Hydro Smart 170
Micro Boiler for Radiant Heating
Installation Manual and Owner’s Guide

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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**NOTE**

*Check the rating plate to ensure this product 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

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:
SAFETY GUIDELINES

- 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.

WARNING

- 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.

- **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.

- **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.

<table>
<thead>
<tr>
<th>Items</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>1</td>
</tr>
<tr>
<td>Warranty Card</td>
<td>1</td>
</tr>
</tbody>
</table>
## WARNING FOR INSTALLATION LOCATIONS

<table>
<thead>
<tr>
<th>Do not install the <strong>micro boiler</strong> where water, debris or flammable vapors may get into the flue terminal. This may cause damage to the micro boiler and void the warranty.</th>
<th>Do not have the vent terminal pointing toward any opening into a building. Do not locate your <strong>micro boiler</strong> in a pit or location where gas and water can accumulate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Prohibited]</td>
<td>[Prohibited]</td>
</tr>
<tr>
<td>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.</td>
<td>Hydro Smart Installation Panel Location Setting?</td>
</tr>
</tbody>
</table>
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:

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:**

<table>
<thead>
<tr>
<th>Micro boiler size</th>
<th>When drawing make-up air from outside the building</th>
<th>When drawing make-up air from inside the building (from other rooms within)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX 199,000 BTU</td>
<td>13.3 Sq. IN</td>
<td>199 Sq. IN</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Max. No. of Elbow</th>
<th>Max. Vertical or Horizontal run in Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>5 Ea.</td>
<td>50 ft.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No. of Elbows</th>
<th>Max. Vertical or Horizontal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>50 ft.</td>
</tr>
<tr>
<td>1</td>
<td>45 ft.</td>
</tr>
<tr>
<td>2</td>
<td>40 ft.</td>
</tr>
<tr>
<td>5</td>
<td>25 ft.</td>
</tr>
</tbody>
</table>

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).
• 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.
VENT CLEARANCES

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>U.S.A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct vent and other than Direct Vent</td>
<td>Direct vent</td>
</tr>
<tr>
<td>A</td>
<td>Clearance above grade, veranda, porch, deck, or balcony.</td>
<td>1 foot</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that may be opened.</td>
<td>3 feet</td>
</tr>
<tr>
<td>C</td>
<td>Clearance to permanently closed window</td>
<td>*</td>
</tr>
<tr>
<td>D</td>
<td>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.</td>
<td>*</td>
</tr>
<tr>
<td>E</td>
<td>Clearance to unventilated soffit</td>
<td>*</td>
</tr>
<tr>
<td>F</td>
<td>Clearance to outside corner</td>
<td>*</td>
</tr>
<tr>
<td>G</td>
<td>Clearance to inside corner</td>
<td>*</td>
</tr>
<tr>
<td>H</td>
<td>Clearance to each side of center line extended above meter/regulator assembly</td>
<td>3 feet</td>
</tr>
<tr>
<td>I</td>
<td>Clearance to service regulator vent outlet.</td>
<td>3 feet</td>
</tr>
<tr>
<td>J</td>
<td>Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other application.</td>
<td>3 feet</td>
</tr>
<tr>
<td>K</td>
<td>Clearance to mechanical air supply inlet.</td>
<td>6 feet</td>
</tr>
<tr>
<td>L</td>
<td>Clearance above paved sidewalk or paved driveway located on public property.</td>
<td>7 feet</td>
</tr>
<tr>
<td>M</td>
<td>Clearance under veranda, porch deck, or balcony.</td>
<td>1 foot</td>
</tr>
</tbody>
</table>

*For clearances not specified in ANSI Z223.1 / NFPA 54 or CAN/CSA-B149.1, please use clearances in accordance with local installation codes and the requirement of the gas supplier.
ADDITIONAL CLEARANCES

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

For sidewall terminations

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

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.

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 vise 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:

<table>
<thead>
<tr>
<th>Gas Type</th>
<th>Minimum Pressure</th>
<th>Maximum Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>5.0” WC</td>
<td>10.5” WC</td>
</tr>
<tr>
<td>Propane Gas</td>
<td>8.0” WC</td>
<td>14.0” WC</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>10'</td>
</tr>
<tr>
<td>¾&quot;</td>
<td>363</td>
</tr>
<tr>
<td>1&quot;</td>
<td>684</td>
</tr>
<tr>
<td>1 ¼&quot;</td>
<td>1404</td>
</tr>
<tr>
<td>1 ½&quot;</td>
<td>2103</td>
</tr>
<tr>
<td>2&quot;</td>
<td>4050</td>
</tr>
</tbody>
</table>

**Propane (LP) Gas Supply Piping**

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

Based on Energy Content of 1000BTU/Cubic Ft:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Length in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>inches</td>
<td>10'</td>
</tr>
<tr>
<td>¾&quot;</td>
<td>567</td>
</tr>
<tr>
<td>1&quot;</td>
<td>1071</td>
</tr>
<tr>
<td>1 ¼&quot;</td>
<td>2205</td>
</tr>
<tr>
<td>1 ½&quot;</td>
<td>3307</td>
</tr>
<tr>
<td>2&quot;</td>
<td>6221</td>
</tr>
</tbody>
</table>

**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 submerged 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.
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.

Connect Power supply
AC120V 60Hz

Ground
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.  

![Remote controller with ON/OFF button](image)

When ON, green LED is lit.

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

2. Set temperature. (Example 110°F)

![Remote controller with temperature setting](image)

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.

Temperatures available under the Default Mode

<p>| | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<td>102</td>
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<td>113</td>
<td>115</td>
<td>117</td>
<td>122</td>
<td>131</td>
</tr>
</tbody>
</table>

We’d like to remove High Temperature Mode (by Ichikawa)
**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

- 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>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Dipswitch Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>104°F</td>
<td>1 2 3 4 5 6 OFF</td>
</tr>
<tr>
<td>113°F</td>
<td>1 2 3 4 5 6 ON</td>
</tr>
<tr>
<td>122°F</td>
<td>1 2 3 4 5 6 ON</td>
</tr>
<tr>
<td>131°F</td>
<td>1 2 3 4 5 6 ON</td>
</tr>
<tr>
<td>140°F</td>
<td>1 2 3 4 5 6 OFF</td>
</tr>
<tr>
<td>158°F</td>
<td>1 2 3 4 5 6 OFF</td>
</tr>
<tr>
<td>176°F</td>
<td>1 2 3 4 5 6 OFF</td>
</tr>
<tr>
<td>185°F</td>
<td>1 2 3 4 5 6 OFF</td>
</tr>
</tbody>
</table>

*Factory default setting
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

### ~ MICRO BOILER ~

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
</table>
| Unit does not ignite when water goes through the unit. | • Is the flow rate over 0.5 GPM? (p. 28)  
  • Check for the Hydro Smart Y Strainer on cold water inlet.  
  • Check for reverse connection and cross connection.  
  • If you use the remote controller, is the power button turned on? (p. 28) |
| The fan motor is still spinning after operation has stopped. | • 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. |
| Abnormal sounds come from the unit. | • Contact HYDRO SMART. |

### ~ REMOTE CONTROLLER: TM-RE30 (OPTIONAL) ~

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
</table>
| Remote controller does not display anything when the power button is turned on. | Press the ON/OFF button.  
  If the lamp lights up ⇒  
  • This is normal. When the unit has not operated for five minutes or more, the display turns off to converse energy.  
  If the lamp does not light ⇒  
  • Make sure the unit has power supply.  
  • Make sure the connection to the unit is correct. (p. 21) |
| An ERROR code is displayed. | • Please see p. 26. |
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.

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

**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.
A wiring diagram is located on the inside front panel of the appliance.

**Electrical Rating:** 120 VAC, 60 Hz

**Note:** If any of the original wiring supplied with this appliance must be replaced, it must be replaced with appliance wiring material (180c) or its equivalent. Replacement wires are available through Hydro Smart.

- FM: Proportional Valve
- BL: Blue
- BK: Black
- LB: Light blue
- BR: Brown
- G: Green
- Y: Yellow
- P: Purple
- O: Orange
- W: White
- R: Red

**Legend:**
- **Transformer:**
- **Ground:**
- **GFI:**
- **Heater:**
- **Freeze protection thermostat:**
- **Elect rod:**
- **AFR rod:**
- **Ground Flame rod:**
- **Flow Adjustment Valve:**
- **Bypass Valve:**
- **Pump:**
- **MAX button:**
- **MIN button:**
- **Increase button:**
- **Decrease button:**
- **Burning lamp:**
- **Error call button:**
- **7 Seg LED:**
- **Multi-system On line lamp:**
- **Dip switch:**
- **Remote Controller:**
- **SLAVE IN:**
- **SLAVE OUT:**
- **MASTER:**
- **SV3:**
- **SV2:**
- **SV1:**
- **MV:**
- **O.H.C.F:**
- **Dip switch:**
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 of 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**
   - 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.
Water way assembly
### PARTS LIST

* * *

Other 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.

<table>
<thead>
<tr>
<th>Item#</th>
<th>Part#</th>
<th>Description</th>
<th>Item#</th>
<th>Part#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EKK1D</td>
<td>Case assembly</td>
<td>122</td>
<td>EKK1B</td>
<td>Igniter plate</td>
</tr>
<tr>
<td>2</td>
<td>EKK1J</td>
<td>Front cover</td>
<td>123</td>
<td>EM167</td>
<td>Wire clamp 60</td>
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<tr>
<td>3</td>
<td>EKJ62</td>
<td>Air blockage plate</td>
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<td>EKK2X</td>
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<tr>
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<td>EKJ09</td>
<td>Bracket</td>
<td>125</td>
<td>EKK2K</td>
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<tr>
<td>5</td>
<td>EKJ64</td>
<td>Junction box</td>
<td>150</td>
<td>EW003</td>
<td>Screw M4×10</td>
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<td>6</td>
<td>EKK5H</td>
<td>Back guard panel</td>
<td>151</td>
<td>EW002</td>
<td>Screw M4×10 (Coated)</td>
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<td>7</td>
<td>EK320</td>
<td>Front cover (REMOVE)</td>
<td>152</td>
<td>EKK37</td>
<td>Screw M4×12</td>
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<td>Hex head screw M4×12</td>
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<td>EW000</td>
<td>Screw M4×12</td>
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<td>EW005</td>
<td>Hex head screw M4×8</td>
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<td>EW001</td>
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<td>EW006</td>
<td>Pan screw M4×10</td>
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<td>EKK1S</td>
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<td>EZP18</td>
<td>O-ring P18 NBR</td>
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<td>EKK25</td>
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<td>402</td>
<td>EKK0T</td>
<td>Flow adjustment valve/ Flow sensor</td>
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<td>106</td>
<td>EKK0E</td>
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<td>403</td>
<td>EKK0U</td>
<td>Bypass valve</td>
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<td>EKK1U</td>
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<td>405</td>
<td>EKK1V</td>
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<td>406</td>
<td>EKK38</td>
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<td>112</td>
<td>EKN61</td>
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<td>EKK2Z</td>
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<td>EKN34</td>
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<td>EKK2V</td>
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<td>EK333</td>
<td>Over heat cut off fuse</td>
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<td>EKK32</td>
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<td>412</td>
<td>EKK2R</td>
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<td>117</td>
<td>EKK0G</td>
<td>Burner holder gasket</td>
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<td>EKK27</td>
<td>Pipe micro boiler fixing plate</td>
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<td>EKK2D</td>
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<td>EKK26</td>
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<td>418</td>
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<td>Inlet micro boiler</td>
<td>705</td>
<td>EKJ59</td>
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<td>EKK2E</td>
<td>Outlet drain plug</td>
<td>706</td>
<td>EKN37</td>
<td>Fuse assembly</td>
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<tr>
<td>420</td>
<td>EK322</td>
<td>Heat exchanger assembly for HYDRO SMART 170-Pro</td>
<td>707</td>
<td>EKJ66</td>
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<tr>
<td>450</td>
<td>EW009</td>
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<td>708</td>
<td>EKK1M</td>
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