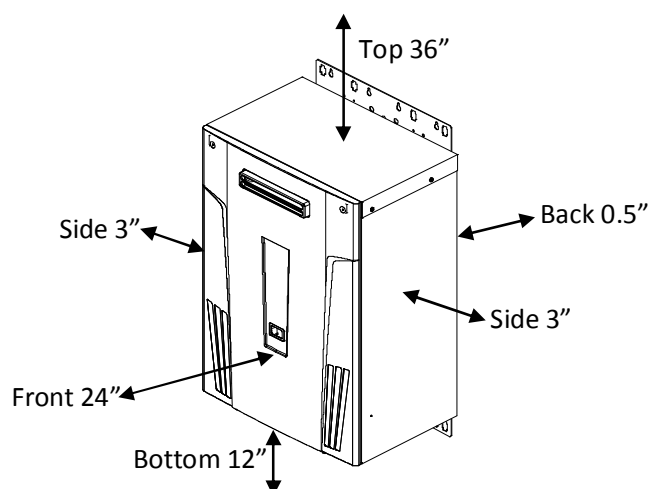
DO NOT adjust any dipswitches on the right bank.

520 Outdoor INSTALLATION

1. Install the 520 Outdoor model only in areas with mild, temperate climates.
2. The 520 Outdoor model shall be wall-mounted or mounted on a stand. Locate the 520 Outdoor model in an open, unroofed area and maintain the following minimum clearances:



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

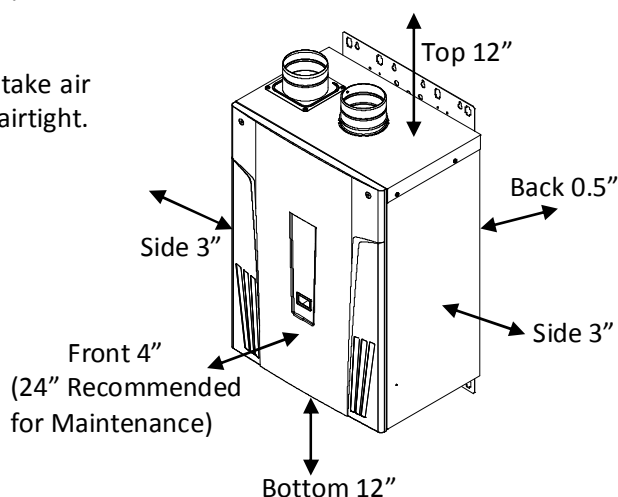


520 Indoor model INSTALLATION

The 520 Indoor models are equipped with a thermistor and hi-limit switch for the exhaust gas, detecting excess temperatures within the flue and enabling the unit to safely stop operations if needed. These components are always monitoring exhaust gas conditions in order to prevent heat damage to PVC (Plastic) venting if PVC is used.

If the exhaust gas temperature exceeds 140°F, these components will enable the unit to safely stop operations. (For the 520 Outdoor model, these components are not available since there's no exhaust venting required.)

- 520 Indoor model requires a 4" make-up intake air supply pipe. The intake pipe must be sealed airtight.
- Air supply pipe can be made of ABS, PVC, galvanized steel, corrugated stainless steel, or Category III / IV stainless steel.
- Sidewall venting is recommended for the 520 Indoor models. Vertical venting (roof termination) is acceptable.
- **The manufacturer** recommends running the exhaust vent and the intake pipe as parallel as possible.
- The PVC adaptor is used to make the connection between the 520 Indoor vent collar and PVC vent pipe easier and for maintenance purposes.



Keep the clearances.

VENTING INSTRUCTIONS

-General-



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



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

The 520 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, 520 Indoor may also be vented with plastic pipe materials such as PVC. For details, please refer to the Exhaust Vent (PVC Vent) section on p. 11. Vent installations in Canada which utilize plastic vent systems must use venting that complies with ULC S636.

-Exhaust vent (PVC & ABS vent) -

The 520 Indoor models can be connected with PVC or ABS venting (temperature rated up to 149°F). However, **the manufacturer** recommends PVC (or ABS) venting certified to ULC S636 standards.

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

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

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

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

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

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

For details on the vent connection to the 520 Indoor, refer to P.14

-Exhaust vent (Stainless steel vent)-

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

- The 520 Indoor is a Category IV appliance and must be vented accordingly with any 4" vent approved for use with Category III/IV or Special BH type gas vent.
- **The manufacturer recommends the "T-Vent" line manufactured by TAKAGI** (Refer to Takagi's "T-Vent" brochure for details). However, the following are also UL listed manufacturers: ProTech Systems Inc. (FasNSeal), Flex-L Inc., Z-Flex Inc. (Z-Vent III), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).

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

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

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

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

-Vent termination -



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

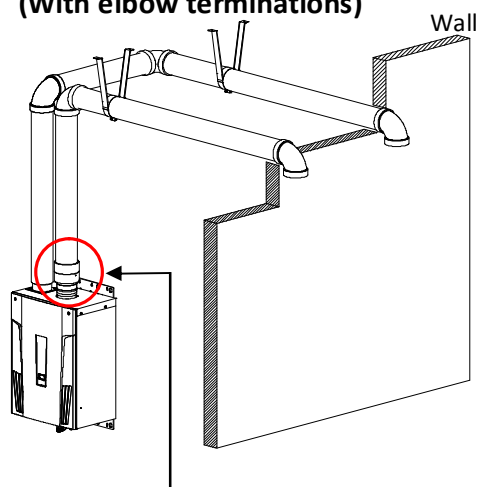
- The vent terminator provides a means of installing vent pipe through the building wall and must be located in accordance with ANSI Z223.1/NFPA 54, or in Canada with CAN/CSA-B149.1 and local applicable codes.
- A proper sidewall direct-vent terminator is recommended when the water heater is vented through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

General rules for venting the 520 Indoor water heater are:

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

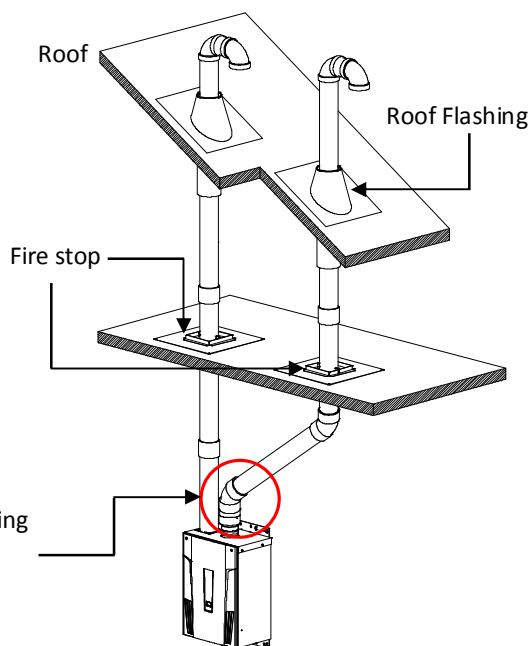
-PVC Venting Illustrations-

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

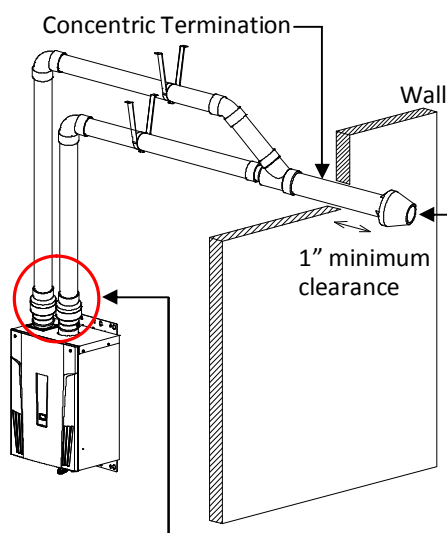


Connection between exhaust vent collar and PVC piping
See the next page for instructions.

Vertical Installation Diagram



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



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



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

Insert the bird screen included with the termination

How to install PVC venting with the 520 Indoor (For Exhaust)

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

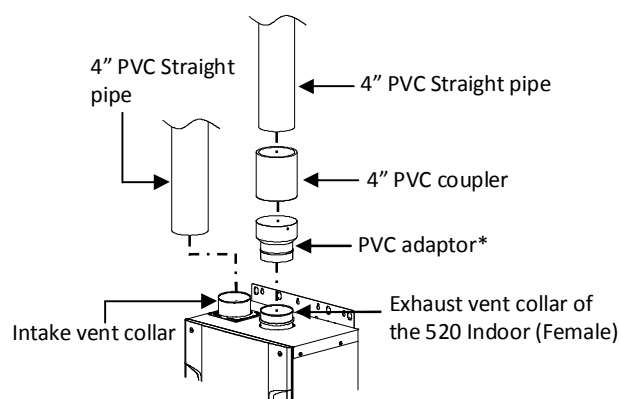
(For Intake: 4" only)

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

(For Intake: 3" only)

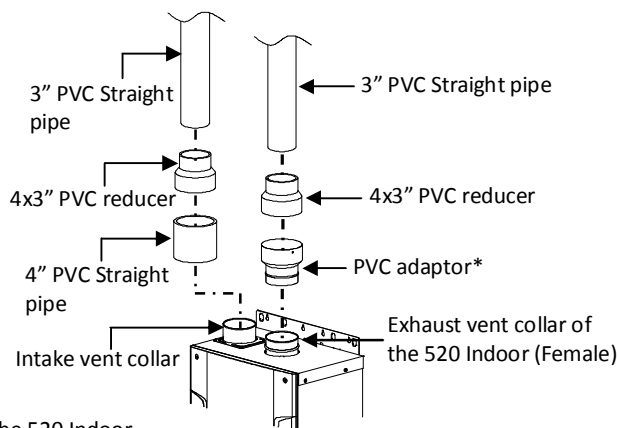
1. Connect a 4" PVC Straight pipe directly on the intake vent collar of the water heater.
2. Connect a 4x3" PVC reducer to the 4" PVC Straight pipe.
3. From the reducer, continue on the rest of the vent run with 3" PVC pipe.

4" vent connection Diagram



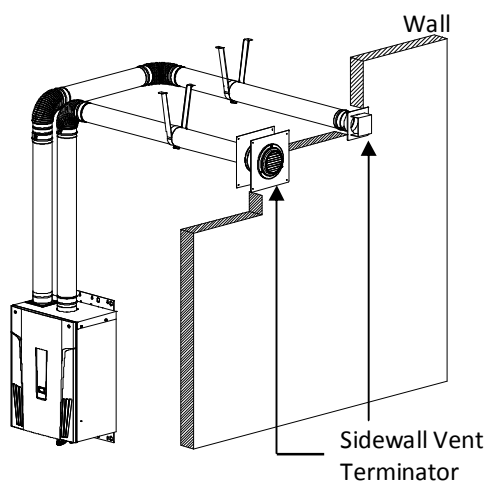
*PVC adaptor is included with the 520 Indoor.

3" vent connection Diagram

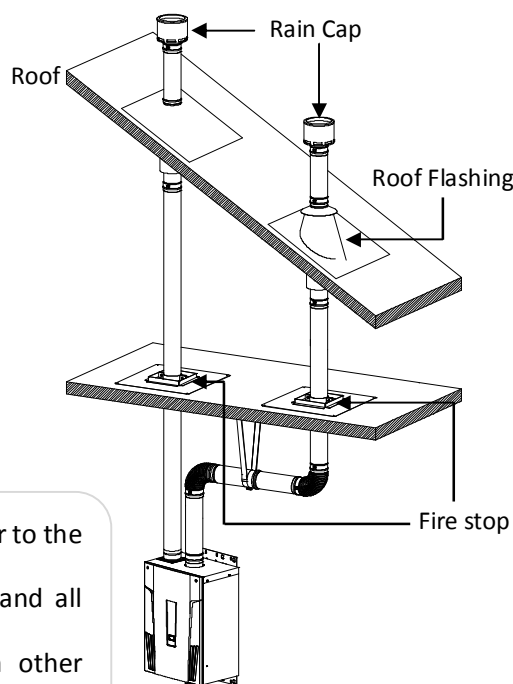


-Stainless steel Venting Illustrations-

Horizontal Installation Diagram

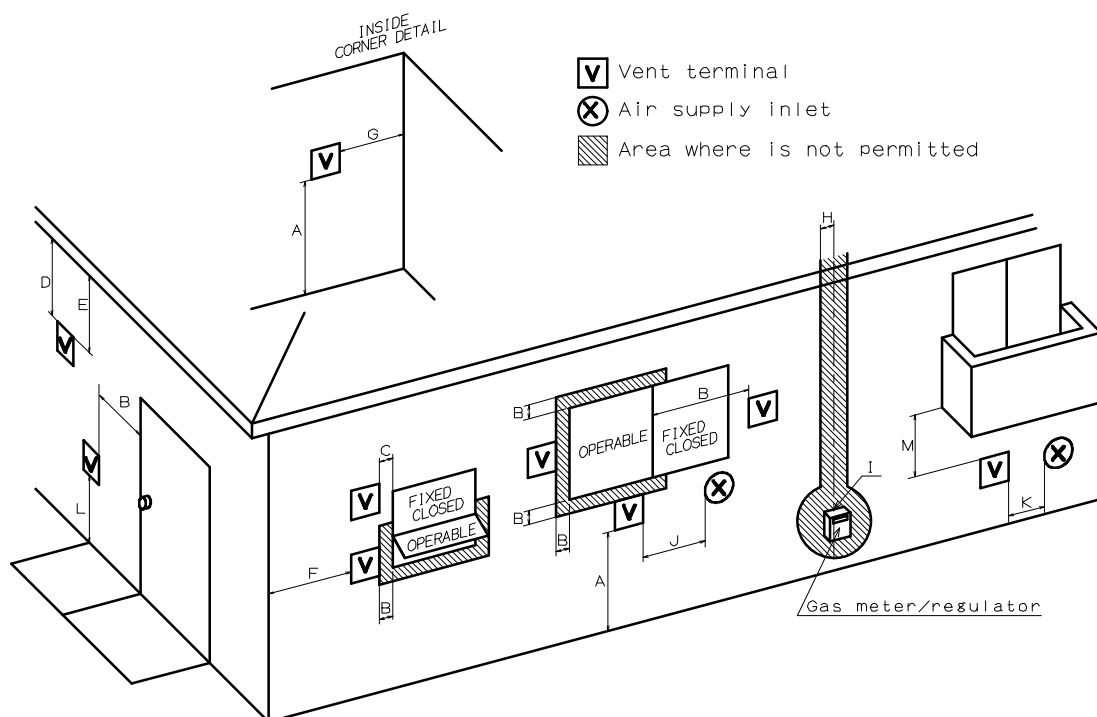


Vertical Installation Diagram



- Regarding the clearances from the exhaust terminator to the air inlet or opening, refer to the next few pages.
- Follow all vent system manufacturer's instructions and all local codes.
- Do not common vent or connect any vent from other appliances to the 520 Indoor water heater vent.
- Use 4" Category III/IV approved or Special BH, single or double wall stainless steel vent pipe.

-Vent clearances-

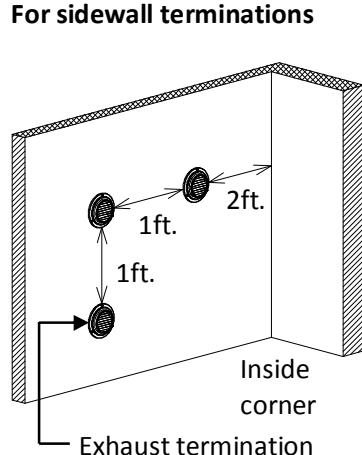


		Canada	U.S.A	
		Direct vent and other than Direct Vent	Direct vent	Other than Direct Vent
A	Clearance above grade, veranda, porch, deck, or balcony.	1 foot	1 foot	1 foot
B	Clearance to window or door that may be opened.	3 feet	1 foot	4 feet from below or side opening. 1 foot from above opening.
C	Clearance to permanently closed window	*	*	*
D	Vertical clearance to ventilated soffit located above the vent terminator within a horizontal distance of 2 feet (61cm) from the center line of the terminator.	*	*	*
E	Clearance to unventilated soffit	*	*	*
F	Clearance to outside corner	*	*	*
G	Clearance to inside corner	*	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet	*	*
I	Clearance to service regulator vent outlet.	3 feet	*	*
J	Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other application.	3 feet	1 foot	4 feet from below or side opening. 1 foot from above opening.
K	Clearance to mechanical air supply inlet.	6 feet	3 feet	3 feet
L	Clearance above paved sidewalk or paved driveway located on public property.	7 feet	*	7 feet
M	Clearance under veranda, porch deck, or balcony.	1 foot	*	*
*For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/CSA-B149.1, please use clearances in accordance with local installation codes and the requirement of the gas supplier.				

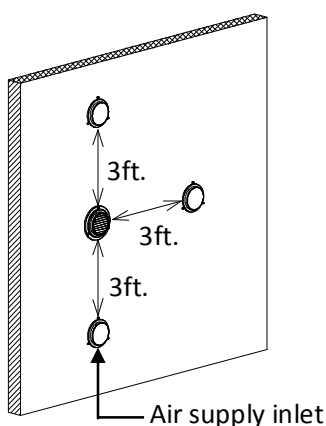
-Additional clearances -

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

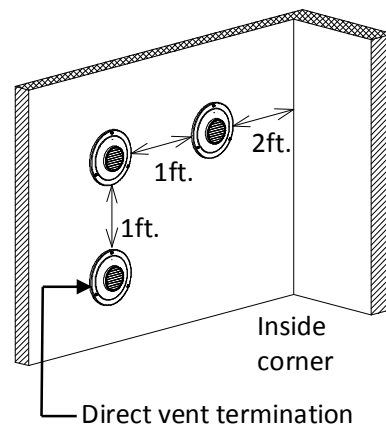
For sidewall terminations



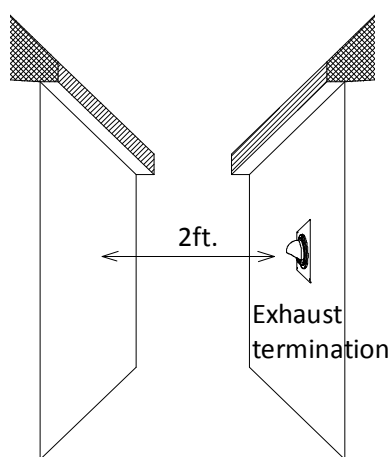
For multiple sidewall exhaust terminations (e.g. multi-unit systems), an exhaust termination must be at least 1 ft. away from another exhaust termination. An exhaust termination must also be at least 2 ft. away from an inside corner (if the adjacent wall is less than 2 ft. of length, the minimum required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



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

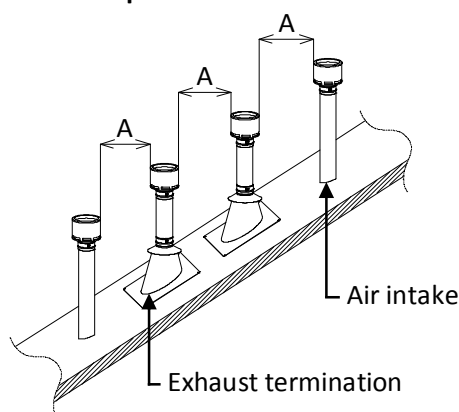


For multiple-unit, direct-vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. away from each other, no matter the orientation. A direct-vent termination must also be at least 2 ft. away from an inside corner (if the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

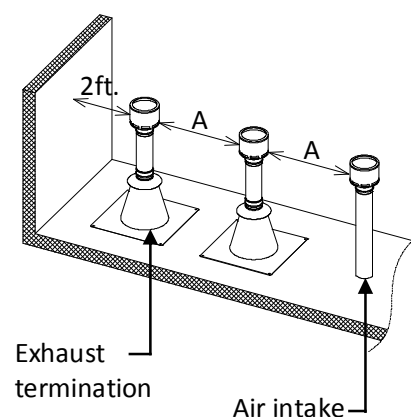


Exhaust and/or direct-vent sidewall terminations should be at least 2 ft. away from an opposite surface/wall. Do not place the termination directly in front of an opening into a building.

For rooftop terminations




A: in accordance with local codes



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

GAS SUPPLY AND GAS PIPE SIZING

TO TURN OFF GAS TO APPLIANCE

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



WARNING

- 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.**

***Check that the type of gas matches the rating plate first.**

1. The minimum and maximum inlet gas pressures are:

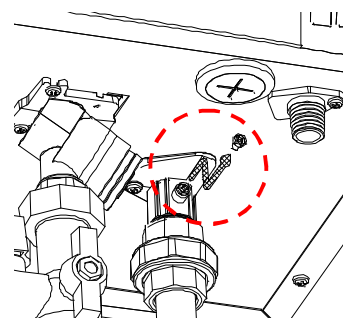
Gas type	Inlet gas pressure
Natural Gas	Min. 5.0" WC – Max. 10.5" WC
Propane Gas	Min. 8.0" WC – Max. 14.0" WC

2. Gas pressure below this specified range for the 520 and/or insufficient gas volume will adversely affect performance. These pressures are measured when the 520 is in full operation.
3. 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.
4. Until testing of the main gas line supply pressure is completed, ensure the gas line to the 520 is disconnected to avoid any damage to the water heater.

-Measuring inlet gas pressure -

The 520 cannot perform properly without sufficient inlet gas pressure. Below are instructions on how to check the inlet gas pressure. **THIS IS ONLY TO BE DONE BY A LICENSED PROFESSIONAL.**

1. Shut off the manual gas valve on the supply gas line.
2. Remove the screw for the pressure port located on the gas inlet of the water heater shown in the diagram to the right.
3. Connect the manometer to the pressure port.



4. Re-open the manual gas valve. Check to see that there are no gas leaks. Open some of the fixtures that use the highest flow rate to turn on the water heater.
5. Check the inlet gas pressure. When the water heater is on maximum burn, the manometer should read from 5.0" to 10.5" WC for Natural gas, from 8.0" to 14.0" WC for Liquid Propane.



Size the gas pipe appropriately to supply the necessary volume of gas required for the 520 Indoor and Outdoor models (199,000 BTU/h for both Natural Gas and Liquid Propane) using ANSI233.1/NFPA 54 in the USA or CAN/CSA B149.1 in Canada or local codes. Otherwise, flow capabilities and output temperatures will be limited.

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

-Natural Gas Supply Piping-

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

Based on Energy Content of 1,000 BTU/Cubic Ft.: 520 requires 199 Cubic Ft./hr.

Unit: Cubic Feet per Hour

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

-Propane (LP) Gas Supply Piping-

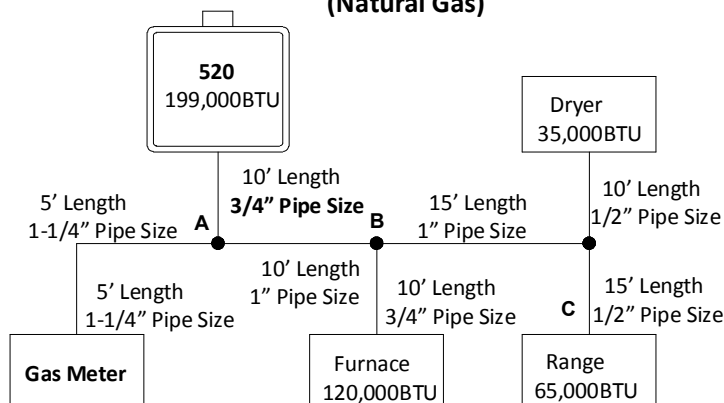
Maximum Capacity of Propane (LP) Gas Based on 11" WC supply pressure at a 0.5" WC pressure drop

Unit: kBTU per Hour

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

For more information, please see the next page.

Gas Sizing Example (Natural Gas)



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

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

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

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

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

WATER CONNECTIONS

FOR YOUR SAFETY, READ BEFORE OPERATING:

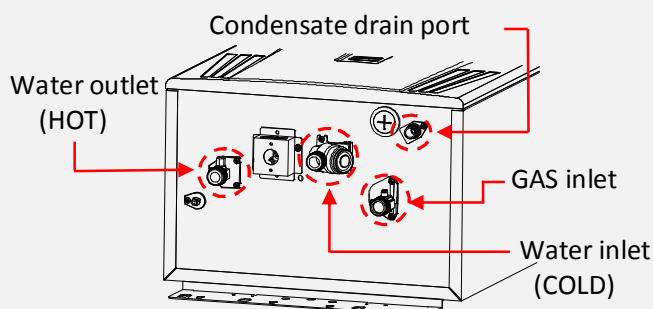
Do not use this water heater if any part has been submersed under water. Immediately call a licensed professional to inspect the water heater and to replace any damaged parts.

1. All pipes, pipe fittings, valves and other components, including soldering materials, must be suitable for potable water systems.
2. A manual shut off valve must be installed on the cold water inlet to the water heater between the main water supply line and the water heater.
3. In addition, a manual shut off valve is also recommended on the hot water outlet of the unit. If the water heater is installed within, or subjected to, a closed loop water system, a thermal expansion tank must be installed.
4. **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.**
5. 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.



CAUTION

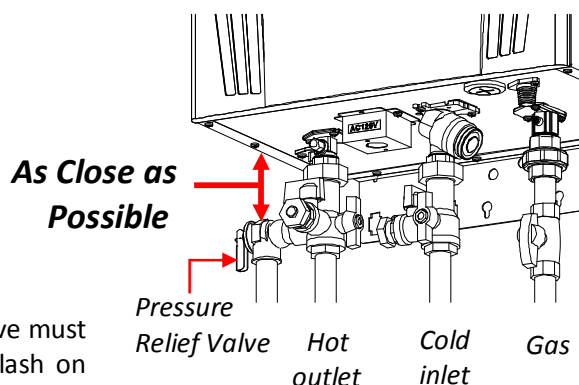
Do not reverse the hot outlet and cold inlet connections to the 520 Water Heater. This will not properly activate the water heater.



PRESSURE RELIEF VALVE

The 520 has a high-temperature shut off switch built in as a standard safety feature (called a Hi-Limit switch) therefore a “**pressure only**” relief valve is required.

1. This unit does not come with an approved pressure relief valve.
2. An approved pressure relief valve must be installed on the hot water outlet.
3. The pressure relief valve must conform to ANSI Z21.22 or CAN 1-4.4 and installation must follow local code.
4. The discharge capacity must be at least 199,000 BTU/h.
5. The pressure relief valve needs to be rated for a maximum of 150 psi.
6. The discharge piping for the pressure relief valve must be directed so that the hot water cannot splash on anyone or on nearby equipment.
7. Attach the discharge tube to the pressure relief valve and run the end of the tube to within 6" from the floor. This discharge tube must allow free and complete drainage without any restrictions.
8. If the pressure relief valve installed on the 520 discharges periodically, this may be due to a defective thermal expansion tank or defective pressure relief valve.
9. The pressure relief valve must be manually operated periodically to check for correct operation.

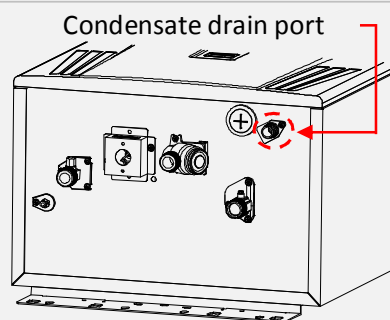


CONDENSATE DRAIN

- The 520 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.

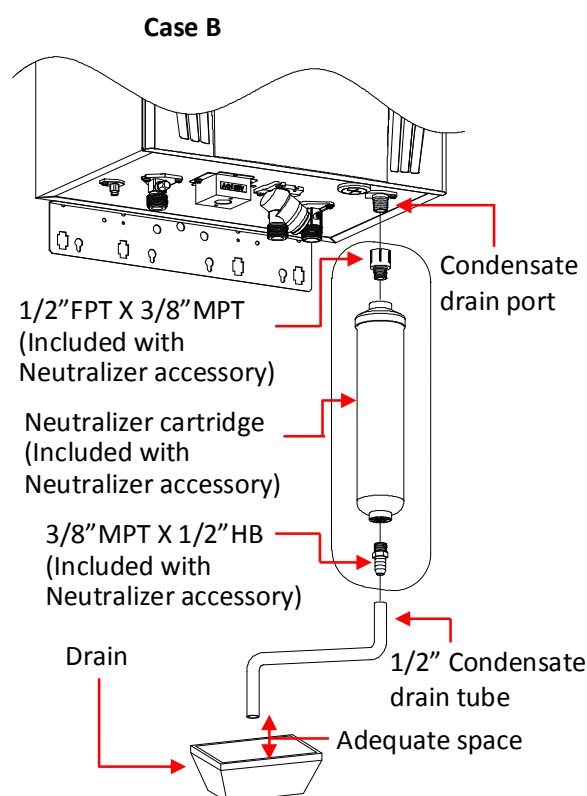
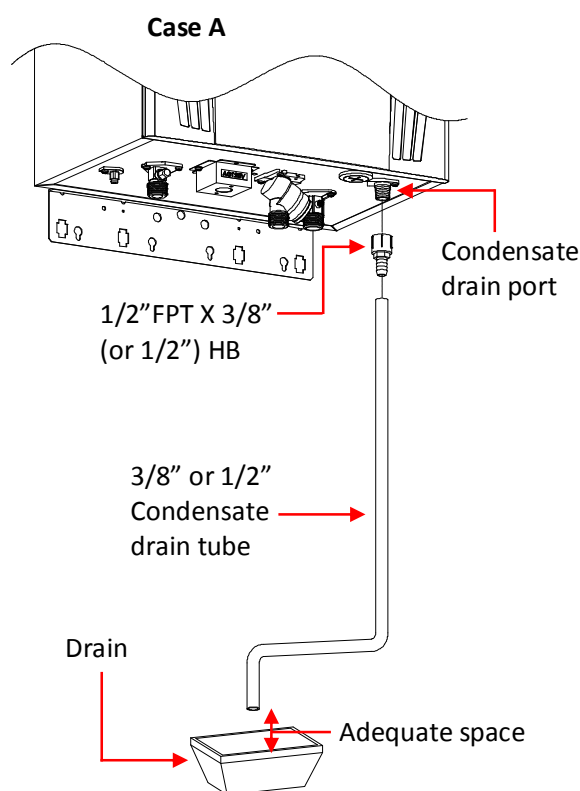
The 520 models are high efficiency condensing water heaters that produce condensate (acidic water). The acidic condensate generated in the secondary heat exchanger can be neutralized by the Neutralizer accessory.

Case A: If a neutralizer is not required

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

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

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



**WARNING**

- The condensate drain is at atmospheric pressure (non-pressurized) and therefore must be allowed to drain freely with gravity only. Please ensure that there are no blockages along the condensate drain tube. **All portions of the condensate drain (neutralizer and drain tube) must be at a lower elevation than the 520 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

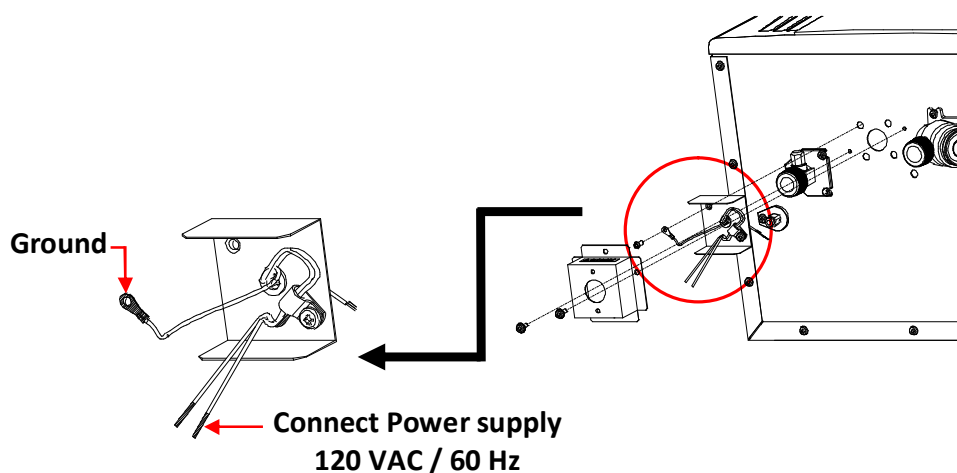


Follow the electrical code requirements of the local authority having jurisdiction. In the absence of such requirements, follow the latest edition of the National Electrical Code ANSI/NFPA 70 in the U.S. or the latest edition of CSA C22.1 Canadian Electrical Code, Part 1, in Canada.



When servicing or replacing parts within the 520, label all wires prior to disconnection to facilitate an easy and error-free reconnection. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

1. The 520 must be electrically grounded. Do not attach the ground wire to either the gas or the water piping.
2. The 520 requires **120 VAC / 60 Hz electrical power supply that is properly grounded.**
 - A proper disconnect (i.e. on/off switch, power plug, etc.) controlling the main power to the water heater must be provided for service reasons. (Must comply with local codes).
 - Connect the power supply to the water heater exactly as shown in the wiring diagram;
3. A green screw is provided in the junction box to ground the connection.
4. Can be hardwired or wired to a plug-in.
5. The use of a surge protector is recommended in order to protect the unit from power surges.



REMOTE CONTROLLER CONNECTION

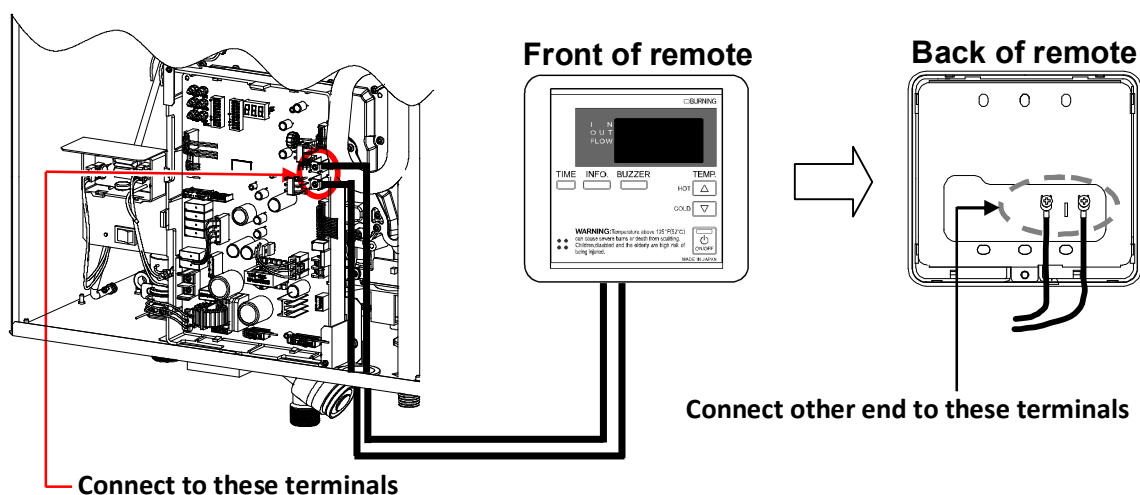
1. Disconnect power supply from the water heater.
2. Take off the water heater's front cover.
3. Locate the remote controller terminal, pictured below (located around the upper right-hand side of the computer board).
4. Open the plastic cover of the remote controller accessory, and then attach the two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

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

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

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

Remote controller terminal of the 520



PUMP CONTROL CONNECTION

The 520 Indoor and Outdoor models can be used to control a recirculation pump. Proper pump control helps to preserve the life of the system and saves energy as well: The water heater pump control port is a “**normally open dry contact**”, and therefore needs additional components to properly control a recirculation pump. To control a recirculation pump, connect the pump to the “**Pump connector**” in the 520 as shown in the diagram below. (In an Easy-Link system, connect the pump **ONLY** to the “**PARENT**” unit.) The pump is to be connected using suitable relays shown in the diagram below.

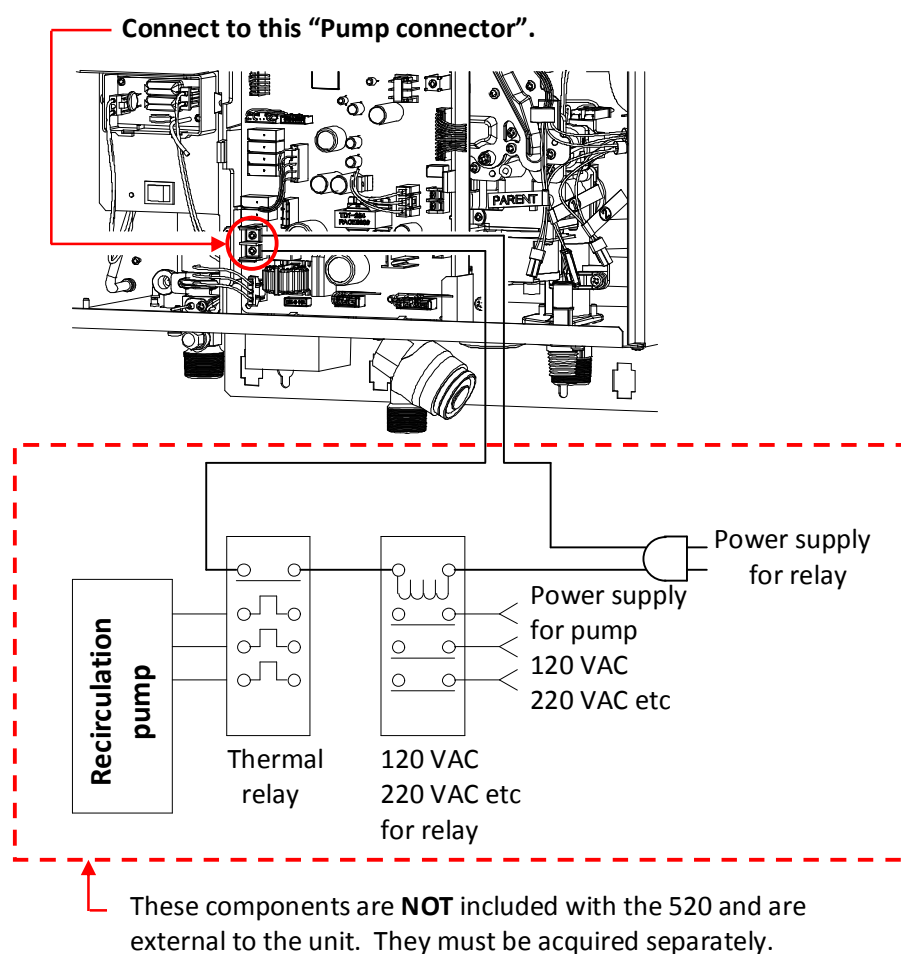
Please make sure the relays are properly rated for the recirculation pump.

Using the 520 models internal thermistors as a temperature control, the recirculation pump will only turn on when recirculation is needed.



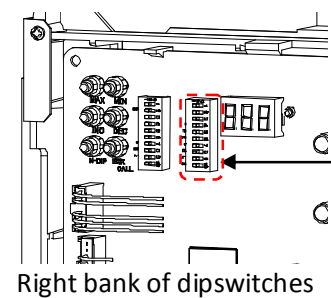
CAUTION

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



PUMP CONTROL MODES

The 520 provides the four types of the pump control modes. The pump control modes are selected by changing dipswitch settings. The dipswitches that change the pump control modes are located in the **right bank** of dipswitches in the upper-left quadrant of the computer board in the 520. (See right.) These 4 modes only affect pumps that are connected to the 520 pump control (p.25)



A) Recirculation Control: No. 5 ON

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

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

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

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

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

B) Storage Tank Circulation Control: No.6 ON

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

Function: The 520 heats the water 5.4°F higher than its set temperature. The circulation pump between the storage tank and the water heater will continually remain running. After set temperature has been reached in the storage tank, the 520 will fire off and limit the water flow rate to less than 2.6 GPM, to continually monitor the temperature throughout the system.

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

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

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

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

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

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

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

Dipswitch settings for the Pump control modes

Right bank of dipswitches

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

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

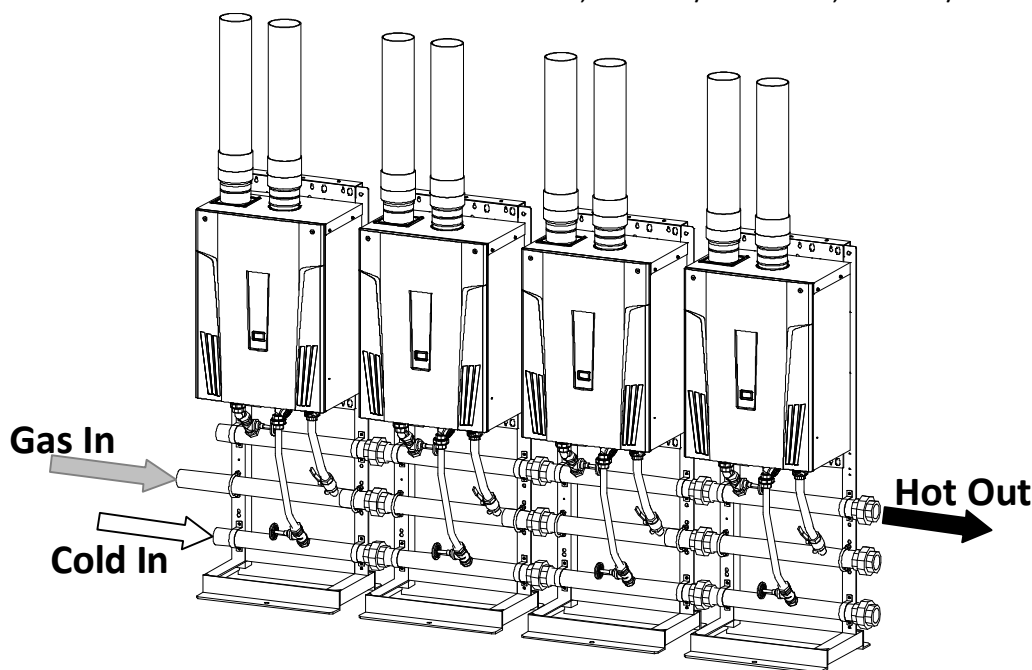
EASY-LINK SYSTEM

-General-

The 520 can be connected with other heaters of the **same model** with communication cables to work as a multiple-unit manifold system.

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

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



CAUTION

- The Easy-Link system is limited up to **4 units**. If you connect more than 4 units, only the first 4 units will work as a part of the Easy-Link system. The other additional units will not work.
- **The 520 cannot be linked with other different tankless models in an Easy-Link system.**

-Easy-Link Connection Procedures-

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

Locate the two banks of dipswitches to the left of the 3-digit 7-seg. LED on the computer board of the 520 that you select to be the “**PARENT**” unit. Change dipswitch No. 10 on the **right bank of dipswitches to the ON position**. Do not change any dipswitches on any of the “**CHILD**” units.

4. Between the “PARENT” and the “CHILD-1” units

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

5. Between the “CHILD-1” and the “CHILD-2” units

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

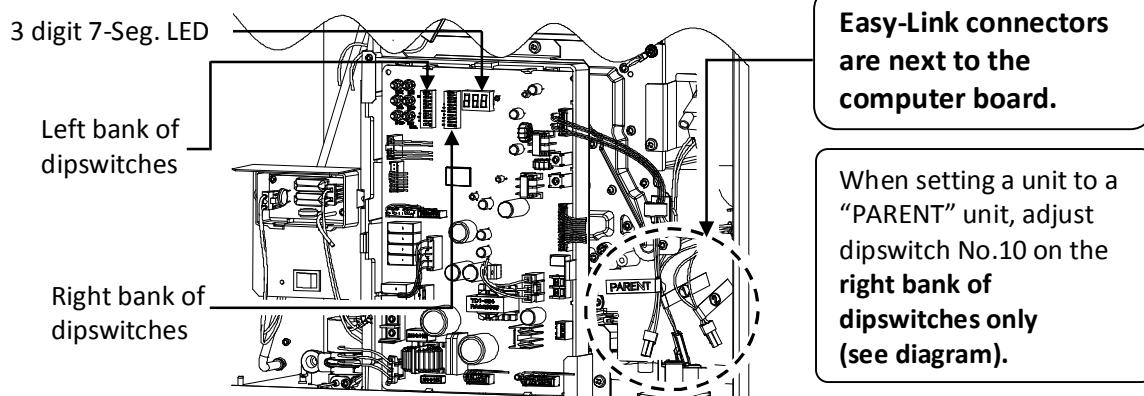
6. Between the “CHILD-2” and the “CHILD-3” units

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

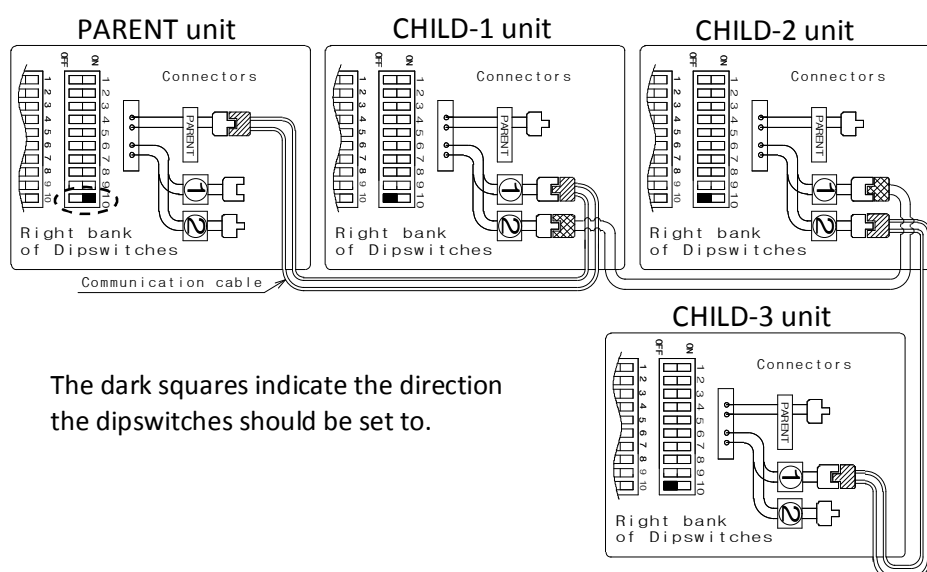
7. Make sure the “3-digit 7-seg. LED” of all the units’ computer boards display the unit #. The numbering system of the 520 automatically allocates the unit # to each water heater in the Easy-Link system, in accordance with the table below.

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

(A) 520 Computer board



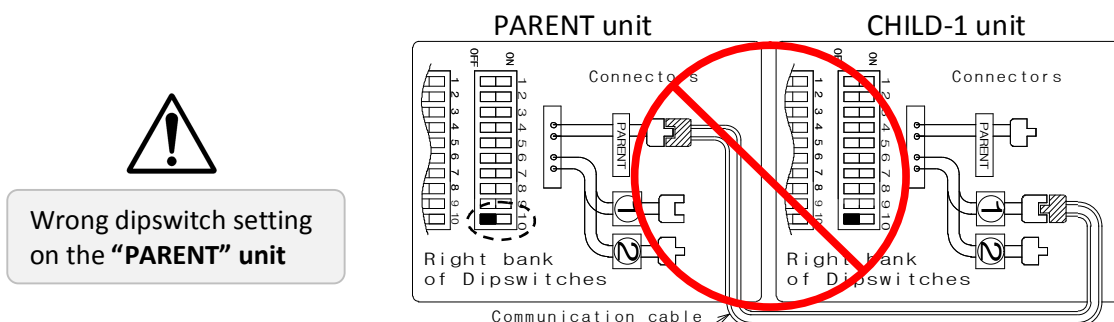
(B) Basic diagram of connections among the 520 models.



(C) Examples of incorrect settings and/or connections

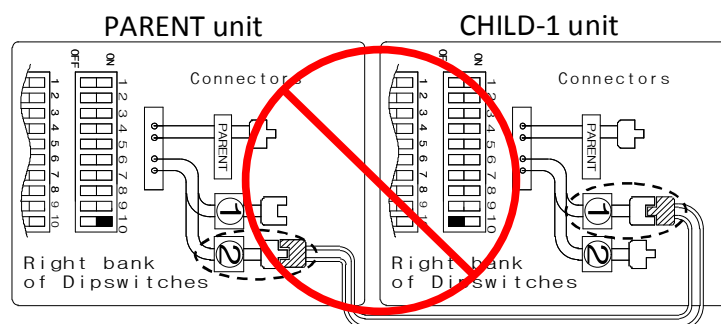
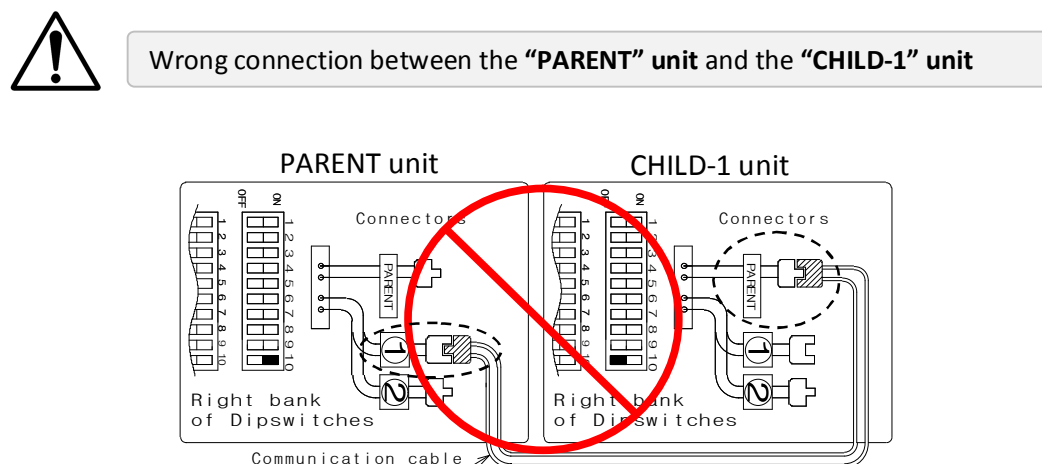
CASE 1:

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



CASE 2:

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

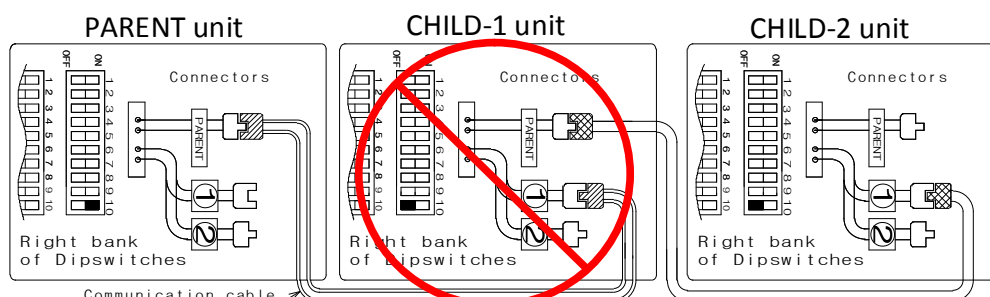


CASE 3:

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



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



WARNING



Prohibited

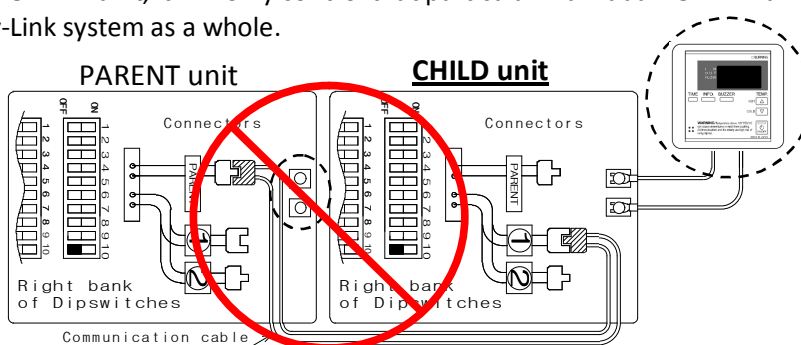
Connecting two “**PARENT connectors**” together from two separate units **may damage the computer board**. The communication cable has a female end and a male end so it's impossible to have a PARENT -to- PARENT connection with the communication cable. Do not splice or modify connectors.

CASE 4:

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



Remote controller
connected to
incorrect unit



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

APPLICATIONS

WARNING-Space-Heating Applications

- In order to purge air in water pipes within a closed-loop system, an air vent and air separator should be installed in to the system. Required circulation flow rates are labeled next to each application diagram. These flow rate requirements must be followed.
- Toxic chemicals used in boiler treatments such as alcohol, glycerol and glycol groups must not be introduced into the system if the system incorporates an open-loop potable water system.
- The 520 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 can cause severe burns instantly or death from scalds.
- Chemicals such as diluted Glycol can be used for radiant floor, Hydro/fan coil air or Baseboard heating only. The diluted solution of glycol must contain between 25% and 55% of Glycol. Be aware that in closed-loop glycol systems, low pressure in the heat exchanger can cause low-temperature boiling, resulting in excessive noise and damage to the water heater. Consult with the glycol maker for specifications prior to use.

-Recirculation-

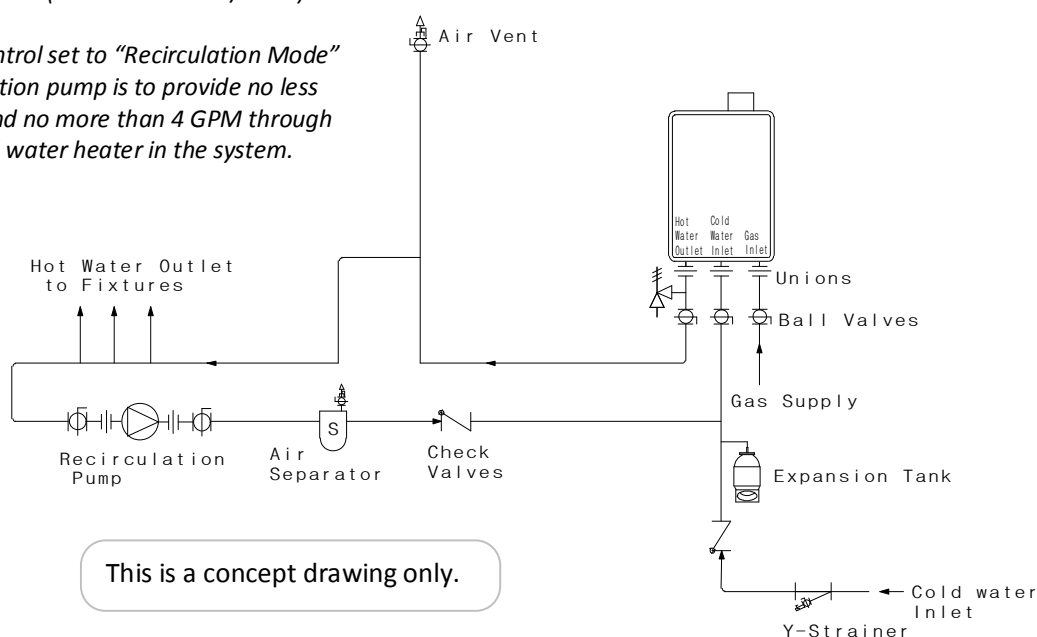
* The recirculation pump is to be controlled by:

-Dual-set aquastat (recommended w/timer)

OR

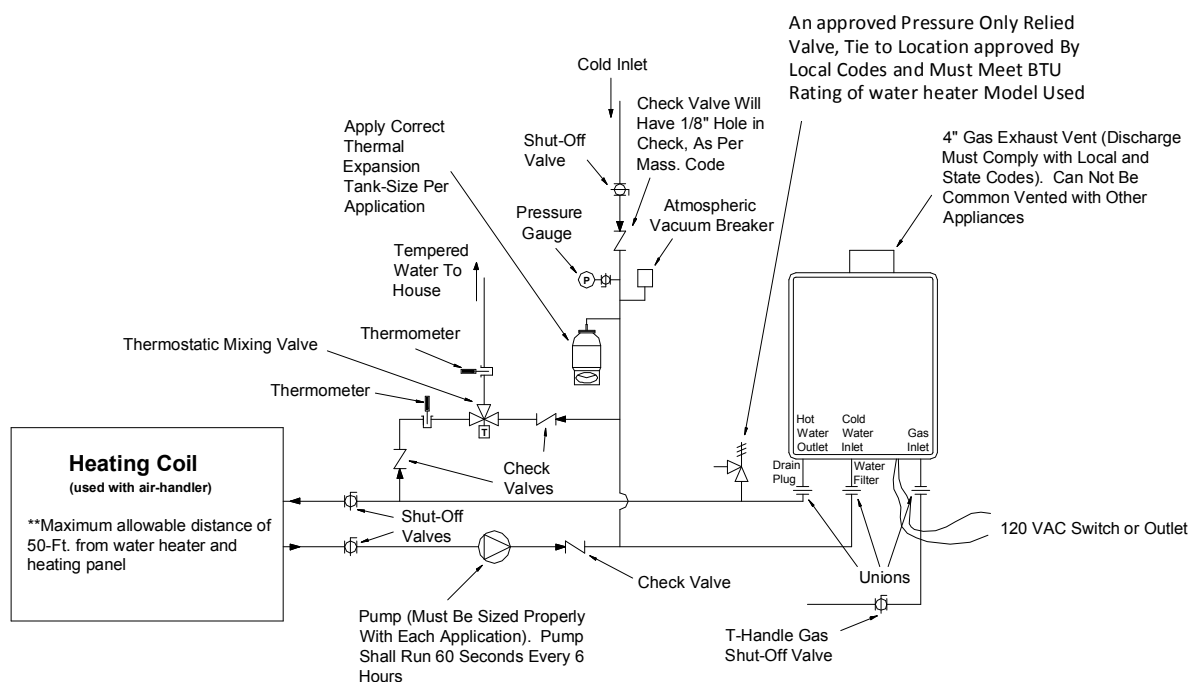
-520 Pump Control set to "Recirculation Mode"

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



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

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



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



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

INITIAL OPERATION

FOR YOUR SAFETY, READ BEFORE OPERATING

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



IF YOU SMELL GAS:

- Do not try to start the water heater.
- Do not touch any electric switches; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

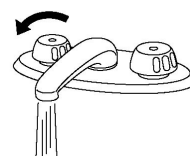
1. Once the above checks have been completed, please clean filter of any debris. Refer to p. 40 for instructions.



2. Fully open the manual water control valve on the water supply line.

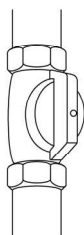


3. Open a hot water tap to verify that water is flowing to that tap.

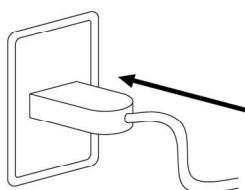


Then close the hot water tap.

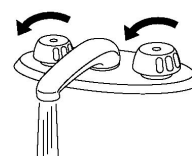
4. Fully open the manual gas control valve installed.



5. Turn on the 120 volt 60 Hz power supply to the water heater.



6. Now you are ready to enjoy hours of endless hot water.



Owner's Guide

OPERATING SAFETY

FOR YOUR SAFETY READ BEFORE OPERATING

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

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

WHAT TO DO IF YOU SMELL GAS.

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

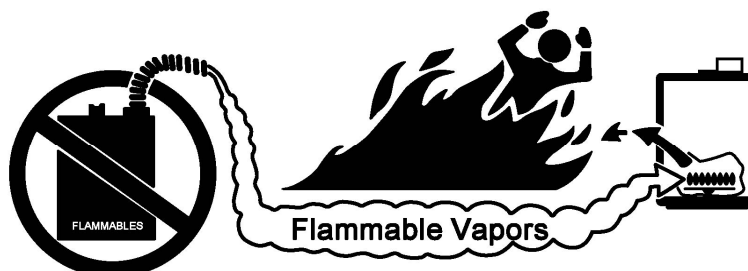
OPERATING INSTRUCTIONS

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

TO TURN OFF GAS TO APPLIANCE

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

DANGER



Vapors from flammable liquids will explode and catch fire causing death or severe burns.

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

Keep flammable products:

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

Vapors:

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

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

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

WARNING

The outlet hot water temperature of the water heater is factory set at 120 °F (49°C).

Use this heater at your own risk. The set outlet water temperature can cause severe burns instantly or death from scalds. Test the water before bathing or showering.

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

DANGER



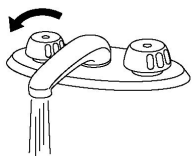
Hot Water Heater temperature over 125 °F (52°C) can cause severe burns instantly or death from scalding. Children, disabled and elderly are at the highest risk of being scalded. Feel water temperature before bathing or showering. Temperature limiting valves are available. Ask a professional person.

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

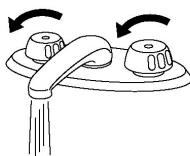
NORMAL OPERATION

GENERAL

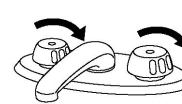
1. Open a hot water tap.



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



3. Close the hot water tap.



- Flow rate to activate the 520 : 0.5 gallon per minute
- Flow rate to keep the 520 running : 0.4 gallon per minute

WARNING

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

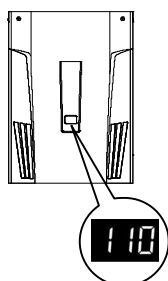
- The outlet hot water temperature of the water heater is factory set at 120°F.
- Feel the water temperature before bathing or showering.



TEMPERATURE SETTINGS

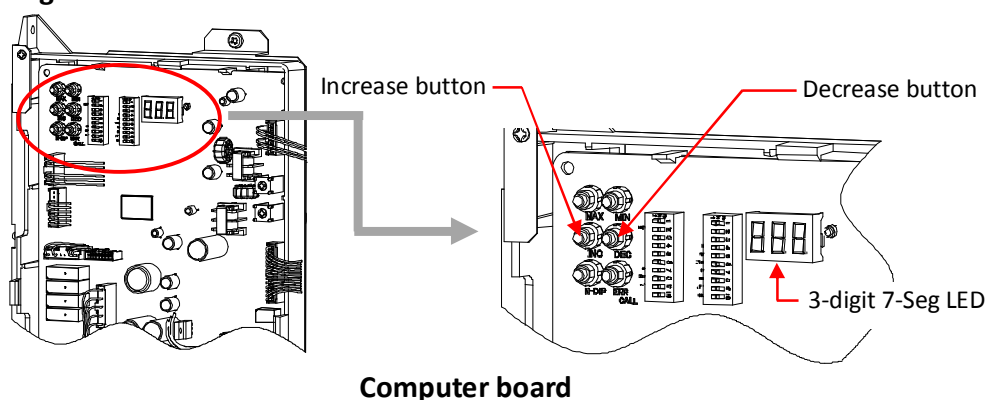
-ON THE 520-

On the 520, changing the temperature setting can be done simply by using the 3-digit 7-seg. LED, and the "Increase" & "Decrease" buttons on the computer board (remote controller is not required)



- The 520 will display the set temperature on the 3-digit 7-seg. LED on the computer board. This LED is visible through a small window on the unit's front cover.
- If the remote controller is installed, refer to the remote controller Installation Manual included with the remote for setting temperature.

Figure.1



Temperatures available

(unit:°F)

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

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

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



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

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



Set temperature (Example 110°F)

3. Scroll to the desired set temperature.



DO NOT set to 185 °F if you use your 520 water heater in a recirculation system. This will cause damage to the heater and void the warranty.

FLOW

- The flow rate through the 520 is limited to a maximum of 9.0 GPM.
- The temperature setting, along with the supply temperature of the water will determine the flow rate output of the unit.
- Please refer to the temperature vs. gallons per minute chart on p. 50 to determine the likely flow rates based on your local ground water temperature and your desired outlet water temperature combination.
- Based on the United States Department of Energy method of testing water heater output, the 520 is rated for 285 gallons per hour (GPH) or 4.8 gallons per minute (GPM) for Natural Gas, and 285 GPH or 4.8 GPM for Liquid Propane, when raising the water temperature by 77°F (from 58°F to 135°F).
- Refer to the chart to the right for typical household plumbing fixture flow rates to determine what the 520 can do in a household application.

Household Flow Rates

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

Taken from UPC 2006

FREEZE PROTECTION SYSTEM

- This unit comes equipped with heating blocks to protect it against damages associated with freezing.
- For this freeze protection system to operate there has to be electrical power to the unit. Damage to the heat exchanger caused by freezing temperatures due to power loss is not covered under the warranty. In cases where power losses can occur, consider the use of a backup power supply.
- The freeze protection system will activate when the surrounding and/or outside temperatures drop below 36.5°F (2.5°C).
- In any areas subject to freezing temperatures, **the manufacturer** highly recommends an indoor installation with the 520 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. It is the installer's responsibility to be aware of these issues and take all preventative measures. **The manufacturer** will not be responsible for any damage to the heat exchanger as a result of freezing.
- **The manufacturer** also highly recommends the use of a back flow vent damper to minimize the amount of cold air entering through the exhaust venting when the water heater is off.
- If you will not be using your heater for a long period of time:
 1. Completely drain the unit of water. Refer to p. 40.
 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



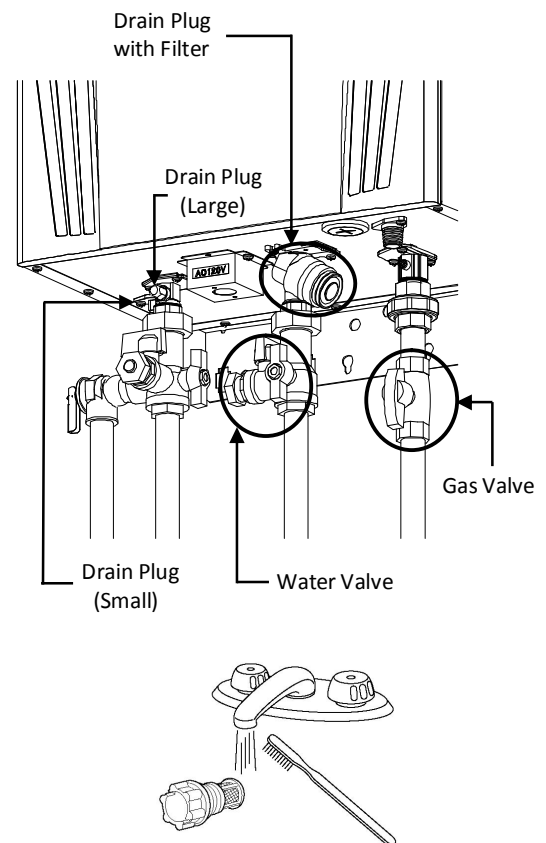
Turn off the electrical power supply and close the manual gas control valve and the manual water control valve before servicing.

- Clean the cold-water inlet filter. (Refer to diagram below)
- Be sure that all openings for combustion and ventilation air are not blocked.
- Check that the exhaust vent pipe is not blocked.
- Check the gas pressure.
- Keep the area around the water heater clear. Remove any combustible materials, gasoline or any flammable vapors and liquids.

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

UNIT DRAINING and FILTER CLEANING

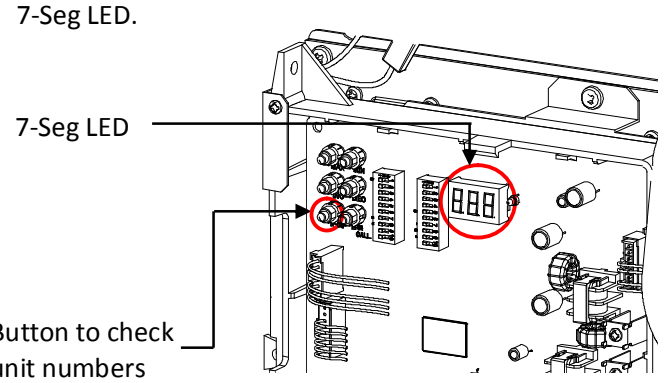
1. Close the manual gas shut off valve.
2. Turn off power to the unit, and then turn on again.
3. Wait 30 seconds, and then turn off power to the unit, yet again.
4. Close the water shut off valve.
5. Open all hot water taps in the house. When the residual water flow has ceased, close all hot water taps.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



TROUBLESHOOTING

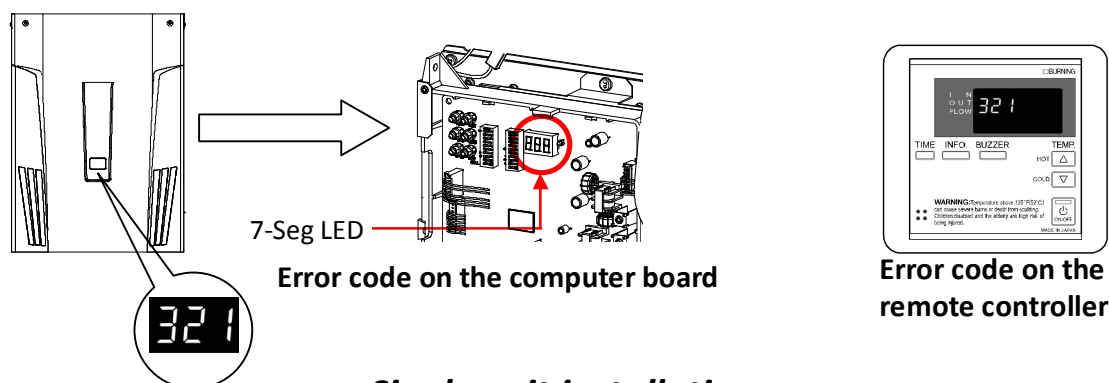
GENERAL

	PROBLEM	SOLUTIONS
-TEMPERATURE and AMOUNT OF HOT WATER-	It takes long time to get hot water at the fixtures.	<ul style="list-style-type: none"> The time it takes to deliver hot water from the water heater to your fixtures depends on the length of piping between the two. The longer the distance or the bigger the pipes, the longer it will take to get hot water. If you would like to receive hot water to your fixtures quicker, you may want to consider a hot water recirculation system. (p. 32)
	The water is not hot enough.	<ul style="list-style-type: none"> Compare the flow and temperature. See the chart on p. 50. Check cross plumbing between cold water lines and hot water lines. Is the gas supply valve fully open? (p. 34) Is the gas line sized properly? (p. 18) Is the gas supply pressure enough? (p. 17) Is the set temperature set too low? (p. 37, 38)
	The water is too hot.	<ul style="list-style-type: none"> Is the set temperature set too high? (p. 37, 38)
	The hot water is not available when a fixture is opened.	<ul style="list-style-type: none"> Make sure the unit gets 120 VAC / 60 Hz power supply. If you are using the remote controller, is the power button turned on? Is the gas supply valve fully open? (p. 34) Is the water supply valve fully open? (p. 34) Is the filter on cold water inlet clean? (p. 40) Is the hot water fixture sufficiently open to draw at least 0.5 GPM through the water heater? (p. 37) Is the unit frozen? Is there enough gas in the tank / cylinder? (For Propane models)
	The hot water turns cold and stays cold.	<ul style="list-style-type: none"> Is the flow rate enough to keep the water heater running? (p. 37) If there is a recirculation system installed, does the recirculation line have enough check valves? Is the gas supply valve fully open? (p. 34) Is the filter on cold water inlet clean? (p. 40) Are the fixtures clean of debris and obstructions?
	Fluctuation in hot water temperature.	<ul style="list-style-type: none"> Is the filter on cold water inlet clean? (p. 40) Is the gas line sized properly? (p. 18) Is the supply gas pressure enough? (p. 17) Check for cross connection between cold water lines and hot water lines.

	PROBLEM	SOLUTIONS
- WATER HEATER -	Unit does not ignite when water goes through the unit.	<ul style="list-style-type: none"> Is the flow rate over 0.5 GPM? (p. 37) Check for the filter on cold water inlet. (p. 40) Check for reverse connection and cross connection. If you use the remote controller, is the power button turned on?
	The fan motor is still spinning after operation has stopped.	<ul style="list-style-type: none"> This is normal. After operation has stopped, the fan motor keeps running for 35 seconds in order to re-ignite quickly, as well as purge all the exhaust gas out of the flue.
	Unit sounds abnormal while in operation	<ul style="list-style-type: none"> Contact the manufacturer at 1-877-737-2840.
-Remote controller: 9007606005 (OPTIONAL)-	Remote controller does not display anything when the power button is turned on.	<p>Press the ON/OFF button on the remote.</p> <p>If the LED lights up ⇒</p> <ul style="list-style-type: none"> This is normal. When the unit has not operated for five minutes or more, the display turns off to conserve energy. <p>If the LED does not light ⇒</p> <ul style="list-style-type: none"> Make sure the unit has power supply. <p>Make sure the connection to the unit is correct.(p. 24)</p>
	An ERROR code is displayed.	<ul style="list-style-type: none"> Please see p. 43.
-EASY-LINK SYSTEM-	How are the unit numbers assigned?	<ul style="list-style-type: none"> For an Easy-Link system, the Parent unit is always labeled #1 and all other subsequent Child units are numbered randomly. To check which numbers are assigned to which Child units, push the button on the computer board of any Child unit as shown below. The unit number will be displayed on the 7-Seg LED.  <p>The diagram shows the internal components of a unit. A 7-Seg LED is highlighted with a red circle and labeled '7-Seg LED'. Below it, a button is highlighted with a red circle and labeled 'Button to check unit numbers'. The button is located on the computer board.</p>

ERROR CODES

- The 520 units are self diagnostic for safety and convenience when trouble shooting.
- If there is a problem with the installation or the unit, it will display a numerical error code on the 3-digit 7-Seg. LED on the computer board (visible through a window on the front cover) or remote controller (if installed) to communicate the source of the problem.
- Consult the table on the following page for the cause of each error code.



-Single unit installations-

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

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

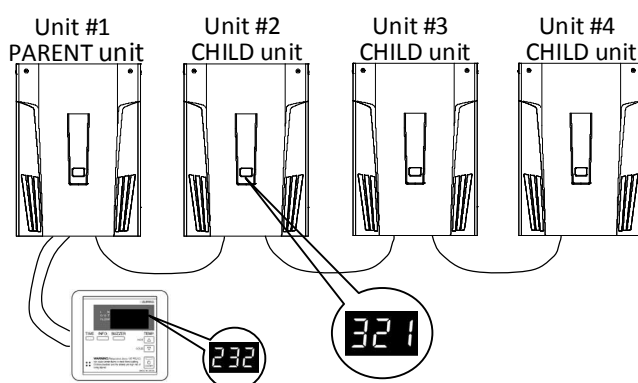
- **Water heater:** It will display “321” on the 7-Seg LED.
- **Remote controller:** It will display “321” on its screen.

-Easy-Link system-

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

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

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



-FAULT ANALYSIS OF ERROR CODES-

If there is a problem with the installation of the 520, it will display a numerical error code on the 7-seg LED of the computer board or the remote controller (if installed) to communicate the source of the problem.

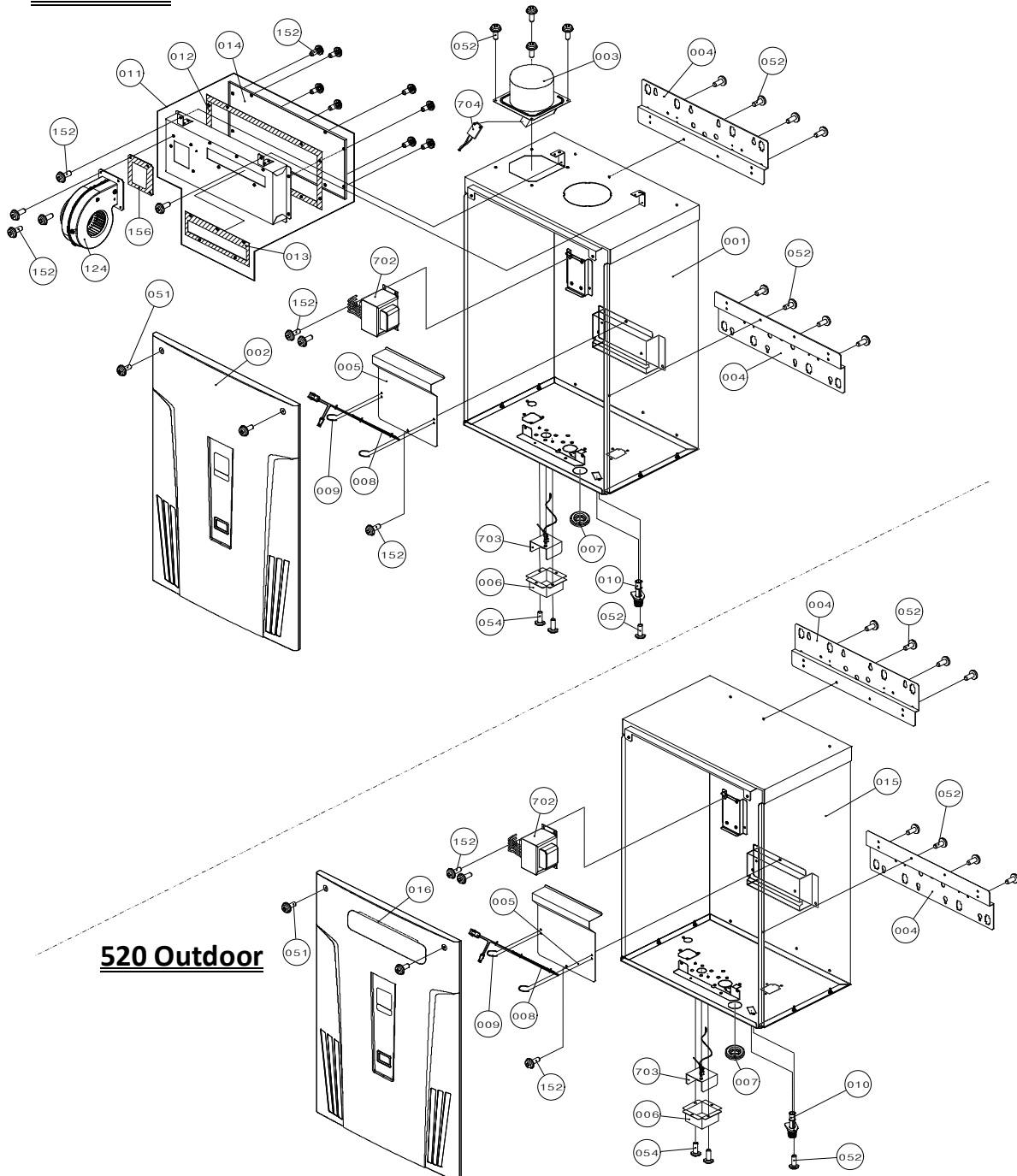
Error Code	Malfunction description	Diagnosis
031	Incorrect dipswitch settings	Check the dipswitch settings on PCB
101	Warning for the “991” error code	Call the manufacturer’s Technical Dept. at 1-877-737-2840
111	Ignition failure	Check gas supply
121	Loss of flame	
311	Output thermistor failure	Call the manufacturer’s Technical Dept. at 1-877-737-2840
321	Inlet thermistor failure	
331	Mixing thermistor failure	
341	Exhaust thermistor failure (520 Indoor only)	
391	Air-fuel Ratio Rod Failure	
441	Flow Sensor Failure (Only Easy-Link system)	
510	Abnormal Main Gas Valve	
551	Abnormal Gas Solenoid Valve	
611	Fan Motor Fault	
621	Exhaust fan motor Fault (520 Indoor only)	
631	Abnormal External Pump	
651	Water Control Valve Fault (Flow Adjustment function) (Only Easy-Link system)	
661	Water Control Valve Fault (Bypass valve function)	
701	Computer board Fault	
711	Gas Solenoid Valve drive circuit failure	
721	False Flame Detection	
741	Miscommunication between water heater and remote controller	
761	Miscommunication in Easy-Link	
941	Abnormal exhaust temperature (520 Indoor only)	Lower the set temperature
991	Imperfect combustion	Call the manufacturer’s Technical Dept. at 1-877-737-2840

COMPONENTS DIAGRAM

Case assembly

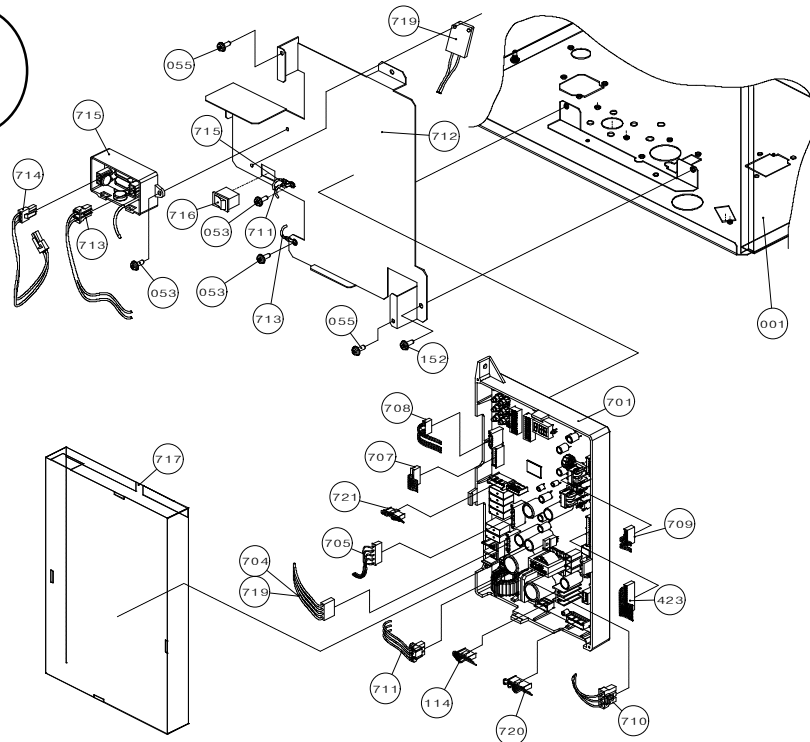
Other than the case assembly (No.15) and front cover (No.16), all of the 520 Outdoor parts are the same as the 520 Indoor. The 520 Outdoor doesn't have fan motor for exhaust

520 Indoor



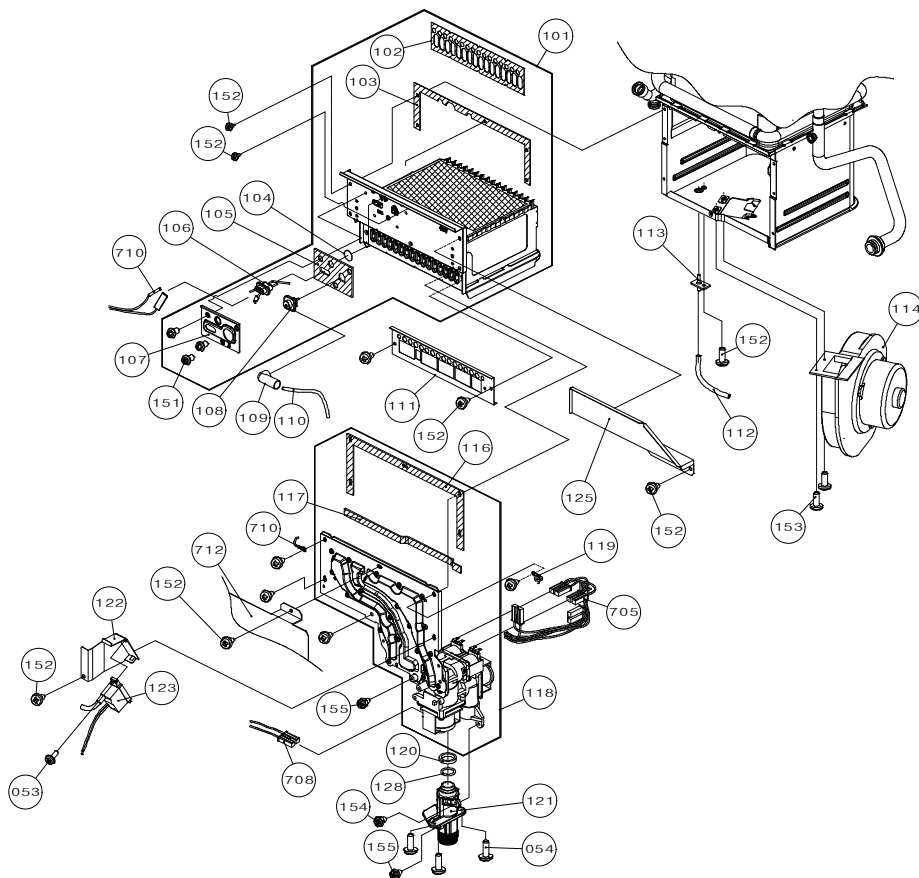
Computer board assembly

Other than Part# 719, the 520 Indoor and the 520 Outdoor share the same components. The 520 Outdoor doesn't have exhaust thermistor assembly (No.706) and exhaust fan motor wire (No.720).



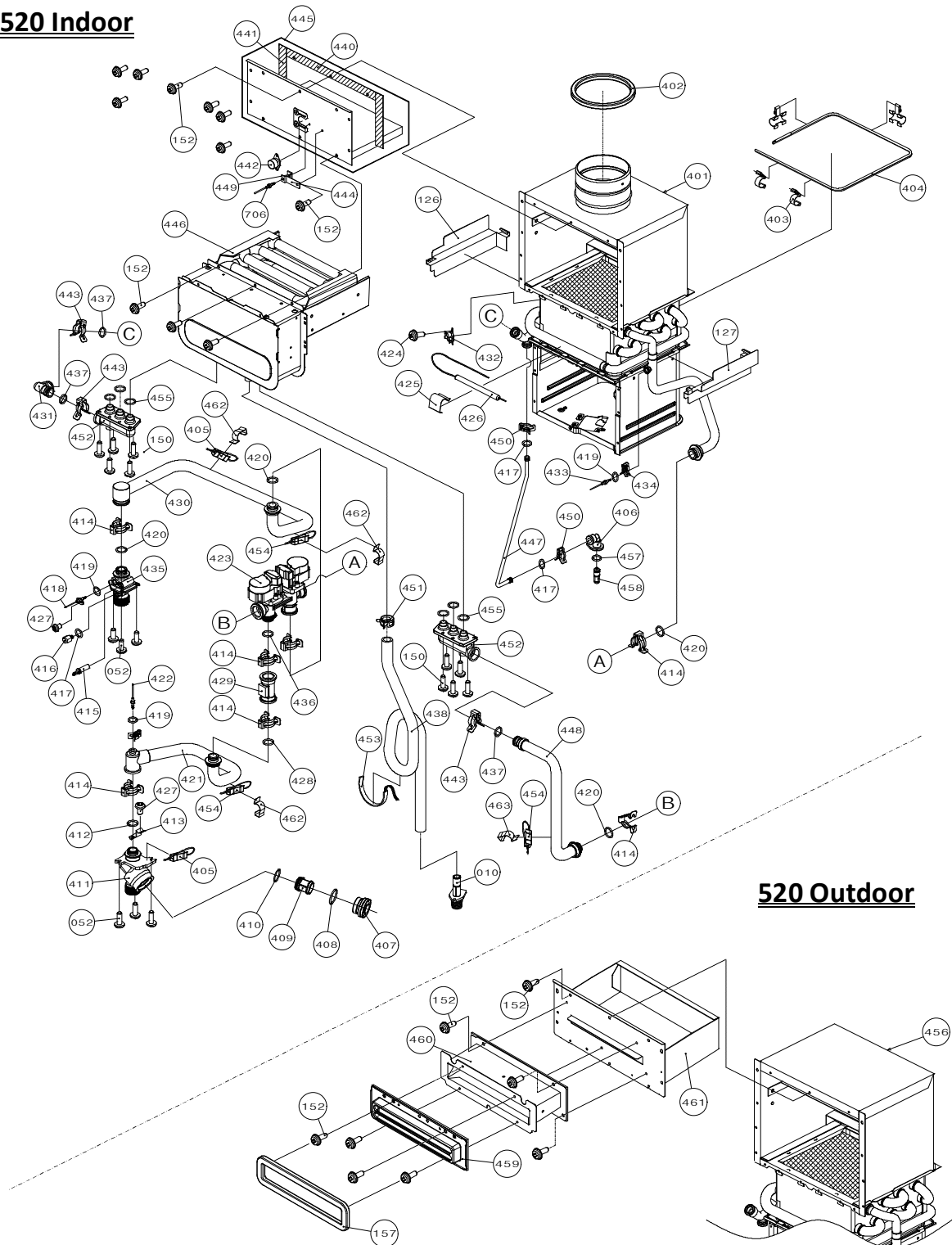
Burner assembly

The 520 Indoor and Outdoor share the same components.



520 Indoor

Other than Part# 456, Part# 459, Part# 460 and Part# 461, the 520 Indoor and the Outdoor share the same components. The 520 Outdoor doesn't have hi-limit switch for exhaust (No.442) and exhaust thermistor assembly (No.706).



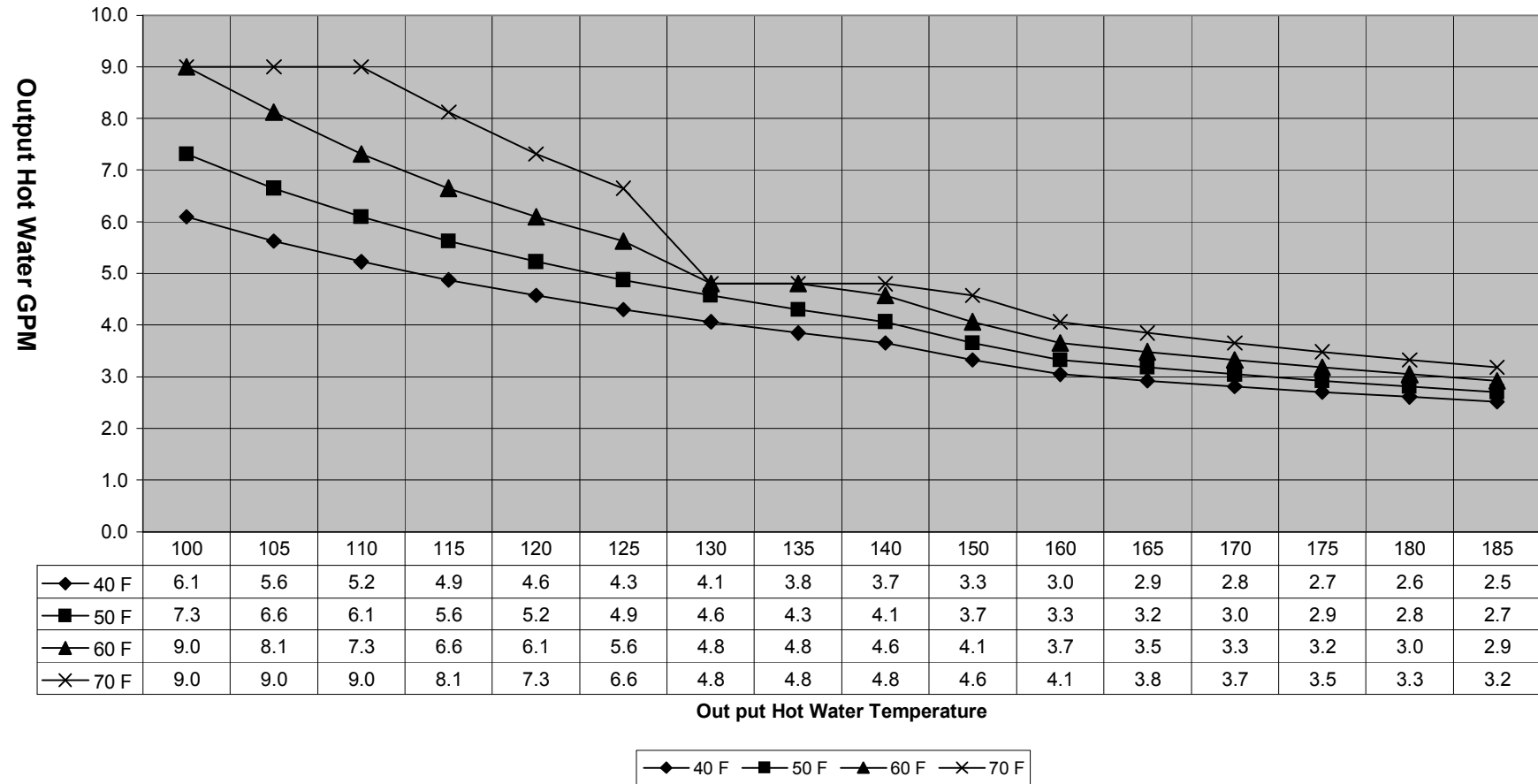
PARTS LIST

Item#	Part#	Description	Item#	Part#	Description
001	319143-009	Case assembly for 520 Indoor	118	319143-046	Manifold assembly with gas valve assembly LP
002	319143-010	Front cover for 520 Indoor		319143-047	Manifold assembly with gas valve assembly NA
003	319143-011	Intake air port assembly			
004	319143-012	Bracket			
005	319143-013	Back guard panel	119	319143-048	Wire clamp 60
006	319143-014	Junction box	120	319143-049	Gas inlet ring
007	319143-015	Rubber bush	121	319143-050	Gas inlet
008	319143-016	Overheat-cut off-fuse for combustion chamber	122	319143-051	Igniter plate
			123	319143-052	Igniter
009	319143-017	Fastener	124	319143-053	Fan motor for exhaust
010	319143-018	Condensate drain port	125	319143-054	Heat exchanger protection plate (Front)
011	319143-019	Duct			
012	319143-020	Duct gasket A	126	319143-055	Heat exchanger protection plate (Right)
013	319143-021	Duct gasket B			
014	319143-022	Duct cover plate	127	319143-056	Heat exchanger protection plate (Left)
015	319143-023	Case assembly for 520 Outdoor			
016	319143-024	Front cover for 520 Outdoor	128	319143-057	O-ring P20 NBR
051	319143-025	Screw M4×12 (W/Washer)	150	319143-058	Screw M4×8
052	319143-026	Screw M4×10 (Coated)	151	319143-059	Pan screw M4×8
053	319143-027	Pan screw M4×10	152	319143-060	Screw M4×10
054	319143-028	Screw M4×10	153	319143-061	Pan screw M4×12 (W/Washer)
055	319143-029	Pan screw M3×10	154	319143-062	Pan screw M4×10
101	319143-030	Burner assembly	155	319143-063	Hex head screw M4×8
102	319143-031	Burner gasket	156	319143-329	Flange gasket for fan motor
103	319143-032	Burner holder gasket			
104	319143-033	Burner window	157	319143-206	Silicon ring
105	319143-034	Rod holder gasket	401	319143-064	Heat exchanger assembly for 520 Indoor
106	319143-035	Flame rod			
107	319143-036	Rod holder	402	319143-065	Silicon ring
108	319143-037	Igniter rod	403	319143-066	Fuse fixing plate 18
109	319143-038	Rod cap	404	319143-067	Overheat-cut-off fuse
110	319143-039	High voltage igniter cable	405	319143-068	Heater 101
111	319143-040	Damper	406	319143-069	Drain port
112	319143-041	Urethane tube	407	319143-070	Filter plug
113	319143-042	Pressure port	408	319143-071	O-ring P25 FKM
114	319143-043	Fan motor	409	319143-072	Water inlet filter
116	319143-044	Manifold gasket A	410	319143-073	O-ring JASO# 1021 FKM
117	319143-045	Manifold gasket B	411	319143-074	Water inlet

Item#	Part#	Description	Item#	Part#	Description
412	319143-075	O-ring JASO# 1016 FKM	450	319143-112	Fastener "6-15"
413	319143-076	Heater plate	451	319143-113	Band B
414	319143-077	Fastener "16AG"	452	319143-114	Header
415	319143-078	Outlet heater	453	319143-115	Flat heater
416	319143-079	Outlet drain plug	454	319143-116	3 array heater
417	319143-080	O-ring P6 FKM	455	319143-117	O-ring P12 FKM
418	319143-081	Mixing thermistor	456	319143-118	Heat exchanger assembly for 520 Outdoor
419	319143-082	O-ring P4 FKM			
420	319143-083	O-ring P16 FKM	457	319143-119	O-ring P3 EPDM
421	319143-084	Cold pipe	458	319143-120	Secondary heat exchanger drain plug
422	319143-085	Inlet thermistor			
423	319143-086	Water control valve	459	319143-121	Exhaust port
424	319143-087	Screw M3×6	460	319143-122	Exhaust chamber assembly
425	319143-088	Pipe heater fixing plate	461	319143-123	Secondary heat exchanger plate
426	319143-089	Pipe heater 120	462	319143-124	Heater fixing plate 20
427	319143-090	Pan screw M4×6 (W/Washer)	463	319143-125	Heater fixing plate 16
428	319143-091	O-ring P15 FKM	701	319143-126	520 Indoor & Outdoor PCB
429	319143-092	Flow sensor	702	319143-127	Transformer
430	319143-093	Hot pipe	703	319143-128	Junction box inner plate
431	319143-094	Joint elbow	704	319143-129	Freeze protection and EH-IG wire for 520 Indoor
432	319143-095	Hi-limit switch			
433	319143-096	Output thermistor	705	319143-130	Gas valve wire
434	319143-097	Fastener "4-11"	706	319143-131	Exhaust thermistor assembly
435	319143-098	Water outlet	707	319143-132	Thermistors wire
436	319143-099	O-ring JASO# 1017 FKM	708	319143-133	Proportional gas valve wire
437	319143-100	O-ring P14 FKM	709	319143-134	Pump and multi-cable
438	319143-101	Drain tube	710	319143-135	Flame rod wire
440	319143-102	Secondary heat exchanger plate gasket A	711	319143-136	Switch wire
			712	319143-137	PCB fixing plate
441	319143-103	Secondary heat exchanger plate gasket B	713	319143-138	AC120V wire
442	319143-104	Hi-limit switch for exhaust	714	319143-139	AC120V Transformer connecting wire
443	319143-105	Fastener "14-22"	715	319143-140	Surge box
444	319143-106	Thermistor fixing plate	716	319143-141	AC120V power ON-OFF switch
445	319143-107	Secondary heat exchanger plate	717	319143-142	PCB cover
446	319143-108	Secondary heat exchanger	718	319143-143	Nylon clamp
447	319143-109	Drain pipe	719	319143-144	Freeze protection and EH-IG wire for 520 Outdoor
448	319143-110	Secondary heat exchanger inlet pipe			
449	319143-111	Exhaust thermistor gasket	721	319143-415	Exhaust thermistor wire

OUTPUT TEMPERATURE CHART

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



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

LIMITED WARRANTY

1. General terms of limited warranty:

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

2. Warranty for models: 520 Indoor and Outdoor

[Unit: Year]

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

(1) Heat exchanger

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

(3) Limited Labor Coverage

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

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

3. Repair, Replacement or Refund:

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

4. Limitation on Duration of Implied Warranties:

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

5. THIS WARRANTY WILL NOT COVER THE FOLLOWING:

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