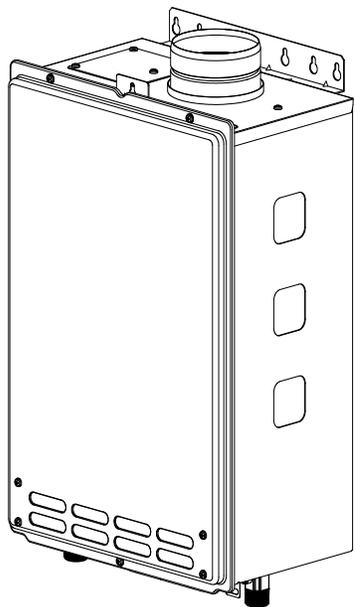




# Hydro Smart 170

## Micro Boiler for Radiant Heating Installation Manual and Owner's Guide



Hydro Smart 170

### WARNING

This product must be installed and serviced by a licensed plumber, a licensed gas fitter, or a professional service technician. **This product is for radiant heating only and must be installed in with a combination of Hydro Panel only.** Improper installation and/or operation, or installation by an unqualified person, will void the warranty.

### WARNING

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

Hydro Smart Contact Information  
(Address, Phone Number)

**Please make sure the proper gas pressure guidelines and recommendation from Hydro Smart, failure to do so can cause a fire or explosion and may result, causing property damage, personal injury, or death.**

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matches your specifications.

\*In accordance with ANSI Z21.10.3 and SCAQMD Rule 1146.2, CO emission does not exceed 400 PPM for normal input

## SPECIFICATIONS HYDRO SMART 170

Natural Gas Input (Operating Range)		Min: 11,000 Btu/h Max: 199,000 Btu/h	
LPG Input (Operating Range)		Min: 11,000 Btu/h Max: 199,000 Btu/h	
Gas Connection		¾" NTP	
Water Connections		¾" NTP	
Water Pressure		15 - 150 psi*	
Natural Gas Pressure Inlet		Min. 5.0" WC Max. 10.5" WC	
LP Gas Pressure Inlet		Min. 8.0" WC Max. 14.0" WC	
Manifold Pressure		Natural: 2.5" WC Propane: 4.4" WC	
Weight		40 lbs.	
Dimensions		H20.5" x W13.8" x D8.5"	
Ignition		Electric Ignition	
Electric	Supply	120VAC (60Hz)	
	Consumption	Operation	92 W (0.77A)
		Standby	6.2 W (0.05A)
		Freeze-Protection	111 W (0.93A)

\*40 psi or above is recommended for maximum flow

### NOTE

\*Check the rating plate to ensure this product

**Hydro Smart 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 **Hydro Smart 170 Micro Boiler**.
- The model description is listed on the rating plate which is attached to the front cover of the **micro boiler**.
- Please read all installation instructions completely before installing this product.
- If you have any problems or questions regarding this equipment, consult with **Hydro Smart** ~~or its local representative.~~
- **Hydro Smart is a micro boiler designed to be used with radiant heating in a combination Hydro Panel.**
- The principle behind the **Hydro Smart 170 Micro Boiler** is simple:

Hydro Smart 170 unit diagram/pictures

# SAFETY GUIDELINES



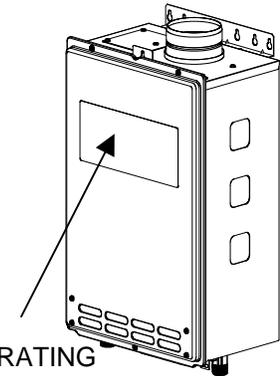
**WARNING**

- Installation and service must be performed by a qualified installer (for example, a licensed plumber or gas fitter), otherwise the warranty by **Hydro Smart** will be void.
- The installer (licensed professional) is responsible for the correct installation of your **Hydro Smart 170 Micro Boiler** and for compliance with all national, state/provincial, and local codes.

PLEASE READ THIS MANUAL CAREFULLY AND FOLLOW ALL DIRECTIONS.

## GENERAL

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or CAN/CSA B149.1 Natural Gas, Propane Installation Code in Canada.
2. Properly ground the unit in accordance with all local codes or in the absence of local codes, with the National Electrical Codes: ANSI/NFPA 70 in the USA or CSA standard C22.1 Canada Electrical Code Part 1 in Canada.
3. Carefully plan where you intend to install your **Hydro Smart 170 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 (please refer to p. 5).
4. Check the rating plate for the correct **GAS TYPE, GAS PRESSURE, WATER PRESSURE and ELECTRIC RATING**.  
\*If this unit does not match your requirements, **do not install and consult with Hydro Smart**.
5. If any problem should occur, turn off all hot water taps and turn off the gas. Then call a trained technician or the Gas Company or the manufacturer.



RATING  
PLATE

## WARNING



**Prohibited**

- Do not store or use gasoline or other flammables, vapors, or liquids in the vicinity of this appliance.
- Do not reverse the water and/or gas connections as this will damage the gas valves and can cause severe injury or death.
- Do not use this appliance if any part has been in contact with or been immersed in water. Immediately call a licensed plumber, a licensed gas fitter, or a professional service technician to inspect and/or service the unit if necessary.
- Do not disconnect the electrical supply if the ambient temperature will drop below freezing. The Freeze Prevention System only works if the unit has electrical power. The warranty will not be covered if the heat exchanger is damaged due to freezing. Refer to the section on the Freeze Prevention System on p. 22 for more information.



# INSTALLATION

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 at the beginning of this manual.



**CAUTION**

- [The warranty will not cover damage caused by water quality. Water hardness that leads to scale formation and/or corrosion may affect/damage the micro boiler. Hard water scaling and/or corrosion must be avoided or controlled by proper water treatment.](#)

- **HYDRO SMART recommends using the direct vent kit, when the micro boiler is installed in a beauty salon.** Some chemicals used in a beauty salon may affect the flame sensor. Micro boiler may not work properly.

- Although the **HYDRO SMART 170** is designed to operate with minimal sound, **HYDRO SMART 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 **micro 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. Hydro Smart 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**

- **HYDRO SMART does not recommend installing unit in an attic due to safety issues.**

## GENERAL

1. The manifold gas pressure is preset at the factory. It is computer controlled and should not need adjustment.
2. Maintain proper space for servicing. Install the unit so that it can be connected or removed easily. Refer to p. 7 and p. 8 for proper clearances.
3. The electrical connection requires a means of disconnection, to terminate power to the micro boiler for servicing and safety purposes.
4. If you will be installing the unit in a contaminated area with a high level of dust, sand, flour, aerosols or other contaminants/chemicals, they can become airborne and enter and build up within the fan and burner causing damage to the unit. In those environments (e.g. residential or commercial laundry facilities, hair salons, pet salons, chemical plants etc.), please purchase the optional TK-TV10 direct vent conversion kit and convert the **HYDRO SMART 170** to a sealed combustion unit. Direct venting allows the **HYDRO SMART 170** to draw fresh intake air from the outside. The warranty will not cover damage caused to the unit due to installation in a contaminated environment that has not been converted using the TK-TV10.
5. Particles from flour, aerosols, and other contaminants may clog the air vent or reduce the functions of the rotating fan and cause improper burning of the gas. Regularly ensure that the area around the unit is dust- or debris-free; regular maintenance is recommended for these types of environment.
6. 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. 13).

## INCLUDED ACCESSORIES

Check that the installation manual and the warranty card are included with the unit.

Items	
Manual	 Qty: 1
Warranty Card	 Qty: 1

## WARNING FOR INSTALLATION LOCATIONS

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



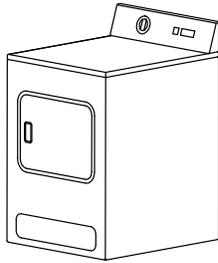
**Prohibited**

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



**Prohibited**

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.



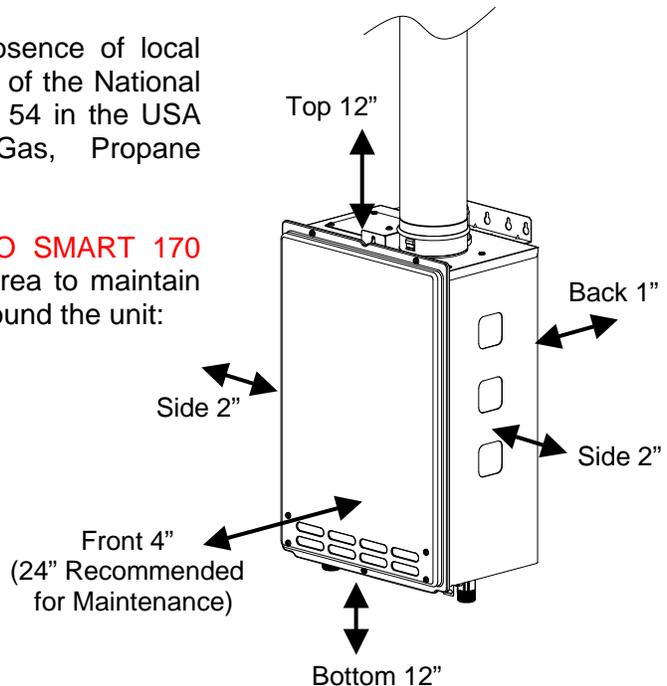
[Hydro Smart Installation Panel Location Setting?](#)

## INDOOR INSTALLATION

1. Follow all local codes, or in the absence of local codes, follow the most recent edition of the National Fuel Gas Code: ANSI Z223.1/NFPA 54 in the USA or CAN/CSA B149.1 Natural Gas, Propane Installation Code in Canada.
2. When installed indoors, the **HYDRO SMART 170 micro boiler** shall be located in an area to maintain the following minimum clearances around the unit:



Keep the clearances.



### Combustion Air Supply

The **micro boiler** location must provide enough air for proper combustion and ventilation of the surrounding area. See the latest edition of ANSI Standard Z223.1 or any applicable local codes. In general, these requirements specify that if the unit is installed in a confined space, there must be a permanent air supply opening.

#### Minimum recommended air supply opening size for micro boiler:

Micro boiler size	When drawing make-up air from outside the building	When drawing make-up air from inside the building (from other rooms within)
MAX 199,000 BTU	<b>13.3 Sq. IN</b>	<b>199 Sq. IN</b>
	When combustion air is supplied from outside the building, an opening communicating directly with the outside should have a minimum free area of one square inch per 15,000 BTUH input of the total input rating of micro boiler in the enclosed area.	When combustion air is supplied from inside the building, an opening communicating with the rest of the dwelling should have a minimum free area of one square inch per 1,000 BTUH input of the total input rating of micro boiler in the enclosed area. This opening should never be less than 199 sq. in.

### Combustible Air Supplied by Mechanical fan or Make up air device

The **HYDRO SMART 170 micro boiler** is equipped with a combustible air sensor that will shut off the unit when inadequate combustible air supply to unit is detected.

- If a mechanical fan or make up air device is used to supply air to the **micro boiler** or utility room, the installer should make sure it does not create drafts which could cause nuisance shutdowns.
- If a blower is necessary to provide adequate combustion air to the **micro boiler**, the blower and micro boiler must be set up so that the micro boiler cannot fire unless the blower is operating. Possible methods include the use of external flow sensors/transmitters and relays.

# DIRECT INTAKE VENT SYSTEM

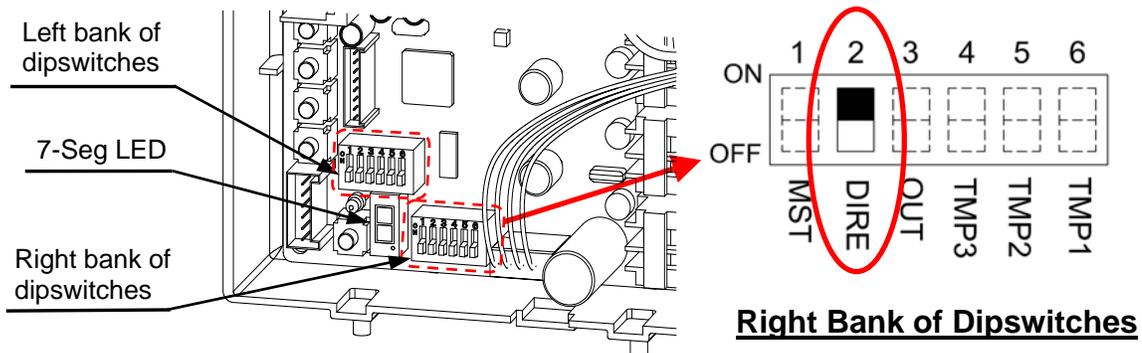
This **HYDRO SMART 170 micro boiler** may be converted to a direct vent (sealed combustion) appliance by installing an adapter (Part No. TK-TV10) which will bring all required combustible air from outside the building. When installing the TK-TV10 conversion kit, please follow all instructions included with the kit.

- The **HYDRO SMART 170** must be installed in a location where the proper amount of combustible air will be available to it at all times without obstructions.
- If used as a direct vent appliance, the **HYDRO SMART 170** requires a 3" combustible air supply pipe. The intake pipe must be sealed airtight.
- Air supply pipe can be made of ABS, PVC, galvanized steel, corrugated aluminum, corrugated stainless steel or Category III stainless steel.
- Change the dipswitch settings to the direct vent system. (See diagram below)
- Sidewall venting is recommended for the direct vent system.
- **Hydro Smart** recommends running the exhaust vent and the intake pipe parallel.



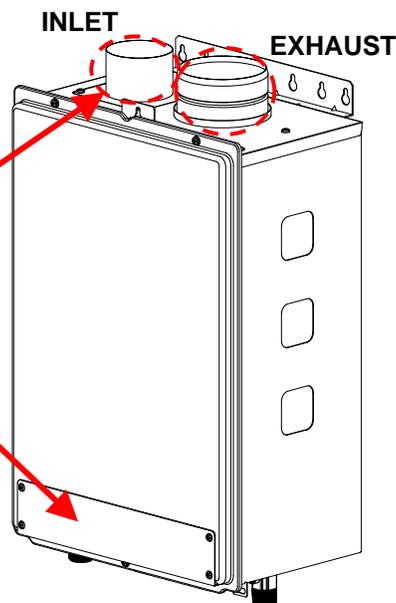
**Make sure power to the unit is turned OFF before changing the dipswitch settings.**

The dark square is the direction the dipswitch should be set to.



**TK-TV10 Direct Vent Conversion Kit**

**TK-TV10 DIRECT VENT CONVERSION KIT**



# VENTING INSTRUCTIONS



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

This **micro boiler** must be vented in accordance with the section "Venting of Equipment" of the latest edition of the Natural Fuel Gas Code: The ANSI Z223.1, All applicable local building codes, Section 7 of the CAN/CSA B149.1 Natural Gas in Canada, Propane Installation Code in Canada.

## EXHAUST VENT

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

1. This **Hydro Smart micro boiler** is a Category III appliance and must be vented accordingly with any 4" vent approved for use with Category III or Special BH type gas vent.
2. **HYDRO SMART recommends the UL lister venting manufacturer as listed: Takagi Industrial Co.USA, Inc. (T-Vent), ProTech Systems Inc. (FasNSeal), Flex-L Inc., Z-Flex Inc. (Z-Vent III), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).**
3. **Follow the vent pipe manufacturer's instructions when installing the vent pipe.**
4. **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).
5. The maximum length of exhaust vent piping must not exceed 50 ft. deducting 5 ft. for each elbow used in the venting system. Do not use more than 5 elbows.

Diameter	Max. No. of Elbow	Max. Vertical or Horizontal run in Length
4"	5 Ea.	50 ft.

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

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

6. When the horizontal vent run exceeds 5 ft., support the vent run at 3 ft. intervals with overhead hangars.
7. **Hydro Smart** will not be responsible for any damage to the **micro boiler** caused by condensation from the vent. Installing a condensate drip is recommended. Please refer to [p. 12 for the diagrams](#).



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.

## VENT TERMINATION



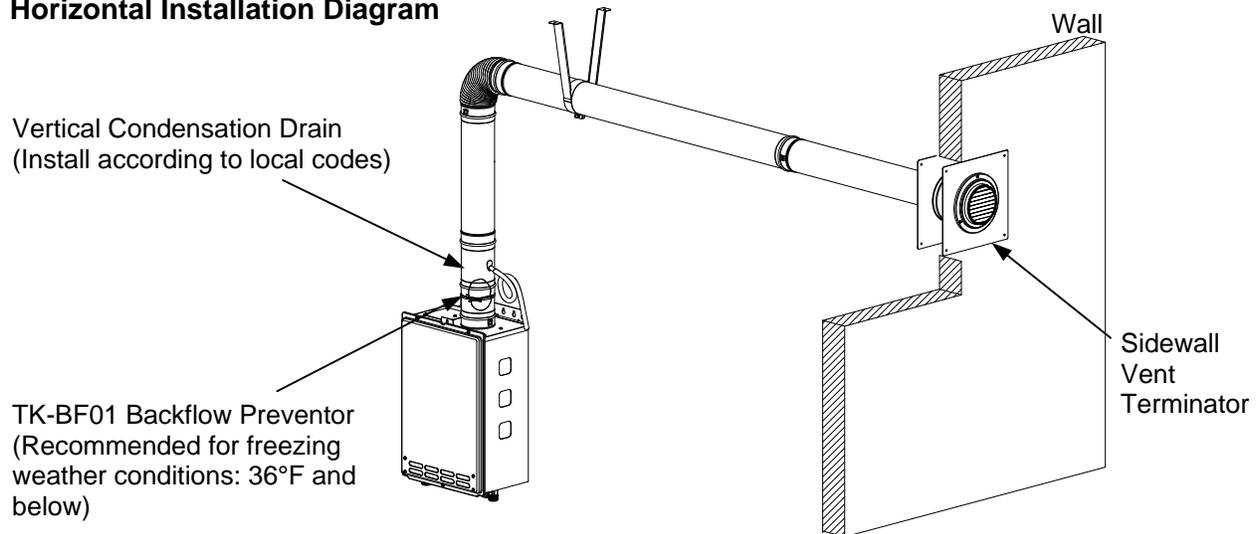
**WARNING:** Improper installation can cause nausea or asphyxiation, severe injury or death from carbon monoxide and flue gases poisoning. Improper installation will void product warranty.

- The vent terminator provides a means of installing vent pipe through the building wall and must be located in accordance with ANSI Z223.1/NFPA 54, or in Canada with CAN/CSA-B149.1 and local applicable codes.
- A proper sidewall vent terminator is recommended when the micro boiler is vented through a sidewall. If the **HYDRO SMART 170** is converted to a direct-vent unit, a proper sidewall direct-vent terminator is to be used.

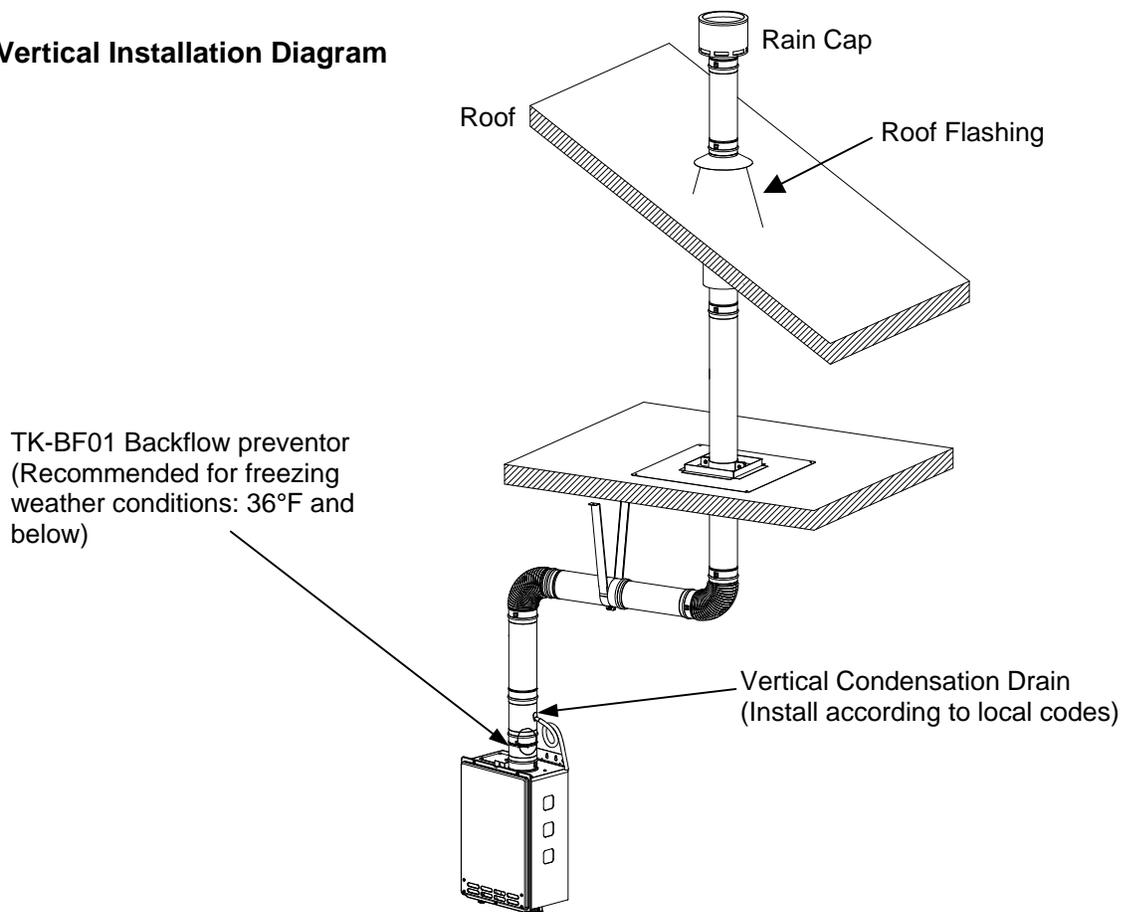
### General rules for venting the **HYDRO SMART 170 micro boiler** are:

1. Place the **micro boiler** as close as possible to the vent terminator.
2. The vent collar of the micro boiler must be fastened directly to an unobstructed vent pipe.
3. Do not weld the vent pipe to the micro boiler collar.
4. Do not cut the vent collar of the unit.
5. The weight of the vent stack must not rest on the micro boiler.
6. The vent must be easily removable from the top of the micro boiler for normal service and inspection of the unit.
7. The **micro boiler** vent must not be connected to any other gas appliance or vent stack.
8. Avoid locating the **micro boiler** vent terminator 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.
9. Avoid using an oversized vent pipe or using extremely long runs of the pipe.
10. Locate the vent terminator so that it cannot be blocked by any debris, at any time. Most codes require that the terminator be at least 12 inches above grade, but the installer may determine if it should be higher depending on the job site condition and applicable codes.
11. For rooftop venting, a rain cap must be installed.
12. **HYDRO SMART recommends the UL lister venting manufacturer as listed: Takagi Industrial Co.USA, Inc. (T-Vent), ProTech Systems Inc. (FasNSeal), Flex-L Inc., Z-Flex Inc. (Z-Vent III), Metal-Fab Inc., and Heat-Fab Inc. (Saf-T Vent).**

### Horizontal Installation Diagram



### Vertical Installation Diagram



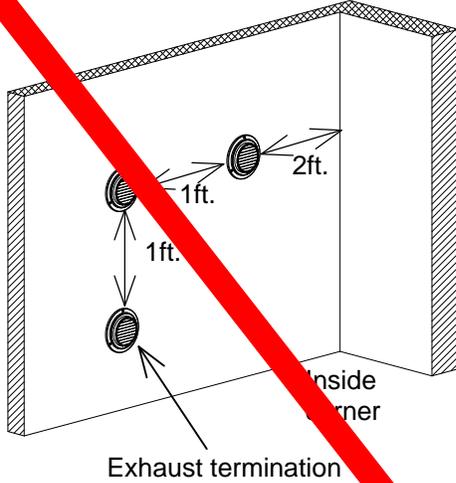
- Regarding the clearance from the terminator to the air inlet or opening, refer to the next page.
- Install a condensation drain in the venting.
- Follow the vent system to vent manufacturer's instruction and local code.
- Do not common vent or connect any vent from other appliances to the **HYDRO SMART 170** vent.
- Use 4" category III approved or Special BH, single or double wall stainless steel vent pipe.



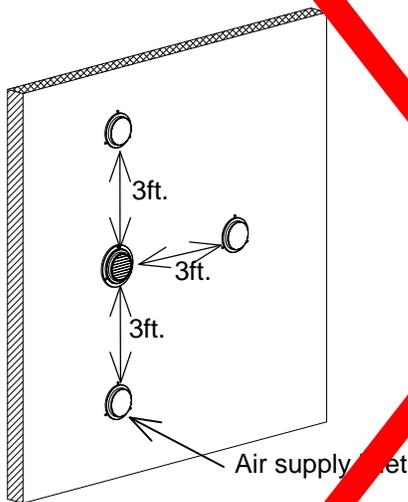
# ADDITIONAL CLEARANCES

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

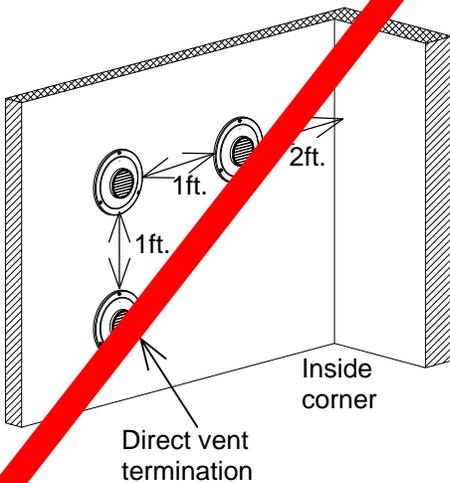
## For sidewall terminations



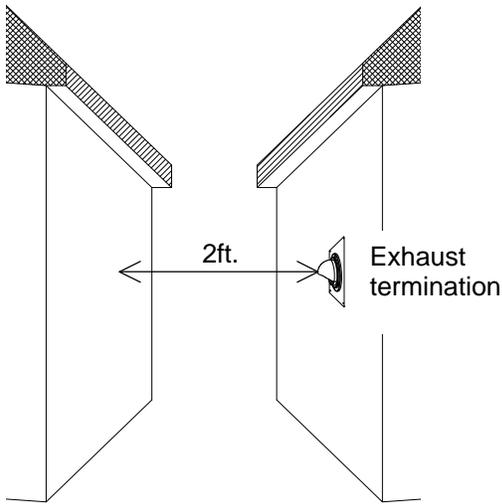
For multiple sidewall exhaust terminations (e.g. multi-unit systems), an exhaust termination must be at least 1 ft. away from another exhaust termination. An exhaust termination must also be at least 2 ft. away from an inside corner (if the adjacent wall is less than 2 ft. in length, the minimum required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



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

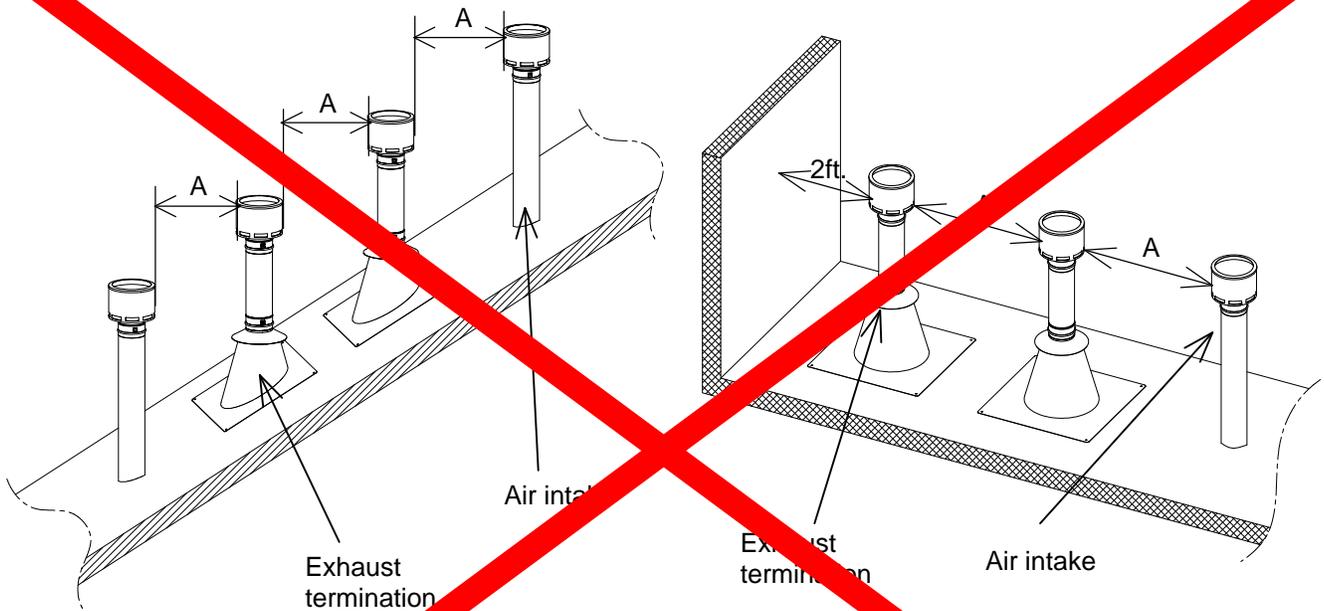


For multiple-unit, direct vent sidewall terminations that combine the intake and exhaust into a single penetration, space each direct-vent termination at least 1 ft. away from each other, no matter the orientation. A direct-vent termination must also be at least 2 ft. away from an inside corner (if the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



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

**For rooftop terminations**



A: in accordance with local codes

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

# GAS SUPPLY AND GAS PIPE SIZING

## TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the **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.



**WARNING:** Conversion of this unit from natural gas to propane or vice versa cannot be done in the field. Contact your local distributor to get the correct unit for your gas type. Conversion done by anyone other than the manufacturer will void all warranty. **Hydro Smart is not liable for any property and/or personal damage resulting from unauthorized conversions.**

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

1. The minimum and maximum inlet gas pressures are:

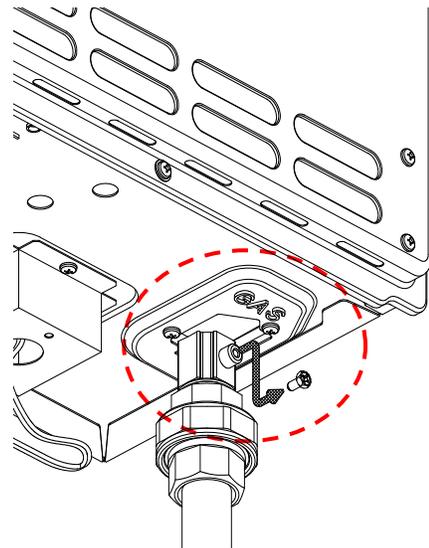
Natural Gas	Min. 5.0" WC - Max. 10.5" WC
Propane Gas	Min. 8.0" WC - Max. 14.0" WC

2. Gas pressure below this specified range for the **HYDRO SMART 170** and/or insufficient gas volume will adversely affect performance. These pressures are measured when the **HYDRO SMART 170** is in full operation.
3. Inlet gas pressure must not exceed the above maximum values; gas pressure above the specified range will cause dangerous operating conditions and damage to the unit. Ensure that any and all gas regulators used are operating properly and are providing gas pressures within the specified range shown above.
4. Until testing of the main gas line supply pressure is completed, ensure the gas line to the **HYDRO SMART 170** is disconnected to avoid any damage to the micro boiler.

## MEASURING INLET GAS PRESSURE

The **HYDRO SMART 170** cannot perform properly without sufficient inlet gas pressure. Below are instructions on how to check the inlet gas pressure. **THIS IS ONLY TO BE DONE BY A LICENSED PROFESSIONAL.**

1. Shut off the manual gas valve on the supply gas line.
2. [Open a faucet. The unit should turn on and the gas in the gas pipe line should purge. Leave the faucet on to keep the unit running until the unit shut down due to lack of gas supply. Then shut the faucet off.](#)
3. Remove the screw for the pressure port located on the gas inlet of the **HYDRO SMART 170** shown in the diagram to the right.
4. Connect the manometer to the pressure port.
5. Re-open the manual gas valve. Check to see that there are no gas leaks.
6. [Open some of the fixtures that use the highest flow rate to turn on the HYDRO SMART 170.](#)
7. Check the inlet gas pressure. When **HYDRO SMART 170** is on a maximum burn, the manometer should read from 5.0" to 10.5" WC for Natural gas, from 8.0" to 14.0" WC for Liquid Propane.





Size the gas pipe appropriately to supply the necessary volume of gas required for the **HYDRO SMART 170** (199,000 BTUH for both Natural Gas and Liquid Propane) using ANSI233.1/NAPA 54 in the USA or CAN/CSA B149.1 in Canada or local codes. Otherwise, flow capabilities and output temperatures will be limited.

1. Install a manual gas shut-off valve between the **HYDRO SMART 170** and the gas supply line.
2. When the gas connections are completed, it is necessary to perform a gas leak test either by applying soapy water to all gas fittings and observing for bubbles or by using a gas leak detection device.
3. Always purge the gas line of any debris and/or water before connecting to the gas inlet.

## Natural Gas Supply Piping

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

Based on Energy Content of 1000 BTU/Cubic Ft.: **HYDRO SMART 170** requires 199 Cubic Ft./hr.

Unit: Cubic Feet per Hour

Pipe Size inches	Length in Feet												
	10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	125'	150'	200'
3/4"	363	249	200	171	152	138	127	118	111	104	93	84	72
1"	684	470	377	323	286	259	239	222	208	197	174	158	135
1 1/4"	1404	965	775	663	588	532	490	456	428	404	358	324	278
1 1/2"	2103	1445	1161	993	880	798	734	683	641	605	536	486	416
2"	4050	2784	2235	1913	1696	1536	1413	1315	1234	1165	1033	936	801

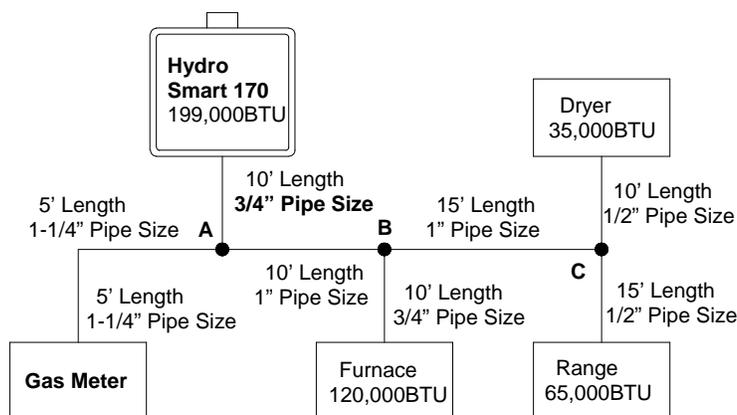
## Propane (LP) Gas Supply Piping

Maximum Capacity of Propane (LP) Gas Based on 11" WC supply pressure at a 1.0" WC pressure drop

Unit: kBtu per Hour

Pipe Size inches	Length in Feet												
	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"	1071	732	590	504	448	409	378	346	322	307	275	252	213
1 1/4"	2205	1496	1212	1039	913	834	771	724	677	630	567	511	440
1 1/2"	3307	2299	1858	1559	1417	1275	1181	1086	1023	976	866	787	675
2"	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1496	1260

### Gas Sizing Example (Natural Gas)



Based on Energy Content of 1000BTU/Cubic Ft:

Divide each appliance's BTU requirement by 1000BTU to get the appliances Cubic Ft. requirement.

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

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

For Example: The section from A to B supplies gas to the furnace, range, and dryer. Adding up the BTU requirements and dividing by 1000 yields a cubic ft. requirement of 220 cubic ft. of gas. The farthest appliance is the range, which is 50 ft. away from the meter. Looking at the above chart, and under the column of 50ft., Section A to B needs to be 1" in order to supply 220 cubic ft.

## WATER CONNECTIONS

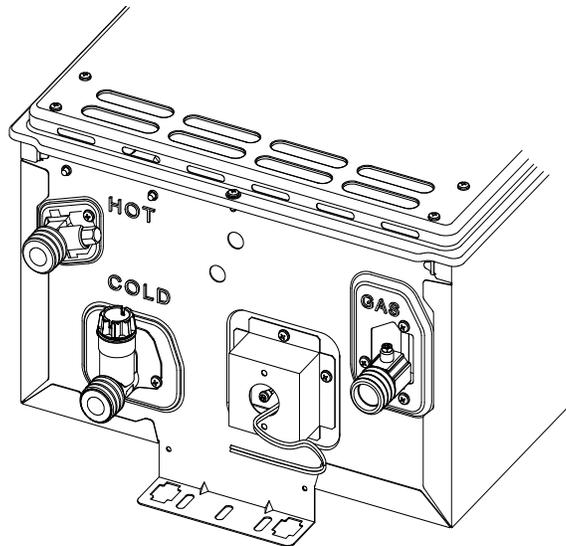
### FOR YOUR SAFETY, READ BEFORE OPERATING:

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

1. All pipes, pipe fittings, valves and other components, including soldering materials, must be suitable for potable water systems.
2. A manual shut off valve must be installed on the cold water inlet to the micro boiler between the main water supply line and the HYDRO SMART 170.
3. In addition, a manual shut off valve is also recommended on the hot water outlet of the unit. If the HYDRO SMART 170 is installed within, or subjected to, a closed loop water system, a thermal expansion tank must be installed.
4. 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 micro boiler.
5. ~~There is a wire mesh filter within the cold inlet to trap debris from entering your micro boiler. This will need to be cleaned periodically to maintain optimum flow.~~



**CAUTION:** Do not reverse the hot outlet and cold inlet connections to the **HYDRO SMART 170 Micro boiler**. This will not properly activate the micro boiler.

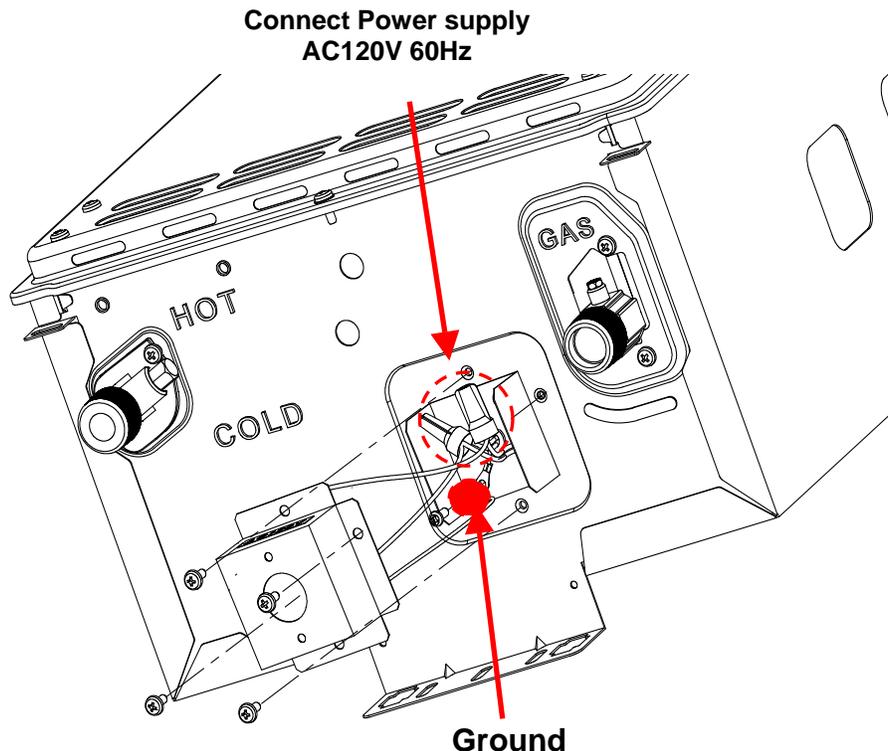


## ELECTRICAL CONNECTIONS

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

**CAUTION:** When servicing or replacing parts within the **HYDRO SMART 170** label all wires prior to disconnection to facilitate an easy and error-free reconnection. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

1. The **micro boiler** must be electrically grounded. Do not attach the ground wire to either the gas or the water piping.
2. The **HYDRO SMART 170 micro boiler** requires **AC 120V 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 **HYDRO SMART 170** must be provided for service reasons. (Must comply with local codes).
  - Connect the power supply to the **HYDRO SMART 170** exactly as shown in the wiring diagram;
3. A green screw is provided in the junction box to ground the connection.
4. Can be hardwired or wired to a plug-in.
5. The use of a surge protector is recommended in order to protect the unit from power surges.



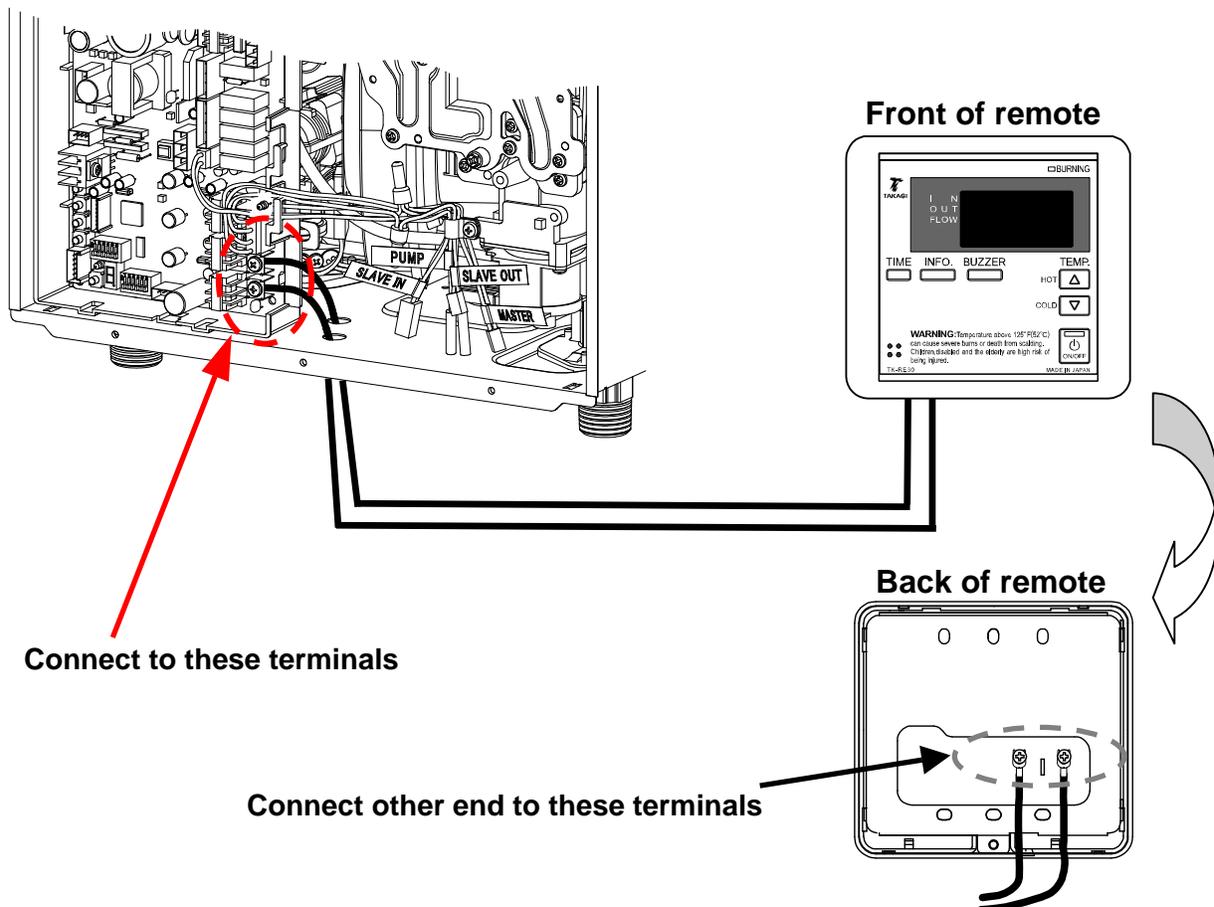
# REMOTE CONTROLLER CONNECTION

- 1) Disconnect power supply from the **HYDRO SMART 170**.
- 2) Take off the **HYDRO SMART 170's** front cover.
- 3) Please find the remote control terminal using the picture below (located around the lower right-hand side of the computer board).
- 4) Open the plastic cover of the TM-RE30, and then attach the fork terminal to the connector base of the backside the TM-RE30 with two screws. Make sure the terminals are firmly fixed.
- 5) Put the remote wires through the hole on the bottom of the unit casing.
- 6) Connect the remote wires to the remote controller terminal properly. (No polarity)
- \*Do NOT jump or short-circuit wires. Computer will be damaged.**
- 7) Replace Front Cover securely.
- 8) Wires used for the remote controller connection must be:

- Minimum 18AWG wire (No polarity)
- Maximum 400 feet long

\*For details on the connection to the TM-RE30, refer to the TM-RE30's Installation Manual.

## Remote controller terminal inside **Hydro Smart 170**

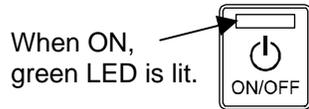
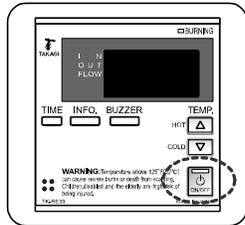


# NORMAL OPERATION

## WITH REMOTE CONTROLLER INSTALLED: TM-RE30 (Optional)

\*If the TM-RE10 is used, refer to the TM-RE10 Installation Manual included with the remote.

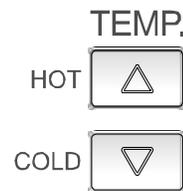
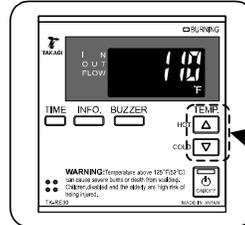
### 1. Press the power ON/OFF button.



When ON, green LED is lit.

The temperature and the time will be displayed on the remote controller.

### 2. Set temperature. (Example 110°F)



### Temperatures available under the Default Mode

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

### We'd like to remove High Temperature Mode (by Ichikawa)

## FREEZE PROTECTION SYSTEM

- This unit comes equipped with heating blocks to protect it against damages associated with freezing.
- For this freeze protection system to operate there has to be electrical power to the unit. Damage to the heat exchanger caused by freezing temperatures due to power loss is not covered under the warranty. In cases where power losses can occur, consider the use of a backup power supply.
- The freeze protection system will activate when the surrounding and/or outside temperatures drop below 36.5°F (2.5°C).
- [In any areas subject to freezing temperatures, Hydro Smart highly recommends installing the unit indoors. In such an installation, freezing issues can only occur if cold air enters through the venting into the heat exchanger, whether by negative pressures within the installation location or by strong outside winds. It is the installer's responsibility to be aware of these issues and take all preventative measures. Hydro Smart will not be responsible for any damage to the heat exchanger as a result of freezing.](#)
- **Hydro Smart** also highly recommends the use of a back flow vent damper and/or converting the **HYDRO SMART 170** to a direct-vent unit to minimize the amount of cold air entering through the exhaust venting when the micro boiler is off.
- If you will not be using your **micro boiler** for a long period of time:
  1. Completely drain the unit of water. [Refer to p. 24](#)
  2. Disconnect power to your **micro boiler**.

This will keep your unit from freezing and being damaged.

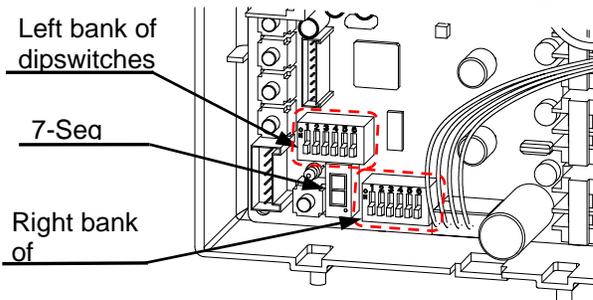
**CAUTION:** Only pipes within the micro boiler are protected by the freeze protection system. Any water pipes (hot or cold) located outside the unit will not be protected. Properly protect and insulate these pipes from freezing.

# TEMPERATURE SETTINGS

warranty.



- Turn off the power supply to the **micro boiler** before changing the dipswitch settings.
- Only change the switches with the dark squares. The dark squares indicate which direction the dipswitch should be set to.
- **DO NOT** set to 185 °F if you use your **HYDRO SMART 170** in a recirculation system. This will cause damage to the **micro boiler** and void the warranty.



To change dipswitch settings for temperatures, locate the right bank of dipswitches the above of 7-seg LED. **DO NOT** adjust the left bank of dipswitches.

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

## Temperature Settings <Right bank of dipswitches>

<p><b>104°F</b></p>	<p><b>113°F</b></p>	<p><b>122°F</b></p> <p>*Factory default setting</p>	<p><b>131°F</b></p>
<p><b>140°F</b></p>	<p><b>158°F</b></p>	<p><b>176°F</b></p>	<p><b>185°F</b></p>

## MAINTENANCE AND SERVICE



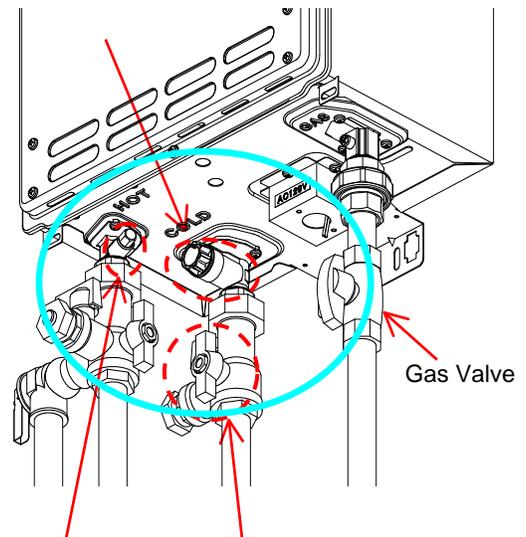
**WARNING:** Turn off the electrical power supply and close the manual gas control valve and the manual water control valve before servicing.

- [Clean the water filter attached on Hydro Smart Heating Panels.](#)
- Be sure that all openings for combustion and ventilation air are not blocked.
- Check that the exhaust vent pipe is not blocked.
- Check the gas pressure.
- Keep the area around the micro boiler clear. Remove any combustible materials, gasoline or any flammable vapors and liquids.

**HYDRO SMART** 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 FOR MAINTENANCE

1. Close the manual gas shut off valve.
2. Turn off power to the unit, and then turn on again.
3. Wait 30 seconds, and then turn off power to the unit, yet again.
4. Close the water shut off valve.
5. ~~Open all hot water taps in the house. When the residual water flow has ceased, close all hot water taps. (??)~~
6. Have a bucket or pan to catch the water from the unit's drain plugs. **Unscrew** the drain plugs to drain all the water out of the unit.
7. Wait a few minutes to ensure all water has completely drained from unit.

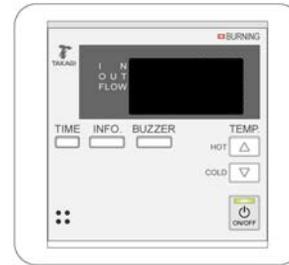
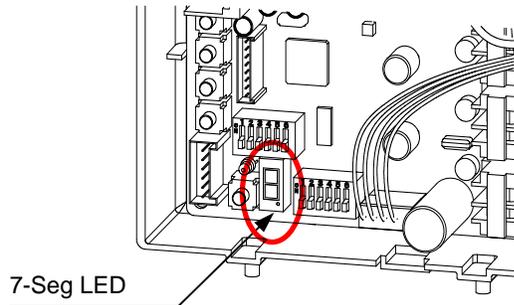


# GENERAL TROUBLESHOOTING

<b>~ MICRO BOILER ~</b>	
<b>PROBLEM</b>	<b>POSSIBLE SOLUTIONS</b>
Unit does not ignite when water goes through the unit.	<ul style="list-style-type: none"> <li>• Is the flow rate over 0.5 GPM? (p. 28)</li> <li>• <a href="#">Check for the Hydro Smart Y Strainer on cold water inlet.</a></li> <li>• Check for reverse connection and cross connection.</li> <li>• If you use the remote controller, is the power button turned on? (p. 28)</li> </ul>
The fan motor is still spinning after operation has stopped.	<ul style="list-style-type: none"> <li>• This is normal. After operation has stopped, the fan motor keeps running from 5 to 50 seconds in order to re-ignite quickly, as well as purge all the exhaust gas out of the flue.</li> </ul>
Abnormal sounds come from the unit.	<ul style="list-style-type: none"> <li>• Contact HYDRO SMART.</li> </ul>
<b>~ REMOTE CONTROLLER: TM-RE30 (OPTIONAL) ~</b>	
<b>PROBLEM</b>	<b>POSSIBLE SOLUTIONS</b>
Remote controller does not display anything when the power button is turned on.	<p>Press the ON/OFF button.</p> <p>If the lamp lights up ⇒</p> <ul style="list-style-type: none"> <li>• This is normal. When the unit has not operated for five minutes or more, the display turns off to conserve energy.</li> </ul> <p>If the lamp does not light ⇒</p> <ul style="list-style-type: none"> <li>• Make sure the unit has power supply.</li> <li>• Make sure the connection to the unit is correct.(p. 21)</li> </ul>
An ERROR code is displayed.	<ul style="list-style-type: none"> <li>• Please see <a href="#">p. 26</a>.</li> </ul>

# TROUBLESHOOTING – ERROR CODES

- All **Hydro Smart** units are self diagnostic for safety and convenience when trouble shooting.
- If there is a problem with the installation or the unit, it will display a numerical error code on the TM-RE30 (if installed) or on the 7-Seg LED at the bottom left corner of the computer board to communicate the source of the problem.
- Consult the following chart for the cause of each error code.



**TM-RE30 (Optional)**

Error Code	Malfunction description	Error Code	Malfunction description	Error Code	Malfunction description
031	Dipswitch setting fault	331	Mixing Thermistor Failure	701	Computer board Fault
101	Warning for 991 Error Code	391	Air-fuel Ratio Rod Failure	721	False Flame Detection
111	Ignition Failure	441	Flow Sensor Failure	741	Miscommunication between HYDRO SMART 170/HYDRO SMART 170-Pro and TM-RE30
121	Flame blows out	510	Abnormal Main and Solenoid Gas Valve	761	Miscommunication in Easy-link
311	Output Thermistor Failure	611	Fan Motor Fault	991	Abnormal burning
321	Inlet Thermistor Failure	651	Flow Adjustment Valve Fault		

## Single Unit

- The 7-Seg LED displays the 3-digit error codes one digit at a time. The TM-RE30 (if installed) displays the whole 3-digit error code at once.

### Example:

If your unit has the “321” error code (inlet thermistor),

- The 7-Seg LED, will flash the 3-digit error code one digit at a time. The 7-Seg LED will display “3”... “2”... “1”, and then repeat the 3 digits.
- The remote controller, however, will display “321” on its screen, in its entirety.



# 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 **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.
- B. **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 supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas valve knob. Never use tools. If the knob will not turn by hand, don't try to repair it. Call a qualified service technician. Forced or attempted repair may result in a fire or explosion.
  - D. Do not use this micro boiler if any part has been under water. Immediately call a qualified service technician to inspect the micro boiler and to replace any damaged parts.

## OPERATING INSTRUCTIONS

1. **STOP!** Read the safety information above or in the Owners Manual.
2. Turn off all electric power to the 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 counter clockwise ↻ 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 micro boiler" 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 severe burns.**

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

Keep flammable products:

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

Vapors:

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

**WARNING: Do not install **micro boiler** where flammable products will be stored.**

**Read and follow micro boiler warnings and instructions. If owner's manual is missing, contact the retailer or manufacturer.**

## WARNING

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

# OPTIONAL ITEMS

## 1. TM-RE30 Temperature Remote Controller



The TM-RE30 Temperature Remote Controller has two functions. It allows the output temperature from the **HYDRO SMART 170** to be adjusted within the range of 99 °F to 185 °F, and it also works as a diagnostic tool that will give a concise error code whenever there is a problem with the unit. The temperature options are 99°F, 100°F, 102°F, 104°F, 106°F, 108°F, 110°F, 111°F, 113°F, 115°F, 117°F, 122°F, 131°F, 140°F, 149°F, 158°F, 167°F, 176°F and 185°F. See the trouble shooting section for information on possible error codes.

## 2. TK-BF01 Backflow preventer



The TK-BF01 Backflow preventer 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 vent damper in accordance with **Hydro Smart's** installation instructions, and any applicable codes.

## 3. TK-TV10 Direct venting kit



This kit can be used convert the **HYDRO SMART 170** from a conventional vent system to a direct vent (or sealed combustion) system. **This is a CSA tested conversion kit.** Install this conversion kit in accordance with **Hydro Smart's** installation instructions and any applicable codes.

## 4. TK-KPWL4 and TK-KPWH4 T-Vent Wall thimble with Termination



**TK-KPWL4**  
**Louver**  
**Termination**



**TK-KPWH4**  
**Hood**  
**Termination**

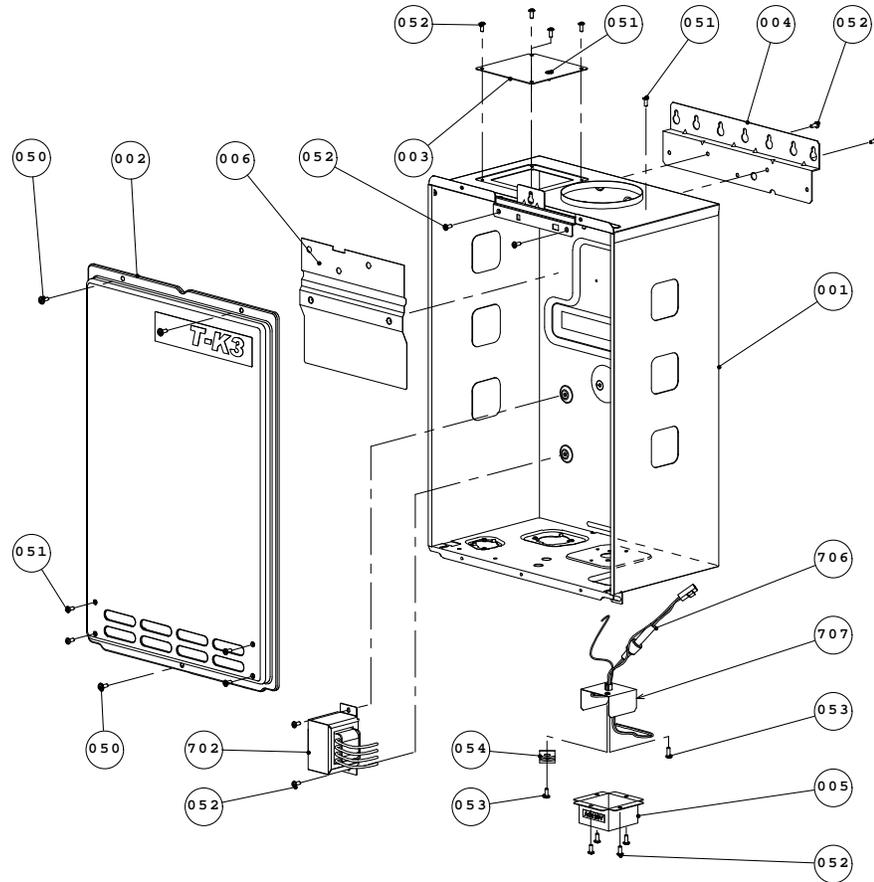
These terminations are used when venting out through the wall and are compatible with the T-Vent pipe system.

These terminations are special stainless steel vents for gas appliances and are UL listed as Category II, III and IV. There are two types of terminations: the Louver termination and the Hood termination. For different wall thicknesses, there are 3 ranges of lengths available (refer to the T-Vent brochure for details).

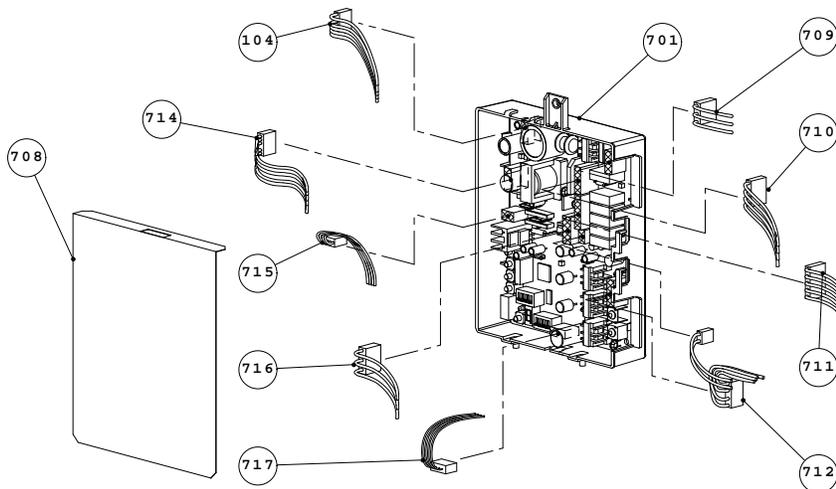
Install these vent terminations in accordance with **Hydro Smart's** installation instructions and any applicable local codes.

# COMPONENTS DIAGRAM

## Case assembly

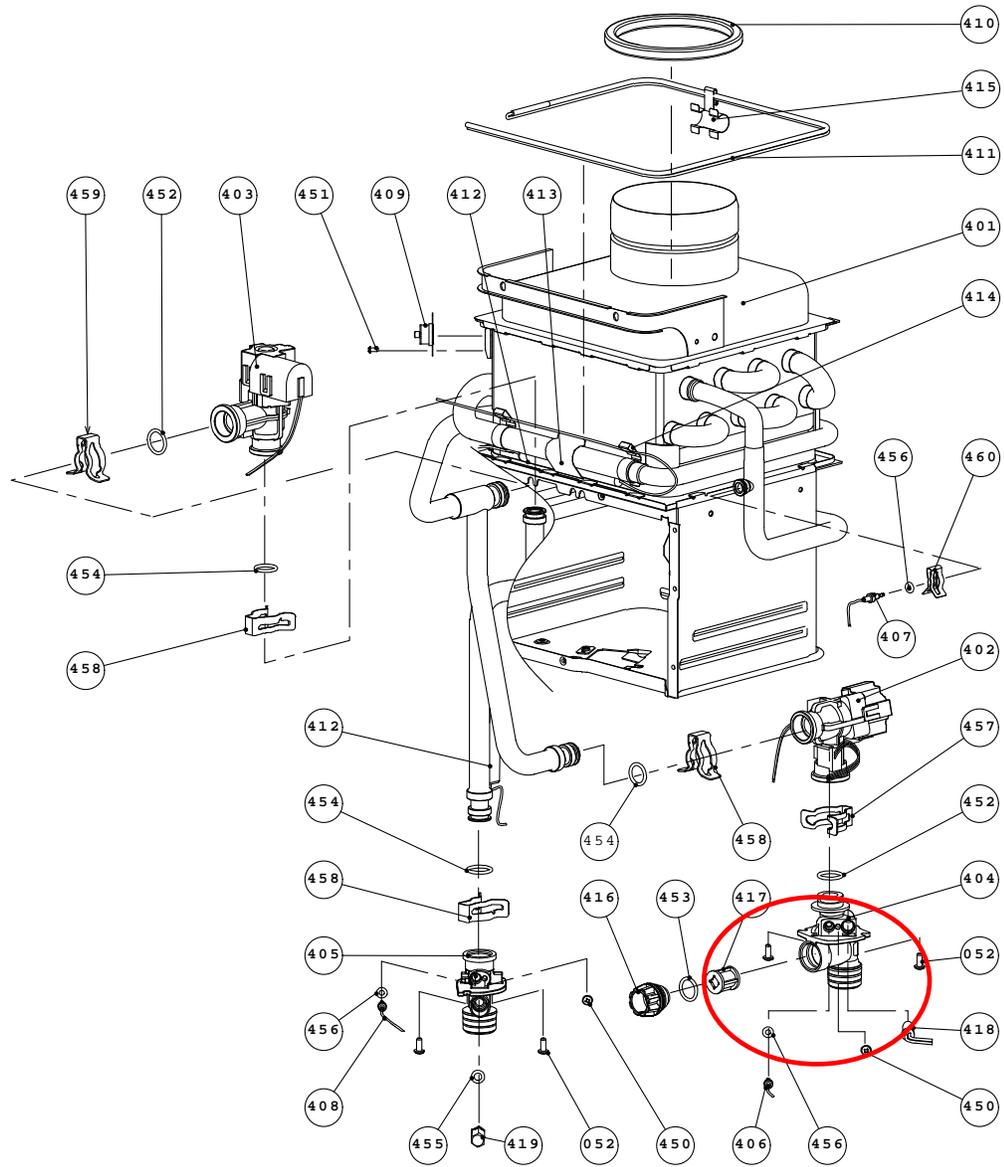


## Computer board assembly





# Water way assembly



# PARTS LIST

ther than the front cover (No.7) and heat exchanger assembly (No.420), all of the T-K3-Pro's components are the same as the T-K3.

Item#	Part#	Description	Item#	Part#	Description
1	EKK1D	Case assembly	122	EKK1B	Igniter plate
2	<b>EKK1J</b>	<b>Front cover</b>	123	EM167	Wire clamp 60
3	EKJ62	Air blockage plate	124	EKK2X	Burner gasket
4	EKJ09	Bracket	125	EKK2K	Manifold gasket B
5	EKJ64	Junction box	150	EW003	Screw M4x10
6	EKK5H	Back guard panel	151	EW002	Screw M4x10 (Coated)
<b>7</b>	<b>EK320</b>	<b>Front cover (REMOVE)</b>	152	EKK37	Screw M4x12
50	EW000	Screw M4x12	153	EW004	Hex head screw M4x12
51	EW001	Screw M4x10 (W/Washer)	154	EW005	Hex head screw M4x8
52	EW002	Screw M4x10 (Coated)	155	EW006	Pan screw M4x10
53	EW003	Screw M4x10	156	EW00B	Screw M3x8
54	EC00X	Nylon clamp	157	EW008	Screw M3x10
101	EKK1N	Burner assembly	158	EK042	O-ring P20 NBR
103	EKK1S	Manifold assembly with gas valve assembly LP	159	EZP18	O-ring P18 NBR
	EKK1T	Manifold assembly with gas valve assembly NA	401	EKK1X	Heat exchanger assembly
104	EKK25	Fan motor	402	EKK0T	Flow adjustment valve/ Flow sensor
106	EKK0E	Flame rod	403	EKK0U	Bypass valve
107	EKK0F	Igniter rod	404	EKK1U	Water inlet
108	EKK1E	Gas inlet	405	EKK1V	Water outlet
110	EKK1P	Damper	406	EKK38	Inlet thermistor
111	EK270	Fan damper	407	EKK2T	Output thermistor
112	EKN61	Rod cap	408	EKK1A	Mixing thermistor
113	EKK2Z	Gas inlet ring	409	EKN34	Hi-Limit switch
114	EKK2V	Burner window	410	EKN50	Silicon ring
115	EKK2W	Rod holder gasket	411	EK333	Over heat cut off fuse
116	EKK32	Rod holder	412	EKK2R	Micro boiler
117	EKK0G	Burner holder gasket	413	EKK27	Pipe micro boiler fixing plate
118	EKK2D	Pressure port	414	EKK26	Fuse fixing plate 18
119	EKK2N	Urethane tube	415	EK029	Fuse fixing plate 14
120	EKK2Y	Manifold gasket A	<b>416</b>	<b>EKK2B</b>	<b>Inlet drain plug</b>
121	EKK20	GFI plate	<b>417</b>	<b>EKK2C</b>	<b>Inlet water filter</b>

Item#	Part#	Description	Item#	Part#	Description
418	EKK2P	Inlet micro boiler	705	EKJ59	Freeze protection thermostat
419	EKK2E	Outlet drain plug	706	EKN37	Fuse assembly
420	EK322	Heat exchanger assembly for HYDRO SMART 170-Pro	707	EKJ66	Junction box inner plate
450	EW009	Screw M4x6	708	EKK1M	Computer board cover
451	EW00A	Screw M4x3	709	EKK0D	AC100V wire
452	EZM16	O-ring P16 EPDM	710	EKK0Z	EH-IG Wire
453	EZM15	O-ring P15 EPDM	711	EKK10	Gas valve wire
454	EZM14	O-ring P14 EPDM	712	EKK36	Pump and multi cable
455	EZM06	O-ring P6 EPDM	714	EKK35	RS-VG wire
456	EZM04	O-ring P4 EPDM	715	EKK33	Water valves wire
457	EM192	Fastener "16A"	716	EKK11	Flame rod wire
458	EKK24	Fastener "14-22"	717	EKK1Z	Thermistors wire
459	EKK39	Fastener "16-25A"	718	EKK0B	Transformer wire
460	EKH30	Fastener "4-11"	719	EKK12	Proportional gas valve wire
701	EKK1L	Computer board	720	EKK2M	High voltage igniter wire
702	EKH09	Transformer			
703	EKN73	Ground fault circuit interrupter			
704	EKN74	Igniter			

