Connecting and Operating Instructions for The Chofu Propane Heater

(Model GF-200L)

INSTALLING PORTS IN THE TUB

NOTE: If you have not mounted the through-wall ports provided with the Chofu Propane Heater onto your tub, carefully read the following section and all connecting instructions. If your tub has pre-installed ports designed to receive the Chofu Propane Heater, move on to the section "Positioning Heater Next To Tub".

When ordering a Chofu heater you should have specified the length of the through-wall ports needed for your tub. Before proceeding with the port installation, determine if you have received the appropriate through-wall ports required for your tub. Tubs with a wall thickness less than ½-inch can use the standard short shank through-wall ports provided with the Chofu heater (brass and chrome). Tubs with a wall thickness greater than ½-inch (wood tubs) must use long shank through-wall ports (plastic). If you do not have the correct ports, contact Island Hot Tub Company toll free at 1-888-878-5512.

Locating the Top Port On The Hot Tub

There are several important factors that must be considered when locating the Top Port:

- The top port must be located high enough on the tub, so that hot water from the heater will rise up into the tub (creating thermosiphon circulation). The top circulating pipe should rise at least 2 inches up to the tub from the heater, however, 3 to 5 inches is preferable. (For more about placement, see "Elevation Of Heater To Tub" below.)
- The top port must be at least 6-inches (on center) below the normal water line, so that it never becomes exposed. This is necessary to provide a margin of safety to guard against extreme water loss due to displacement or splashing. CAUTION: If the water level drops below the top port during heater operation, water will not be able to circulate through the heater, causing the heater to overheat. This can result in a dangerous situation and possible damage to the heater. The safety shut-off will turn off gas to the heater if it overheats, but only after it has reached a temperature that will damage the heater.
- You must also consider where you want to place the bottom port and the distance between the ports before finalizing top port placement.
- Port placement on the tub will determine the height of the heater in relation to the tub, therefore, you must consider the dimensions of your heater foundation materials before finalizing port placement.

Locating the Bottom Port On The Hot Tub

The Bottom Port should be at least 8-inches below the Top Port (center to center); however, 10-12 inches is preferable, 13 is maximum. The Bottom Port should be located so that the bottom circulating pipe slopes down from the heater to the tub at least 1-inch, however, 2 to 4-inches is preferable.

It is desirable to locate the bottom port close to the tub floor to pick-up cold unheated water – 3½ inches (on center above the tub floor). NOTE: Even though cold water at the tub bottom will be circulated through the heater, a cold-water layer will remain on the bottom. Thermosiphon circulation moves water so slowly that it does not thoroughly mix the temperature, therefore water in the tub must be stirred with a paddle to determine the overall temperature and before getting into the tub.

Cutting Holes In The Tub

Once the location of the circulating ports in the tub is determined, you can cut holes in the tub to receive the through-wall ports. Holes can be cut with either a hole-saw using a drill motor or with a jigsaw. Short-shank (metal) through-wall ports require a $1^{7}/_{8}$ - inch diameter hole. Plastic ports require a $2^{3}/_{8}$ -inch hole.

Installing Short-Shank Metal Ports (for tub walls ½-inch thick or less)

Place the metal port fixture through the tub wall with the thin plastic washer between the port flange and the black rubber washer. From outside the tub, thread on the rubber sleeve with the internal tightening nut.

Top Port (With Cover-Plate) – Remove the Cover Plate and tighten the Port by using the shaft of a screwdriver through the Cover Plate Support.

Bottom Port – Tighten this port by using a pair of channel-lock pliers, expanded so the jaws catch the metal knobs inside the port.

The complete connection sequence is described in "Connecting The Heater To The Tub" below.

Installing Plastic Ports (both long and short shank)

Make sure the rubber gasket is placed between the port flange and the inside tub wall. The complete connection sequence is described in "Connecting The Heater To The Tub" below.

POSITIONING HEATER NEXT TO TUB

The Heater Foundation

The heater must sit on a firm, level base, never directly on the ground. Common red or cement brick may be used. The foundation need only be slightly larger than the size of the heater – 12-inches by 10-inches.

Distance to the Tub

The length of the connecting pipes determines the distance from the heater to the tub, about 16-inches. Position the foundation in relation to the tub to account for this distance.

Elevation of the Heater to the Tub

The height of the heater base will determine the elevation between the heater and tub. The heater must be positioned so that the **Top Pipe rises up** to the tub and the **Bottom Pipe slopes down** to the tub.

The **Bottom Pipe** from the heater must slope downward from the heater to the tub to allow complete draining of the heater for cleaning and freeze protection. This slope must be at least 1-inch from the heater to the tub, but preferably 2 to 4-inches (the flexible rubber connection allows the pipe to be angled up or down). Since the heavier cold water is brought into the heater through this pipe, it's desirable to place the Bottom Port as low as possible on the tub so that the cold water at the bottom is circulated through the heater.

The **Top Pipe** from the heater must rise from the heater up to the tub to create **thermosiphon circulation.** The Top Port of the tub should be at least 2-inches higher than the top outlet pipe on the heater; however, a rise of 3 to 5-inches is preferable. The steeper the slope, the faster the water circulates through the heater; however, faster water circulation does not increase the heating rate.

CONNECTING THE HEATER TO THE TUB

These connecting accessories are provided with the Chofu Propane Heater depending on the tub wall thickness you specified when ordering the heater:

Standard (short-shank) through-wall ports for ½-inch or less tub wall thickness – two L-shaped rubber tubes, two stainless tubes, two metal through-wall tub ports with flexible neoprene sleeves, wire clamps for all connections.

Long-shank through-wall ports (for wood tubs) – two L-shaped rubber tubes, two stainless tubes, two (short) rubber flex connectors, two long-shank plastic through-wall ports, clamps for all connections.

Connection Options

Parallel heater installation – Connect the short end of the L-shaped tubes to the heater ports. Pivot the tubes as necessary to adjust the angle for proper slope to the tub ports.

Perpendicular heater installation – Cut off the 90-degree elbow of the L-tube thereby making a straight tube. OPTION: Since these tubes must be connected to the heater port at an angle, you can cut the tube in the middle of the 90-degree bend, so the tube will connect to the heater port at an angle.

Connection Sequence (starting from heater)

1. Connect the rubber L-tubes to heater ports. (cut-off bend for a straight connection, or use as-is for a 90° connection.)
2. Connect the stainless tubes to the rubber L-tubes. (Use PVC freeze-tubes instead if provided). If you received one stainless tube and one PVC tube with a drain, place the PVC tube on the bottom.
3. Connect stainless tubes to through wall ports:

   a. Short-Shank Metal Ports – Connect metal tubes (and or plastic tubes) to rubber flex-sleeves of through-wall ports, inserting pipe as far as possible into rubber sleeve.

   b. Plastic Ports – Connect metal tubes (and or plastic tubes) to short rubber flex connectors, flex connectors to short PVC stub on plastic ports (used water hose clamps instead of wire clamps).

HOOKING UP TO PROPANE

If you're uncertain about propane connection procedures, consult with a certified propane installer. Always check connections for leaks with soapy water. If you smell propane at any time, shut off the heater and check for leaks. If you need help, call Island Hot Tub Co. at 1-888-878-5512.

Portable Propane Tank

The Chofu Propane Heater requires a low-pressure regulator with at least 3 feet of hose to the tank. The fitting needed to connect to the heater is a female 3/8-inch flare.

Large Volume Permanent Propane Tank

Run a buried (18 in. deep) gas line to a secure post several feet from the front of the heater. If the gas has not been stepped down to low pressure, you must install a low-pressure regulator on the post. Place a shut-off valve between the regulator and the heater. Run a metal-sheathed flex line from the shut-off valve to the heater with a 3/8-inch female flare fitting at the heater.

OPERATING THE HEATER

The Chofu Propane Heater uses a spring wound timer to regulate the heating time. It allows a hot tub to be heated without monitoring the heating time. **IMPORTANT: It's necessary to turn the timer knob to ½-hour or more to start the heater. The main burner will not light unless the timer is turned on**. The timer will shut off gas to the heater once the prescribed time is completed. To determine where to set the timer, it will be necessary to monitor the heating time and temperature for the first several firings.

Using The Timer

1. NOTE: Before the heater can be ignited, the timer must first be turned on. When the timer is turned off, the pilot can be ignited, but it will not stay lit and the master burner will not ignite.
2. Once the timer has been turned on, you can proceed to turn on the heater with the master control knob (See Lighting The Heater below).
3. If you are unsure about the time required to heat your tub, you can either set the timer for a longer time than expected and manually monitor the temperature, or you can set it for less time than expected and reset the timer in one or two hour increments until the tub is ready. When first heating your tub, keep track of the exact heating time, so you can accurately set the timer in the future.
4. When setting the timer, it must be turned several clicks past the desired time, because the knob springs back from it's furthest clockwise position. If you set the timer for a longer time than desired, you can safely turn it back without damage to the timer mechanism.
5. With experience you will get to know quite accurately how long it takes to heat your tub. Some people like to set the timer slightly under the maximum desired temperature and then boost the temperature up manually just before getting in. If the tub gets to hot, you'll have to cool it down by adding cold water.
6. NOTE: A common mistake for first time users of thermosiphon hot tub heaters is to assume that the entire tub temperature is the same as the surface water, however, since hot water circulates slowly into the tub, it floats to the surface and does not mix with cold bottom water. This creates a hot surface layer of water (thermal cline). To determine the true temperature of the tub, you must first thoroughly mix the water with a paddle.
7. While you're using your hot tub you will find that the water gradually gets colder. To boost it back up, turn on the timer and manually control the heater with the master control switch. NOTE: the Chofu Propane Heater does not have a slow speed heating setting.
8. CAUTION: never leave the heater turned off with just the timer shut-off. When you have finished using the heater, make sure both the timer and master control switch are turned to the off position and gas is turned off to the heater.

   If you have any questions concerning operation of the Chofu Propane Heater, contact Island Hot Tub Co. at 1-888-878-5512.

Lighting The Heater

1. Make sure all propane valves are open to the heater.
2. Turn timer knob to desired time. Even if you want to manually control the heating time you must first turn the timer on to at least ½-hour to allow the heater to be ignited.
3. To light heater, start with the control knob turned all the way to the right (0).
4. To light pilot, turn control knob to the left to (1). You will hear a loud click. It's normal to have to repeat this procedure several times before the pilot will ignite. Pilot ignition is indicated by a roaring sound. After pilot is ignited, hold knob at (1) for ten seconds.
5. Turn knob back to 2 (pilot). If pilot is ignited, indicated by a much quieter burner sound, you are now ready to ignite the main burner. If pilot does not stay lit, repeat step 2. The control knob will not turn to (3) until the pilot is lit.
6. When pilot has been lit, turn control knob all the way to the left to (3) to ignite main burner.

NOTE: *The Chofu Propane Heater has one speed – full on – so turn knob all the way to the left. Turning the knob back to the right will not moderate the flame.* When tub water reaches the desired temperature, turn the knob back to the right to pilot (2) or to off (0).

USING THE HOT TUB

Thermosiphon heating circulates water slowly, thereby creating a "thermal cline" – hot water on top, colder water on bottom. To determine the true temperature of the tub, you will need to mix the colder bottom water with the surface water by stirring the water with a paddle.

CAUTION: *The timer on the front of the heater determines the length of the heating time, however, since there is no thermostatic temperature control on the Chofu heater, the water temperature in the tub will continue to rise until the heater is turned off either manually or by the timer.*

Warning! The Chofu propane heater model GF-200L does not have a chimney. The stainless cowling on top of the heater allows the hot exhaust gases to escape freely into the air. When the heater is in operation, this cowling will get extremely hot and can cause burns when touched. Keep children's hands away from this hot cowling.

This heater is designed for outdoor use only! Never use the heater inside of an enclosed space. Never operate the heater with an obstruction over the top of the exhaust cowling.

Safety Shut-Off

The white wire running from the back of the heater to the front connects a bi-metal switch on the back of the heater to a millivolt, safety shut-off switch. This is designed to turn off gas to the burner in the event of over-heating. This switch is activated only when the internal temperature of the heater reaches 336°F, which can only occur if the heater is operated without water in it. While this automatic safety feature will prevent a fire, it will not prevent damage to the heater.

Freeze Protection

The Chofu heater must be protected from freezing during cold weather. When the temperature is just a little below freezing, water from the tub will circulate into the heater and provide a small margin of protection; however, sustained sub-freezing temperatures will eventually freeze the heater, causing damage to the heat exchanging tubes and water jacket. If you do not have freeze protecting accessories, you must protect the heater by draining water out of both the heater and tub. If you want to leave water in the tub and drain the heater, you must be equipped with a freeze-protection bottom circulation pipe with a drain cap as well as freeze plugs for closing the tub ports. If you do not have a freeze-protecting bottom pipe and port plugs, you can obtain them from Island Hot Tub Company, 1-888-878-5512. See instructions for freeze protection on the next page.

Freeze-Protection Drain

If your Chofu Propane Heater is supplied with a freeze-protection drain, you will have received a 10-inch x 1½-inch PVC pipe with a plastic drain cap. This pipe must be used for the bottom circulating pipe between the heater and tub. It must be installed with the end closest to the drain cap toward the tub and the cap facing down. The 10-inch stainless steel tube must be used for the top circulating pipe.

Procedure For Draining Heater

1. Place plugs in both through-wall ports from inside the tub. This will require you to reach into the tub water to accomplish this task.

2. After the ports have been plugged, remove the plastic drain cap on the bottom circulating port to drain water out of the heater. **CAUTION:** The Chofu Propane Heater must never be ignited while the ports are plugged. Steam will build up inside the heater and may cause serious bodily injury, as well as damaging the heater.

Altering Brass Through-Wall Ports to Receive Drain Plugs (thin-wall ports only)

If your heater is supplied with brass and chrome through-wall ports, they must be altered to receive plugs. (You should have received two black rubber plugs with brass wing-nuts.) This will allow you to drain water out of the heater, while leaving water in the tub. Alteration of the ports must be done after they are installed in the tub because you will be removing the physical features of the ports that are used for tighten them.

1. Top Port – The one with the stainless steel cover plate. Using a hack saw or angle grinder with an abrasive wheel, cut off the brass loop that holds the cover plate. Grind the loop off flush to the port face.
2. Bottom Port – The tightening knobs inside the port must be either ground off or removed with a file. This material is brass, so it's actually do-able with a half-round file, but a grinder will be a whole lot faster. Grind the knobs off flush. You may want to finish the job with a file, since this is part of the surface that will seal the rubber plug.
3. The ports are now ready to receive the plugs. Test the plugs to make sure they fit and can be properly tightened.

Trouble Shooting

Main Burner Won't Ignite:

This is the most common problem with the Chofu Propane and Natural Gas Heaters. Example: The starter flame ignites with the normal roaring sound when the control handle is turned to (1), but the pilot flame won't stay lit when the handle is turned to (2).

Cause # 1 – The timer is not turned on. The main gas burner valve will not open unless the timer is turned on.

Solution: Turn on the timer to the 20-minute mark or more.

Cause #2 – Obstructed pilot orifice. If the pilot orifice is obstructed, the pilot flame will not be directed onto the thermal-couple sensor rod, which will prevent the main burner valve from opening. (The heat from the pilot flame causes the thermal-couple to generate a small "millivolt" amount of electricity, which in turn allows the main burner valve to open.) The obstruction is usually caused by an insect (typically a spider or earwig) that has made a home inside the pilot orifice

Solution: Cleaned the pilot orifice by following "pilot cleaning instructions" on page?

Smell Gas:

If this should occur, turn off the gas supply immediately.
Solution: Check for leaks at all gas line connections between the gas supply and heater. Leaks can be detected by smelling the connection or by checking for bubbles with soapy water on the connection. Tighten connections and apply joint compound or Teflon tape where appropriate. If gas smell persists, call professional help or Island Hot Tub Company for advice.

Heater Backfires When Ignited:

If this should occur, turn off the gas supply and discontinue using heater until the problem is solved. The problem may be caused by higher than specified gas pressure. If this were the case, then the main burner, would make a loud roaring sound. (It shouldn't be loud.)

Cause #1: A low-pressure regulator has not been installed between the gas supply and heater. The Chofu Propane Heaters require a low-pressure regulator (rated at 9.5 – 11 inches of water column) between the gas supply and heater. The Chofu Natural Gas Heater requires a low-pressure regulator (rated at 6.5 inches of water column). Gas pressure to the heater that is higher than specified will create a dangerous situation and damage the heater.

Solution: Install a low-pressure regulator. See gas installation instructions on page ?

Cause #2: The vent on the gas regulator is plugged by frost: A small vent opening on the bottom of the regulator allows the diaphragm to operate properly. If the regulator is exposed to damp, freezing conditions, the diaphragm may freeze, allowing unregulated high-pressure gas to enter the heater.

Solution: Warm up regulator (not with a flame) to thaw the frozen diaphragm inside regulator. Protect regulator from direct rain.