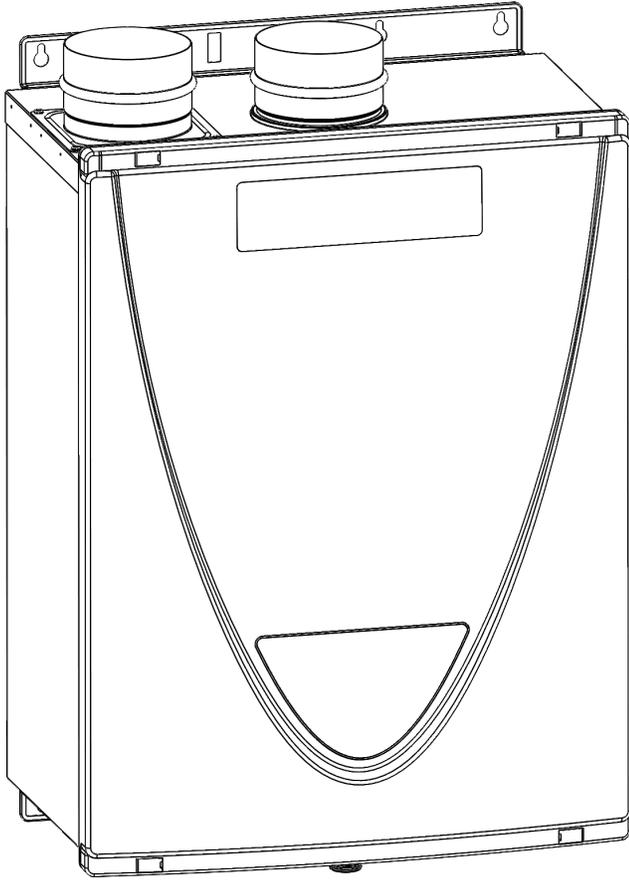


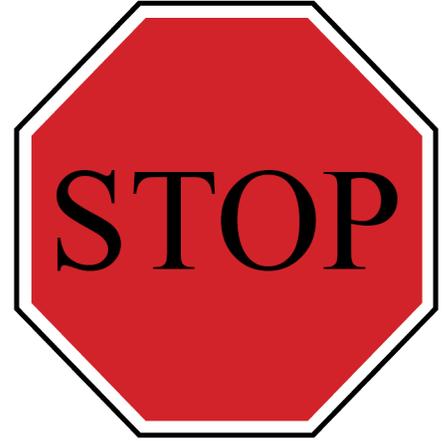
Hydro Smart 199 Condensing Gas Micro Boiler Installation Manual and Owner's Guide



Models:

HS199Con-NG

HS199Con-LP



Do not return to stores. Damages or repairs call Hydro Smart 763-331-3066

M-F 8 AM - 5 PM

Sat 8 AM - Noon

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

The **Hydro Smart 199** Condensing Gas Micro Boiler is a compact and powerful residential unit with a versatile BTU modulating range.

Featuring

- Efficiency: 95 %
- Wall Hung
- Flow Activated: .5 GPM
- Copper Heat Exchanger
- Temperature Range: 80°-160° F*
- Freeze Protection
- Power Vent
- PVC Venting

*Up to 185 with optional control

-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:
10725 165th Ave. NW
Elk River, MN 55331



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Installation Manual

CONGRATULATIONS

Congratulations and thank you for choosing our condensing micro boiler. Before use, we recommend that you read through this installation manual carefully. Keep this manual for future reference.

If you need an additional 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 boiler.

SPECIFICATIONS

Hydro Smart 199 Gas Condensing Micro-Boiler			
Natural Gas Input (Operating Range)		BTU/h	Min.: 15,000 Max.: 199,000
Propane Input (Operating Range)		BTU/h	Min.: 13,000 Max.: 199,000
Gas Connection		3/4" NPT	
Water Connections		3/4" NPT	
Water Pressure*		psi (MPa)	15 - 150 (0.1 - 1)
Natural gas Inlet Pressure		inch W.C. (kPa)	Min. 5.0 (1.24) Max. 10.5 (2.61)
Propane Inlet Pressure		inch W.C. (kPa)	Min. 8.0 (1.99) Max. 14.0 (3.48)
Manifold Pressure**	Natural Gas	inch W.C. (Pa)	2.95 (734)
	Propane	inch W.C. (Pa)	3.3 (821)
Weight		lbs. (kg)	59 (26.8)
Dimensions		inch	H 22.4 x W 17.7 x D 10.7
		mm	H 570 x W 450 x D 272
Ignition		Electric Ignition	
Electric Consumption	Supply	VAC / Hz	120 / 60
	Operation	W / A	89.0 / 0.74
	Standby	W / A	4.2 / 0.04
	Freeze- Protection	W / A	175 / 1.5

*18-25 PSI is recommended for maximum flow (Space Heating)

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

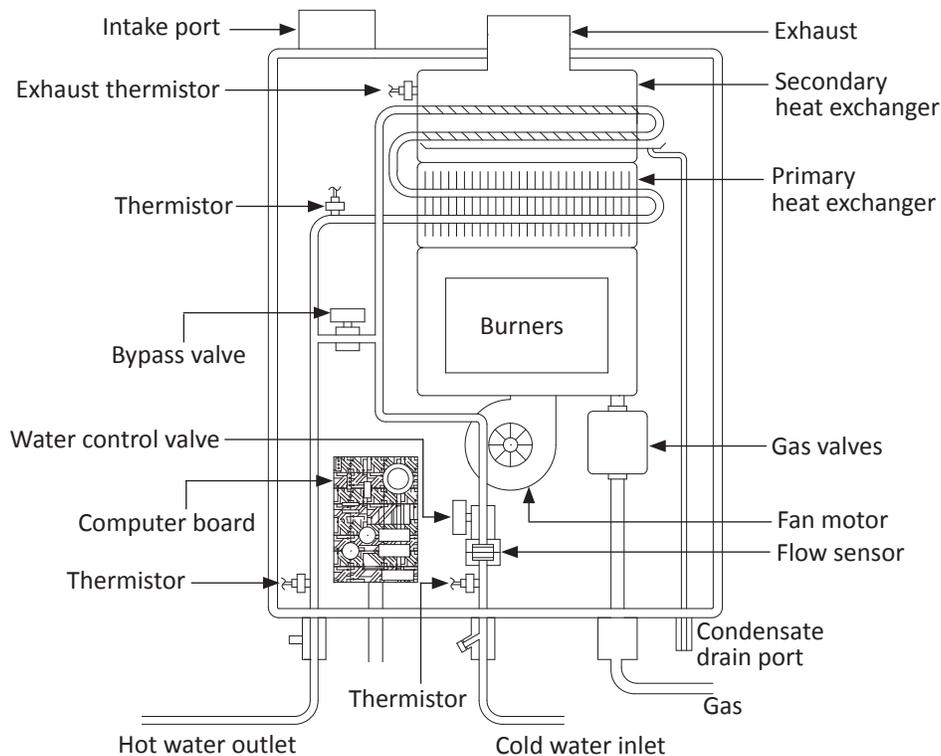
NOTE:

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

*When using boiler in-conjunction with Hydro Smart Combi panel, system pressure may be much higher on your domestic water side. Your space heating side should still reflect the recommended 18-25 PSI for system pressure.

INTRODUCTION

- This manual provides information necessary for the installation, operation, and maintenance of the boiler.
- The model description is listed on the rating plate which is attached to the side panel of the boiler.
- Please read all 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 a condensing micro boiler designed to efficiently supply endless hot water for your needs. (Radiant Heating, or Domestic Water used in-conjunction with Radiant Heating) See Combi panel for more information on integrating domestic water with your radiant heating system.
- These **high efficiency models** have a built-in secondary heat exchanger that absorbs latent heat from the exhaust gas.
- These boilers are only to be installed indoors.
- The principle behind condensing micro boilers is easy:



*This diagram illustrates condensing micro boiler design concepts only and does not accurately represent the boiler's physical description.

1. Your thermostat indicates a need for heat and turns on the circulator pump(s).
2. Water flows through the boiler.
3. The 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 micro-boiler, the computer modulates the gas and water valves to ensure proper output water temperature.
8. When your room reaches desired temperature the pumps turn off and the boiler 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 current 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 micro boiler. Please ensure:
 - Your micro boiler will have enough combustible air and proper ventilation
 - Locate your micro boiler where water leakage will not damage surrounding areas.
4. Check the rating plate for the correct **Gas Type, Gas Pressure, Water Pressure and Electric Rating.**
5. *If this unit does not match your requirements, **do not install and consult with the manufacture.**
6. If any problem should occur, turn off the unit and unplug the zone controls for the space heating and/or combi panel system zone controls and turn off the gas. Then call a trained technician or the Gas Company or the manufacture.



- Water temperature over 125°F (52°C) can cause severe burns instantly or death from scalding. The water temperature is set at 120°F (50°C) from the factory to minimize any scalding risk. If using micro boiler with Hydro Smart Combi Panel, always check the water temperature. Always verify emitter water delivery temperature requirements to avoid damage.
- Do not store or use gasoline or other flammables, vapors, or liquids in the vicinity of this appliance.
- Do not reverse the fluid and/or gas connections as this will damage the gas valves and can cause sever injury or death.
- 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.

INSTALLATION

GENERAL

1. Follow all local codes, or in the absence of local codes, follow the current 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 micro boilers 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 for proper clearance.
5. The micro boiler 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 connections requires a means of disconnections, to terminate power to the micro boiler for servicing and safety purposes.
7. Do not install the unit where the exhaust vent is pointing into any opening in the 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.
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 micro boiler. Regularly ensure that the area around the unit is dust or debris free. Regular maintenance is recommended for these types of environment.
9. The Hydro Smart 199 condensing gas boiler is to be installed indoors only. This unit is equipped with thermistors and a hi-limit switch for the exhaust gas, detecting excess temperatures within the flue and enabling the unit to safely stop operations. These components are always monitoring exhaust gas conditions in order to prevent heat damage to ABS, PVC, CPVC, or polypropylene (Plastic) venting if ABS, PVC, CPVC, or polypropylene is used. If the exhaust gas temperatures exceeds 140° F, these components will enable the unit to safely stop operations.
 - The micro-boiler requires 3” or 4” make-up intake air supply pipe. The intake pipe must be sealed airtight.
 - Air supply pipe can be made of ABS, PVC (solid core), CPVC (solid core), polypropylene, corrugated stainless steel, or Category III/IV stainless steel. Regarding exhaust pipe refer to the “Exhaust section” under venting instructions.
 - Sidewall venting is recommend for this boiler. Vertical venting (roof termination) is acceptable.
 - The manufacturer recommends running the exhaust vent and the intake pipe as parallel as possible.



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 for the micro boiler and for compliance with all national, state / provincial, and local codes.**
- **The manufacturer does not recommend installing the micro boiler 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 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 micro boiler in an attic due to safety issues.** If you install the micro boiler in an attic:
 - Make sure the unit will have enough combustion air and proper ventilation.
 - Keep the area around the micro boiler clean. When dust collects on the flame sensor, the micro boiler will shut down on an error code.
 - Place the unit for easy access for service and maintenance.
 - A drain pan, or other means of protection against water damage, is to be installed under the micro boiler in case of leaks.

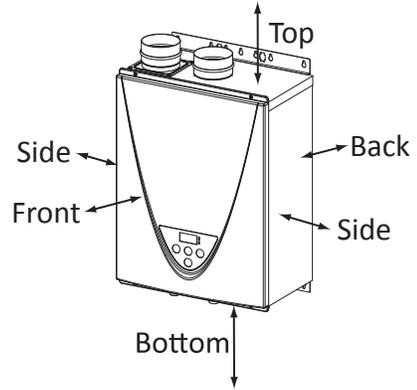


CAUTION

- **The warranty will not cover damage cause by water quality.**
 - Only distilled water or distilled water/glycol mixtures can be used with this micro boiler, unless when used in-conjunction with Hydro-Smart Combi panel system. Do not introduce pool or spa water, or any chemically treated water into the micro boiler.
 - Water hardness levels must not exceed 7 grains per gallon (120 ppm) for single family 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 micro boiler. 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 no install the micro boiler where water, debris, or flammable vapors may get into the flue terminal.
- Although the micro boiler 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 boiler close to a drain where water leakage will not do damage to surrounding areas. As with any water heating appliance, the potential for leakage at some time in the life of the product does exist. The manufacturer will not be responsible for any water damage that may occur. If you install a drain pan under the unit, ensure that it will not restrict the combustion air flow.

CLEARANCES

 Maintain all clearances around the micro-boiler.

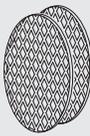


Model	Top	Bottom	Front	Back	Sides
HS199Con-LP (Liquid propane)	12 in. (914 mm)	12 in. (305 mm)	24 in. (610 mm)	0.5 in. (13 mm)	2 in. (51 mm)
HS199Con-NG (Natural Gas)	12 in. (914 mm)	12 in. (305 mm)	24 in. (610 mm)	0.5 in. (13 mm)	2 in. (51 mm)

*24 inches recommended for maintenance.

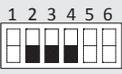
INCLUDED ACCESSORIES

Check that these items below are included with the micro boiler.

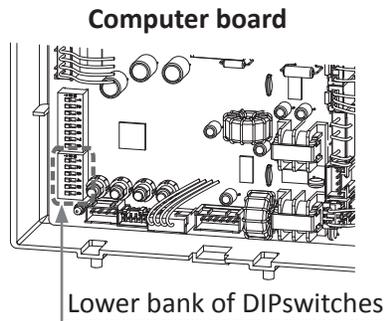
Installation manual and owner's guide	Bird screen
 Qty: 1	 Qty: 2

HIGH-ALTITUDE INSTALLATIONS

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

Altitude DIPswitches	0 (DEFAULT)	Up to 2,500 ft	Up to 5,000 ft	Up to 7,500 ft	Up to 10,100 ft
HS199Con Boiler (Lower bank of DIPswitches)	ON  OFF	ON  OFF	ON  OFF	ON  OFF	ON  OFF
	No. 2 : OFF No. 3 : OFF No. 4 : OFF	No. 2 : OFF No. 3 : ON No. 4 : OFF	No. 2 : OFF No. 3 : OFF No. 4 : ON	No. 2 : OFF No. 3 : ON No. 4 : ON	No. 2 : ON No. 3 : ON No. 4 : ON

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



WARNING

DO NOT adjust any DIPswitches on the upper bank.

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.

This appliance 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 use of venting materials approved for Category III/IV appliances is recommended whenever possible. However, this appliance may also be vented with plastic pipe materials such as ABS, PVC (solid core), CPVC (solid core), or polypropylene. **For details, please refer to the Exhaust Vent (ABS, PVC, CPVC, or Polypropylene Vent) Section.** Vent installations in Canada which utilize plastic vent systems must use venting that complies with ULC S636.

General rules for venting micro boilers are:

- Place the micro boiler as close as possible to the vent termination.
- The vent collar of the micro boiler must be fastened directly to an unobstructed vent pipe.
- Do not weld the vent pipe to the micro boiler's vent collar.
- Do not cut the vent collar of the unit.
- The vent must be easily removable from the top of the boiler for normal service and inspection of the unit.
- The micro boiler vent must not be connected to any other gas appliance or vent stack except an approved common venting system.
- Avoid using an oversized vent pipe or using extremely long runs of the pipe unless it is part of an approved common vent system.
- For rooftop venting, a rain cap or other form of termination that prevents rain water from entering into the micro boiler must be installed.
- Do not terminate vent into chimney. If the vent must go through the chimney, the vent must run all the way through the chimney with approved vent pipe.

General rules for vent terminations:

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

DIPswitch settings for Vent length

<Two-pipe, direct-vent installation>

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

3" venting	
Vent length	(Upper bank of DIPswitches)
5 to 20 ft (DEFAULT)	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : ON No. 4 : OFF</p>
21 to 40 ft	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : OFF No. 4 : OFF</p>
41 to 70 ft	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : ON No. 4 : ON</p>

4" venting	
Vent length	(Upper bank of DIPswitches)
5 to 50 ft (DEFAULT)	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : ON No. 4 : OFF</p>
51 to 100 ft	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : OFF No. 4 : OFF</p>

<Single pipe with room-air intake installation>

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

3" venting	
Vent length	(Upper bank of DIPswitches)
5 to 45 ft (DEFAULT)	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : ON No. 4 : OFF</p>
46 to 70 ft	<p style="text-align: center;">ON 1 2 3 4 5 6 7 8 OFF</p> <p style="text-align: center;">No. 3 : OFF No. 4 : OFF</p>

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

This appliance can be vented with ABS, PVC, CPVC, or polypropylene (temperature rated up to 149°F). Vent material certified to ULC S636 standards is recommended in the USA. In Canada, plastic venting must be certified to ULC S636 standards.

Item	Material	United States	Canada
Exhaust pipe and Fittings	Schedule 40 PVC	ANSI/ASTM D1785	ULC S636 Certified Materials Only
	PVC-DWV	ANSI/ASTM D2665	
	Schedule 40 CPVC	ANSI/ASTM F441	
	Schedule 40 ABS-DWV	ANSI/ASTM D2661	
	Polypropylene	UL-1738	
Pipe Cement/Primer	PVC	ANSI/ASTM D2564	
	CPVC	ANSI/ASTM F493	
	ABS	ANSI/ASTM D2235	
NOTE: Do NOT Use Cellular Foam Core Pipe			

- The maximum length of exhaust vent piping must not exceed 70 ft. (21.3 m) for 3" venting, which depends on the elevation where the micro boiler is installed, and 100 ft (30.5 m) for 4" venting (deducting 5 ft. (1.5 m) for each elbow used in the venting system). Do not use more than 5 elbows. See the table below.
- When the horizontal vent run exceeds 5 ft. (1.5 m), support the vent run at 3 ft. 0.9 m) intervals with overhead hangers.

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

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

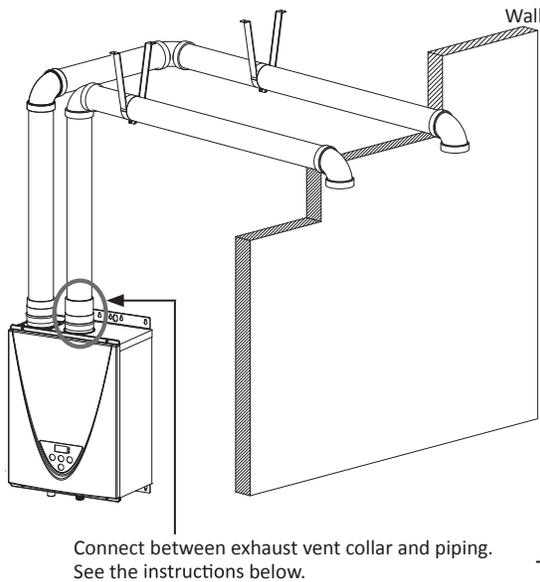
No. of Elbows	Max. Vertical or Horizontal (Total) Vent Length			
	3" venting			4" venting
	Up to 3,000 ft	Up to 6,000 ft	Up to 10,100 ft	Up to 10,100 ft
0	70 ft. (21.3 m)	40 ft. (12.2 m)	25 ft. (7.6 m)	100 ft. (30.5 m)
1	65 ft. (19.8 m)	35 ft. (10.7 m)	20 ft. (6.1 m)	95 ft. (29.0 m)
2	60 ft. (18.3 m)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

Excludes vent terminators, termination elbows, or rain caps.

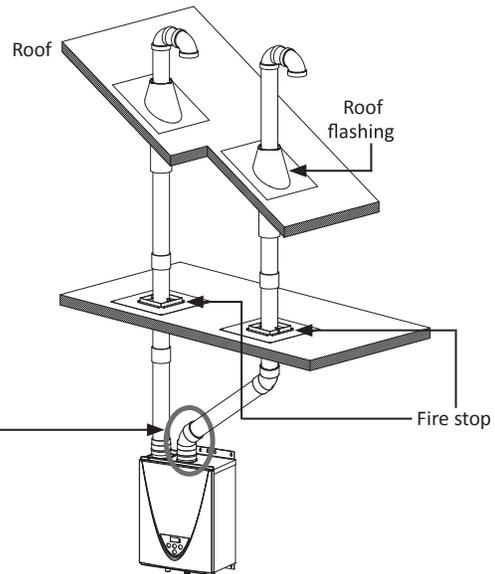
Two-pipe, direct vent illustrations

Typical installation using PVC, ABS, or polypropylene vent

Horizontal Installation



Vertical Installation

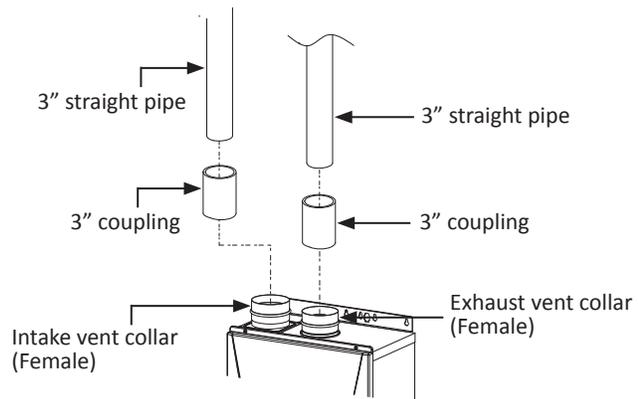


For details of the optional items, refer to the installation manual for each optional item.

<How to install intake and exhaust venting (two-pipe, direct vent)

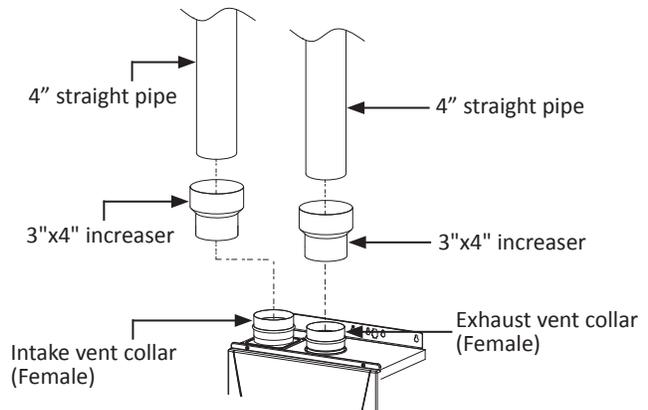
3" vent connection

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



From 3" to 4" vent connection

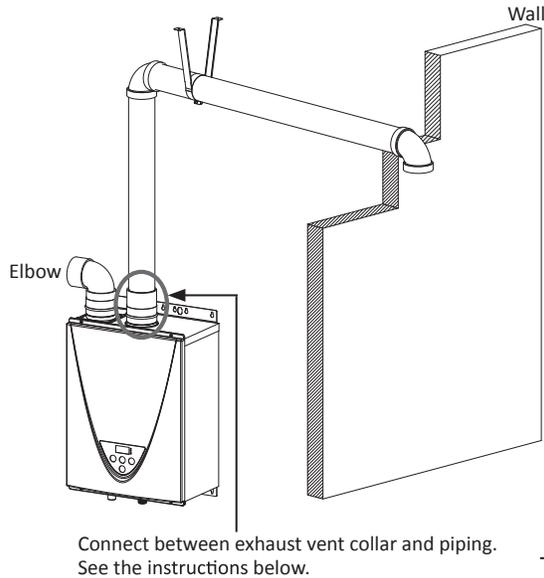
1. Connect 3" x 4" increasers directly on the exhaust and intake vent collar of the micro boiler
2. Connect 4" straight pipes to the increasers.



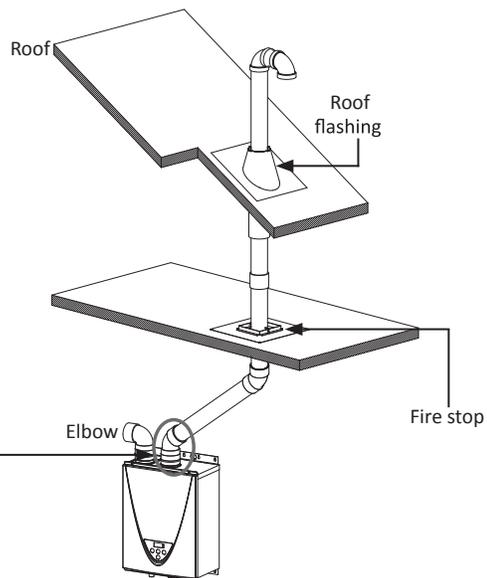
Single pipe with room-air intake illustrations

Typical installation using PVC, ABS, or polypropylene vent

Horizontal Installation



Vertical Installation

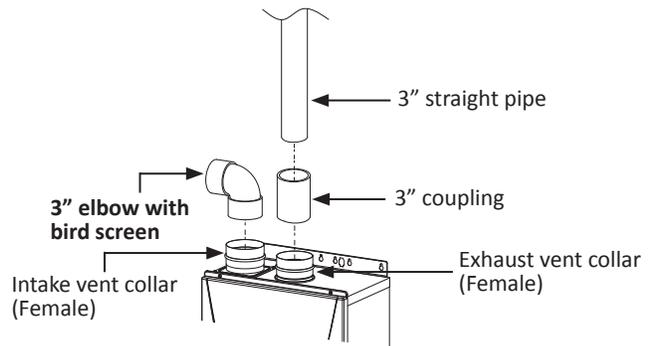


For details of the optional items, refer to the installation manual for each optional item.

<How to install single vent>

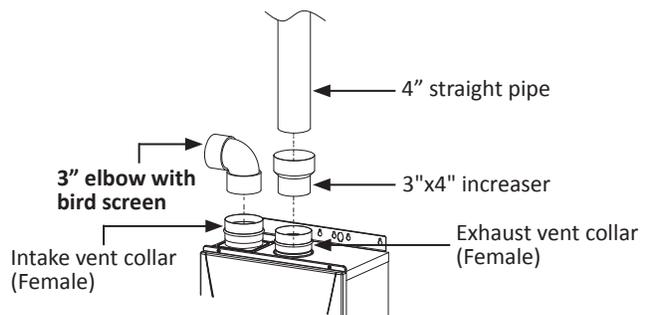
3" vent connection

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



From 3" to 4" vent connection

1. Connect 3" elbow directly on the intake vent collar of the micro boiler.
2. Connect 3" x 4" increasers directly on the exhaust vent collar of the micro boiler.
3. Connect a 4" straight pipe to the increasers.



Exhaust vent (Stainless Steel Vent)

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

- The micro boiler is a Category IV appliance and must be vented accordingly with any 4” vent approved for use with Category III/IV or Special BH type gas vent.
- The manufacturer recommends the NovaVent line. However, the following are also UL listed manufactures: ProTech Systems Inc.(FasNSeal), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T-Vent).
- **Follow the vent pipe manufacturer’s instructions when installing the vent pipe.**
- The maximum length of exhaust vent piping must not exceed 100 ft. (30.5 m) (deducting 5 ft (1.5 m) for each elbow used in the venting system). Do not use more than 5 elbows.
- When the horizontal vent run exceeds 5 ft. (1.5 m), support the vent run at 3 ft. (0.9 m) intervals with overhead hangers.

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

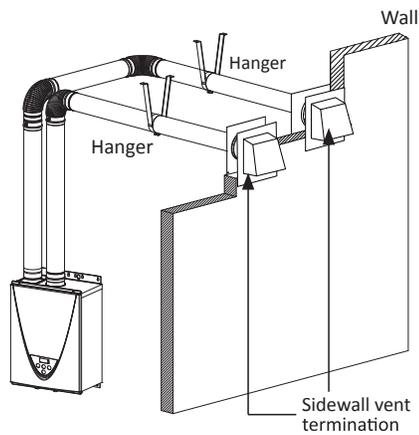
***For each elbow added, deduct 5 ft. (1.5 m) from max. vent length.**

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

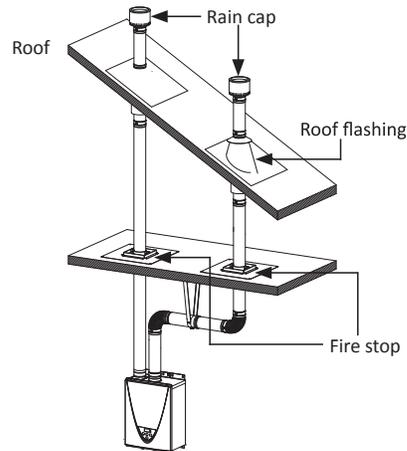
Excludes vent terminators, termination elbows, or rain caps.

Direct-vent and single vent illustrations

Horizontal Installation



Vertical Installation



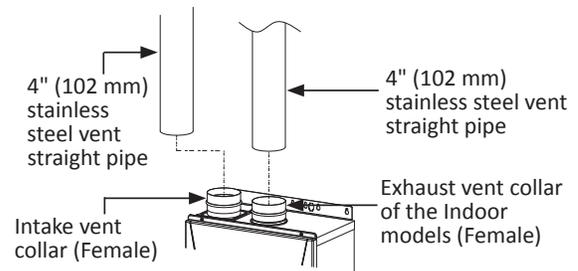
- The diagram above shows direct-vent installations. For single vent installation, connect a 4" elbow directly on the intake vent collar instead of a straight pipe. See the instructions below for the detail.
- For details of the optional items, refer to the installation manual for each optional item.

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

<How to install single vent>

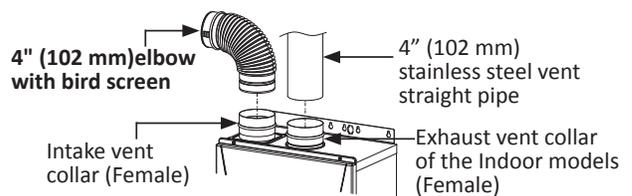
4" vent connection for direct vent installation

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

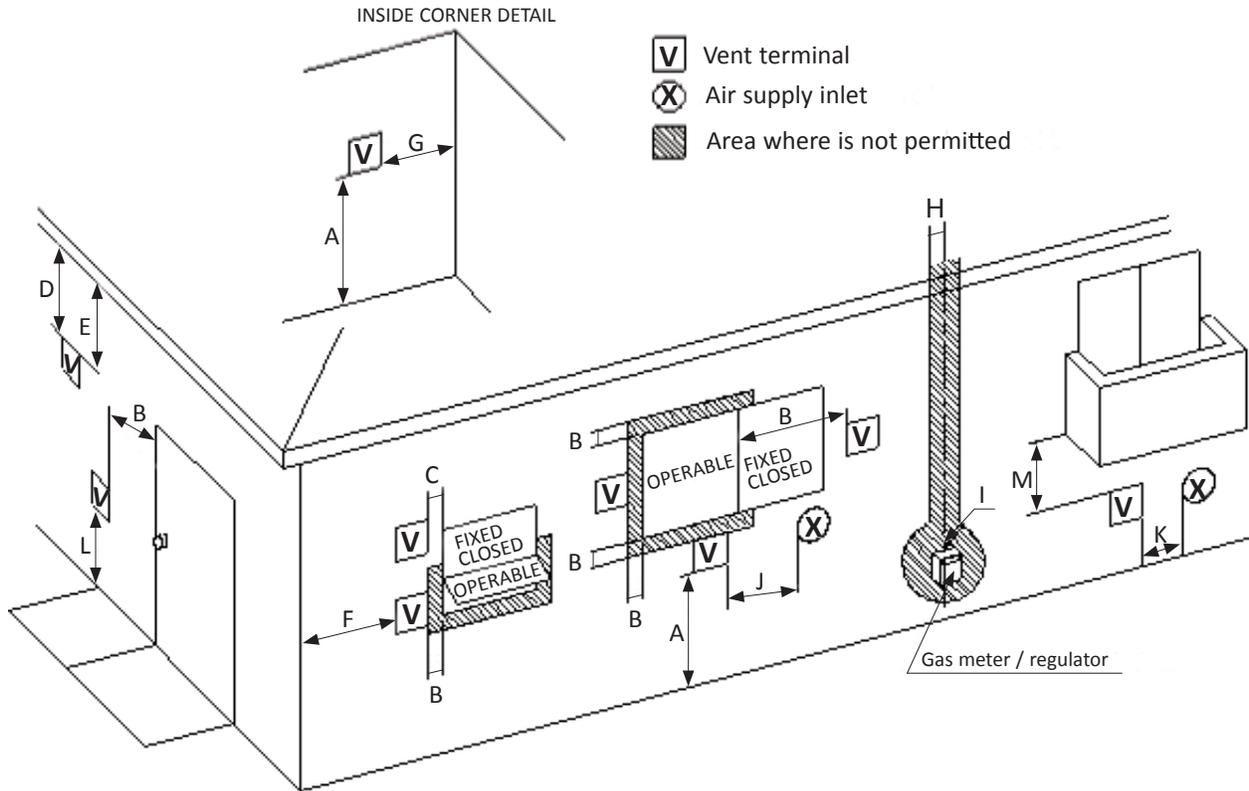


4" vent connection for a single vent installation

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



Vent termination clearances

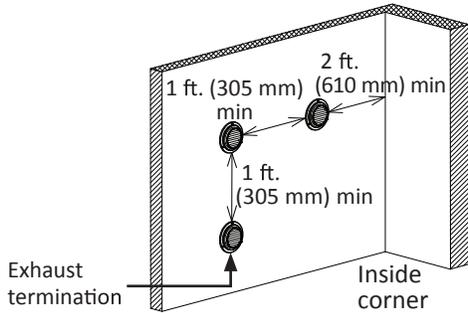


		Canada		U.S.A	
		Direct-vent and other than Direct-vent	Direct-vent	Direct-vent	Other than Direct-vent
A	Clearance above grade, veranda, porch, deck, or balcony	1 foot	1 foot	1 foot	1 foot
B	Clearance to window or door that may be opened	3 feet	1 foot	4 feet from below or side opening. 1 foot from above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

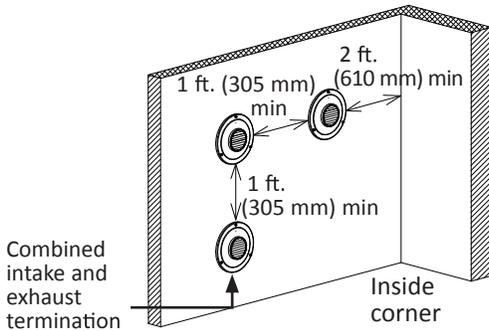
*For clearances not specified in ANSI Z223.1/NFPZ 54 (US) or B149.1 (Canada), please use clearances in accordance with local installation codes and the requirements of the gas supplier.

For sidewall terminations

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



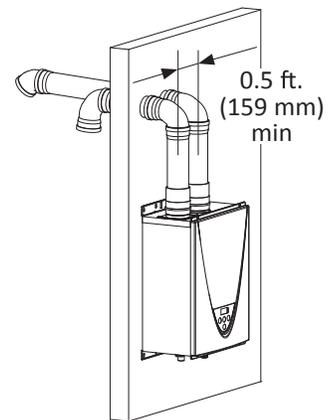
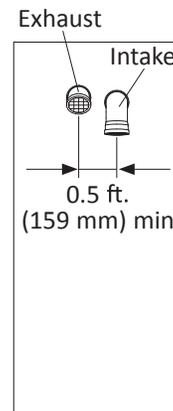
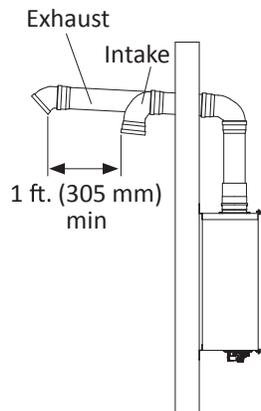
For multiple sidewall exhaust terminations (e.g. Multi-unit Systems), an exhaust termination must be at least 1 ft. (305mm) away from another exhaust termination. An exhaust termination must also be at least 2 ft. (610mm) away from an inside corner. (If the adjacent wall is less than 2 ft. (610mm) of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



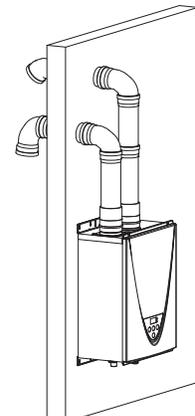
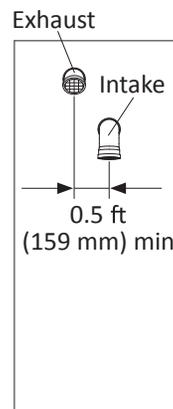
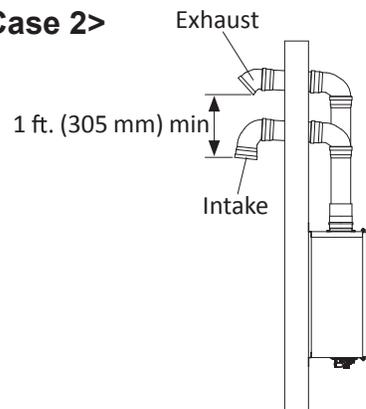
For multiple-unit, direct-vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. (305mm) away from each other, no matter the orientation. A direct vent termination must also be at least 2 ft. (610mm) away from an inside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

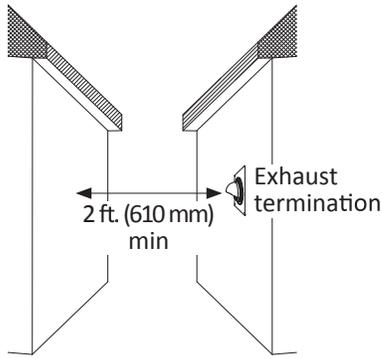
<Case 1>

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



<Case 2>





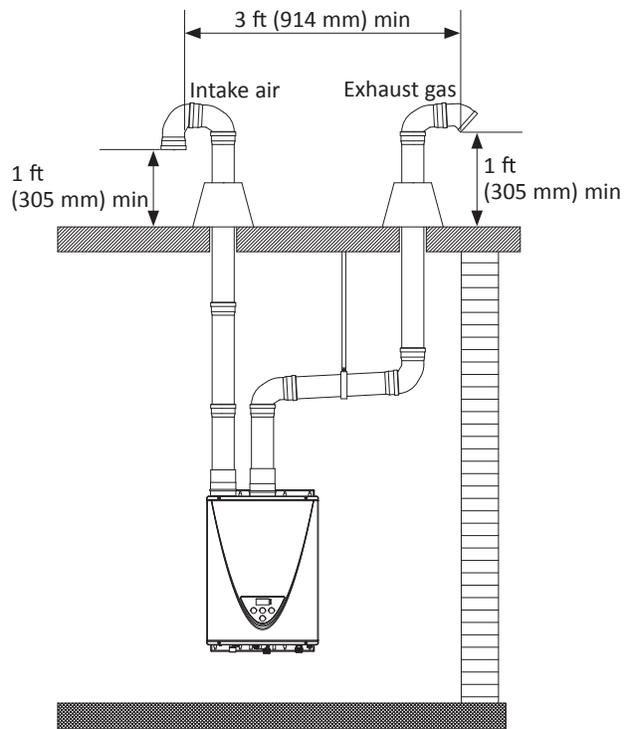
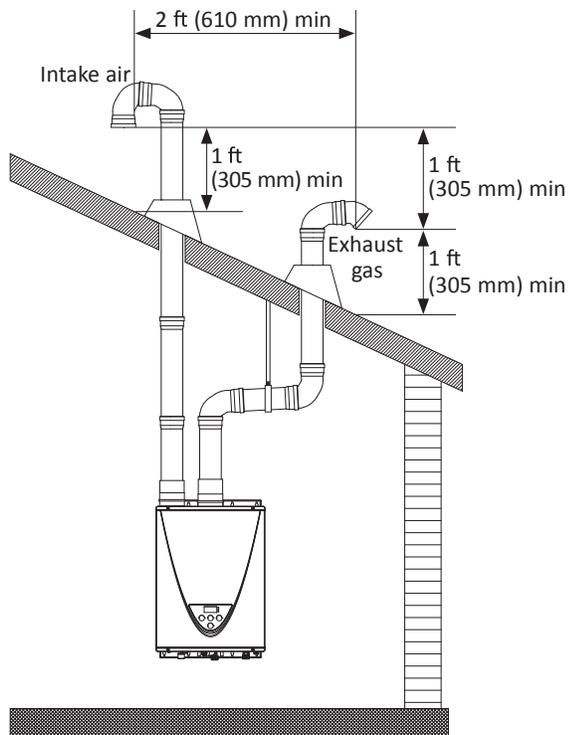
Exhaust and/or direct-vent sidewall terminations should be at least 2 ft. (610mm) away from an opposite surface/wall. Do not place the termination directly in front of an opening into a building.

For rooftop terminations



CAUTION

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



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

GAS SUPPLY AND GAS PIPING SIZE



CAUTION

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

- The minimum and maximum inlet gas pressures are:

Gas type	Inlet gas pressure
Natural Gas	Min. 5.0" W.C. (1.24 kPa) – Max. 10.5" W.C. (2.61 kPa)
Propane	Min. 8.0" W.C. (1.99 kPa) – Max. 14.0" W.C. (3.48 kPa)

- Inlet gas pressures that fall outside the range of values listed above may adversely affect the performance of the micro boiler. These pressures are measured when the micro boiler 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 damages to the unit.
- Until testing of the main gas line supply pressure is completed, ensure the gas line to the micro boiler is disconnected to avoid any further damage.

Gas connections

1. Install a manual gas shutoff valve between the micro boiler and the gas supply.
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 bubble or by using a gas leak detection device.
 - The micro boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at the test pressures in excess of 1/2 psi (3.5kPa).
 - The micro boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psi (3.5 kPa).
3. Always purge the gas line of any debris and/or water before connecting to the gas inlet.

NOTICE

Size the gas pipe appropriately to supply the necessary volume of gas required for the micro boiler 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 micro boiler requires 199 Cubic ft./hr.

Unit: Cubic feet per hour

Pipe Size	Length												
Diameter	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	363	249	200										
1"	684	470	377	323	286	259	239	222	208				
1 1/4"	1,404	965	775	663	588	532	490	456	428	404	358	324	278
1 1/2"	2,103	1,445	1,161	993	880	798	734	683	641	605	536	486	416
2"	4,050	2,784	2,235	1,913	1,696	1,536	1,413	1,315	1,234	1,165	1,033	936	801

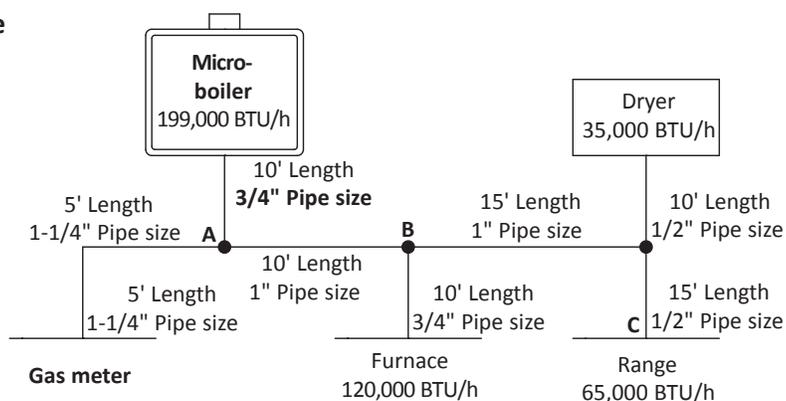
Propane (LP) Supply Piping

Maximum Capacity of Propane (LP) Based on 11" W.C. supply pressure at 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							
1"	1,071	732	590	504	448	409	378	346	322	307	275	252	213
1 1/4"	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511	440
1 1/2"	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787	675
2"	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496	1,260

Gas sizing example (Natural Gas)



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

Divide each appliance's BTU/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 requirements 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 column of 50 ft., Section A to B needs to be 1" in order to supply 220 cubic ft.

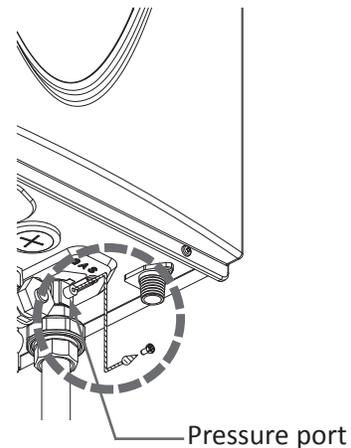
Measuring inlet gas pressure



1. Turn off all electric power to the micro boiler if service is to be performed.
2. Turn the manual gas valve located on the outside of the unit clockwise to the off position.
3. Failure to follow these steps could lead to a fire or explosion, resulting in personal injury or death.

The micro boiler cannot perform properly without sufficient inlet gas pressures. 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 micro boiler 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.
5. Check in inlet gas pressure. When the micro boiler is on maximum and minimum burn, the manometer should read from 5.0" W.C. to 10.5" W.C. (1.24 to 2.61 kPa) for Natural Gas, from 8.0" to 14.0" W.C. (1.99 to 3.48 kPa) for Propane.



WATER CONNECTIONS



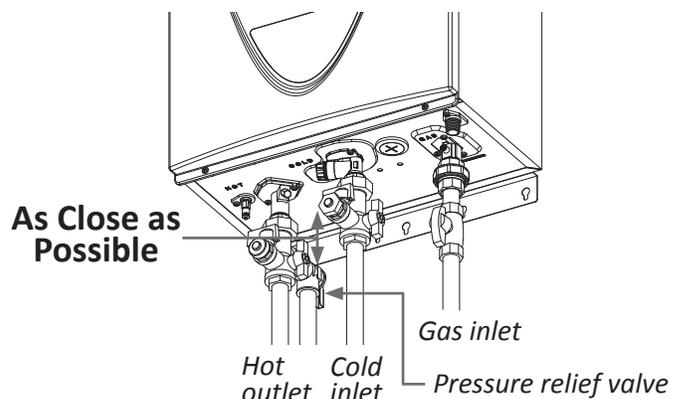
Do not use the micro boiler if any part has been under water. Immediately contact a qualified installer or licensed professional to inspect the boiler to determine if it needs to be replaced.



Do not reverse the hot outlet and cold inlet connections to the micro boiler. This will not properly activate the micro boiler.

All pipes, pipe fittings, valves and other components, including soldering materials, must be suitable for potable water systems (when using combi panel), or distilled water or distilled water/glycol mix.

1. A manual shutoff valve must be installed on the cold water inlet to the micro boiler between the main water supply line and the micro boiler.
2. In addition, a manual shutoff valve is also recommended on the hot water outlet of the unit. If the micro boiler is installed within, or subjected to, a closed loop system (recommended), a thermal expansion tank or code approved device to handle the thermal expansion must be installed.
3. Before installing the micro boiler, 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 boiler.



Pressure relief valve

The micro boiler 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.

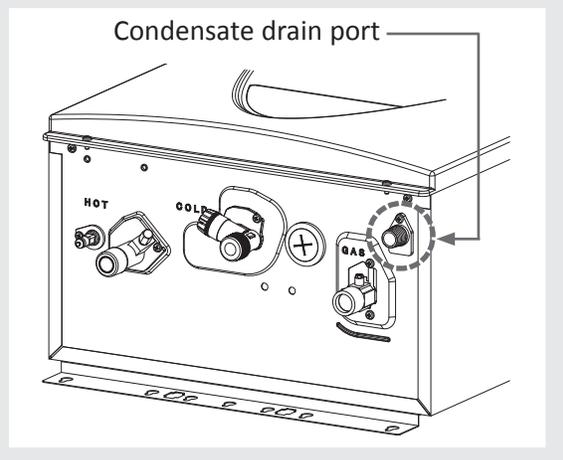
- This unit does not come with an approved pressure relief valve.
- An approved pressure relief valve must be installed on the hot water outlet.
- The pressure relieve vale must conform to ANSI Z21.22 or Can 1-4.4 and installation must follow local codes.
- The discharge capacity must be at least 199,000 BTU/h.
- 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 relive valve installed on the micro boiler 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 micro boiler.

CONDENSATE DRAIN

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



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





WARNING

Condensate Drain Connections

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

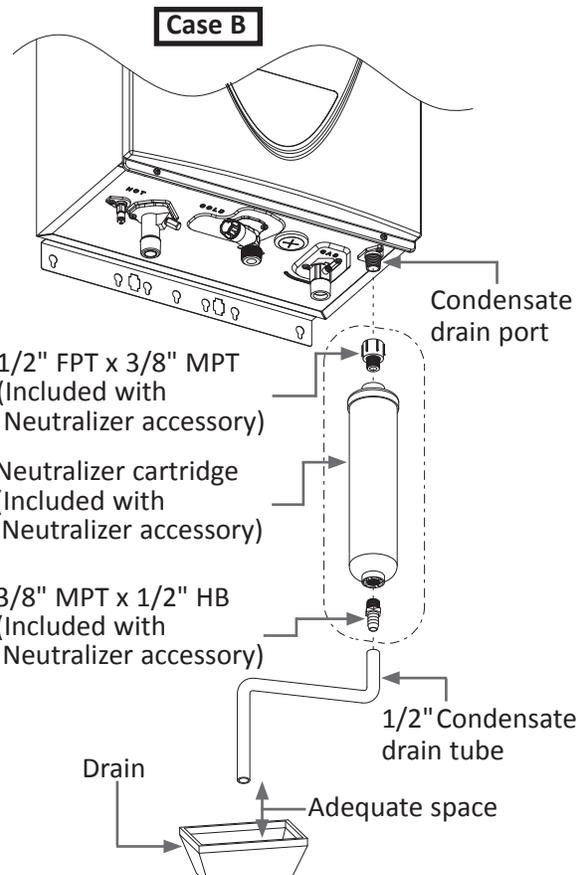
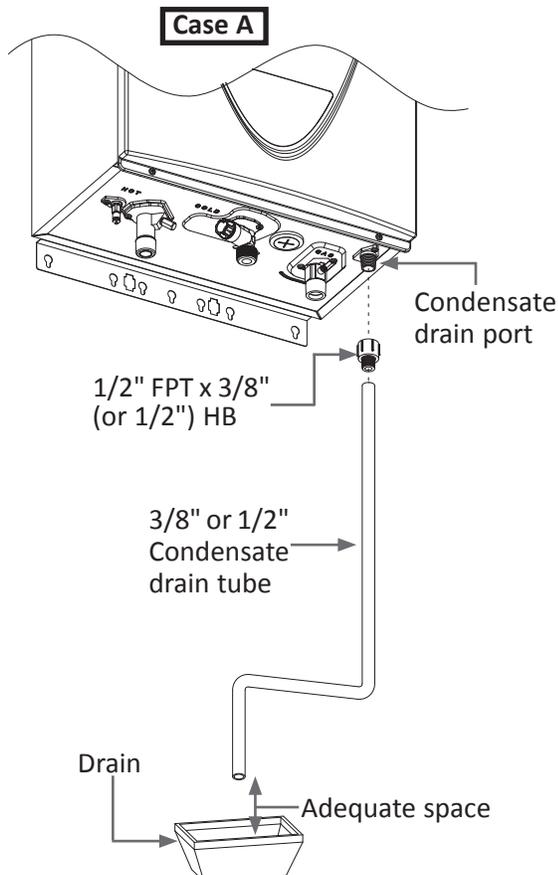
The micro boiler is a high efficiency condensing micro boiler that produces condensate (acidic water). The acidic condensate generated in the secondary heat exchanger can be neutralized by the Neutralizer accessory.

Case A: If a neutralizer is not required

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

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

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





WARNING

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

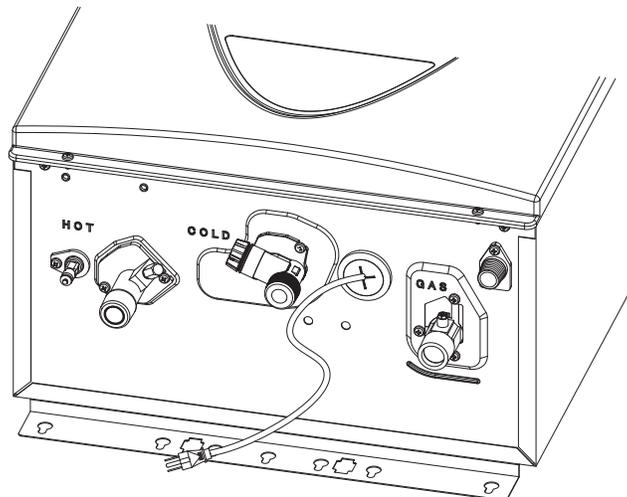
ELECTRICAL CONNECTIONS



WARNING

- Follow the electrical code requirements of the local authority having jurisdiction. In the absence of such requirements, follow the 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.
- When servicing or replacing parts with the micro boiler, 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.
- Failure to observe these warnings could result in personal injury or loss of life.

This unit comes with a power plug instead of a junction box.



APPLICATIONS

Space Heating Applications



WARNING

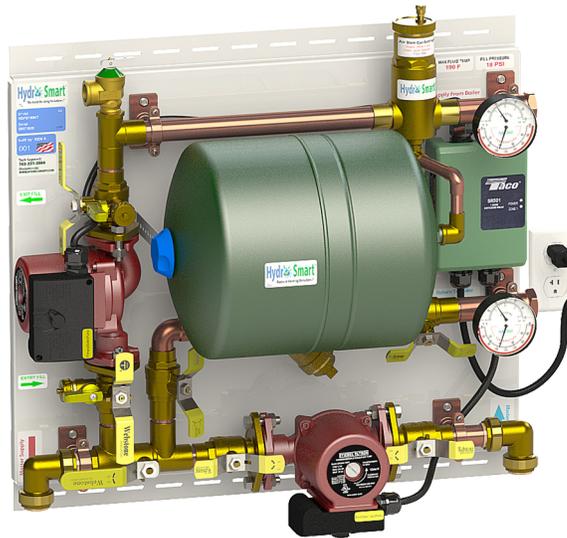
- In order to purge air in water pipes within a closed loop system, an air vent, air separator, and expansion tank should be installed in the system. **(Hydro Smart pre-built space heating panels incorporate all of these features).**
- Water temperature over 125° F (52° C) can cause severe burns instantly or death from scalding.
- Chemicals such as diluted Glycol can be used for radiant floor, Hydro/fan coil air or Baseboard heating only. The diluted solution of glycol must contain between 25% and 55% of Glycol. Be aware that in a closed loop system, low pressure in the heat exchanger can cause low-temperature boiling, resulting in excessive noise and damage to the micro boiler. Consult with the glycol maker for specifications prior to use.

Hydro Smart Pre-Built Space Heating Panels

Hydro Smart per-plumbed panels help make space heating easy and reliable. These panels are professionally engineered and use proven Primary/Secondary hydronic practices. Call Tech Support (1-763-331-3066) for assistance.

Sample:

HSPS190HT 1 Zone Panel:

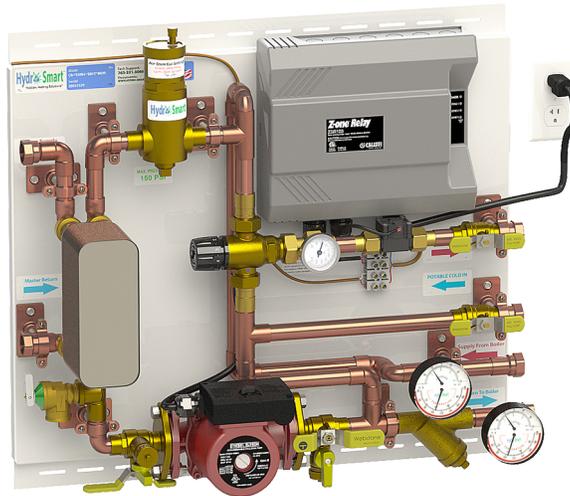


For more information on Hydro Smart pre-plumbed panels and zoning options for this boiler please visit www.hydro-smart.com or call 763-331-3066.

Dual-purpose hot water heating

(Domestic and Space Heating)

Insert a Hydro Smart Combi Panel to provide potable heated water and Hydronic Heating (with space heating panel(s)) with one heat source.



The Hydro Smart Combi Panel integrates with a wide variety of boilers and delivers “Priority” potable heated water with no storage tank and hydronic space heating in a small reliable package.

NOTICE

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.

For more information on Hydro Smart Combi panels and integrating space heating and domestic water for this boiler please visit www.hydro-smart.com or call 763-331-3066.

INITIAL OPERATION

- Check the Gas and Water Connections for leaks before firing the unit for the first time.
- Open the main gas supply valve to the unit using only your hand to avoid a 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.
- Do not try to light the burner manually. It is equipped with an electric ignition device which automatically lights the burner.
- Check for proper venting and combustible air to the micro boiler.
- Purge the gas and water lines to remove any air pockets.
- Do not use this micro boiler if any part has been under water. Immediately call a qualified installer or service technician to inspect the micro boiler to determine if it needs replacement.

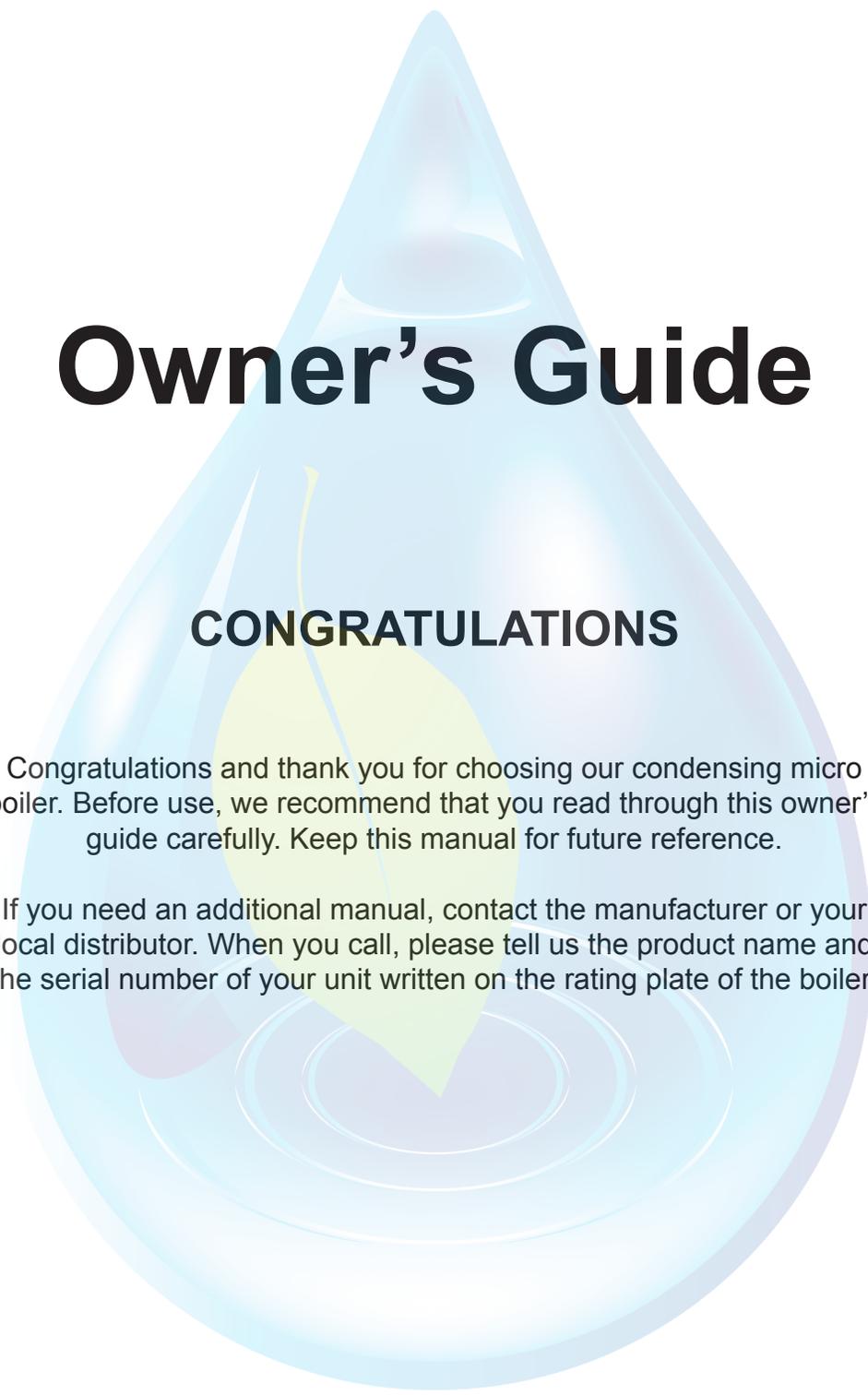
IF YOU SMELL GAS:

- Do not try to start the micro boiler.
- 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.



WARNING

	Operation	
1.	Once the above checks have been completed, please clean filter of any debris.	
2.	Fully open the manual water control valve on the water supply line.	
3.	Turn on the thermostat and verify that fluid flows through your radiant system. Then turn off your thermostat.	
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 turn on the thermostat. You are ready to enjoy hours of endless comfort.	



Owner's Guide

CONGRATULATIONS

Congratulations and thank you for choosing our condensing micro boiler. Before use, we recommend that you read through this owner's guide carefully. Keep this manual for future reference.

If you need an additional 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 boiler.

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.

1. The micro boiler does not have a pilot. It is equipped with an ignition device that automatically lights the burner. Do **NOT** try to light the burner by hand.
2. Before operating smell all around the micro boiler area for evidence of leaking gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
WHAT TO DO IF YOU SMELL GAS:
 - Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone.
 - Follow the gas suppliers instructions. If gas supplier cannot be reached, call fire dept.
3. 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.
4. Do not use this micro boiler if any part has been under water. Immediately call a qualified service technician to inspect the micro boiler and to replace the unit if needed.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above or in the Owner's Manual.
2. Turn off all electric power to the micro boiler.
3. Do not attempt to light the burner by hand.
4. Turn the manual gas valve located on the outside of the unit clockwise to the OFF position.
5. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to next step.
6. Turn the manual gas valve located on the outside of the unit counterclockwise to the ON position.
7. Turn on all electrical power to the micro boiler.
8. If the micro boiler will not operate, follow the instructions "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 micro boiler if service is to be performed.
2. Turn the manual gas valve located on the outside of the unit clockwise to the OFF position.

DANGER

Vapors from flammable liquids will explode and catch fire causing death or sever burns. Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the micro boiler.



Read and follow micro boiler warnings and instructions. if the owner's manual is missing, contact the manufacturer.

Keep flammable products:

1. Far away from boiler.
2. In approved containers.
3. Tightly closed and out of reach of children.
4. Micro boiler 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

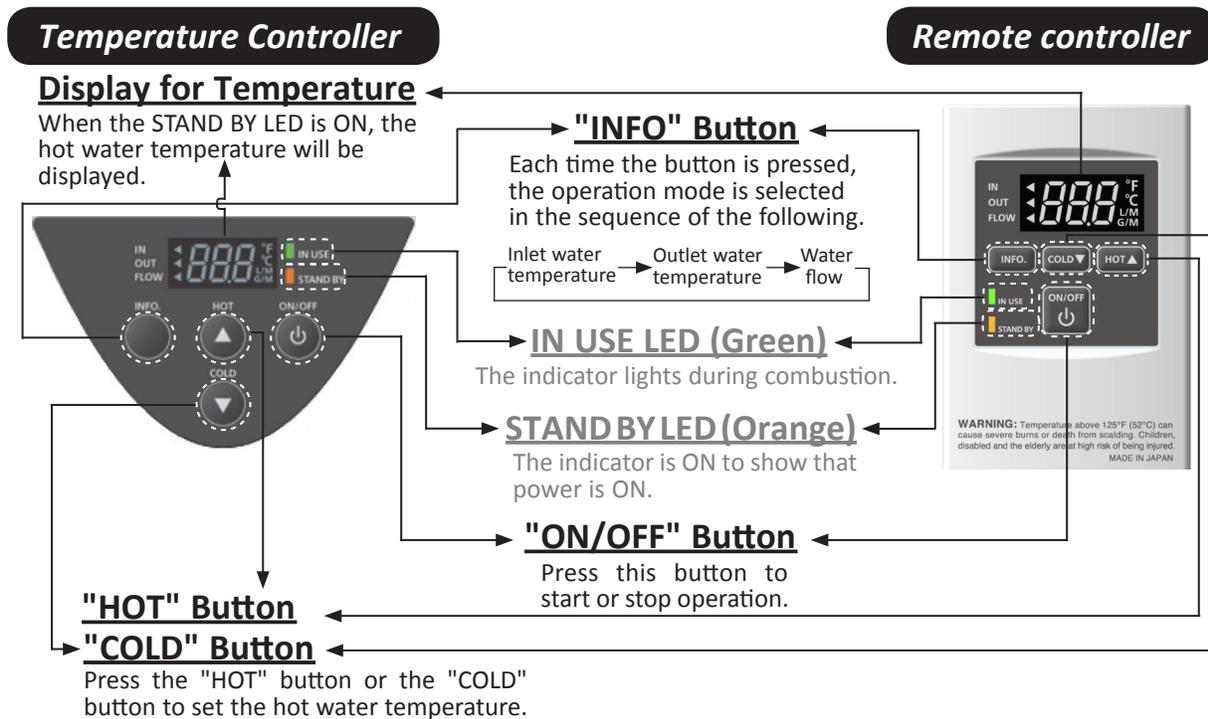
When using micro boiler with Combi Panel for Domestic Hot Water:

1. Water temperature over 125° F 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. Temperate limiting valves are available on the Combi Panel(s). Adjust these mixing valves accordingly.
5. The outlet temperature of the micro boiler is set at 120° F (50° C). If you require water temperatures below this setting, follow the instruction manual.
6. Test the boiler before bathing or showering. Do not leave children or an infirm person unsupervised.

NORMAL OPERATION

TEMPERATURE CONTROLLER AND REMOVE CONTROLLER

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



NOTICE

- When the remote controller is installed it will take priority over the built-in controller.
- The controller has an energy saving mode. Five minutes after the water heater stops operating, the backlight of the controller turns off.
- The backlight of the remote will turn back on once the water heater begins firing again.

GENERAL

NOTICE

- Flow rate to active micro boiler: 0.5 gallon per minute at the default set temperature
- Flow rate to keep the micro boiler running: 0.4 gallon per minute.



- The controllers have an energy saving mode. Five minutes after the micro boiler stops operating, the back-light of the controllers turn off.
- The back-light of the controllers will turn back on once the micro boiler begins firing again.

TEMPERATURE SETTINGS

Set Temperature

	Operation	Screen on the controller	
		Built-in controller	Remote controller
1.	Turn on the 120 VAC power supply to the unit.		
2.	Press the "ON/OFF" button on the controller in order to turn the controller on.		
3.	When ON, the STAND BY LED is lit.		
4.	It shows the set temperature on its display as shown in the picture on the right. (EX.: 120 °F)	 (EX.: 120 °F)	
5.	Press the "HOT" button or the "COLD" button to set the temperature setting of the unit.	 	 
	Increasing temperature from 120 °F (50 °C) to 125 °F (52 °C) : 1. The micro boiler must be in Stand By to increase the temperature. 2. Press the "HOT" button to set 120 °F (50 °C). 3. Press and hold the "INFO" button and the "HOT" button for at least 3 seconds. The remote will emit a beep and change to 125 °F (52 °C). 4. Press the "HOT" button to set up to 140 °F (60 °C).	 	 
	Increasing temperature above 140 °F (60 °C) 1. The micro boiler must be in Stand By to increase the temperature. 2. Press the "HOT" button to set 140 °F (60 °C). 3. Press and hold the "INFO" button and the "HOT" button for at least 3 seconds. The remote will emit a beep and change to 145 °F (63 °C). 4. Press the "HOT" button to set up to 160 °F (70 °C).		

TEMPERATURE TABLE OF CONTROLLER

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

*Factory setting (Default): 120 °F

ADDITIONAL FEATURES

Information mode

You can get some information about the micro boiler condition by pressing “Info” button. For more information, follow the procedures below:

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

Unit Conversion Mode

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

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



When the micro boiler is connected with the remote controller, the temperature controller will not operate temperature settings, as only work for the information mode.

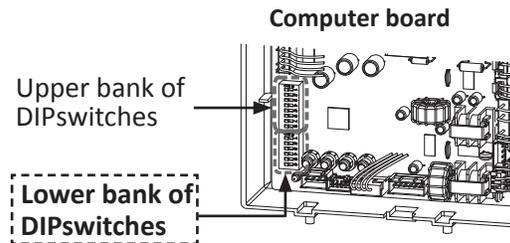
TEMPERATURE SETTINGS ON THE PCB (WITHOUT REMOTE CONTROLLER)

There are 2 preset DIPswitches (120° F (50° C) and 140° F (60° C)) that you can select from by changing the DIPswitch settings on the computer board without the remote controller. See the table below. When the remote controller is in normal operation, the set temperature of the remote controller is given priority over the set temperature of the DIPswitch settings.

- The temperature has been preset at the factory to 120° F (50° C).

(Lower bank of DIPswitches)

120 °F (49 °C) DEFAULT		140 °F (60 °C)	
ON	1 2 3 4 5 6	ON	1 2 3 4 5 6
OFF		OFF	
	No. 5 : OFF		No. 5 : ON



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



- DO NOT** adjust the upper bank of DIPswitches
- Turn off the power supply to the micro boiler before changing the DIPswitch settings.

FLOW

- The flow rate through the micro boiler is limited to a maximum of 10.0 GPM (38 L/min).
- The temperature setting, along with the supply temperature of the water will determine the flow rate output of the unit.

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 a power loss is not covered under warranty. In cases where power losses can occur, consider the use of a backup power supply.
- The freeze protection system will activate when the surrounding and/or outside temperature drop.
- It is the installer's responsibility to be aware of freezing issues and take all preventive measures. The manufacture will not be responsible for any damage to the heat exchanger as a result of freezing.
- In any area subject to freezing temperatures, freezing issues can occur if cold air enters through the venting into the heat exchanger by either negative pressures within the installation location or by strong outside wind. The manufacturer highly recommends the use of a back flow preventer (sold separately) to minimize the amount of cold air entering through the exhaust venting when the micro boiler is off.
- It is the installer's responsibility to be aware of freezing issues and take all preventive measures. The manufacture will not be responsible for any damage to the heat exchanger as a result of freezing.
- If you will not be using your boiler for a long period of time:
 1. Completely drain the water out of the unit.
 2. Disconnect power to your boiler.

This will keep your unit from freezing and being damaged.



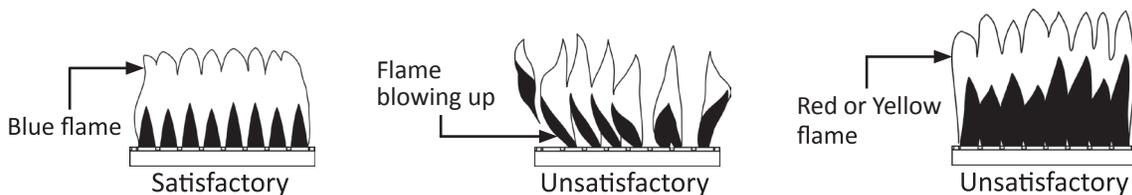
CAUTION

Only pipes within the micro boiler are protected by the freeze protection system. Any water pipes (hot or cold) located outside the unit will no be protected. Properly protect and insulate these pipes from freezing.

MAINTENANCE AND SERVICE

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

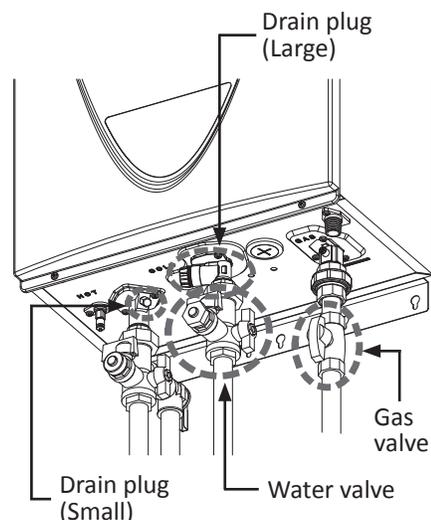
- Be sure that all openings for combustion and ventilation air are not blocked.
- The venting system should be checked annually for any leaks, corrosion, blockages or damage.
- The burner should be checked annually for dust, lint, grease or dirt.
- Keep the area around the micro boiler clear. Remove 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 micro boiler.



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

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 shut off valve.
5. 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.
6. Wait a few minutes to ensure all water has completely drained from the unit.

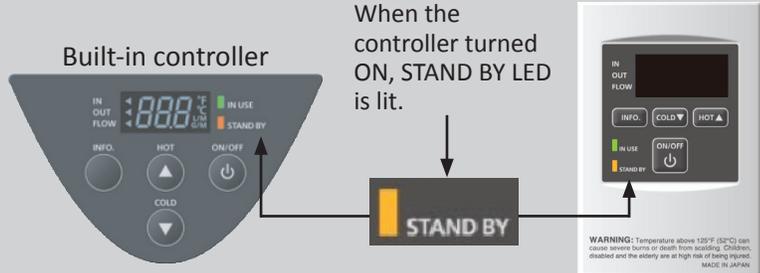


TROUBLESHOOTING

General

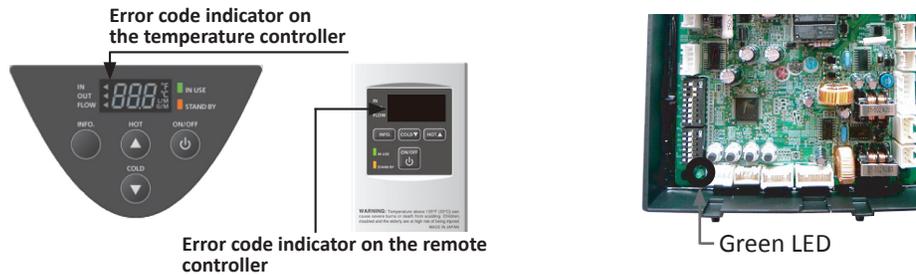
	PROBLEM	SOLUTIONS
TEMPERATURE and AMOUNT OF HOT WATER	The water is not hot enough.	<ul style="list-style-type: none"> • Compare the flow and temperature. • Check cross plumbing between cold water lines and hot water lines. • Is the gas supply valve fully open? • Is the gas line sized properly? • Is the gas supply pressure sufficient? • Is the set temperature set too low?
	The water is too hot.	<ul style="list-style-type: none"> • Is the set temperature set too high?
	The hot water is not available when there is a call for heat.	<ul style="list-style-type: none"> • Make sure the unit has 120 VAC, 60 Hz power supply. • If you are using the remote controller and/or temperature controller, is the power button turned on? • Is the gas supply valve fully open? • Is the water supply valve fully open? • Is the unit frozen? • Is there enough gas in the tank / cylinder? (For Propane models)
	The hot water turns cold and stays cold.	<ul style="list-style-type: none"> • Is the flow rate enough to keep the micro-boiler running? • Is the gas supply valve fully open? • Are the fixtures clean of debris and obstructions? • Check if the flow rate is too low.
	Fluctuation in hot water temperature.	<ul style="list-style-type: none"> • Is the gas line sized properly? • Is the supply gas pressure sufficient? • Check for cross connection between cold water lines and hot water lines.

Troubleshooting (Cont'd)

	PROBLEM	SOLUTIONS
WATER HEATER	Unit does not ignite when water goes through the unit.	<ul style="list-style-type: none"> • Is the flow rate over 0.5 GPM (1.9 L/min)? • Check for the filter on the cold water inlet. • Check for reverse connection and cross connection. • If you use the remote controller and/or temperature controller, is the power button turned on? • Check if the inlet temperature is too high. If it is too close to the set temperature, the water heater will not activate.
	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 1-763-331-3066
BUILT-IN CONTROLLER AND REMOTE CONTROLLER	Controller does not display anything when the power button is turned on.	<ul style="list-style-type: none"> • Make sure the unit is supplied with power. • Make sure the connection to the unit is correct. <p>NOTICE: When the unit has not operated for five minutes or more, the display of the controllers turns off to conserve energy.</p> <p>When the controller turned ON, STAND BY LED is lit.</p>  <p>Although the controller of the parent unit will display the set temperature at the Easy-Link System, the controller of the child unit will not display the set temperature.</p>
	An ERROR code is displayed.	<ul style="list-style-type: none"> • Please see Error Code Section.

ERROR CODES

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



Single unit installations

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

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



Fault Analysis of Error Codes

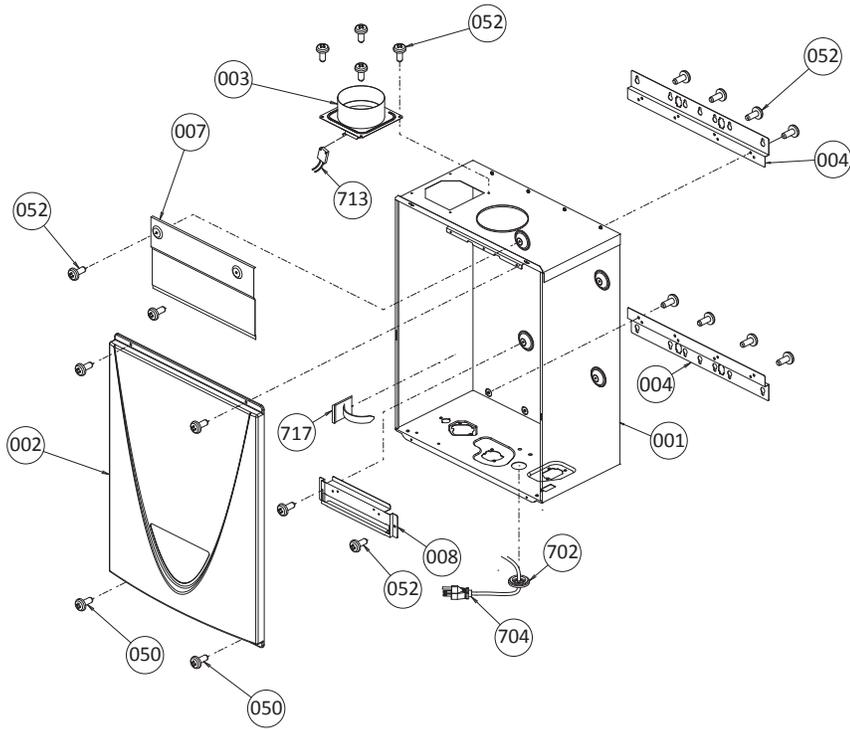
If the error code is displayed on the computer board of the micro boiler or remote controller and/or temperature controller, please check the following. After checking, **Consult with the manufacturer.**

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

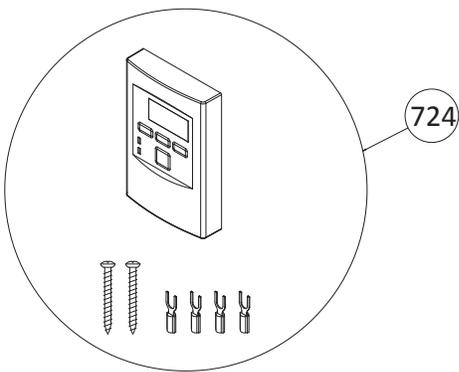
Remote	Green LED	Malfunction description	Diagnosis
391	Two Times	Air-fuel ratio rod failure	<ul style="list-style-type: none"> Check for connection/breakage of wires (Part #709) and/or soot on the AFR rod (Part #108).
441	Two Times	Flow sensor failure (Easy-Link System only)	<ul style="list-style-type: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

COMPONENTS DIAGRAM

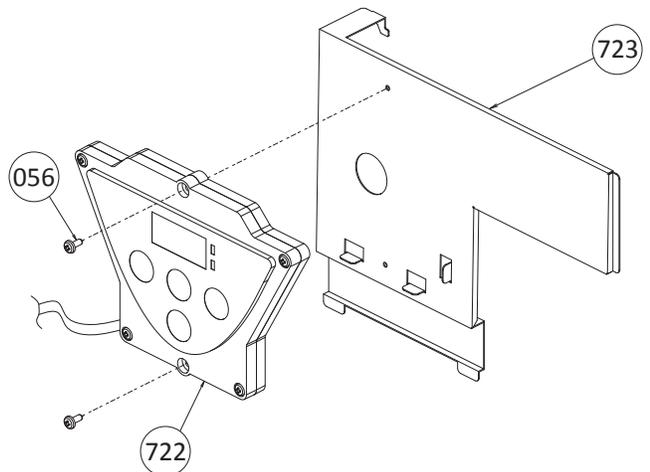
Case assembly



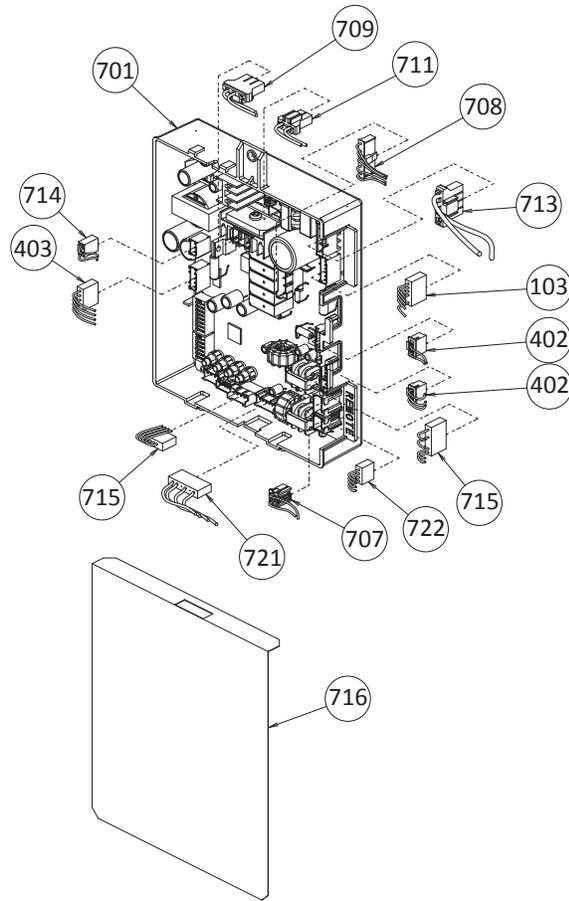
Temperature remote controller



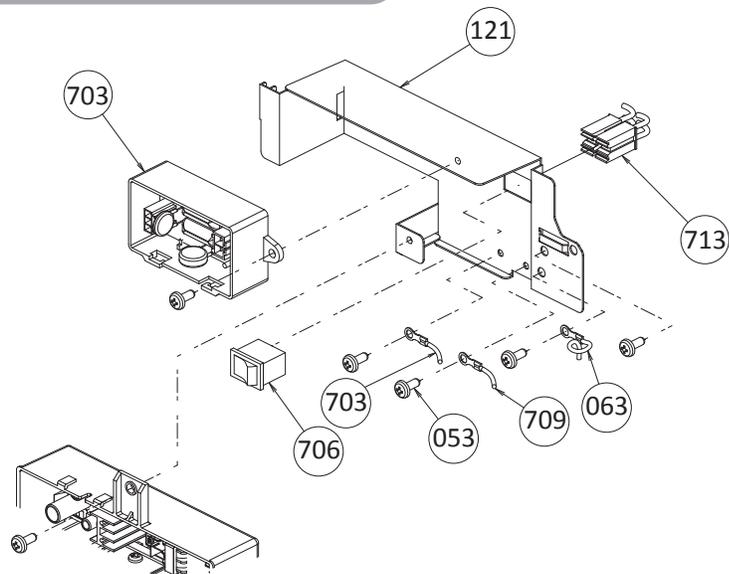
Temperature controller



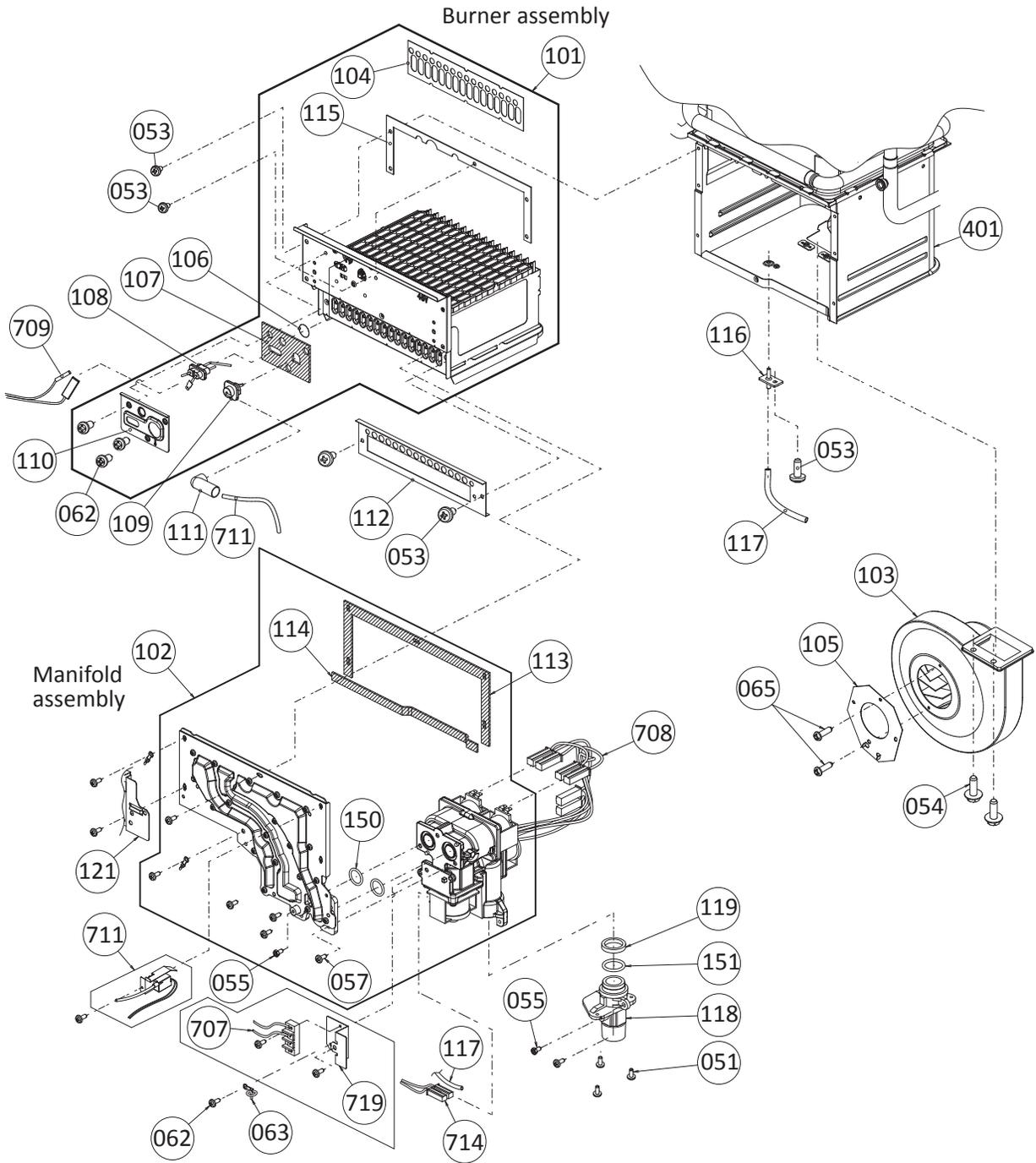
Computer board assembly



Surge box assembly



Burner assembly

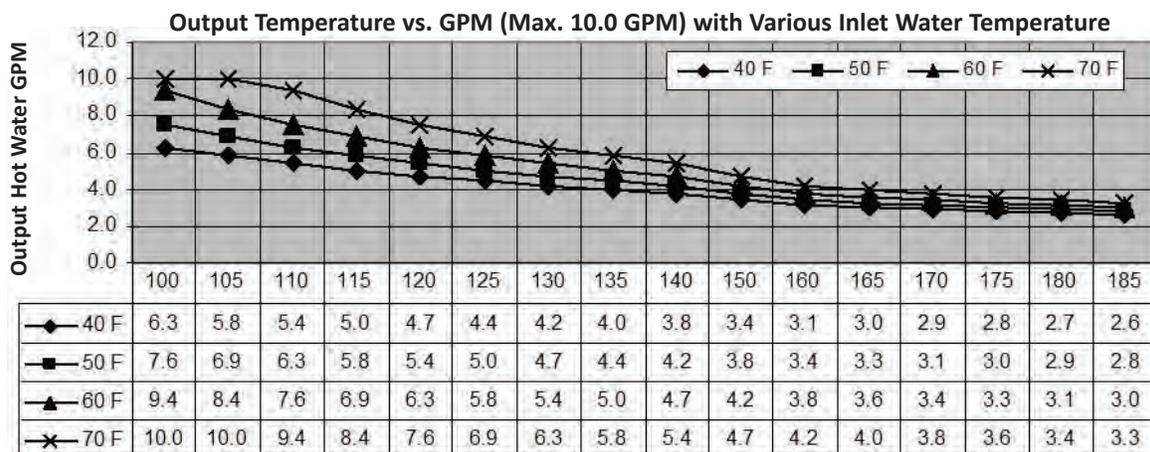


PARTS LIST

Item #	Description	Part #
001	Case assembly	EK159
002	Front cover	EK158
003	Intake air port assembly	EK170
004	Bracket	EK162
005	Junction box	EK190
006	Power supply cord assembly	EK171
007	Back guard panel	EK161
008	Chamber fixing plate	EK160
009	Condensate drain port	EKH23
050	Screw M4×12 (W/Washer)	EW000
051	Screw M4×10 (W/Washer)	EW001
052	Screw M4×10 (Coated)	EW002
053	Screw M4x10	EW003
054	Hex head screw M4×12 (W/Washer)	EW004
055	Hex head screw M4x8	EW005
056	Pan screw M4x20	EW018
057	Tap tight screw M4x12 FEZN	EKK31
058	Screw M3x6	EW00A
059	Screw M4x6	EW009
060	Screw M4x12	EKK37
061	Screw M3x6	EK191
062	Pan screw M4x8	EW00D
063	Wire clamp 60	EM167
064	Screw M4x10	EK230
065	Screw M3x6 SUS3	EW00B
101	Burner assembly	EK192
102	Manifold with gas valve assembly LP	EK181
	Manifold with gas valve assembly NA	EK182
103	Fan motor	EK109
104	Burner gasket	EKK2X
105	Fan damper	EM381
106	Burner window	EKK2V
107	Rod holder gasket	EKK2W
108	Flame rod	EK193
109	Igniter rod	EKK0F
110	Rod holder	EKK32
111	Rod cap	EKN61
112	Burner damper LP	EK183
	Burner damper NA	EK169
113	Manifold gasket A	EKK2Y
114	Manifold gasket B	EKK2K
115	Burner holder gasket	EKK0G

Item #	Description	Part #
116	Pressure port	EKK2D
117	Combustion chamber tube	EX019
118	Gas inlet	EK117
119	Gas inlet ring	EX00D
121	Surge box plate	EK163
150	O-ring P18 NBR (Black)	EZP18
151	O-ring P20 NBR (Black)	EK042
401	Primary heat exchanger	EK250
402	Flow adjustment valve / Flow sensor	EK129
403	Bypass valve	EKD58
404	Water inlet	EKK1U
405	Inlet drain plug	EKK2B
407	Inlet thermistor	EK137
408	Outlet thermistor	EKK1A
409	Water outlet	EK208
410	Outlet drain plug	EKK2E
411	Heat exchanger thermistor	EKK2T
412	Hi-Limit switch	EKN34
413	Overheat-cut-off fuse	EK333
414	Pipe heater	EK209
415	Inlet heater	EK210
416	Drain tube	EK231
417	Inlet heater	EK105
418	Secondary heat exchanger	EK251
450	Pipe heater fixing plate	EKK27
451	Heater fixing plate 16	EK031
452	Fuse fixing plate 18	EKK26
453	Fuse fixing plate 14	EK029
454	O-ring P4 FKM	EZM04
455	O-ring P6 FKM	EZM06
456	O-ring P14 FKM	EZM14
457	O-ring P15 FKM	EZM15
458	O-ring P16 FKM	EZM16
459	Fastener "4-11"	EKH30
460	Fastener "14-22"	EKK24
461	Fastener "16A"	EM192

Item #	Description	Part #
462	Fastener "16-25A"	EKK39
463	Fastener "6-15"	EX12K
464	Flat heater	EK217
465	Drain tube	EK218
466	Cold pipe	EK220
467	Stainless heat exchanger out pipe	EK222
468	Header connection	EK226
469	Drain port	EK228
470	Thermistor fixing plate	EK13H
471	Exhaust thermistor gasket	EK13L
472	Hi-limit switch for exhaust	EKH6G
473	Gasket	EK229
701	Computer board	EK176
702	Rubber grommet	EX00B
703	Surge box	EK280
704	120 VAC wire	EK146
706	120 VAC Power ON-OFF switch	EKK4V
707	Remote controller wire	EK165
708	Gas valve wire	EK168
709	Flame rod wire	EK166
711	Igniter assembly	EK153
713	Switch wire with thermostat	EK184
714	Proportional gas valve wire	EM167
715	24V cables	EK179
716	Computer board cover	EKK1M
717	Cable clamp	EX13C
718	Exhaust thermistor	EKH6E
719	Remote fixing plate	EK152
721	Exhaust Hi-limit switch wire	EK180
722	Temperature controller	EK173
723	Fixing plate	EK178
724	Temperature remote controller	ER014



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

NOTES:

