

On-Demand Water Heater

Installation Manual and Owner's Guide



ANSI Z21.10.3 • CSA 4.3

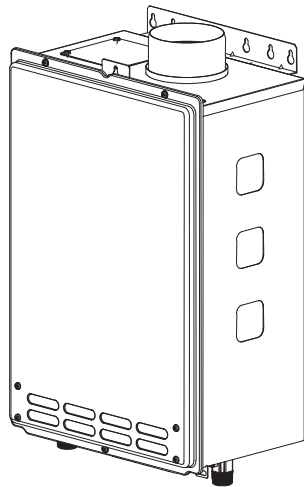


510 (T-D2)
model only



Models

- 110 Indoor (T-KJr2-IN)
- 310 Indoor (T-K4-IN)
- 510 Indoor (T-D2-IN)
- 110 Outdoor (T-KJr2-OS)
- 310 Outdoor (T-K4-OS)
- 510 Outdoor (T-D2-OS)



Gas Tankless Water Heater™

*Suitable for combination 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
- 510 (T-D2) model only
- Complies with natural gas Low NOx emissions of 40 ng/J or 55 ppm.



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

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

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

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

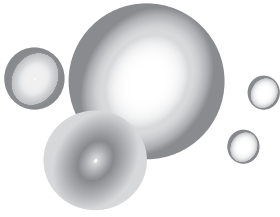
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Installation Manual

CONGRATULATIONS

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

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

SPECIFICATIONS

Model			110 Indoor (T-KJr2-IN)	110 Outdoor (T-KJr2-OS)	310 Indoor (T-K4-IN)	310 Outdoor (T-K4-OS)	510 Indoor (T-D2-IN)	510 Outdoor (T-D2-OS)	
Natural Gas Input (Operating Range)		BTU/h	Min.: 19,500 Max.: 140,000		Min.: 11,000 Max.: 190,000		Min.: 11,000 Max.: 199,000		
Propane Gas Input (Operating Range)		BTU/h	Min.: 19,500 Max.: 140,000		Min.: 11,000 Max.: 190,000		Min.: 11,000 Max.: 199,000		
Gas Connection			3/4" NPT						
Water Connections			3/4" NPT						
Water Pressure*		psi	15 - 150*						
Natural gas Inlet Pressure		" W.C.	Min. 4.0 Max. 10.5						
Propane gas Inlet Pressure		" W.C.	Min. 8.0 Max. 14.0						
Manifold Pressure**	Natural	" W.C.	2.0	2.5	2.0	2.5	2.0	2.5	
	Propane	" W.C.	2.5	3.1	3.7	4.0	3.7	4.5	
Weight		lbs.	33		38		39		
Dimensions		inch	H 20.5 x W 13.8 x D 6.7		H 20.5 x W 13.8 x D 8.5				
Ignition			Electric Ignition						
Electric	Supply		VAC / Hz	120 / 60					
	Consumption	Operation	W / A	73.1 / 0.61		87.6 / 0.73		89.8 / 0.75	
		Standby	W / A	6.2 / 0.05		6.2 / 0.05		6.2 / 0.05	
		Freeze- Protection	W / A	111 / 0.93		111 / 0.93		111 / 0.93	

*The maximum flow may need water pressure equal to or above 40 psi.

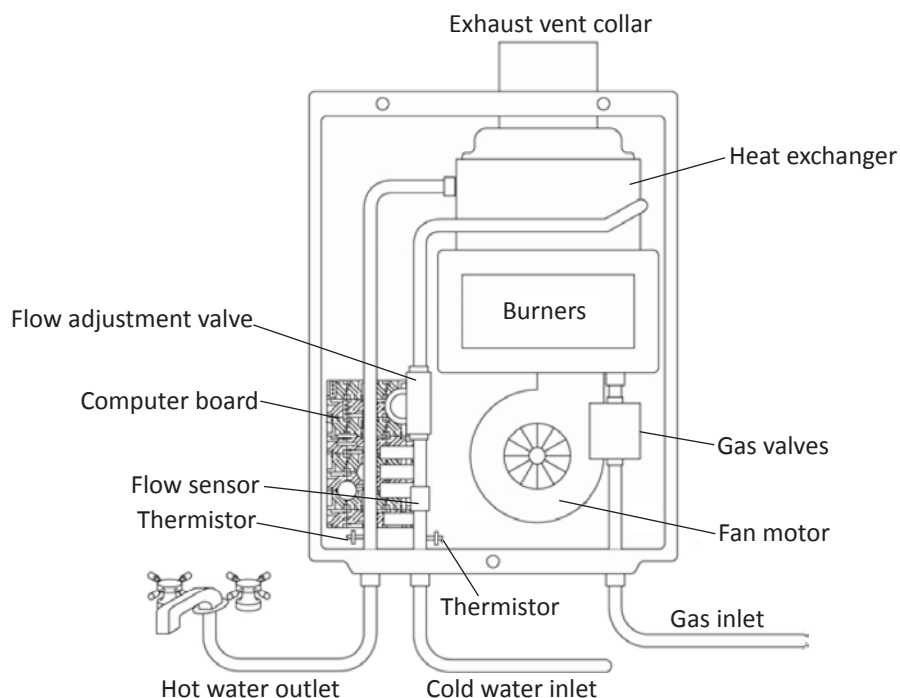
** The Manifold Pressure is the factory setting and generally **should not need adjustment**.

NOTE:

- Check the rating plate to ensure this product matches your specifications.
- **The manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.**

INTRODUCTION

- This manual provides information necessary for the installation, operation, and maintenance of the water heater.
- The model description is listed on the rating plate which is attached to the side panel of the water heater.
- Please read all installation instructions completely before installing this product.
- If you have any problems or questions regarding this equipment, consult the manufacturer or its local representative.
- This equipment is an on-demand, tankless water heater designed to efficiently supply endless hot water for your needs.
- The 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN), and 510 Indoor (T-D2-IN) models are only to be installed indoors (direct-vent convertible). The 110 Outdoor (T-KJr2-OS), 310 Outdoor (T-K4-OS), and 510 Outdoor (T-D2-OS) models are only to be installed outdoors.
- The principle behind tankless water heaters is simple:



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

1. A hot water tap is turned on.
2. Water enters the heater.
3. The water flow sensor detects the water flow.
4. The computer initiates the fan motor and sends a signal to the igniter to create an ignition spark.
5. The gas ignites and flames appear within the burner chamber.
6. Water circulates through the heat exchanger and then gets hot.
7. Using thermistors to measure temperatures throughout the water heater, the computer modulates the gas and water valves to ensure proper output water temperature.
8. When the tap is turned off, the unit shuts down.

SAFETY GUIDELINES

SAFETY DEFINITION



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



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



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

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or B149.1 Natural Gas, Propane Installation Code in Canada.
2. Properly ground the unit in accordance with all local codes or in the absence of local codes, with the National Electrical Codes: ANSI/NFPA 70 in the USA or CSA standard C22.1 Canadian Electrical Code Part 1 in Canada.
3. Carefully plan where you intend to install the water heater. Please ensure:
 - Your water heater will have enough combustible air and proper ventilation.
 - Locate your heater where water leakage will not damage surrounding areas. (Please refer to p. 8.)
4. Check the rating plate for the correct **GAS TYPE, GAS PRESSURE, WATER PRESSURE and ELECTRIC RATING**.
*If this unit does not match your requirements, **do not install and consult with the manufacturer.**
5. If any problem should occur, turn off all hot water taps and turn off the gas. Then call a trained technician or the Gas Company or the manufacturer.



- Water temperatures over 125 °F (52 °C) can cause severe burns instantly or death from scalding. The water temperature is set at 122 °F (50 °C) from the factory to minimize any scalding risk. Before bathing or showering always check the water temperature.
- Do not store or use gasoline or other flammables, vapors, or liquids in the vicinity of this appliance.
- Do not reverse the water and/or gas connections as this will damage the gas valves and can cause severe injury or death. Follow the diagram on p. 20 when installing your water heater.
- Do not use this appliance if any part has been in contact with or been immersed in water. Immediately call a licensed plumber, a licensed gas fitter, or a professional service technician to inspect and/or service the unit if necessary.
- Do not disconnect the electrical supply if the ambient temperature will drop below freezing. The Freeze Protection System only works if the unit has electrical power. The warranty will not be covered if the heat exchanger is damaged due to freezing. Refer to the section on the Freeze Protection System on p. 39 for more information.

INSTALLATION

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or B149.1 Natural Gas, Propane Installation Code in Canada.
2. All gas water heaters require careful and correct installation to ensure safe and efficient operation. This manual must be followed exactly. Read the "Safety Guidelines" section.
3. The manifold gas pressure is preset at the factory. It is computer controlled and should not need adjustment.
4. Maintain proper space for servicing. Install the unit so that it can be connected or removed easily. Refer to the "Clearances" section on p. 10 for proper clearances.
5. The water heater must be installed in a location where the proper amount of combustible air will be available to it at all times without obstructions.
6. The electrical connection requires a means of disconnection, to terminate power to the water heater for servicing and safety purposes.
7. Do not install the unit where the exhaust vent is pointing into any opening in a building or where the noise may disturb your neighbors. Make sure the vent termination meets the required distance by local code from any doorway or opening to prevent exhaust from entering a building. (Refer to p. 16.)
8. Particles from flour, aerosols, and other contaminants may clog the air vent, build up and reduce the functions of the rotating fan, cause improper burning of the gas, or cause damage to the water heater. Regularly ensure that the area around the unit is dust- or debris-free. Regular maintenance is recommended for these types of environment.
9. If you will be installing the water heater 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 water heater.
10. For the 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN) models:
 - These units may be converted to a direct-vent (sealed combustion) appliance by installing a direct-vent conversion kit Part No. 9007667005 (TK-TV10), which will bring in all required combustible air from outside the building. When installing the direct-vent conversion kit, please follow all instructions included with the kit.
 - If the water heater is used as a direct-vent appliance, the unit requires a 3 in. (76 mm) combustible air supply pipe. The intake pipe must be sealed airtight. Air supply pipe can be made of ABS, PVC (solid core), CPVC (solid core), Polypropylene, corrugated stainless steel, or Category III / IV stainless steel.
 - Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in non-metallic venting systems is prohibited. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited.
 - Terminating the venting through a sidewall is recommended for the direct-vent system.
 - Running the exhaust vent and the intake pipe parallel is recommended.
 - Terminating the exhaust and intake on the same wall/surface is recommended. Terminating in the same pressure zone allows for pressure balancing, which prevents nuisance shutdowns.
11. The 110 Outdoor (T-KJr2-OS), 310 Outdoor (T-K4-OS), and 510 Outdoor (T-D2-OS) models are only to be installed outdoors and only in the area with mild, temperate climates.



WARNING

- Installation and service must be performed by a qualified installer (for example, a licensed plumber or gas fitter), otherwise the warranty will be void.
- The installer (licensed professional) is responsible for the correct installation of the water heater and for compliance with all national, state / provincial, and local codes.
- The manufacturer does not recommend installing the water heater in a pit or location where gas and water can accumulate.
- Do not have the vent terminal pointing toward any operating window, door, or opening into a building.
- Do not install next to any source of airborne debris, such as a clothes dryer, that can cause debris to be trapped inside the combustion chamber, unless the system is direct-vented.
- The manufacturer does not recommend installing the water heater in an attic due to safety issues. If you install the water heater in an attic:
 - Make sure the unit will have enough combustion air and proper ventilation.
 - Keep the area around the water heater clean. When dust collects on the flame sensor, the water heater will shut down on an error code.
 - If the above conditions cannot be met, use the direct-vent conversion kit Part No. 9007667005 (TK-TV10).
 - Place the unit for easy access for service and maintenance.
 - A drain pan, or other means of protection against water damage, is required to be installed under the water heater in case of leaks.



CAUTION

- The warranty will not cover damage caused by water quality.
 - Only potable water can be used with this water heater. Do not introduce pool or spa water, or any chemically treated water into the water heater.
 - Water hardness levels must not exceed 7 grains per gallon (120 ppm) for single family domestic applications or more than 4 grains per gallon (70 ppm) for all other types of applications. Water hardness leads to scale formation and may affect / damage the water heater. Hard water scaling must be avoided or controlled by proper water treatment.
 - Water pH levels must be between 6.5 and 8.5
 - Well water must be treated.
- Do not install the unit where water, debris, or flammable vapors may get into the flue terminal.
- The manufacturer recommends using the direct-vent kit when the water heater is installed in a beauty salon. Some chemicals used in a beauty salon may affect the flame sensor. Water heater may not work properly.
- Although the water heater is designed to operate with minimal sound, the manufacturer does not recommend installing the unit on a wall adjacent to a bedroom, or a room that is intended for quiet study or meditation, etc.
- Locate your heater close to a drain where water leakage will not do damage to surrounding areas. As with any water heating appliance, the potential for leakage at some time in the life of the product does exist. The manufacturer will not be responsible for any water damage that may occur. If you install a drain pan under the unit, ensure that it will not restrict the combustion air flow.

WARNING FOR INSTALLATIONS

FOR YOUR SAFETY, READ BEFORE INSTALLATION:

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



Prohibited



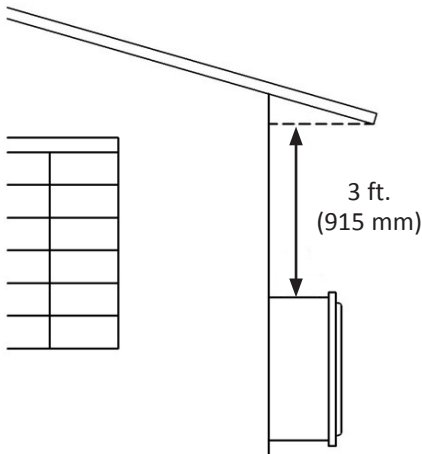
Do not have the vent terminal pointing toward any opening into a building. Do not locate your heater in a pit or location where gas and water can accumulate.



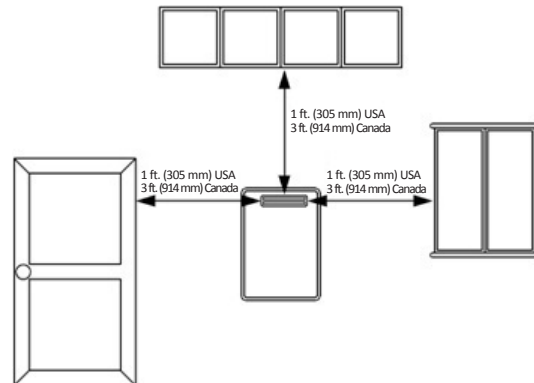
Prohibited



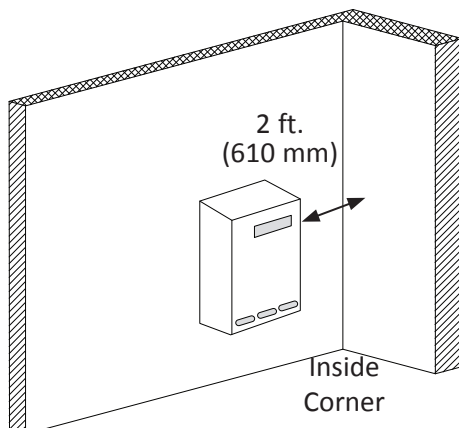
Do not install this water heater under an overhang less than 3 ft. from its top or eaves. The area under an overhang must be open to three sides (Outdoor models only).



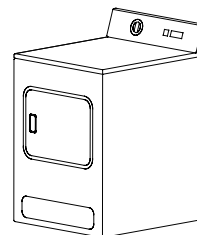
Do not install the water heater vent terminator within 1 ft. in the USA of any air intake or building opening, and within 3 ft. in Canada of any air intake or building opening (Outdoor models only, refer to p. 16).



Water heater vent terminator must be at least 2 ft. (610 mm) away from an inside corner for both outdoor installation and direct-vent installation.



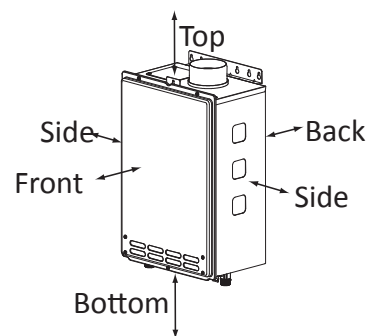
Do not install next to a dryer or any source of airborne debris that can be trapped inside the combustion chamber, unless the system is direct-vented.



CLEARANCES



Maintain all clearances around the water heater.






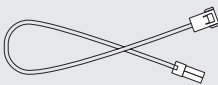
Model	Top	Bottom	Front	Back	Sides
110 Indoor* (T-KJr2-IN)* 310 Indoor* (T-K4-IN)* 510 Indoor* (T-D2-IN)*	12 in. (305 mm)	12 in. (305 mm)	4 in.** (102 mm)	1 in. (25 mm)	3 in. (76 mm)
110 Outdoor (T-KJr2-OS) 310 Outdoor (T-K4-OS) 510 Outdoor (T-D2-OS)	36 in. (914 mm)	12 in. (305 mm)	24 in. (610 mm)	1 in. (25 mm)	3 in. (76 mm)

*Standard indoor installations and direct-vent indoor installations have the same clearances.

**24 inches recommended for maintenance

INCLUDED ACCESSORIES

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

1. Installation manual and Owner's guide	2. Temperature remote controller	3. Communication cable 510 (T-D2) model only
 Qty: 1	 or  Qty: 1 TK-RE02 TM-RE30	 Qty: 1

Model	110 Indoor (T-KJr2-IN)	110 Outdoor (T-KJr2-OS)	310 Indoor (T-K4-IN)	310 Outdoor (T-K4-OS)	510 Indoor (T-D2-IN)	510 Outdoor (T-D2-OS)
9007666005 (TK-RE02)	✓	✓	✓	✓		
9007603005 (TM-RE30)					✓	✓

OPTIONAL ITEMS

No.	Model	110 Indoor (T-KJr2-IN)	110 Outdoor (T-KJr2-OS)	310 Indoor (T-K4-IN)	310 Outdoor (T-K4-OS)	510 Indoor (T-D2-IN)	510 Outdoor (T-D2-OS)
1	9007996005 (4" Backflow preventer and F-F adaptor)	✓		✓		✓	
2	9007667005 (Direct-vent conversion kit)	✓		✓		✓	
3	9007670005 (Pipe cover)			✓	✓	✓	✓
	9007671005 (Pipe cover)	✓	✓				
4	9007674005 (Recess box)		✓		✓		✓
5	9008004005/9008005005 (Termination & Wall thimble kit)	✓		✓		✓	
6	9008147005/9008148005 (Direct-vent concentric Termination)	✓		✓		✓	

1. 4" Backflow preventer and F-F adaptor: 9007996005



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

2. Direct-vent conversion kit: 9007667005 (TK-TV10)



This kit can be used to convert the water heater from a single vent system to a direct-vent (double vent) (or sealed combustion) system with a 3 in. (76 mm) intake. Install this conversion kit in accordance with the installation instructions and any applicable codes.

3. Pipe cover: 9007670005 (TK-PC01) and 9007671005 (TK-PCJr2)



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

4. Recess box: 9007674005 (TK-RB02)

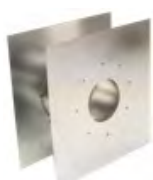


The recess box will allow for "clean" installations. The water heater fits inside the recess box, which hides and protects the whole water heater and plumbing. The recess box will fit in-between most wall studs.

5. Sidewall vent terminator (Hood) and Wall thimble kit: 9008004005 / 9008005005



Terminator Hood



Wall Thimble

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

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

6. Direct-vent concentric termination:



Used when terminating direct-vent (sealed combustion) systems, with indoor models that require a 3 in. (76 mm) intake and a 4 in. (102 mm) exhaust. This concentric termination provides the convenience of only having to make one penetration through a sidewall instead of two separate penetrations for the intake and exhaust piping. The termination includes a bird screen, restricting small animals, pests, and foreign objects from entering into the vent system. This sidewall termination is available in two different sizes, to cover a wide range of wall thicknesses.




For different wall thicknesses, there are two ranges of lengths available. (Refer to the NovaVent brochure for details.)

Covering wall thicknesses	Part#
5.0 – 10.0 in. (127 - 254 mm)	9008147005
12.0 – 18.0 in. (305 - 457 mm)	9008148005


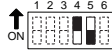

HIGH-ALTITUDE INSTALLATIONS

Check the elevation where your water heater is installed. Set DIPswitches shown in the table below depending on the altitude.

110 (T-KJr2) and 310 (T-K4) models

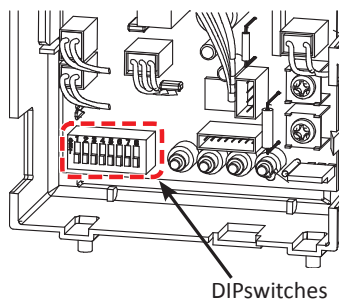
Altitude	0 to 2,000 ft. (DEFAULT)	2,000 to 4,000 ft.	4,000 to 6,000 ft.
Switch No. 3	OFF	ON	OFF
Switch No. 4	OFF	OFF	ON
			

510 (T-D2) model (Left bank of dipswitches)

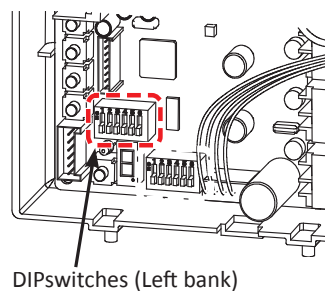
Altitude	0 to 2,000 ft. (DEFAULT)	2,000 to 4,000 ft.	4,000 to 6,000 ft.
Switch No. 4	OFF	ON	OFF
Switch No. 5	OFF	OFF	ON
			

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

110 (T-KJr2) and 310 (T-K4) models Computer board



510 (T-D2) model Computer board



Installation altitude

The maximum certified or allowable installed altitude is 6,000 ft. for indoor and outdoor models.



DO NOT adjust any DIPswitches on the upper bank for the 510 (T-D2) model.

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



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

The water heater must be vented in accordance with the section "Venting of Equipment" of the current edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the United States and/or Section 8 of the B149.1 Natural Gas and Propane Installation Code in Canada, as well as applicable local building codes.

The manufacturer recommends the NovaVent line. However, the following are also UL listed manufacturers: ProTech Systems Inc. (FasNSeal), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).

General rules for venting water heaters are:

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

General rules for vent terminations:

- Avoid locating the water heater vent termination near **any air intake devices**. These fans can pick up the exhaust flue products from the water heater and return them to the building. This can create a health hazard.
- Locate the vent termination so that it cannot be blocked by any debris, at any time. Most codes require that the termination must be at least 12 in. (305 mm) above grade, but the installer may determine if it should be higher depending on the job site condition and applicable codes.
- A proper sidewall termination is recommended when the water heater is vented through a sidewall.
- Regarding the clearances from the exhaust termination to the air inlet or opening, refer to the next few pages.

-Exhaust venting-
For the 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN), and 510 Indoor (T-D2-IN) models

This is a Category III appliance and must be vented accordingly. The vent system must be sealed airtight. All seams and joints **without gaskets** must be sealed with high heat resistant silicone sealant or UL listed aluminum adhesive tape having a minimum temperature rating of 350 °F (177 °C). For best results, a vent system should be as short and straight as possible.

- This water heater is a Category III appliance and must be vented accordingly with any 4 in. (102 mm) vent approved for use with Category III or Special BH type gas 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 approved or Special BH vent pipe.)
- When the horizontal vent run exceeds 5 ft. (1.5 m), support the vent run at 3 ft. (0.9 m) intervals with overhead hangers.
- When the vent run exceeds 5 ft. (1.5 m), a condensate drain is recommended. It should be installed as close to the heater as possible.
- The maximum length of exhaust vent piping must not exceed 50 ft. (15.2 m) (deducting 5 ft. (1.5 m) for each elbow used in the venting system). Do not use more than 5 elbows.

Diameter	Max. No. of Elbows	Max. Vertical and Horizontal (Total) Vent Length
4 in. (102 mm)	5	50 ft. (15.2 m)

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

No. of Elbows	Max. Vertical or Horizontal Vent Length
0	50 ft. (15.2 m)
1	45 ft. (13.7 m)
2	40 ft. (12.2 m)
3	35 ft. (10.7 m)
4	30 ft. (9.1 m)
5	25 ft. (7.6 m)

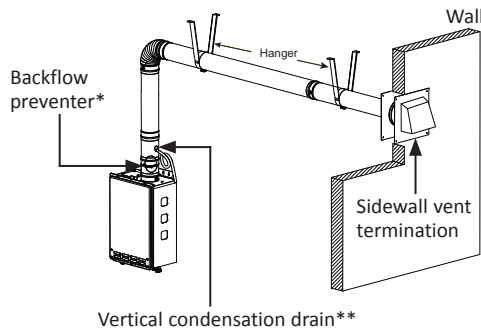
Excludes elbow termination, rain caps, or the 4 in. (102 mm) Concentric termination

Venting Illustrations-

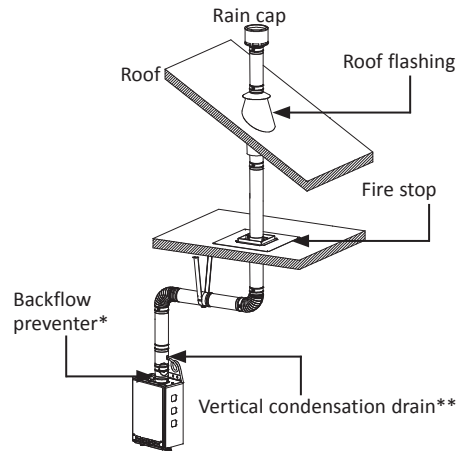
For the 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN), and 510 Indoor (T-D2-IN) models

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

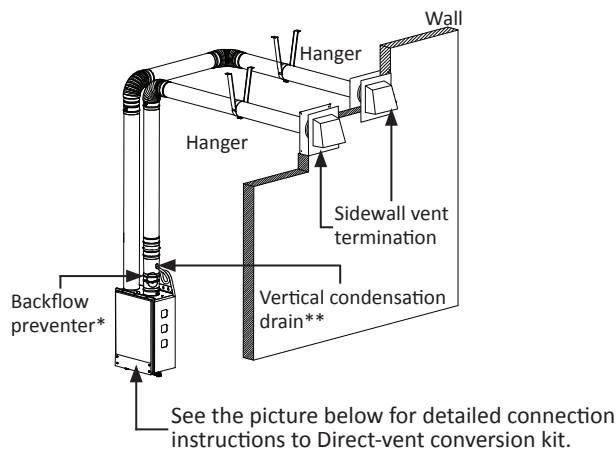
Horizontal Installation



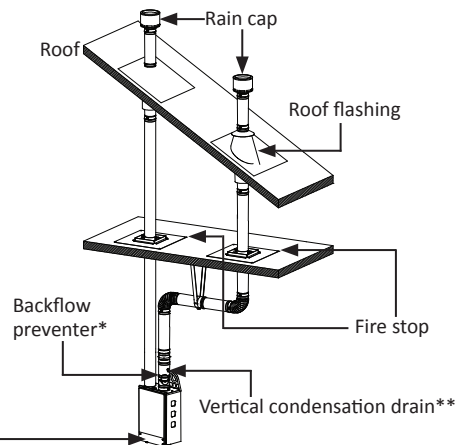
Vertical Installation



Horizontal Installation (With direct-venting)



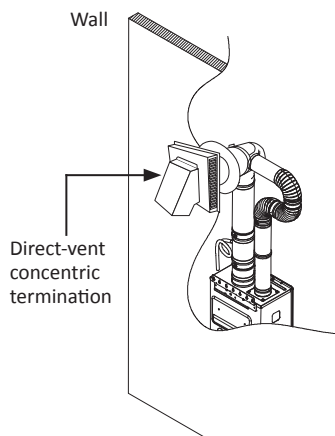
Vertical Installation (With direct-venting)



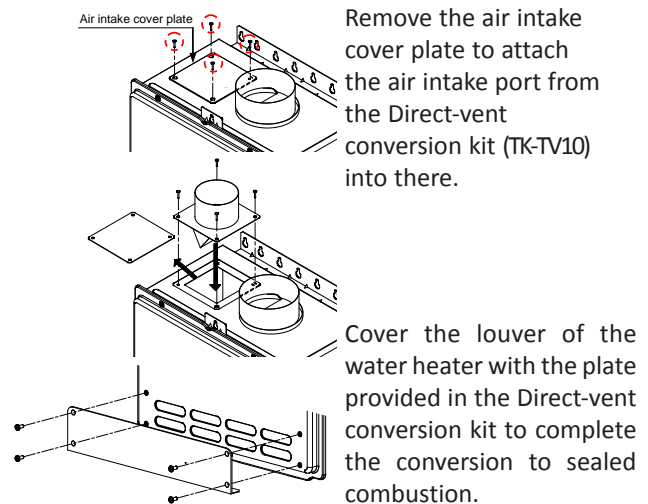
*Backflow preventer (Recommended for freezing weather conditions: 36 °F (2 °C) and below).

**Vertical condensation drain must be installed in accordance with local codes.

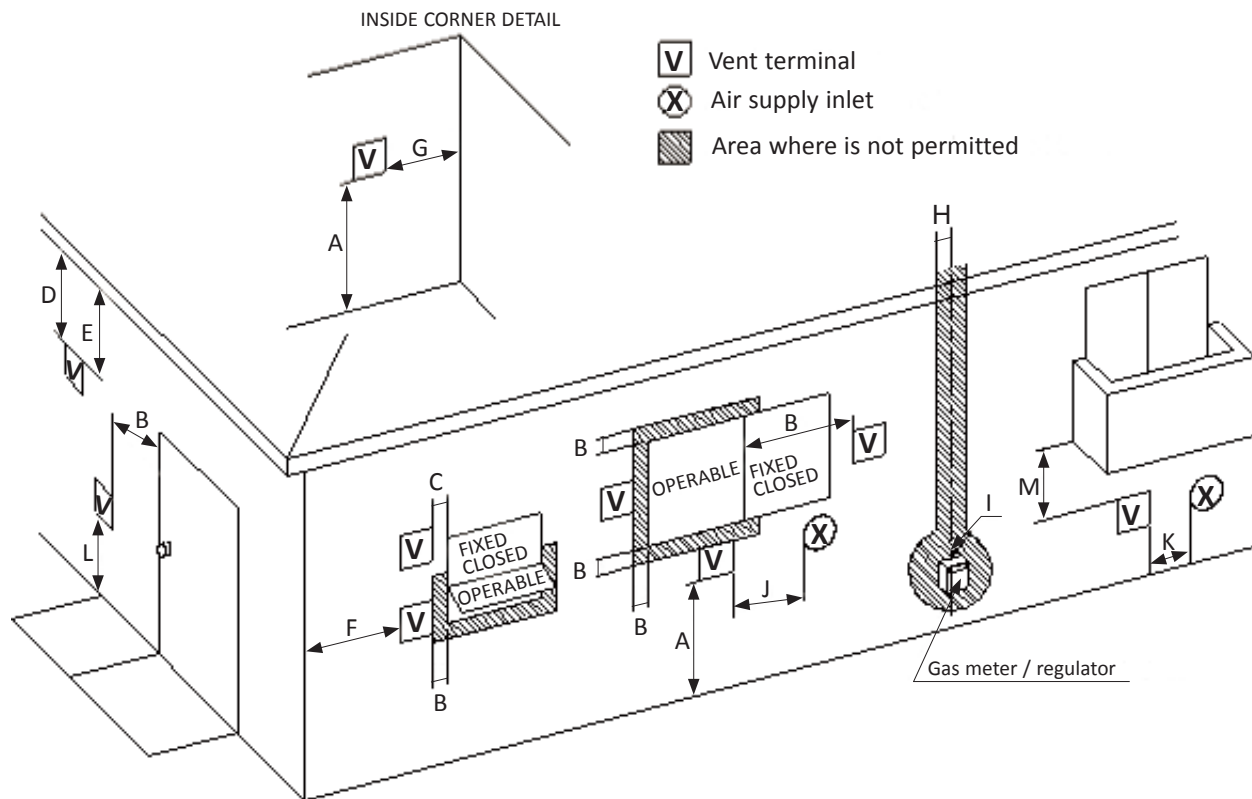
Horizontal Installation with Direct-vent concentric termination



Installation of Direct-vent conversion kit (TK-TV10) with a water heater



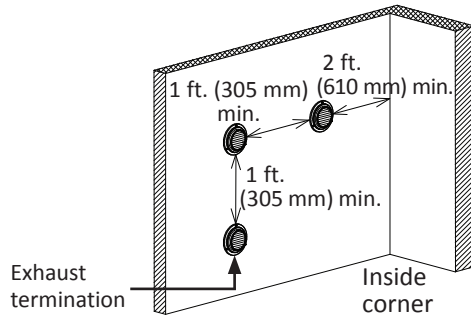
-Vent termination clearances-



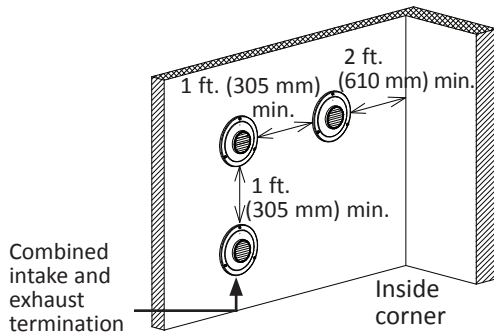
		Canada	U.S.A	
		Direct-vent and other than Direct-vent	Direct-vent	Other than Direct-vent
A	Clearance above grade, veranda, porch, deck, or balcony	1 foot	1 foot	1 foot
B	Clearance to window or door that may be opened	3 feet	1 foot	4 feet from below or side opening. 1 foot from above opening.
C	Clearance 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 (US) or B149.1 (Canada), please use clearances in accordance with local installation codes and the requirements of the gas supplier.

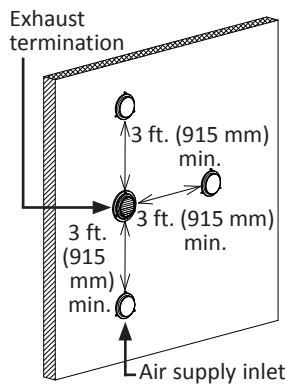
-For sidewall terminations-



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

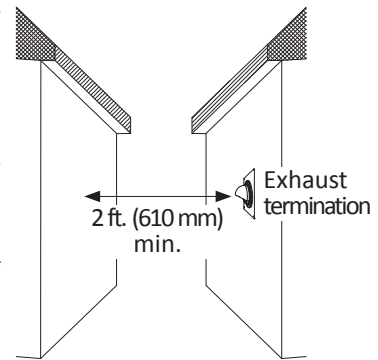


For multiple-unit, direct-vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. (305 mm) away from each other, no matter the orientation. A direct-vent termination must also be at least 2 ft. (610 mm) away from an inside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

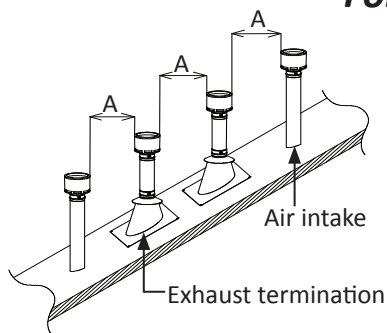


For direct-vent sidewall terminations that use two separate penetrations for the intake and exhaust, distance the intake and exhaust terminations at least 3 ft. (915 mm) away from each other, no matter the orientation.

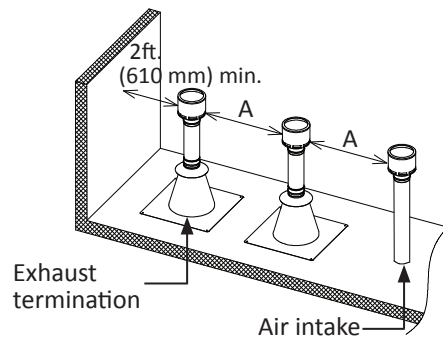
Exhaust and/or direct-vent sidewall terminations should be at least 2 ft. (610 mm) away from an opposite surface/wall. Do not place the termination directly in front of an opening into a building.



-For rooftop terminations-



A: In accordance with local codes



For multiple-unit rooftop terminations (whether for standard 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. (610 mm) away from a wall or surface.



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

GAS SUPPLY AND GAS PIPE SIZING

-General-



CAUTION

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

- The minimum and maximum inlet gas pressures are:

Gas type	Inlet gas pressure
Natural Gas	Min. 4.0" W.C. – Max. 10.5" W.C.
Propane	Min. 8.0" W.C. – Max. 14.0" W.C.

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

-Gas connections-

1. Install a manual gas shutoff valve between the water heater and the gas supply line.
2. When the gas connections are completed, it is necessary to perform a gas leak test either by applying soapy water to all gas fittings and observing for bubbles or by using a gas leak detection device.
 - The water heater and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psi (3.5 kPa).
 - The water heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psi (3.5 kPa).
3. Always purge the gas line of any debris, air, and/or water before connecting to the gas inlet.

NOTICE

Size the gas pipe appropriately to supply the necessary volume of gas required for the water heater using ANSI Z223.1/NFPA 54 in the USA or B149.1 in Canada or local codes. Otherwise, flow capabilities and output temperatures will be limited.

-Natural Gas Supply Piping-

Maximum delivery capacity of cubic feet of gas per hour of IPS pipe carrying Natural Gas with 0.60 specific gravity Based on pressure drop of 0.5" W.C.

Based on energy content of 1,000 BTU/Cubic ft.: The water heater requires 140 Cubic ft./hr for the 110 (T-KJr2) model, 190 Cubic ft./hr for the 310 (T-K4) model, and 199 Cubic ft./hr for the 510 (T-D2) model.

Unit: Cubic feet per hour

Pipe Size	Length												
Diameter	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	360	247	199	170	151	137	126	117	110	104	92	83	71
1"	678	466	374	320	284	257	237	220	207	195	173	157	134
1 1/4"	1,390	957	768	657	583	528	486	452	424	400	355	322	275
1 1/2"	2,090	1,430	1,150	985	873	791	728	677	635	600	532	482	412
2"	4,020	2,760	2,220	1,900	1,680	1,520	1,400	1,300	1,220	1,160	1,020	928	794

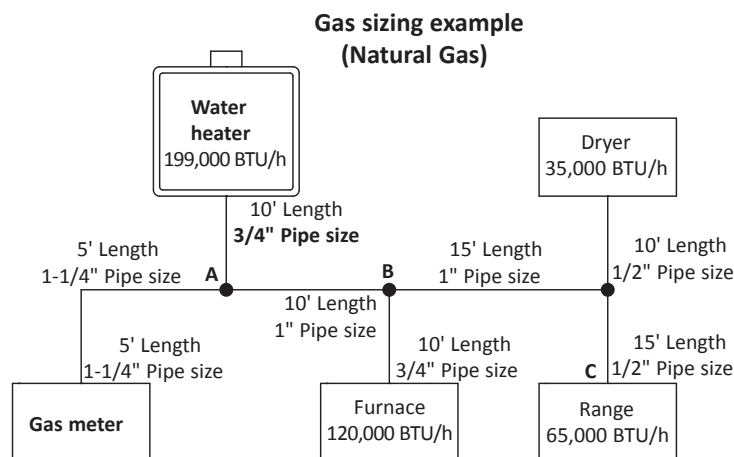
-Propane (LP) Supply Piping-

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

Unit: kBTU per Hour

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

For more information, please see the below.



Based on Energy Content of 1,000 BTU/Cubic ft.: Divide each appliance's BTU/h requirement by 1,000 BTU/ft³ to get the appliances ft³/h 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. per hour 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/h requirements and dividing by 1,000 yields a cubic ft. per hour requirement of 220 cubic ft. of gas per hour. The farthest appliance is the range, which is 50 ft. away from the meter. Looking at the above chart, and under the column of 50 ft., Section A to B needs to be 1" in order to supply 220 cubic ft.

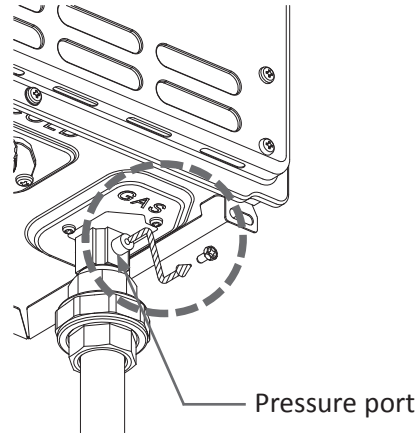
-Measuring inlet gas pressure-



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

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

1. Shut off the manual gas valve on the gas supply line.
2. Remove the screw for the pressure port located on the gas inlet of the water heater shown in the diagram on the right.
3. Connect the manometer to the pressure port.
4. Re-open the manual gas valve. Check to see that there are no gas leaks. Open some of the fixtures that use the highest flow rate to turn on the water heater.
5. Check the inlet gas pressure. When the water heater is on maximum and minimum burn, the manometer should read from 4.0" to 10.5" W.C. for Natural gas, from 8.0" to 14.0" W.C. for Propane.



WATER CONNECTIONS

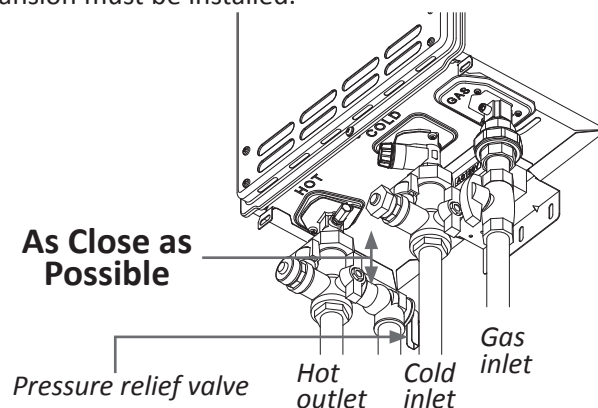


WARNING

- Do not use this appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

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

1. A manual shutoff valve must be installed on the cold water inlet to the water heater between the main water supply line and the water heater.
2. In addition, a manual shutoff valve is also recommended on the hot water outlet of the unit. If the water heater is installed within, or subjected to, a closed loop water system, a thermal expansion tank or code approved device to handle thermal expansion must be installed.
3. Before installing the water heater, flush the water line to remove all debris, and after installation is complete, purge the air from the line. Failure to do so may cause damage to the heater.
4. There is a wire mesh filter within the cold inlet to trap debris from entering your heater. This will need to be cleaned periodically to maintain optimum flow. (Refer to p. 40.)



-Pressure relief valve-

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

- This unit does not come with an approved pressure relief valve.
- An approved pressure relief valve must be installed on the hot water outlet.
- The pressure relief valve must conform to **ANSI Z21.22** or **CAN 1-4.4** and installation must follow local codes.
- The discharge capacity must be at least 140,000 BTU/h for the 110 (T-KJr2) model, 190,000 BTU/h for the 310 (T-K4) model, and 199,000 BTU/h for the 510 (T-D2) model.
- The pressure relief valve needs to be rated for a maximum of 150 psi (1 MPa).
- The discharge piping for the pressure relief valve must be directed so that the hot water cannot splash on anyone or on nearby equipment.
- Attach the discharge tube to the pressure relief valve and run the end of the tube to within 6 in. (152 mm) from the floor. This discharge tube must allow free and complete drainage without any restrictions.
- If the pressure relief valve installed on the water heater discharges periodically, this may be due to a defective thermal expansion tank or defective pressure relief valve.
- The pressure relief valve must be manually operated periodically to check for correct operation.
- No valve must be placed between the relief valve and the water heater.

ELECTRICAL CONNECTIONS



WARNING

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



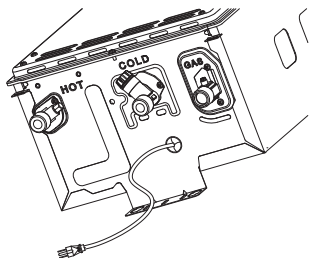
CAUTION

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

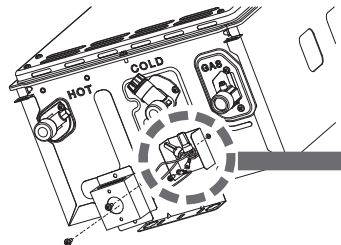
All indoor models come with a power plug instead of a junction box. The following procedure is for outdoor models only.

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

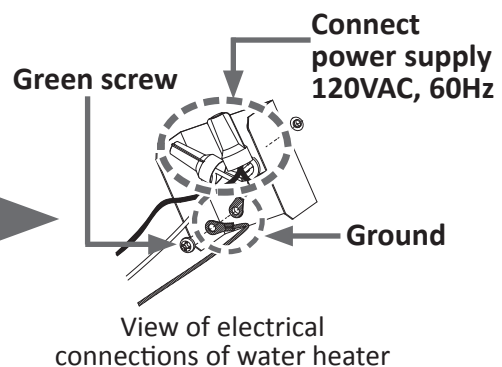
Indoor models only



Outdoor models only



Bottom view of water heater



View of electrical connections of water heater

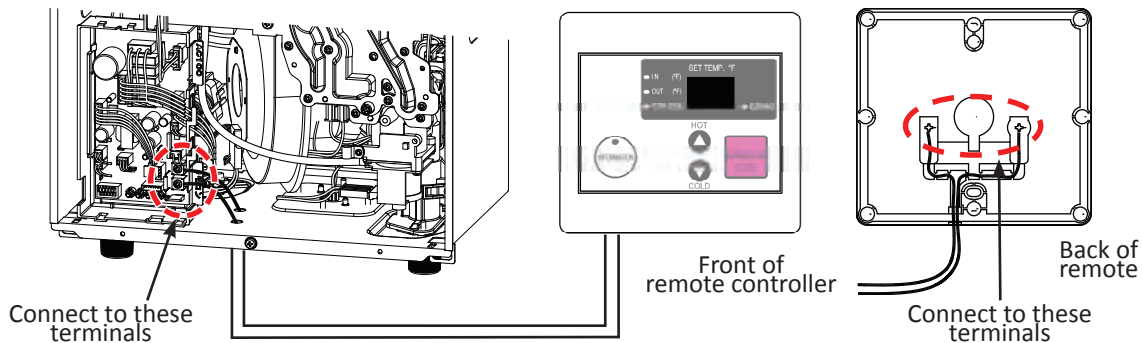
REMOTE CONTROLLER CONNECTIONS

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

1. Disconnect power supply from the water heater.
2. Take off the water heater's front cover.
3. Wires used for the remote controller connection must be:
 - Minimum 20 AWG wire (No polarity)
 - 9007666005 (TK-RE02) for 110 (T-KJr2) & 310 (T-K4) models
Maximum 150 ft. long
 - 9007603005 (TM-RE30) for 510 (T-D2) model
Maximum 400 ft. long
- * For detailed connection to the remote controller, refer to the instructions that are packaged with the remote controller.
4. Pick location of install for the remote controller.
5. Cut enough two pair wire.
6. Crimp on supplied fork connectors.
7. Locate the remote controller terminals, pictured below (located around the lower right-hand side of the computer board).
8. Open the plastic cover of the remote controller, and then attach the two fork terminals to connector base of the backside of the remote controller with two screws. Make sure the terminals are firmly fixed.
9. Pull the remote's wires through the hole at the bottom of the water heater's casing.
10. Properly attach the remote's wires to the remote controller terminals on the computer board.
(No polarity)
- * **Do NOT jump or short-circuit the wires, or the computer board will be damaged.**
11. Replace the plastic computer board cover and then replace the front cover securely.

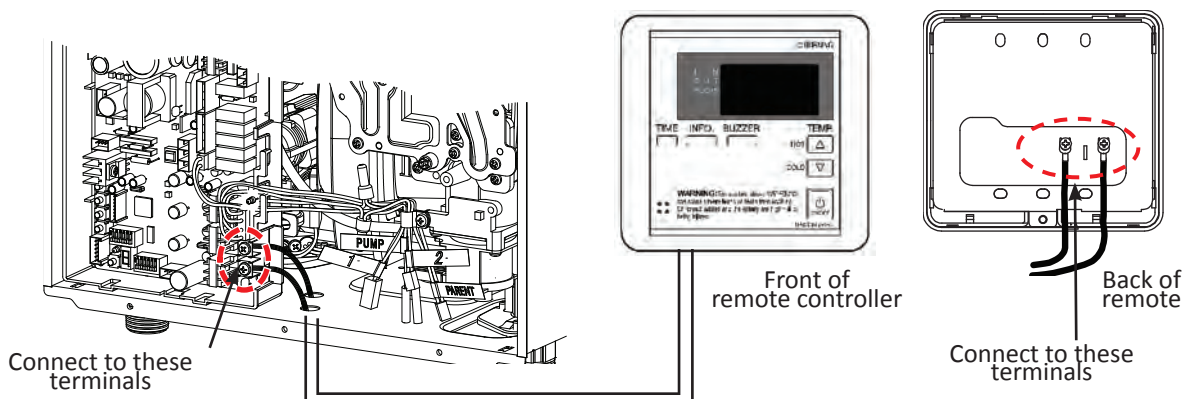
110 (T-KJr2) & 310 (T-K4) models

9007666005(TK-RE02)



510 (T-D2) model

9007603005(TM-RE30)



PUMP CONTROL CONNECTIONS

Available on the 510 (T-D2) model only

The 510 (T-D2) model water heater can be used to control a recirculation pump. **Proper pump control helps to preserve the life of the system and saves energy as well.**

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

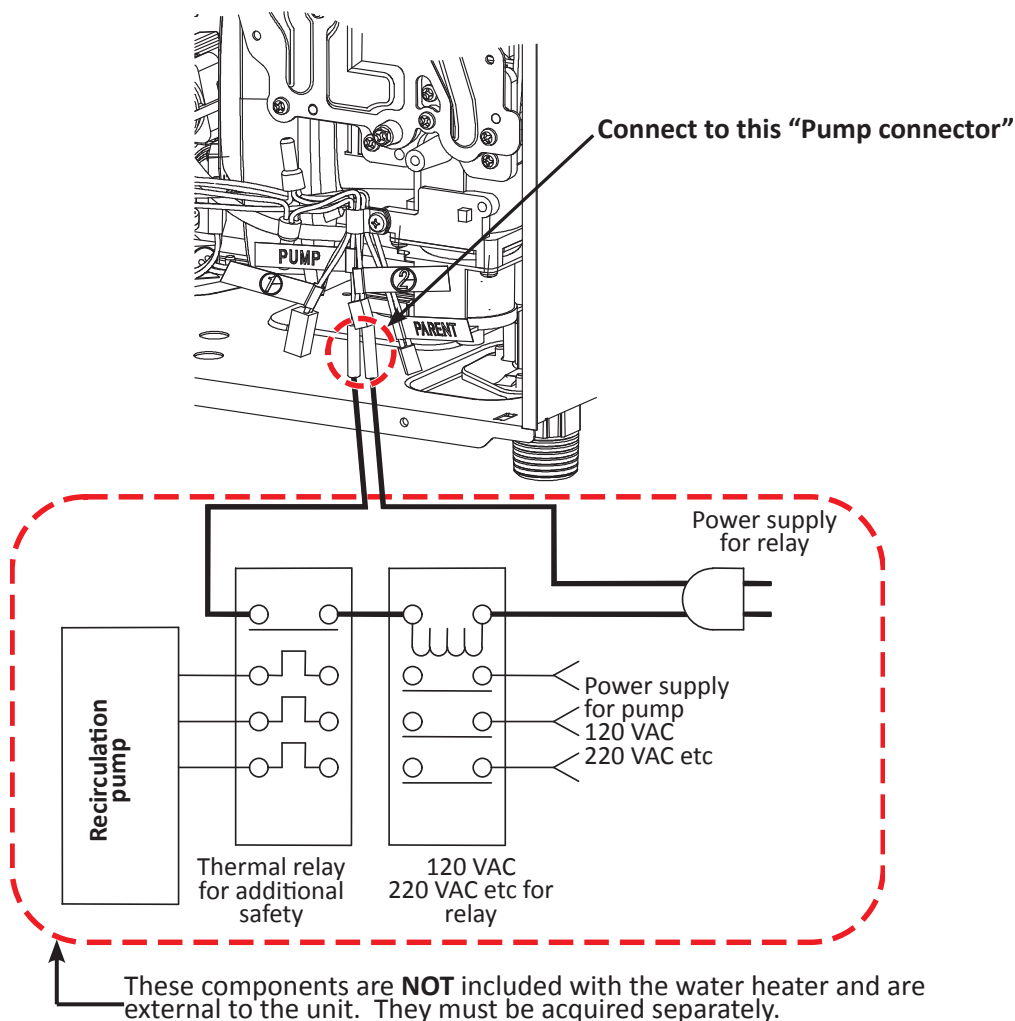
Please make sure the relays are properly rated for the recirculation pump.

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



CAUTION

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



EASY-LINK SYSTEM

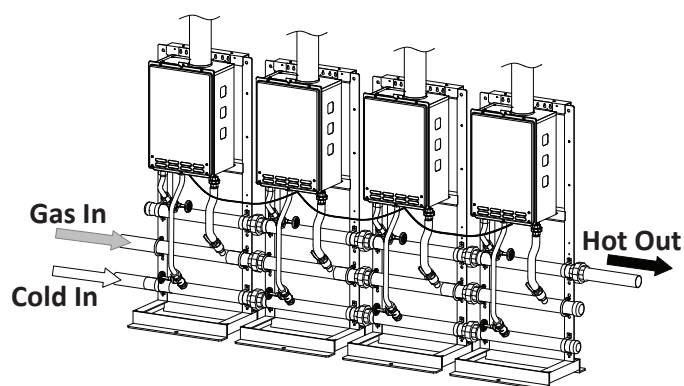
(Available on the 510 (T-D2) model only)

-General-

The 510 (T-D2) model water heaters can be connected with other allowable heaters (see the table below) with communication cables to work as a multiple-unit manifold system.

- The Easy-Link System allows up to 4 units to manifold together.
- A communication cable (gray color) comes with each 510 (T-D2) model.

You can manifold from 2 to 4 units without the need for a multi-unit controller. A 4-unit system has full automatic modulation between 11,000 BTU/h and 796,000 BTU/h.



Easy-Link connection with allowable heaters
T-K3
T-K3-Pro
510 model (T-D2-IN / T-D2-OS)
510U model (T-D2U-IN / T-D2U-OS)*
510U model (T-D3U-IN / T-D3U-OS)*
200 series

*If the 510U (T-D2U) model or 510U (T-D3U) model is incorporated in an Easy-Link System with the other models in the table above, the DIP switch of all the 510U (T-D2U) and the 510U (T-D3U) computer boards must be changed. Please refer to the manual of 510U (T-D2U) model or 510U (T-D3U) model on Easy-Link System for more detail.



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.
- **Only listed models on the table above can be combined together as an Easy-Link System. These models cannot be combined together with other models not listed on the table above.**

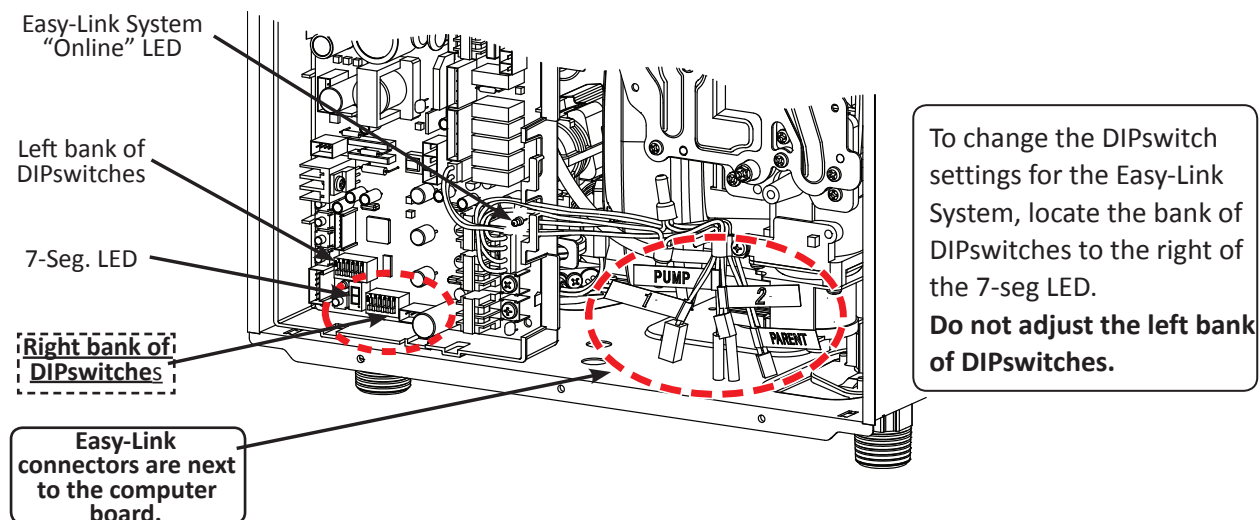
-Easy-Link Connection Procedures-

1. Make sure the power to the heaters are off.
2. Verify the DIPswitch set temperatures of all units within the system. Every single water heater must be set to the same set temperature. If an TM-RE30 remote controller is used, it should be installed to the **"PARENT"** unit. The remote will set the temperature for the entire system.
3. Select one unit to be the **"PARENT"** unit. The **"PARENT"** unit should be one of the end units.
4. **"PARENT"** unit:
Locate the two banks of DIPswitches to the right of the 7-seg. LED on the computer board of the unit that you select to be the **"PARENT"** unit. Change DIPswitch No. 1 on the **right bank of DIPswitches to the ON position**. See the computer board diagram as shown in the next page. Do not change any DIPswitches on any of the **"CHILD"** units.

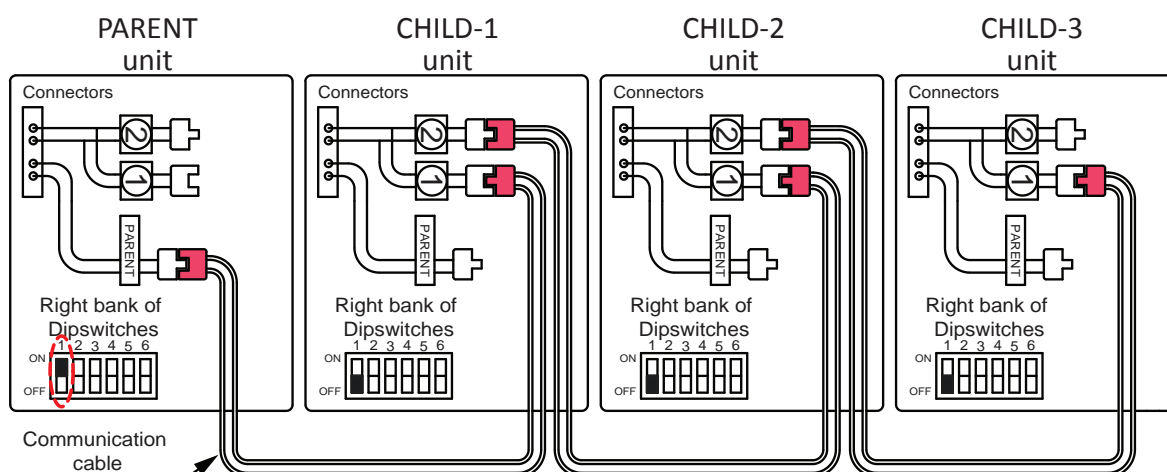
5. Between the **"PARENT"** and the **"CHILD-1"** units:
Connect the **"PARENT"** connector of the **"PARENT"** unit to the **"1"** connector of the **"CHILD-1"** unit using the supplied linking cable.
6. Between the **"CHILD-1"** and the **"CHILD-2"** units:
Connect the **"2"** connector of the **"CHILD-1"** unit to the **"1"** connector of the **"CHILD-2"** unit.
7. 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.
8. Verify that all cables are connected like the diagram below (B).
9. Turn on power to the **"PARENT"** unit. The 7-seg LED will display **"1"**.
Turn on **"CHILD-1"**. When the 7-seg LED displays a number, turn on **"CHILD-2"**.
When the 7-seg LED displays a number, turn on **"CHILD-3"**.
Make sure the 7-seg LED of all the units' computer boards display the unit #. The numbering system automatically allocates the unit # to each water heater in the Easy-Link System, in accordance with the table below.

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

(A) 510 (T-D2) model Computer board



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



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

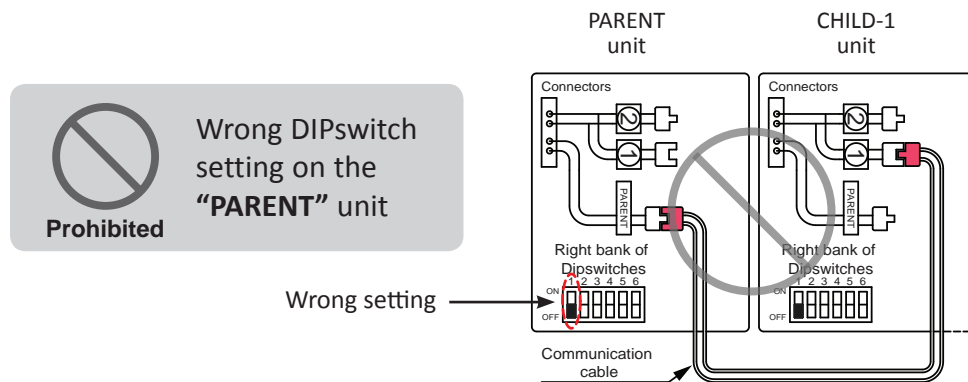
NOTICE

- A remote controller is not required for an Easy-Link System, however, it does provide for more temperature options and ease of maintenance.
- If running the Easy-Link System without a remote controller, please make sure the temperature settings on ALL the units are set to the same settings. Otherwise, the units will not operate properly.
- If a 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.

(C) Examples of incorrect settings and /or connections

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

- Unless you change DIPswitch No. 1 of the "PARENT" unit to the "ON" position, the system will not work as an Easy-Link System. The units will operate as individual units.



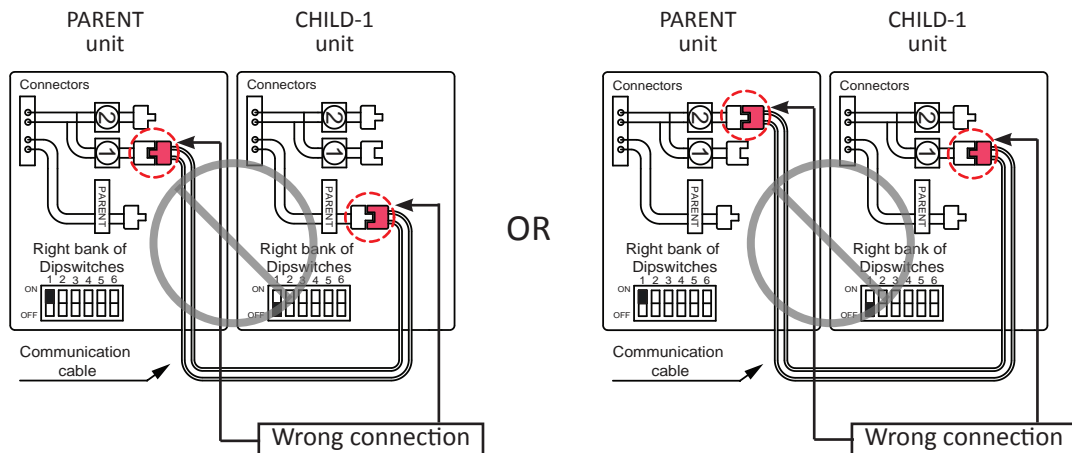
CASE 2: Wrong connections between the "PARENT" unit and the "CHILD-1" unit

- If you connect the "1" (or "2") connector of the "PARENT" unit to the "PARENT" (or "1") connector of the "CHILD-1" unit, the system will not work as an Easy-Link System. The units will operate as individual units.



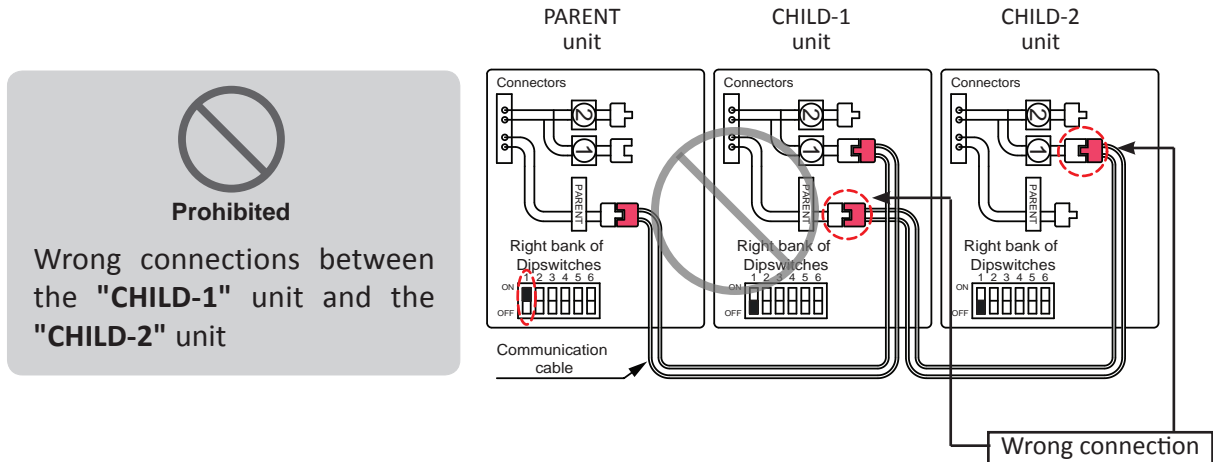
Prohibited

Wrong connections between the "PARENT" unit and the "CHILD-1" unit



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

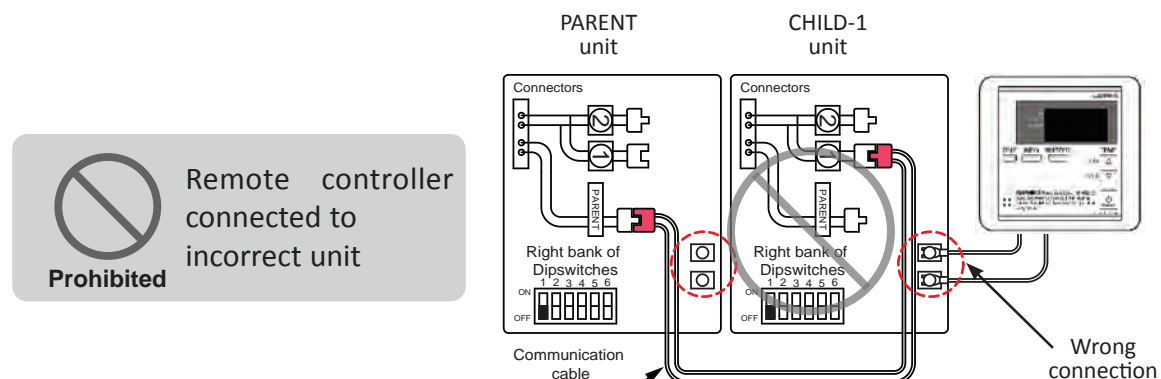
- If you connect the "PARENT" connector of the "CHILD-1" unit to the "1" connector of the "CHILD-2" unit, the "CHILD-2" unit will operate as an individual unit, and will not be part of the Easy-Link System.



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

CASE 4: Remote controller connected to incorrect unit

- If a remote controller 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.



APPLICATIONS

-Space-Heating Applications-



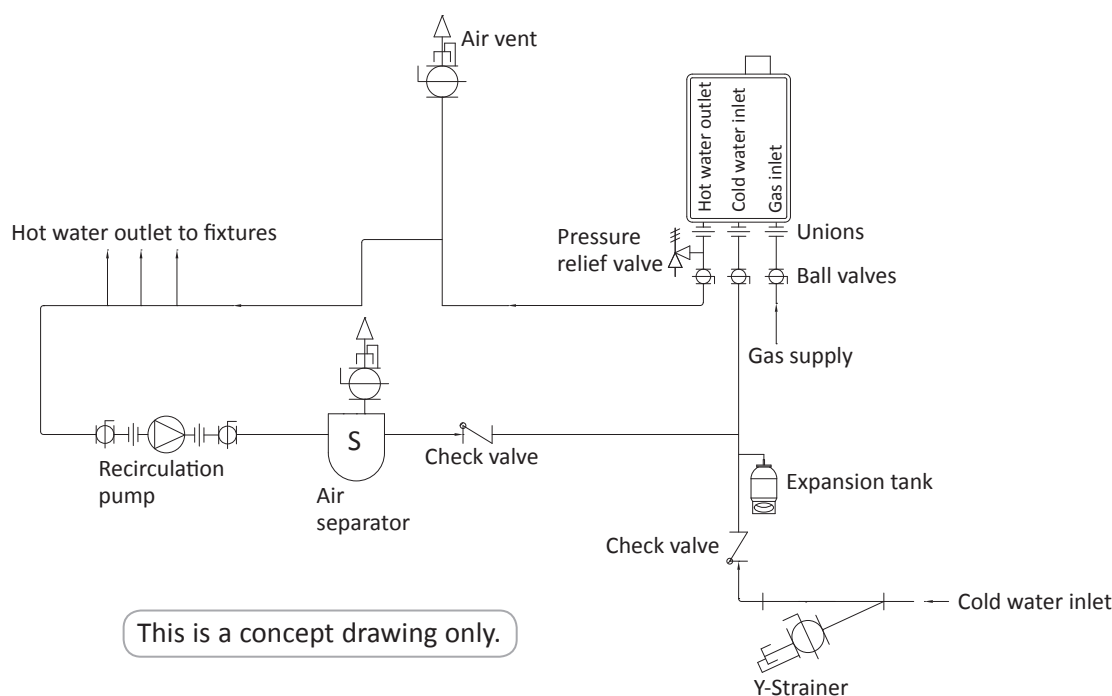
- This water heater is suitable for combination water (potable) heating and space heating and not suitable for space heating applications only.
- In order to purge air in water pipes within a closed-loop system, an air vent and air separator should be installed in the system. Required circulation flow rates are labeled next to each application diagram. These flow rate requirements must be followed.
- Toxic chemicals used in boiler treatments such as alcohol, glycerol and glycol groups must not be introduced into the system if the system incorporates an open-loop potable water system.
- The water heater can be used to supply potable water and space heating and shall not be connected to any heating system or component(s) previously used with non-potable water where any chemicals were added to the water heating appliances.
- When the system requires water for space heating at temperatures higher than required for other uses, a means such as a mixing valve shall be installed to temper the water for those other uses in order to reduce scald hazard potential.
- Water temperature over 125 °F (52 °C) can cause severe burns instantly or death from scalding.

-Recirculation-

*The recirculation pump is to be controlled by:

-Dual-set aquastat (recommended w/timer) or -"Pump Control Connections" 510 (T-D2) model only. (Refer to p.23.)

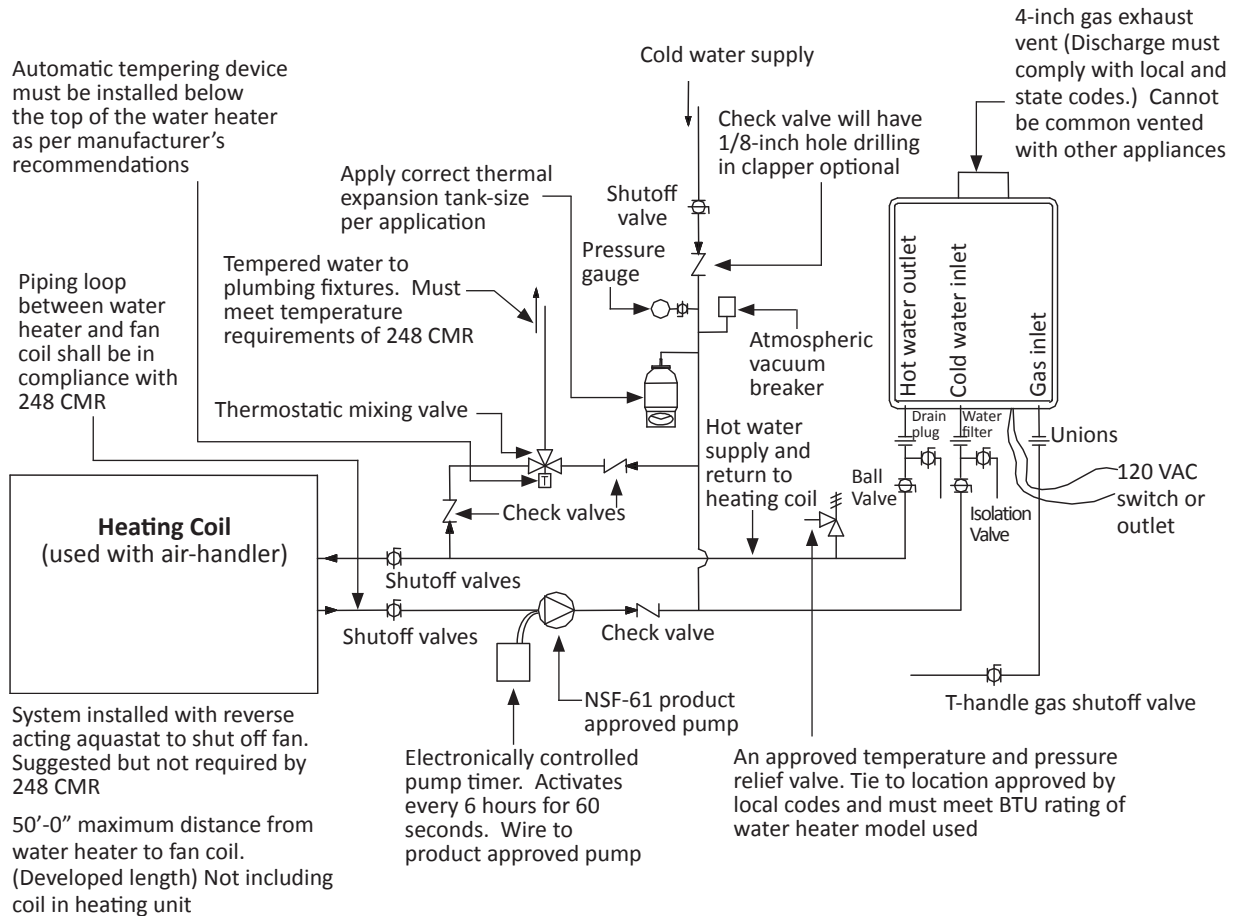
*The recirculation pump is to provide no less than 2 GPM and no more than 4 GPM through each activated unit in the system.



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

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

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



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

NOTICE

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

INITIAL OPERATION

FOR YOUR SAFETY, READ BEFORE OPERATING

- **Check the GAS and WATER CONNECTIONS** for leaks before firing unit for the first time.
- Open the main gas supply valve to the unit using only your hand to avoid any spark. Never use tools. If the knob will not turn by hand, do not try to force it; call a qualified service technician. Forced repair may result in a fire or explosion due to gas leaks.
- Be sure to check for the presence of leaking gas toward the bottom of the unit because some gases are heavier than air and may settle towards the floor.
- **Check the GAS PRESSURE.** Refer to p. 20.
- 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 appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

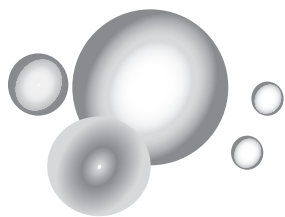


WARNING

IF YOU SMELL GAS:

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

	Operation	
1.	Once the above checks have been completed, please clean filter of any debris. Refer to p. 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 VAC, 60 Hz power supply to the water heater.	
6.	Now you are ready to enjoy hours of endless hot water.	



Owner's Guide

CONGRATULATIONS

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

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

OPERATING SAFETY

FOR YOUR SAFETY READ BEFORE OPERATING

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

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for 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 shutoff valve. Never use tools. If the valve will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately contact a qualified installer or service agency to replace a flooded water heater. Do not attempt to repair the unit! It must be replaced!

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Turn off all electric power to the appliance.
3. Do not attempt to light the burner by hand.
4. Turn the gas shutoff valve located on the outside of the unit to the closed 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 the next step.
6. Turn the gas shutoff valve located on the outside of the unit to the open position.
7. Turn on all electrical power to the appliance.
8. If the appliance will not operate, follow the instructions in "To Turn Off Gas to Appliance," and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the appliance if service is to be performed.
2. Turn the gas shutoff valve located on the outside of the unit to the closed 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.



Do not install water heater where flammable products will be stored or used unless the main burner is at least 18" above the floor. This will reduce, but not eliminate the risk of vapors being ignited by the main burner.

FLAMMABLES

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

Keep flammable products:

1. Far away from heater.
2. In approved containers.
3. Tightly closed and out of reach of children.
4. Water heater has a main burner, which may come on at any time and will ignite flammable vapors.

Vapors:

1. Cannot be seen.
2. 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.

⚠ DANGER

1. Water temperature over 125°F (52°C) can cause severe burns instantly or death from scalds.
2. Children, disabled and elderly are at highest risk of being scalded.
3. Feel water before bathing or showering.
4. Temperature limiting valves are available. See manual.
5. The outlet temperature of the water heater is set at 120°F (50°C). If you require water temperatures below this setting, follow the instruction manual.
6. Use this heater at your own risk. Test the water before bathing or showering. Do not leave children or an infirm person unsupervised. See your local water supply company [plumbing hardware retailer] for temperature limiting valves that are available.



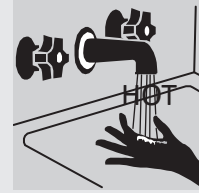
A pressure relief valve listed as complying with the standard for Relief Valve and Automatic Gas Shutoff Devices for Hot Water Supply System, ANSI Z21.22 • CSA 4.4, shall be installed at the time of installation of the water heater in the location specified by the manufacturer. Local codes shall govern the installation of relief devices for safety operation of the water heater. The relief valve must not be removed or plugged. No valve shall be placed between the relief valve and the water heater. The relief from the discharge of the pressure relief valve shall be disposed of in a suitable place where it will cause no damage. Also, there shall be no other reducing coupling or other restrictions installed on the discharge line to restrict flow. See Installation Manual heading "PRESSURE RELIEF VALVES" for installation and maintenance of relief valve discharge line and other safety precautions.

NORMAL OPERATION

GENERAL



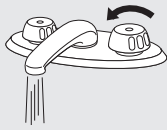
- Hot water temperature above 125 °F (52 °C) can cause severe burns instantly or death from scalding.
- The outlet hot water temperature of the water heater is factory set at 122 °F (50 °C).
- Feel the water temperature before bathing or showering.



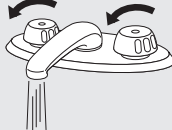
NOTICE

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

1. Open a cold water fixture.



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



3. When finished, close the water fixture.



TEMPERATURE SETTINGS

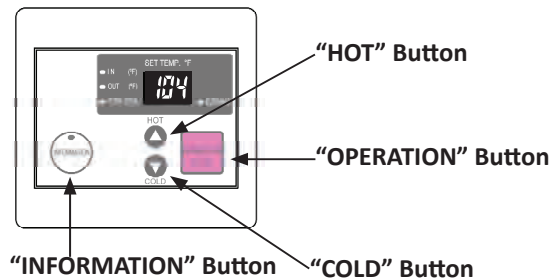
-With remote controller-

a) 110 (T-KJr2) and 310 (T-K4) models: 9007666005 (TK-RE02)

<Set temperature>

1. Turn on the 120 VAC power supply to the water heater.
2. Press the **"OPERATION"** button on the remote in order to turn the remote controller on. It shows the set temperature on its display as shown to the right.
3. Press the **"HOT"** button or the **"COLD"** button to set the temperature setting of the unit.
4. You can set the temperature from 99 °F (38 °C) to 122 °F (50 °C).

9007666005 (TK-RE02)



Increasing temperature from 122 °F (50 °C) to 140 °F (60 °C)

- Press the **"HOT"** button to set 122 °F (50 °C).
- Press and hold the **"INFORMATION"** button and the **"HOT"** button for at least 3 seconds. The remote will emit a beep and change to 131 °F (55 °C).
- Press the **"HOT"** button to set up to 140 °F (60 °C).

Increasing temperature above 140 °F (60 °C)

- Press the **"HOT"** button to set 140 °F (60 °C).
- Press and hold the **"INFORMATION"** button and the **"HOT"** button for at least 3 seconds. The remote will emit a beep and change to 158 °F (70 °C).
- Press the **"HOT"** button to set up to 167 °F (75 °C).

The temperature options

(Unit: °F)*

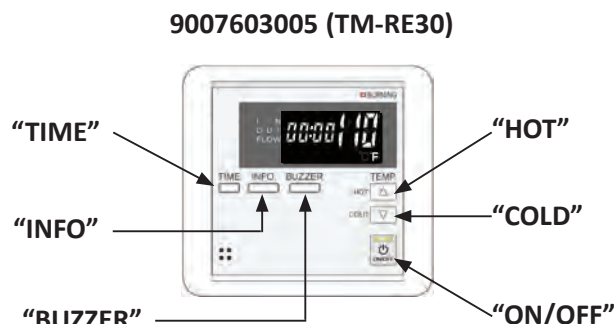
99	100	102	104	106	108	110	111	113	115	117	122	131	140	158	167
----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

*The remote (9007666005 (TK-RE02)) can display only by degree Fahrenheit.

b) 510 (T-D2) model: 9007603005 (TM-RE30)

<Set temperature>

1. Turn on the 120VAC power supply to the water heater.
2. Press the "ON/OFF" button on the remote to turn the remote controller on. It shows the time and set temperature on the display as shown to the right.
3. Press the "HOT" button or the "COLD" button to set the temperature.
You can set the temperature from 100 °F (37 °C) to 122 °F (50 °C).



Increasing temperature from 122 °F (50 °C) to 140 °F (60 °C)

- Press the "HOT" button to set 122 °F (50 °C).
- Press and hold the "INFO" button and the "HOT" button for at least 3 seconds. The remote will emit a beep and change to 131 °F (55 °C).
- Press the "HOT" button to set up to 140 °F (60 °C).

Increasing temperature above 140 °F (60 °C)

- Press the "HOT" button to set 140°F (60°C).
- Press and hold the "INFO" button and the "HOT" button for at least 3 seconds. The remote will emit a beep and change to 158 °F (70 °C) or 149 °F (65 °C) – under High temperature mode. (See below.)
- Press the "HOT" button to set up to 167 °F (75 °C) or 176 °F (80 °C) – under High temperature mode. (See below.)

The temperature options

The remote controller has two temperature range options-Default mode and High temperature mode.

Unit	Default mode															
°C	37	38	39	40	41	42	43	44	45	46	47	50	55	60	70	75
°F	100		102	104	106	108	110	111	113	115	117	122	131	140	158	167

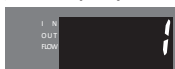
Unit	High temperature mode															
°C	37	38	39	40	41	42	43	44	45	50	55	60	65	70	75	80
°F	100		102	104	106	108	110	111	113	122	131	140	149	158	167	176

<High temperature mode>

To change the remote controller's mode from **Default mode** to **High temperature mode**, please follow the procedures on the next page.

How to change to the High temperature mode

1. Turn off power to the remote controller by pressing the **"ON/OFF"** button. (Lamp is OFF to indicate that power is off.)
2. Simultaneously press and hold both the **"HOT"** and **"COLD"** buttons for at least 5 seconds. And then make sure **"1"** (or **"0"**) is displayed on remote controller.



"1" is displayed for single unit.



"0" is displayed for Easy-Link System.

3. Press the **"TIME"** button. Make sure **"OFF"** and **"F1"** are displayed on remote controller.



4. Press the **"INFO"** button. After, make sure **"OFF"** blinks.



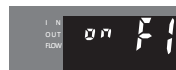
"OFF" blinks.

5. Press the **"HOT"** button or the **"COLD"** button to set display to **"on"**.



"ON" blinks.

6. Simultaneously press both the **"BUZZER"** button and the **"INFO"** button to fix the setting. Make sure the display is no longer blinking.



"ON" stops blinking.

7. Press the **"ON/OFF"** button to finish the setting.
8. Turn on power to the remote controller by pressing the **"ON/OFF"** button again. (Lamp is ON to indicate that power is on.)

C) Other features of the remote controllers

- Features available on 9007666005 (TK-RE02) and 9007603005 (TM-RE30)

<Buzzer operation>

If there is a problem with the water heater, the remote controller will sound a buzzer and display the error code to inform you the source of the problem.

You can stop the buzzer by pressing : **"any button"** for 9007666005 (TK-RE02)

"Buzzer button" for 9007603005 (TM-RE30).

For details on the error code, refer to p. 43.

NOTE: If you want to disable the buzzer operation, press and hold the **"BUZZER"** button for 3 seconds or longer. (9007603005 (TM-RE30) only.)

<Information mode>

You can get some information about the water heater condition by pressing :

"INFORMATION" button for 9007666005 (TK-RE02)

"INFO" button for 9007603005 (TM-RE30)

During the information mode, the information will be rotated by pressing the **"INFORMATION"** or **"INFO"** button as follows:

Inlet water temperature → Outlet water temperature → Water flow → Finish information mode

- **Features available only on 9007603005 (TM-RE30)**

<Set the time>

1. Press the **"TIME"** button, then press the **"HOT"** or the **"COLD"** button to set the clock time.
2. Press the **"TIME"** button again to save and exit.

NOTE: If you want to hide the clock time, press and hold the **"TIME"** button for 3 seconds or longer.

<Energy saving mode >

The remote controller has an energy saving mode. The backlight of the LCD in the remote controller will be turned off in five minutes after the water heater stops the operation for energy saving. Once the unit is working, the backlight of the LCD is turned back on during the operation.

<Unit conversion mode>

The remote controller has a function that can change units of temperature and flow rate from **"°F and GPM"** to **"°C and Liter / min"**, please follow the procedures below:

1. Turn off power to the remote controller by pressing the **"ON/OFF"** button.
(Lamp is OFF to indicate that power is off.)
2. Simultaneously press and hold both the **"HOT"** and **"COLD"** buttons for at least 5 seconds. And then make sure **"1"** (or **"0"**) is displayed on remote controller.



"1" is displayed for single unit.



"0" is displayed for Easy-Link System.

3. Press the **"TIME"** button. Make sure **"OFF"** and **"F1"** are displayed on remote controller.



4. Press the **"HOT"** button or the **"COLD"** button to set display to **"F3"**.



5. Press the **"INFO"** button. After, make sure **"°F"** blinks.



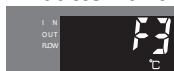
←Blinking

6. Press the **"HOT"** button or the **"COLD"** button to set display to **"°C"**.



←Blinking

7. Simultaneously press both the **"BUZZER"** button and the **"INFO"** button to fix the setting. Make sure display is no longer blinking.



←Stops blinking

8. Press the **"ON/OFF"** button to finish the setting.
9. Turn on power to the remote controller by pressing the **"ON/OFF"** button again. (Lamp is ON to indicate that power is on.).

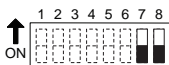
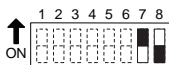
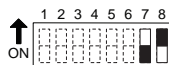
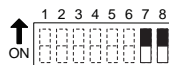
NOTE: Please refer to each manual of the remote controller included with a remote controller for more detail.

TEMPERATURE SETTINGS ON THE PCB

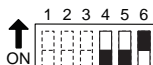
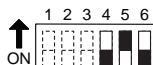


-WITHOUT REMOTE CONTROLLER-

Depending on the model, there are 4 or 8 temperatures that you can select from by changing the DIPswitch settings on the computer board without the remote controller. See the table below.

110 (T-KJr2) and 310 (T-K4) models

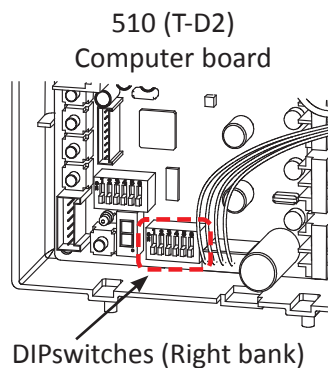
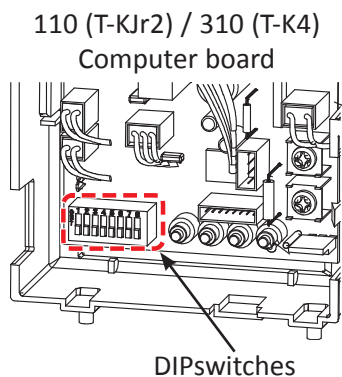
Temperatures settings			
113 °F (45 °C)	122 °F (50 °C) Default	131 °F (55 °C)	140 °F (60 °C)
			

510 (T-D2) model

Temperatures settings <Right bank of DIPswitches>			
104 °F (40 °C)	113 °F (45 °C)	122 °F (50 °C) Default	140 °F (60 °C)
			

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

Location of the bank of DIPswitches on the computer board



- DO NOT adjust the left bank of DIPswitches for the 510 (T-D2) model.
- Turn off the power supply to the water heater before changing the DIPswitch settings.

FLOW

Household Flow Rates

- The flow rate through the water heater is limited to a maximum of 6.6 GPM for the 110 (T-KJr2) model, 8.0 GPM for the 310 (T-K4) model, and 10.0 GPM for the 510 (T-D2) model.
- The temperature setting, along with the supply temperature of the water will determine the flow rate output of the unit.
- Please refer to the temperature vs. gallons per minute charts on p. 54 to determine the likely flow rates based on your local ground water temperature and your desired outlet water temperature.

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

- Based on the United States Department of Energy method of testing water heater output, the water heater is rated for gallons per hour (GPH) or gallons per minute (GPM) for Natural Gas and Propane, when raising the water temperature by 77 °F (from 58 °F to 135 °F). See the diagram below.

Model	110 Indoor (T-KJr2-IN)		110 Outdoor (T-KJr2-OS)		310 Indoor (T-K4-IN)		310 Outdoor (T-K4OS)		510 Indoor (T-D2-IN)		510 Outdoor (T-D2-OS)	
GPH/GPM	GPH	GPM	GPH	GPM	GPH	GPM	GPH	GPM	GPH	GPM	GPH	GPM
Natural Gas	172	2.9	180	3.0	244	4.1	242	4.0	252	4.2	255	4.3
Propane	184	3.1	179	3.0	250	4.2	249	4.2	256	4.3	255	4.3

- Refer to the table to the top right for typical household plumbing fixture flow rates to determine what the water heater can do in a household application.

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 freeze protection thermostat senses air temperature below 36.5 °F (2.5 °C).
- For the 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN), and 510 Indoor (T-D2-IN) models:
 - In any areas subject to freezing temperatures, the manufacturer highly recommends an indoor installation with an indoor model. In such an installation, freezing issues can only occur if cold air enters through the venting into the heat exchanger, whether by negative pressures within the installation location or by strong outside winds.
 - The manufacturer also highly recommends the use of a backflow preventer (sold separately) to minimize the amount of cold air entering through the exhaust venting when the water heater is off.
- It is the installer's responsibility to be aware of freezing issues and take all preventative measures. The manufacturer will not be responsible for any damage to the heat exchanger as a result of freezing.
- If you will not be using your heater for a long period of time:
 1. Completely drain the water out of the unit. Refer to p. 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.

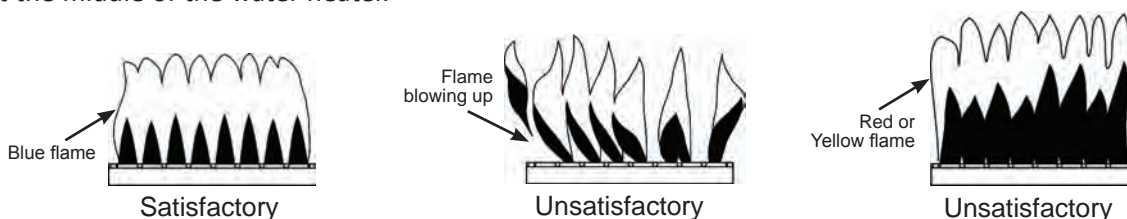
MAINTENANCE AND SERVICE



WARNING

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

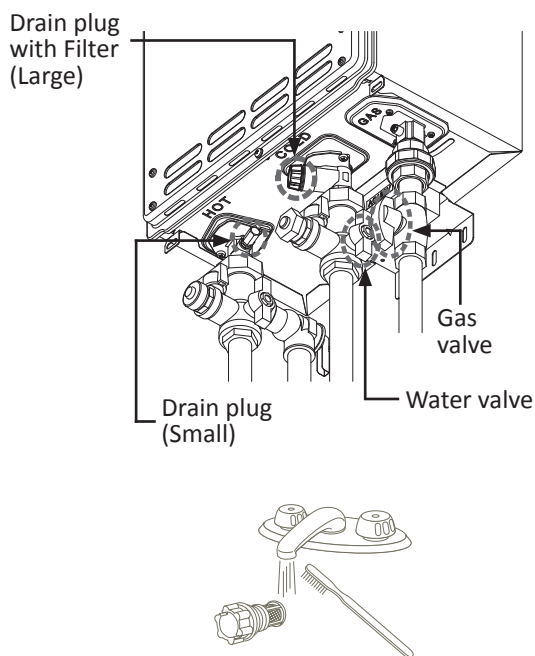
- Clean the cold-water inlet filter. (Refer to Unit draining and filter cleaning section in this page.)
- Be sure that all openings for combustion and ventilation air are not blocked.
- The venting system should be checked annually for any leaks, corrosion, blockages or damage.
- The burner should be checked annually for dust, lint, grease or dirt.
- Keep the area around the water heater clear. Remove any combustible materials, gasoline or any flammable vapors and liquids.
- In accordance with all local codes and common safety practices, water discharged from the pressure relief valve can cause severe burns instantly from scalding. DO NOT touch the pressure relief valve.
- If the relief valve discharges periodically, it may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation.
- Visual check of burner flames (see below) through the burner window in the burner assembly located at the middle of the water heater.



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

UNIT DRAINING and FILTER CLEANING

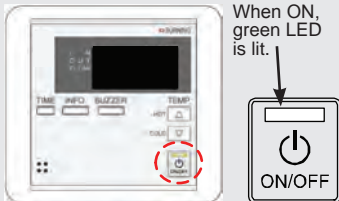
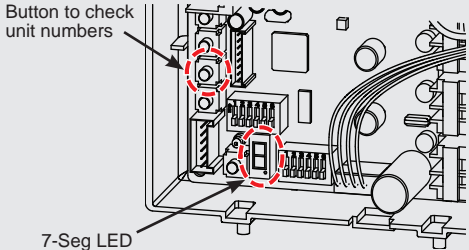
1. Close the manual gas shutoff valve.
2. Turn off power to the unit and wait a couple of seconds. Turn on again.
3. Wait 30 seconds, and then turn off power to the unit, yet again.
4. Close the water shutoff valve.
5. Open all hot water taps in the house. When the residual water flow has ceased, close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



TROUBLESHOOTING

GENERAL

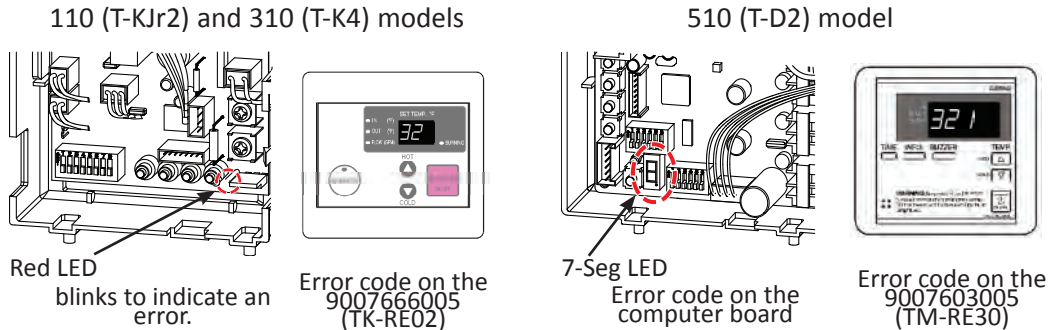
	PROBLEM	SOLUTIONS
TEMPERATURE and AMOUNT OF HOT WATER	It takes long time to get hot water at the fixtures.	<ul style="list-style-type: none"> The time it takes to deliver hot water from the water heater to your fixtures depends on the length of piping between the two. The longer the distance or the bigger the pipes, the longer it will take to get hot water. If you would like to receive hot water to your fixtures quicker, you may want to consider a hot water recirculation system. (p. 28)
	The water is not hot enough.	<ul style="list-style-type: none"> Compare the flow and temperature. See the charts on p. 54. Check cross plumbing between cold water lines and hot water lines. Is the gas supply valve fully open? (p. 30) Is the gas line sized properly? (p. 18-19) Is the gas supply pressure enough? (p. 20) Is the set temperature set too low? (p. 34-38)
	The water is too hot.	<ul style="list-style-type: none"> Is the set temperature set too high? (p. 34-38)
	The hot water is not available when a fixture is opened.	<ul style="list-style-type: none"> Make sure the unit has 120 VAC, 60 Hz power supply. If you are using the remote controller, is the power button turned on? Is the gas supply valve fully open? (p.30) Is the water supply valve fully open? (p. 30) 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. 34) Is the unit frozen? (p. 39) 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. 34) If there is a recirculation system installed, does the recirculation line have enough check valves? (p. 28) Is the gas supply valve fully open? (p. 30) Is the filter on cold water inlet clean? (p. 40) Are the fixtures clean of debris and obstructions? Check if the flow rate is too low. (p. 34)
	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. 19) Is the supply gas pressure sufficient? (p. 20) 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. 34) 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? Check if the inlet temperature is too high.
	The fan motor is still spinning after operation has stopped.	<ul style="list-style-type: none"> This is normal. After operation has stopped, the fan motor keeps running from 15 to 70 seconds in order to re-ignite quickly, as well as purge all the exhaust gas out of the flue.
	Unit sounds abnormal while in operation.	<ul style="list-style-type: none"> Contact the manufacturer at 1-877-737-2840.
Remote controller	Remote controller does not display anything when the power button is turned on.	<ul style="list-style-type: none"> Make sure the unit is supplied with power. Make sure the connection to the unit is correct. (p. 22) <p>-9007603005 (TM-RE30) only- If the green LED lights up, the remote controller has been turned ON. When the unit has not operated for five minutes or more, the display turns off to conserve energy.</p>  <p>When ON, green LED is lit.</p>
	An ERROR code is displayed.	<ul style="list-style-type: none"> Please see p. 43-45.
EASY-LINK SYSTEM 510 (T-D2) model only	How are the unit numbers assigned?	<ul style="list-style-type: none"> For an Easy-Link System, the Parent unit is always labeled #1 and all other subsequent Child units are numbered randomly. To check which numbers are assigned to which Child units, push the button on the computer board of any Child unit as shown below. The unit number will be displayed on the 7-Seg LED. (Refer to p. 25.)  <p>Button to check unit numbers</p> <p>7-Seg LED</p>

ERROR CODES

-General-

- The water heaters have self-diagnostic function for safety and convenience when troubleshooting.
- If there is a problem with the installation or the unit, the 510 (T-D2) model will display a numerical error code on the 7-Seg LED on the computer board, and the 110 (T-KJr2) and 310 (T-K4) models will display a blinking red LED on the computer board. If a remote controller is installed, the error codes will be displayed on the remote controller.
- Consult with the table on the following page for the description of each error code.



-Single unit Installations-

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

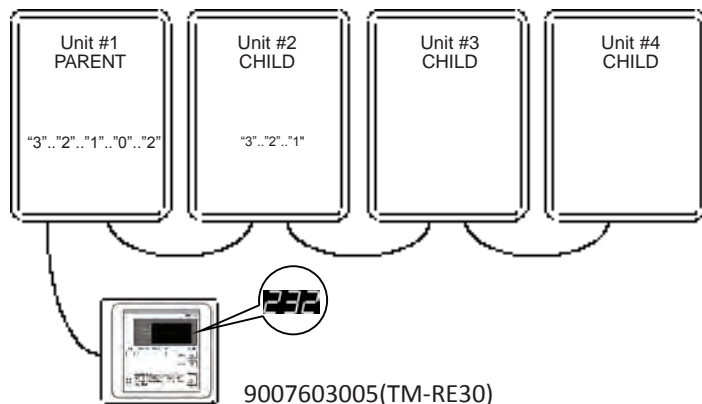
- **110 (T-KJr2) and 310 (T-K4) models:** The red LED on the computer board will be blinking two times.
- **If the remote controller 9007666005 (TK-RE02) is installed:** It will display “32” on the screen in its entirety.
- **510 (T-D2) model:** The 7-Seg LED on the computer board will display “3”...“2”...“1” in that order one digit at a time and continually repeat.
- **If the remote controller 9007603005 (TM-RE30) is installed:** It will display “321” on the screen in its entirety.

-Easy-Link System for the 510 (T-D2) model only-

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

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

- **Remote controller 9007603005 (TM-RE30):** It will display “232” and on the display. The first “2” indicates that Unit #2 has the error. The “32” indicates the first two digits of the “321” error code.
- **Parent unit:** It will display “3”...“2”...“1”...“0”...“2” one digit at a time on the 7-Seg LED. The first 3 numbers indicate the error code. The last two numbers indicate that Unit #2 has the error code.
- **Unit #2:** It will display “3”...“2”...“1” on the 7-Seg LED, just like in the Single Unit example.
- **Unit #3 & #4:** These units will not display anything, as the error code does not pertain to them.



-Fault Analysis of Error Codes-

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

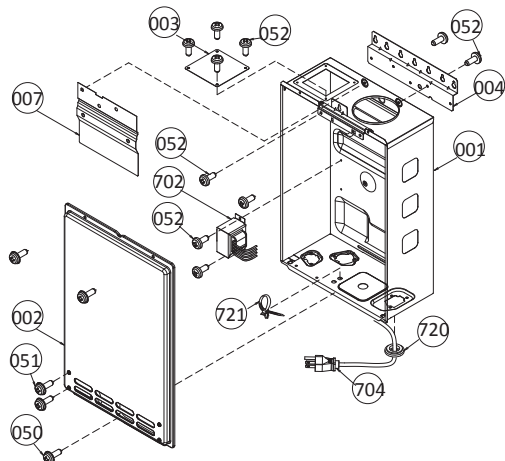
110 (T-KJr2) and 310 (T-K4)		510 (T-D2)	Malfunction description	Diagnosis
Red LED	Remote	Remote 7 Seg LED		
One Time	03	031	Incorrect DIPswitch setting	<ul style="list-style-type: none"> Check the DIPswitch settings on the PCB (Part #701).
Five Times	10	101	Warning for the "991" error code	<ul style="list-style-type: none"> Check the gas type of the water heater. Check if there is any blockage in the intake air and/or exhaust. If the water heater is installed as a direct-vent system, check whether there is enough distance between the intake air terminal and the exhaust terminal. Check the altitude/elevation of area of where the water heater is installed. Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part #103), especially if the water heater has been installed in a contaminated area.
Three Times	11	111	Ignition failure	<ul style="list-style-type: none"> Check if the Hi-limit switch (Part #412) is properly functioning. Check for connection/breakage of wires (Part #413, 708, 709, 710, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). Check if there is a buzzing spark ignition sound coming from the burner (Part #101) when water heater prepares for combustion. Listen for the double "clunk" sound coming from gas valve assembly (Part #102) when water heater goes into combustion. Check if there is leaking from heat exchanger (Part #401).
Three Times	12	121	Loss of flame	<ul style="list-style-type: none"> Check if the Hi-limit switch (Part #412) is properly functioning. Check for connection/breakage of wires (Part #413, 708, 709, 710, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). Check if there is leaking from heat exchanger (Part #401).
Two Times	31	311	Outlet thermistor failure	<ul style="list-style-type: none"> Check for connection/breakage of wires and/or debris on thermistor (Part #407, 408, 411, 716).
Two Times	32	321	Inlet thermistor failure	
N/A	N/A	331	Mixing thermis- tor failure	

110 (T-KJr2) and 310 (T-K4)		510 (T-D2)	Malfunction description	Diagnosis
Red LED	Remote	Remote 7 Seg LED		
Two Times	39	391	Air-fuel ratio rod failure	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #709) and/or soot on the AFR rod (Part #108).
N/A	N/A	441	Flow sensor failure (Easy-Link System only)	<ul style="list-style-type: none"> Check for connection/breakage of wires and/or debris on the flow sensor impeller (Part #402, 717).
Six Times	51	510	Abnormal gas solenoid valve	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701).
Six Times	55	N/A	Abnormal main gas valve	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701).
Four Times	61	611	Fan motor fault	<ul style="list-style-type: none"> Check for connection/breakage of wires, dust buildup in the fan motor (Part #103) and/or burn marks on the computer board (Part #701). Check for frozen/corrosion of connectors (Part #103).
N/A	N/A	651	Flow adjustment valve fault (Easy- Link System only)	<ul style="list-style-type: none"> Inspect the flow adjustment valve (Part #402), for connection/breakage of wires (Part #718), locked motor drive due to scale buildup, and/or water leakage.
One Time	70	701	Computer board fault	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #714) and/or burn marks on the computer board (Part #701). Check the power supply of the water heater.
Six Times	72	721	False flame detection	<ul style="list-style-type: none"> For indoor models, check if condensate drain is installed on the vent collar of the water heater. Check if there is leaking from heat exchanger (Part #401).
N/A	74	741	Miscommuni- cation between water heater and remote controller	<ul style="list-style-type: none"> Check the model type of the remote controller. Inspect the connections between the water heater and remote controller. Check the power supply of the water heater.
N/A	N/A	761	Miscommuni- cation in Easy- Link System	<ul style="list-style-type: none"> Check if the connections between the parent unit and the child units are correct. Refer to p. 24-27.
Five Times	99	991	Imperfect combustion	<ul style="list-style-type: none"> Check the gas type of the water heater. Inspect the environment around the water heater. Determine how long the unit has been installed. Check the altitude/elevation of the area of where the water heater is installed. Check if there is any blockage in the intake air and/or exhaust. If the water heater is installed as a direct-vent system, check whether there is enough distance between the intake air terminal and the exhaust terminal. Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part #104), especially if the water heater has been installed in a contaminated area.

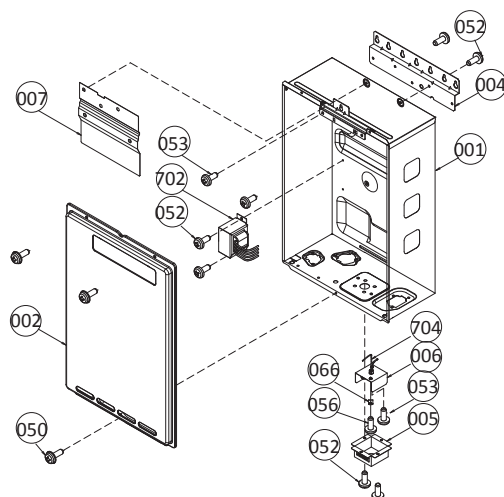
COMPONENTS DIAGRAM

Case assembly

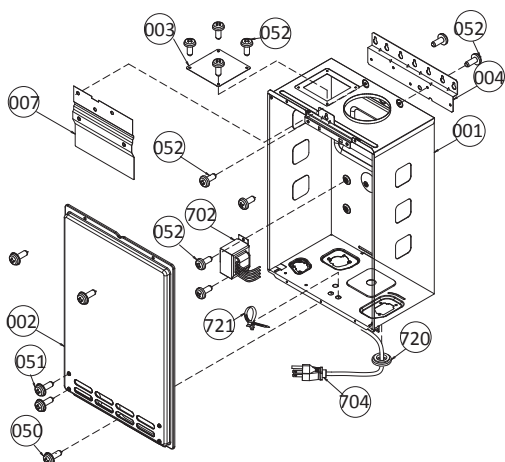
110 Indoor (T-KJr2-IN)



110 Outdoor (T-KJr2-OS)

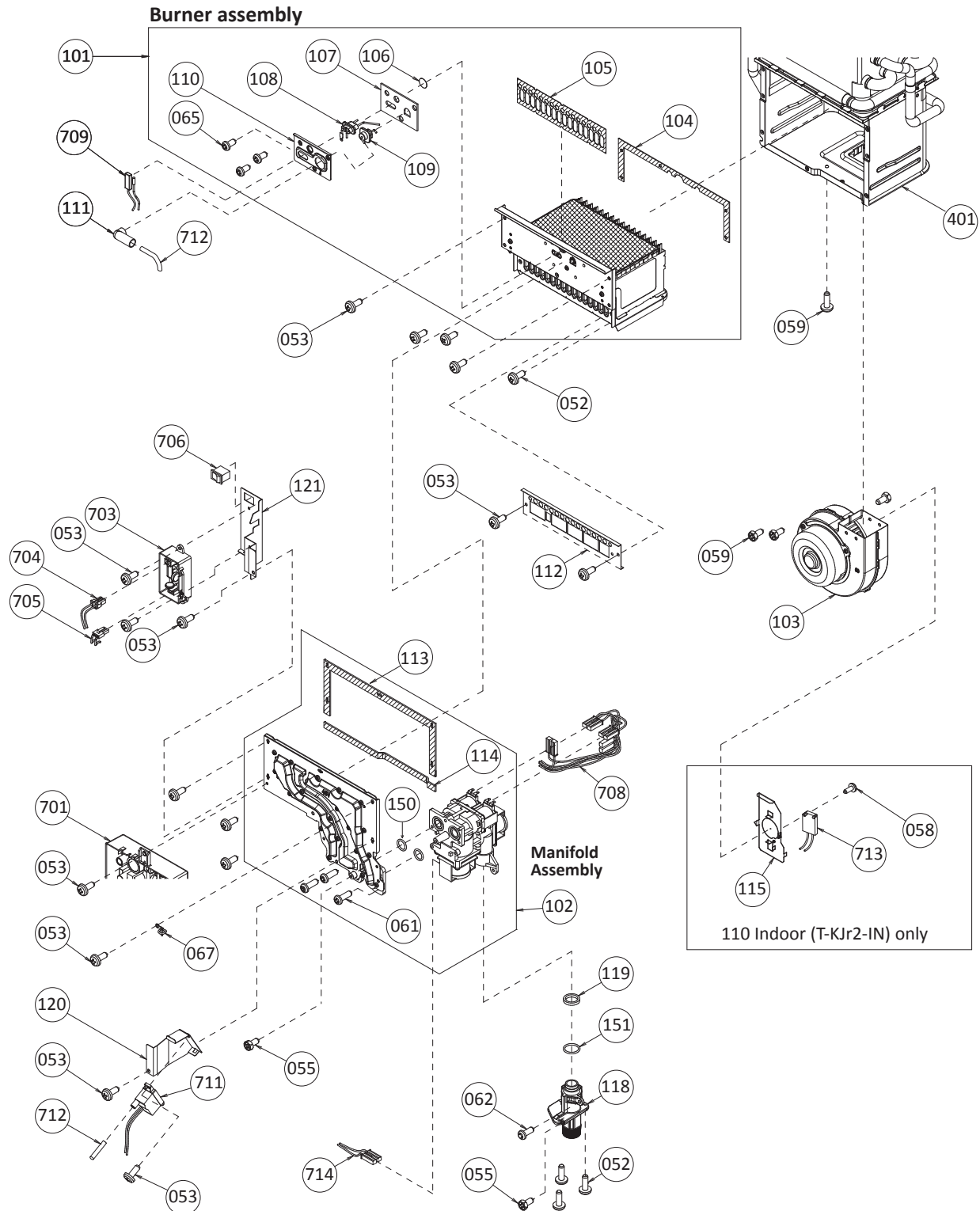


310 and 510 Indoor (T-K4-IN and T-D2-IN)



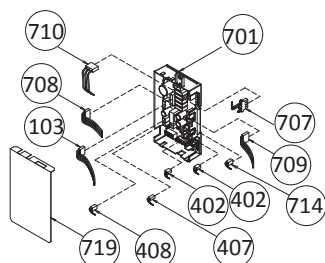
Burner assembly

110 (T-KJr2) model

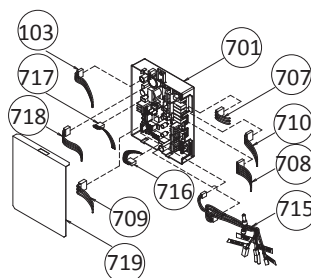


Computer board assembly

110 (T-KJr2) and 310 (T-K4) models

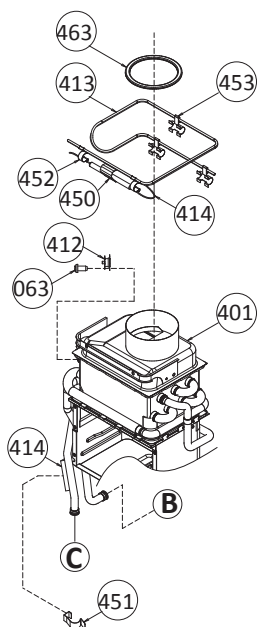


510 (T-D2) model

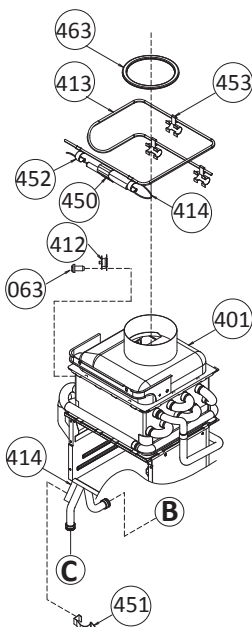


WaterWay assembly

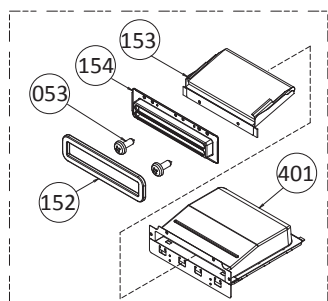
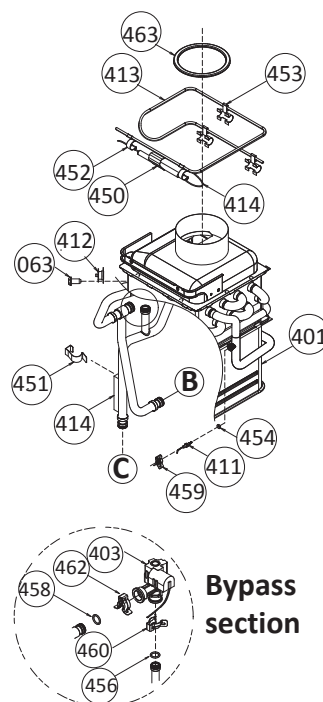
110 (T-KJr2) model



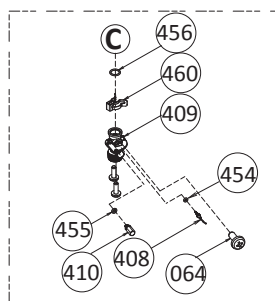
310 (T-K4) model



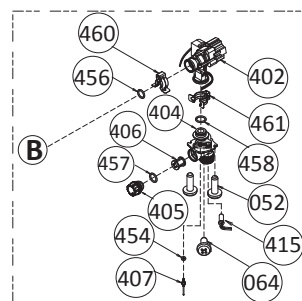
510 (T-D2) model



Exhaust section (Outdoor model)



Water outlet section



Water inlet section

PARTS LIST

Item #	Description	Part #	
		110, 310 and 510 models	T-KJr2, T-K4 and T-D2 models
001	Case assembly for 110 Indoor (T-KJr2-IN) for 110 Outdoor (T-KJr2-OS) for 310 and 510 Indoor (T-K4-IN and T-D2-IN) for 310 and 510 Outdoor (T-K4-OS and T-D2-OS)	319143-159 319143-172 319143-151 319143-211	EK415 EK432 EK402 EKK41
002	Front cover for 110 Indoor (T-KJr2-IN) for 110 Outdoor (T-KJr2-OS) for 310 Indoor (T-K4-IN) for 310 Outdoor (T-K4-OS) for 510 Indoor (T-D2-IN) for 510 Outdoor (T-D2-OS)	319143-163 319143-173 319143-152 319143-371 319143-174 319143-175	EK419 EK433 EK403 EK409 EK434 EK435
003	Air blockage plate for 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN)	319143-150	EK401
004	Bracket	319143-184	EKJ09
005	Junction box	319143-014	EKJ64
006	Junction box inner plate	319143-128	EKJ66
007	Back guard panel for 110 (T-KJr2) model Back guard panel for 310 (T-K4) and 510 (T-D2) models	319143-338 319143-221	EX00M EKK5H
050	Screw M4x12 (W/Washer)	319143-025	EW000
051	Screw M4x10 (W/Washer)	319143-325	EW001
052	Screw M4x10 (Coated)	319143-026	EW002
053	Screw M4x10	319143-060	EW003
054	Hex head screw M4x12 (W/Washer)	319143-326	EW004
055	Hex head screw M4x8	319143-063	EW005
056	Screw M4x10	319143-372	EX014
057	Screw M3x6 SUS3	319143-330	EW00B
058	Screw M3x10	319143-327	EW008
059	Pan screw M4x12 (W/Washer)	319143-061	EW00H
060	Pan screw M4x10 FEZN	319143-332	EW024
061	Tap tight screw M4x12 FEZN	319143-201	EKK31
062	Pan screw M4x10	319143-062	EW006
063	Screw M3x6	319143-087	EW00A
064	Screw M4x6	319143-328	EW009
065	Pan screw M4x8	319143-059	EW00D
066	Nylon clamp	319143-143	EC00X
067	Wire clamp 60	319143-048	EM167
101	Burner assembly for 110 (T-KJr2) model Burner assembly for 310 (T-K4) and 510 (T-D2) models	319143-161 319143-030	EK417 EKH5W
102	Manifold with gas valve assembly LP for 110 (T-KJr2) model Manifold with gas valve assembly LP for 310 (T-K4) and 510 (T-D2) models Manifold with gas valve assembly NA for 110 (T-KJr2) model Manifold with gas valve assembly NA for 310 (T-K4) and 510 (T-D2) models	319143-169 319143-046 319143-165 319143-368	EK429 EKH6T EK421 EKK5K
103	Fan motor for 110 (T-KJr2) model Fan motor for 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN) Fan motor for 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	319143-347 319143-043 319143-217	EX02E EKK25 EKK54
104	Burner holder gasket for 110 (T-KJr2) model Burner holder gasket for 310 (T-K4) and 510 (T-D2) models	319143-341 319143-032	EX00V EKK0G
105	Burner gasket	319143-031	EKK2X
106	Burner window	319143-033	EKK2V
107	Rod holder gasket	319143-034	EKK2W

Item #	Description	Part #	
		110, 310 and 510 models	T-KJr2, T-K4 and T-D2 models
108	Flame rod for 110 (T-KJr2) model	319143-339	EX00R
	Flame rod for 310 (T-K4) and 510 (T-D2) models	319143-035	EKK0E
109	Igniter rod for 110 (T-KJr2) model	319143-373	EX00S
	Igniter rod for 310 (T-K4) and 510 (T-D2) models	319143-037	EKK0F
110	Rod holder for 110 (T-KJr2) model	319143-340	EX00U
	Rod holder for 310 (T-K4) and 510 (T-D2) models	319143-036	EKK32
111	Rod cap	319143-038	EKN61
112	Burner damper for 110 (T-KJr2) model	319143-170	EK430
	Burner damper for 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN)	9009012005	EK2AJ
	Burner damper for 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	9009014005	EK492
113	Manifold gasket A	319143-044	EKK2Y
114	Manifold gasket B	319143-045	EKK2K
115	Fan damper for 110 Indoor (T-KJr2-IN)	319143-160	EK416
	Fan damper for 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN)	319143-367	TU001
116	Pressure port for 310 (T-K4) and 510 (T-D2) models	319143-042	EKK2D
117	Combustion chamber tube for 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN)	319143-041	EKK2N
	Combustion chamber tube for 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	319143-344	EX019
118	Gas inlet	319143-050	EKK1E
119	Gas inlet ring	319143-049	EKK2Z
120	Igniter plate	319143-051	EKK1B
121	Surge box plate for 110 (T-KJr2) and 310 (T-K4) models	319143-213	EKK4H
	Surge box plate for 510 (T-D2) model	319143-176	EK436
150	O-ring P18 NBR (Black)	319143-350	EZP18
151	O-ring P20 NBR (Black)	319143-057	EK042
152	Silicon ring for 110 Outdoor (T-KJr2-OS)	319143-370	EK442
	Silicon ring for 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	319143-206	EKK3G
153	Rain protection plate in Exhaust chamber for 110 Outdoor (T-KJr2-OS), 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	319143-216	EKK53
154	Exhaust port	319143-219	EKK56
401	Heat exchanger assembly for 110 Indoor (T-KJr2-IN)	319143-162	EK418
	for 110 Outdoor (T-KJr2-OS)	319143-166	EK426
	for 310 Indoor (T-K4-IN)	319143-153	EK406
	for 310 Outdoor (T-K4-OS)	319143-157	EK413
	for 510 Indoor (T-D2-IN)	319143-369	TU002
	for 510 Outdoor (T-D2-OS)	319143-177	EK437
402	Flow adjustment valve/Flow sensor for 110 (T-KJr2) and 310 (T-K4) models	319143-167	EK427
	Flow adjustment valve/Flow sensor for 510 (T-D2) model	319143-178	EK438
403	Bypass valve for 510 (T-D2) model	319143-186	EKK0U
404	Water inlet	319143-193	EKK1U
405	Inlet drain plug	319143-197	EKK2B
406	Inlet water filter	319143-198	EKK2C
407	Inlet thermistor for 110 (T-KJr2) and 310 (T-K4) models	319143-214	EKK4J
	Inlet thermistor for 510 (T-D2) model	319143-085	EKK38
408	Outlet thermistor for 110 (T-KJr2) and 310 (T-K4) models	319143-218	EKK55
	Mixing thermistor for 510 (T-D2) model	319143-190	EKK1A
409	Water outlet	319143-194	EKK1V
410	Outlet drain plug	319143-199	EKK2E
411	Output thermistor for 510 (T-D2) model	319143-096	EKK2T
412	Hi-Limit switch for 110 (T-KJr2) and 310 (T-K4) models	319143-228	EM212
	Hi-Limit switch for 510 (T-D2) model	319143-095	EKN34

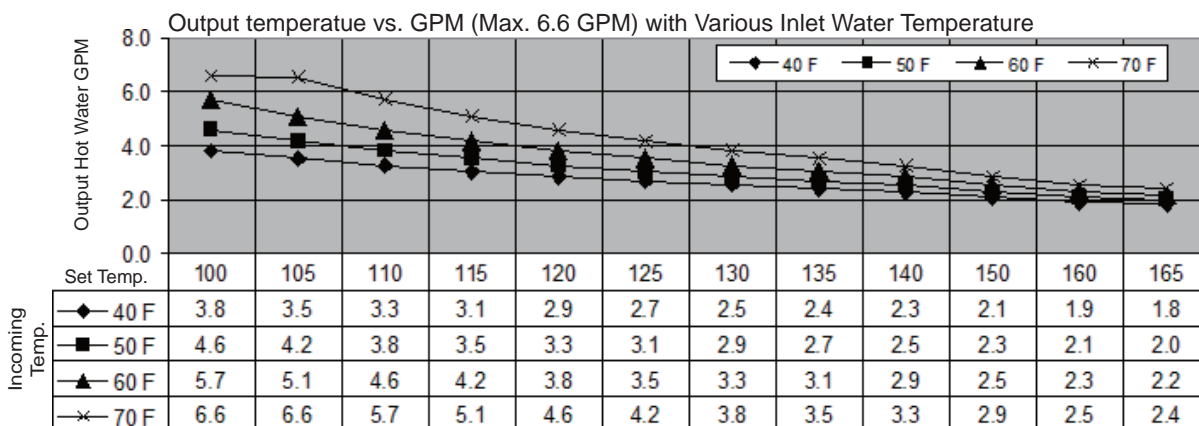
Item #	Description	Part #	
		110, 310 and 510 models	T-KJr2, T-K4 and T-D2 models
413	Overheat-cut-off fuse	319143-149	EK333
414	Heater	319143-200	EKK2R
415	Inlet heater	319143-078	EKK2P
450	Pipe heater fixing plate	319143-088	EKK27
451	Heater fixing plate 16	319143-125	EK031
452	Fuse fixing plate 18	319143-066	EKK26
453	Fuse fixing plate 14	319143-146	EK029
454	O-ring P4 FKM	319143-082	EZM04
455	O-ring P6 FKM	319143-080	EZM06
456	O-ring P14 FKM	319143-100	EZM14
457	O-ring P15 FKM	319143-091	EZM15
458	O-ring P16 FKM	319143-083	EZM16
459	Fastener "4-11" for 510 (T-D2) model	319143-097	EKH30
460	Fastener "14-22"	319143-105	EKK24
461	Fastener "16A"	319143-226	EM192
462	Fastener "16-25A" for 510 (T-D2) model	319143-205	EKK39
463	Silicon ring	319143-065	EKN50
701	Computer board for 110 (T-KJr2) model	319143-164	EK420
	for 310 (T-K4) model	319143-158	EK414
	for 510 (T-D2) model	319143-179	EK439
702	Transformer	319143-182	EKH09
703	Surge box	319143-168	EK428
704	AC120V wire for Indoor models	319143-427	EK146
	AC120V wire for 110 Outdoor (T-KJr2-OS)	319143-222	EKK5M
	AC 120 V wire for 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS) models	319143-138	EKK3C
705	Transformer wire for 110 (T-KJr2) model	319143-155	EK408
	Transformer wire for 310 (T-K4) and 510 (T-D2) models	319143-180	EK440
706	AC120V Power ON-OFF switch	319143-141	EKK4V
707	Switch wire for 110 (T-KJr2) model	319143-154	EK407
	Switch wire for 310 (T-K4) and 510 (T-D2) models	319143-181	EK441
708	Gas valve wire for 110 (T-KJr2) and 310 (T-K4) models	319143-207	EKK3K
	Gas valve wire for 510 (T-D2) model	319143-188	EKK10
709	Flame rod wire for 110 (T-KJr2) model	319143-171	EK431
	for 310 (T-K4) model	319143-208	EKK3L
	for 510 (T-D2) model	319143-189	EKK11
710	EH-IG wire for 110 Indoor (T-KJr2-IN) and 310 Indoor (T-K4-IN)	319143-209	EKK3R
	EH-IG wire with freeze protection thermostat for 110 Outdoor (T-KJr2-OS), 310 Outdoor (T-K4-OS) and 510 Outdoor (T-D2-OS)	319143-210	EKK40
	EH-IG wire for 510 Indoor (T-D2-IN)	319143-187	EKK0Z
711	Igniter	319143-052	EKN74
712	High voltage igniter cable	319143-039	EKK2M
713	Freeze protection thermostat for 110 Indoor (T-KJr2-IN), 310 Indoor (T-K4-IN) and 510 Indoor (T-D2-IN)	319143-185	EKJ59
714	Proportional gas valve wire for 110 (T-KJr2) and 310 (T-K4) models	319143-220	EKK58
	Proportional gas valve wire for 510 (T-D2) model	319143-133	EKK12

Item #	Description	Part #	
		110, 310 and 510 models	T-KJr2, T-K4 and T-D2 models
715	Pump and multi cable for 510 (T-D2) model	319143-204	EKK36
716	Thermistors wire for 510 (T-D2) model	319143-195	EKK1Z
717	RS-VG wire for 510 (T-D2) model	319143-203	EKK35
718	Water valves wire for 510 (T-D2) model	319143-202	EKK33
719	Computer board cover for 110 (T-KJr2) and 310 (T-K4) models	319143-212	EKK49
	Computer board cover for 510 (T-D2) model	319143-191	EKK1M
720	Rubber grommet for Indoor models	319143-426	EK148
721	Cable strap for Indoor models	319143-425	EW022
722	Temperature remote controller for 110 (T-KJr2) and 310 (T-K4) models	9007666005	TK-RE02
	Temperature remote controller for 510 (T-D2) model	9007603005	TM-RE30

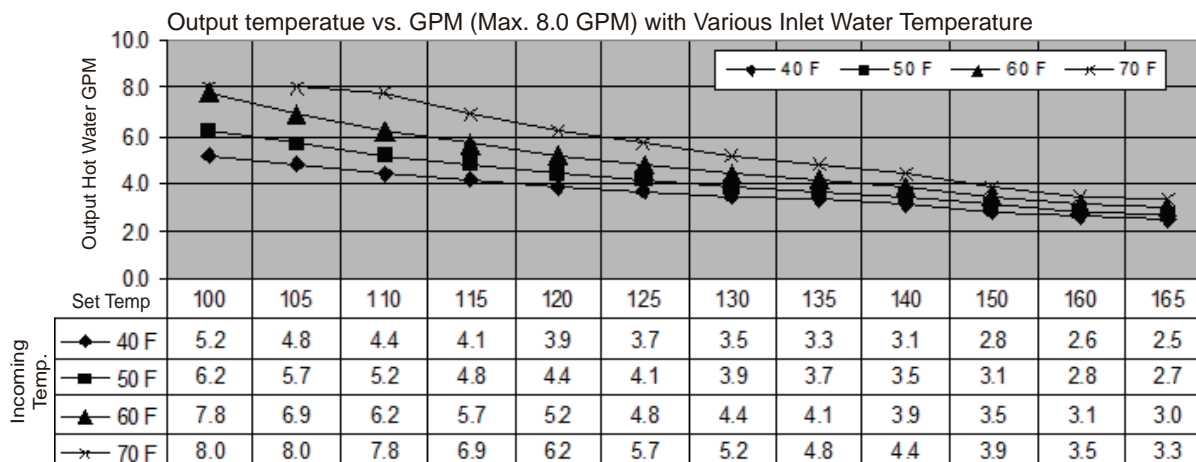
OUTPUT TEMPERATURE CHART

Chart is based on properly sized gas line

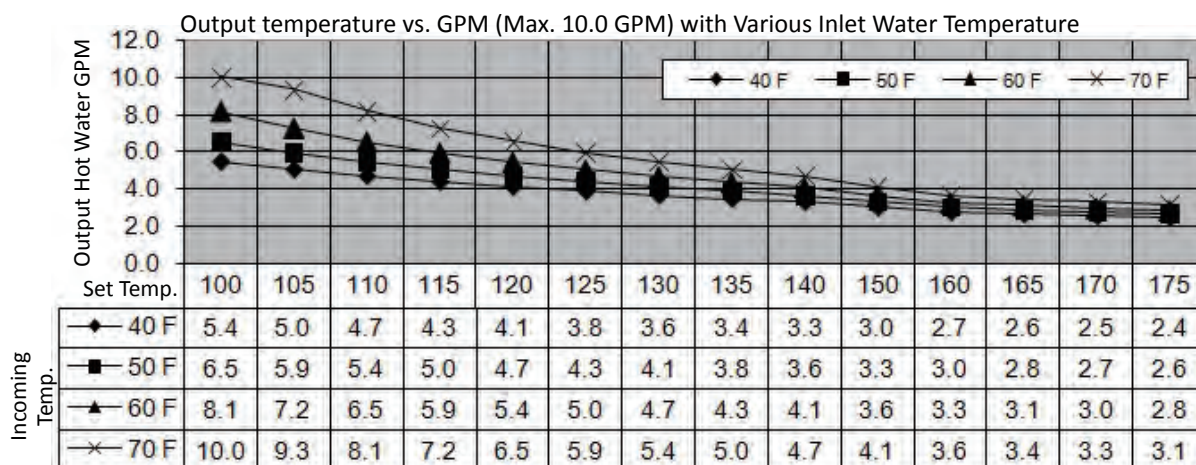
110 (T-KJr2) model



310 (T-K4) model



510 (T-D2) model



*When the set temperature is 131 °F or higher, maximum flow rate is limited to 8.0 GPM.

LIMITED WARRANTY

- The manufacturer warrants this product against defects in materials or workmanship as described in this document if installed within the United States or Canada. The manufacturer or its authorized Service Representative will, at its sole discretion, repair or replace any failed or defective mechanical or electrical parts, or components thereof, or, if the manufacturer or its authorized Service Representative cannot replace said parts, and repair is not commercially practicable, the manufacturer or its authorized Service Representative will refund the purchase price. The manufacturer or its authorized Service Representative may, at its sole discretion, use new, refurbished or reconditioned parts.

- Warranty for all models:

[Unit: Year]

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

- 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.

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

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

- In all applications, the total of length of operation time must be less than 3,000 hours for the 110 (T-KJr2) and 310 (T-K4) models, and less than 9,000 hours for the 510 (T-D2) model.

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

- General terms of limited warranty:

This limited warranty gives you specific legal rights, and you may also have other rights which vary from State to State. The manufacturer will honor the warranty to the original retail buyer at the original location only, within the United States or Canada, and it is not transferable.

THIS WARRANTY COVERS ONLY FAILED MECHANICAL AND ELECTRICAL PARTS DUE TO FACTORY DEFECTS UNDER NORMAL USAGE FOR THE PRODUCT'S INTENDED PURPOSES AND WITHIN THE APPLICABLE PERIOD SPECIFIED IN THE TABLE ABOVE. ONLY DIRECT DAMAGES SHALL BE RECOVERABLE BY A CLAIMANT UNDER THIS LIMITED WARRANTY AND, IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT, BREACH OF WARRANTY, TORT LIABILITY (INCLUDING NEGLIGENCE), STRICT LIABILITY, INDEMNITY OR OTHERWISE WILL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR INDIRECT CONSEQUENTIAL DAMAGES INCLUDING PROPERTY DAMAGE, PERSONAL DAMAGES, LOSS OF USE, OR INCONVENIENCE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

- Limitation on Duration of Implied Warranties:

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

- THIS WARRANTY WILL NOT COVER THE FOLLOWING:

- Any product that is not installed by a licensed plumber, gas installer, or contractor.
- Damages due to accidents, abuse, misuse, improper installation, misapplication, or incorrect sizing.
- Damages due to fires, flooding, freezing, electrical surges, or any Acts of God.
- Damages due to unauthorized alterations, attachments, and/or repairs.
- Damages due to a lack of maintenance (e.g. water filter, water treatment system, vent blockage, etc.).
- Any product installed in an improper environment (e.g. corrosive, dusty, chemically contaminated, excessive lint, etc.).

- Freeze damage that occurs without taking proper preventive measures as described in the installation manual.
- Condensate damage due to improperly installed or lack of a condensate trap (drain).
- Any product not installed in compliance with all applicable local & provincial codes, ordinances, and good trade practices.
- Any product sold to or installed in areas outside of the fifty states (and the District of Columbia) of the United States of America and Canada.
- Any product installed in applications that cause the water heater to activate more than 300 times per day. (This averages to an activation every 5 minutes in a 24-hour period.)
- Any failures that are not due to defects in materials or workmanship (mechanical and/or electrical parts).
- Damages due to improper installation:
 - Gas: incorrect gas pipe sizing, incorrect gas meter sizing, incorrect gas type, and/or gas pressures that fall outside the product's specified range.
 - Water: incorrect water pipe sizing, water pressures that fall outside the product's specified range, recirculation flow rates that fall outside the product's specified range (air removal), and/or lack of proper methods of air removal in a closed-loop, circulation system. (See installation manual for details.)
 - Electric: supply power voltages that fall outside the product's specified range.
- Damages due to water quality:
 - Introduction of liquids other than potable water 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.