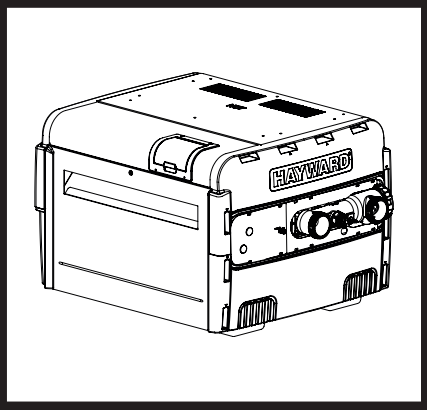
51300004201 RevE

HAYWARD®

In-Ground Pool/Spa Gas Heaters

Owner's Manual



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H150FD
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H500FD

W3H150FD
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W3H250FD
W3H400FD

H250FDASME
H400FDASME
H500FDASME

Hayward Industries
1415 Vantage Park Dr., Suite 400
Charlotte, NC 28203
Phone (908)-355-7995
www.hayward.com

IMPORTANT SAFETY INSTRUCTIONS

Basic safety precautions should always be followed, including the following: Failure to follow instructions can cause severe injury and/or death.

⚠ This is the safety-alert symbol. When you see this symbol on your equipment or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

⚠ **WARNING** – Warns about hazards that could cause serious personal injury, death or major property damage and if ignored presents a potential hazard.

⚠ **CAUTION** – Warns about hazards that will or can cause minor or moderate personal injury and/or property damage and if ignored presents a potential hazard. It can also make consumers aware of actions that are unpredictable and unsafe.

⚠ **ATTENTION** – Indicates special instructions that are important but not related to hazards.

⚠ **WARNING** – **Read and follow all instructions in this owner's manual and on the equipment. Failure to follow instructions can cause severe injury and/or death.**

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

- Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical 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.

⚠ **WARNING** – This product must be installed and serviced by authorized personnel, qualified in pool/spa heater installation. Improper installation and/or operation can create carbon monoxide gas and flue gases that can cause serious injury, property damage, or death.

USE OF NON-HAYWARD REPLACEMENT PARTS VOIDS WARRANTY.

⚠ **WARNING** – Pool heaters are heat producing appliances. To avoid possible over heating of the outer jacket and damage or injury with such an event: (1) no materials should be stored against the jacket and (2) care should be taken to avoid unnecessary contact (especially by children) with the jacket.

⚠ **WARNING** – When lighting a gas heater, the lighting instructions must be followed exactly to prevent "flashback" of excess gas in the heater. Electronic ignition heaters and electric heaters must have the power shut off when making adjustments for servicing, or coming into contact with the heater.

⚠ **WARNING** – UNDER NO CIRCUMSTANCES SHOULD FLAMMABLE MATERIALS, SUCH AS GASOLINE OR PAINT THINNERS, BE USED OR STORED IN THE VICINITY OF THE HEATER OR IN ANY LOCATION FROM WHICH FUMES COULD REACH THE HEATER.

See product plate for manufacturer's information.
For warranty information, please go to www.hayward.com/warranty.

SAVE THESE INSTRUCTIONS

⚠ WARNING – **Suction Entrapment Hazard.** Suction in suction outlets and/or suction outlet covers, which are damaged, broken, cracked, missing, or unsecured cause severe injury and/or death due to the following entrapment hazards:



Hair Entrapment – Hair can become entangled in suction outlet cover.



Limb Entrapment – A limb inserted into an opening of a suction outlet sump or suction outlet cover that is damaged, broken, cracked, missing, or not securely attached can result in a mechanical bind or swelling of the limb.



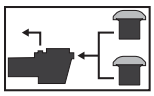
Body Suction Entrapment – A differential pressure applied to a large portion of the body or limbs can result in an entrapment.



Evisceration/ Disembowelment – A negative pressure applied directly to the intestines through an unprotected suction outlet sump or suction outlet cover which is damaged, broken, cracked, missing, or unsecured can result in evisceration/disembowelment.

Mechanical Entrapment – There is potential for jewelry, swimsuits, hair decorations, fingers, toes, or knuckles to be caught in an opening of a suction outlet cover resulting in mechanical entrapment.

⚠ WARNING – To Reduce the risk of Entrapment Hazards:



- When outlets are small enough to be blocked by a person, a minimum of two functioning suction outlets per pump must be installed. Suction outlets in the same plane (i.e. floor or wall), must be installed a minimum of three feet (3') [0.91 meter] apart, as measured from near point to near point.
- Dual suction fittings shall be placed in such locations and distances to avoid "dual blockage" by a user.
- Dual suction fittings shall not be located on seating areas or on the backrest for such seating areas.
- Never use pool or spa if any suction outlet component is damaged, broken, cracked, missing, or not securely attached.
- Replace damaged, broken, cracked, missing, or not securely attached suction outlet components immediately.
- Install two or more suction outlets per pump in accordance with latest ASME, APSP Standards and CPSC guidelines. Follow all applicable National, State, and Local codes.
- Installation of a vacuum release or vent system, which relieves entrapping suction, is recommended.

⚠ WARNING – Failure to remove pressure test plugs and/or plugs used in winterization of the pool/spa from the suction outlets can result in an increase potential for suction entrapment as described above.

⚠ WARNING – Failure to keep suction outlet components clear of debris, such as leaves, dirt, hair, paper and other material can result in an increase potential for suction entrapment as described above.

⚠ WARNING – Suction outlet components have a finite life, the cover/grate should be inspected frequently and replaced at least every ten years or if found to be damaged, broken, cracked, missing, or not securely attached.

⚠ CAUTION – Components such as the filtration system, pumps and heater must be positioned so as to prevent their being used as means of access to the pool by young children. To reduce risk of injury, do not permit children to use or climb on this product. Closely supervise children at all times. Components such as the filtration system, pumps, and heaters must be positioned to prevent children from using them as a means of access to the pool.

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⚠ **WARNING** – **Hazardous Pressure.** Pool and spa water heating and circulation systems operate under hazardous pressure during start up, normal operation, and after pump shut off. Stand clear of circulation system equipment during pump start up. Failure to follow safety and operation instructions could result in violent separation of the pump housing and cover, and/or filter housing and clamp due to pressure in the system, which could cause death, severe personal injury and/or property damage. Before servicing pool and spa water circulation system, all system and pump controls must be in off position and filter manual air relief valve must be in open position. Before starting system pump, all system valves must be set in a position to allow system water to return back to the pool. Do not change filter control valve position while system pump is running. Before starting system pump, fully open filter manual air relief valve. Do not close filter manual air relief valve until a steady stream of water (not air or air and water) is discharged.



⚠ **WARNING** – **Separation Hazard.** Failure to follow safety and operation instructions could result in violent separation of pump components. Strainer cover must be properly secured to pump housing with strainer cover lock ring. Before servicing pool and spa circulation system, all system and pump controls must be in off position and filter manual air relief valve must be in open position. Do not operate pool and spa circulation system if a system component is not assembled properly, damaged, or missing. Do not operate pool and spa circulation system unless filter manual air relief valve body is in locked position in filter upper body. **Never operate or test the circulation system at more than 50 PSI. Do not purge the system with compressed air.** Purging the system with compressed air can cause components to explode, with risk of severe injury or death to anyone nearby. Use only a low pressure (below 5 PSI), high volume blower when air purging the pump, filter, or piping.



⚠ **WARNING** – **Risk of Electric Shock.** All electrical wiring MUST be in conformance with applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can shock, burn, and cause death or serious property damage. To reduce the risk of electric shock, do NOT use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. Before working on pump or motor, turn off power supply to the pump.

⚠ **WARNING** – To reduce the risk of electric shock replace damaged wiring immediately. Locate conduit to prevent abuse from lawn mowers, hedge trimmers and other equipment. Do NOT ground to a gas supply line.

⚠ **WARNING** – **Risk of Electric Shock.** Failure to ground all electrical equipment can cause serious or fatal electrical shock hazard. Electrically ground all electrical equipment before connecting to electrical power supply.

⚠ **WARNING** – **Risk of Electric Shock.** Failure to bond all electrical equipment to pool structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, see installation instructions and consult a professional electrician on how to bond all electrical equipment. Also, contact a licensed electrician for information on local electrical codes for bonding requirements.

Notes to electrician: Use a solid copper conductor, size 8 or larger. Run a continuous wire from external bonding lug to reinforcing rod or mesh. Connect a No. 8 AWG (8.4 mm2) [No. 6 AWG (13.3 mm2) for Canada] solid copper bonding wire to the pressure wire connector provided on the electrical equipment and to all metal parts of swimming pool, spa, or hot tub, and metal piping (except gas piping), and conduit within 5 ft. (1.5 m) of inside walls of swimming pool, spa, or hot tub. **IMPORTANT** - Reference NEC codes for all wiring standards including, but not limited to, grounding, bonding and other general wiring procedures.

⚠ **Additionally, Hayward recommends the use of a sacrificial anode(s). Sacrificial anodes provide protection to the heat exchanger against galvanic corrosion when properly installed. Sacrificial anodes should be regularly inspected and replaced before the end of their useful life.**

WARNING – **Risk of Electric Shock.** The electrical equipment must be connected only to a supply circuit that is protected by a ground-fault circuit-interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the electrical equipment without the test button being pushed, a ground current is flowing, indicating the possibility of an electrical shock. Do not use this electrical equipment. Disconnect the electrical equipment and have the problem corrected by a qualified service representative before using.

⚠ **CAUTION** – These heaters are intended for use with permanently-installed pools and may be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.

⚠ **WARNING** – **Risk of Hyperthermia.** To avoid hyperthermia the following “Safety Rules for Hot Tubs” are recommended by the U.S. Consumer Product Safety Commission.

1. Spa or hot tub water temperatures should never exceed 104°F [40°C]. A temperature of 100°F [38°C] is considered safe for a healthy adult. Special caution is suggested for young children. Prolonged immersion in hot water can induce hyperthermia.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness, which could lead to unconsciousness and subsequently result in drowning.

3. Pregnant women beware! Soaking in water above 100°F [38°C] can cause fetal damage during the first three months of pregnancy (resulting in the birth of a brain-damaged or deformed child). Pregnant women should adhere to the 100°F [38°C] maximum rule.
4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).
5. Persons taking medications, which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants, should not use spas or hot tubs.
6. If the pool/spa is used for therapy, it should be done with the advice of a physician. Always stir pool/ spa water before entering the pool/spa to mix in any hot surface layer of water that might exceed healthful temperature limits and cause injury. Do not tamper with controls because scalding can result if safety controls are not in proper working order.
7. Persons with a medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain a physician's advice before using spas or hot tubs.
8. Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above normal body temperature of 98.6°F [37°C]. The symptoms of Hyperthermia include: drowsiness, lethargy, dizziness, fainting,and an increase in the internal temperature of the body.

The effects of Hyperthermia include:
- Unawareness of impending danger.
- Failure to perceive heat.
- Failure to recognize the need to leave the spa.
- Physical inability to exit the spa.
- Fetal damage in pregnant women.
- Unconsciousness resulting in danger of drowning.

Definitions:

ANSI: American Nation Standards Institute
CSA: Canadian Standards Association
NFPA: National Fire Protection Association
NEC: National Electric Code
SCAQMD: South Coast Air Quality Management District
ISTA: International Safe Transit Association
Suction Outlet: The Suction Outlet is a fitting, fitting assembly, cover/grate and related components that provide a means for water to exit the pool and return into the pump circulating system. This fitting may also be referred to as the "Main Drain"
Bypass Valves: A valve or series of valves that direct the pool water to flow or not flow through the heater.

Pressure measurement units:

Inches of Mercury (inHg) is typically used with atmospheric pressure measurements.
Pounds per square inch (PSI) is typically used with water "pressure", "suction" or system measurements.
Inches of Water (inwc) is typically used with gas or air pressure measurements (1.0 inHg = .49 PSI = 13.5inwc)

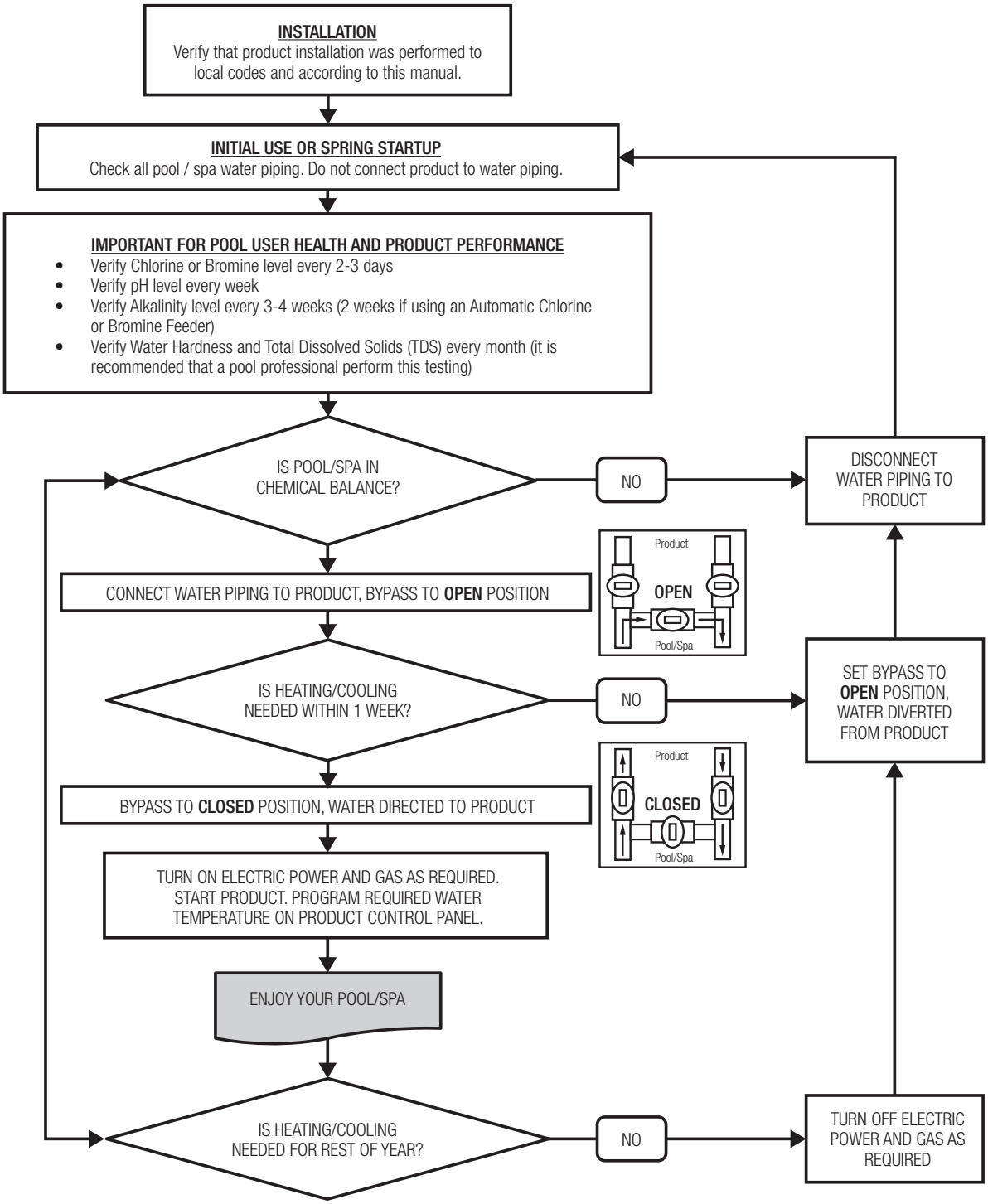
Certification and Compliance		
Certification Codes and Standards	**USA**	**Canada**
Design Certified	ETL	ETL
Design Compliant	ANSI Z21.56	CSA 4.7
Installation Compliant Gas	NFPA 54, ANSI Z223.1, NFPA 58	CAN/CSAB149.1-2
Installation Compliant Electric	ANSI/NFPA 70, NEC	CSA C22.1 - Canadian Electrical Code, Part 1
Emissions	SCAQMD 1146.2	
Shipping Compliant	ISTA 3B	ISTA 3B

CONFORMANCE WITH CODES: The heater shall be installed in accordance with all local and state codes and with the requirements of the authority having jurisdiction of the installing site. The heater installation must conform to the latest edition of the above listed installation codes.

Getting Started

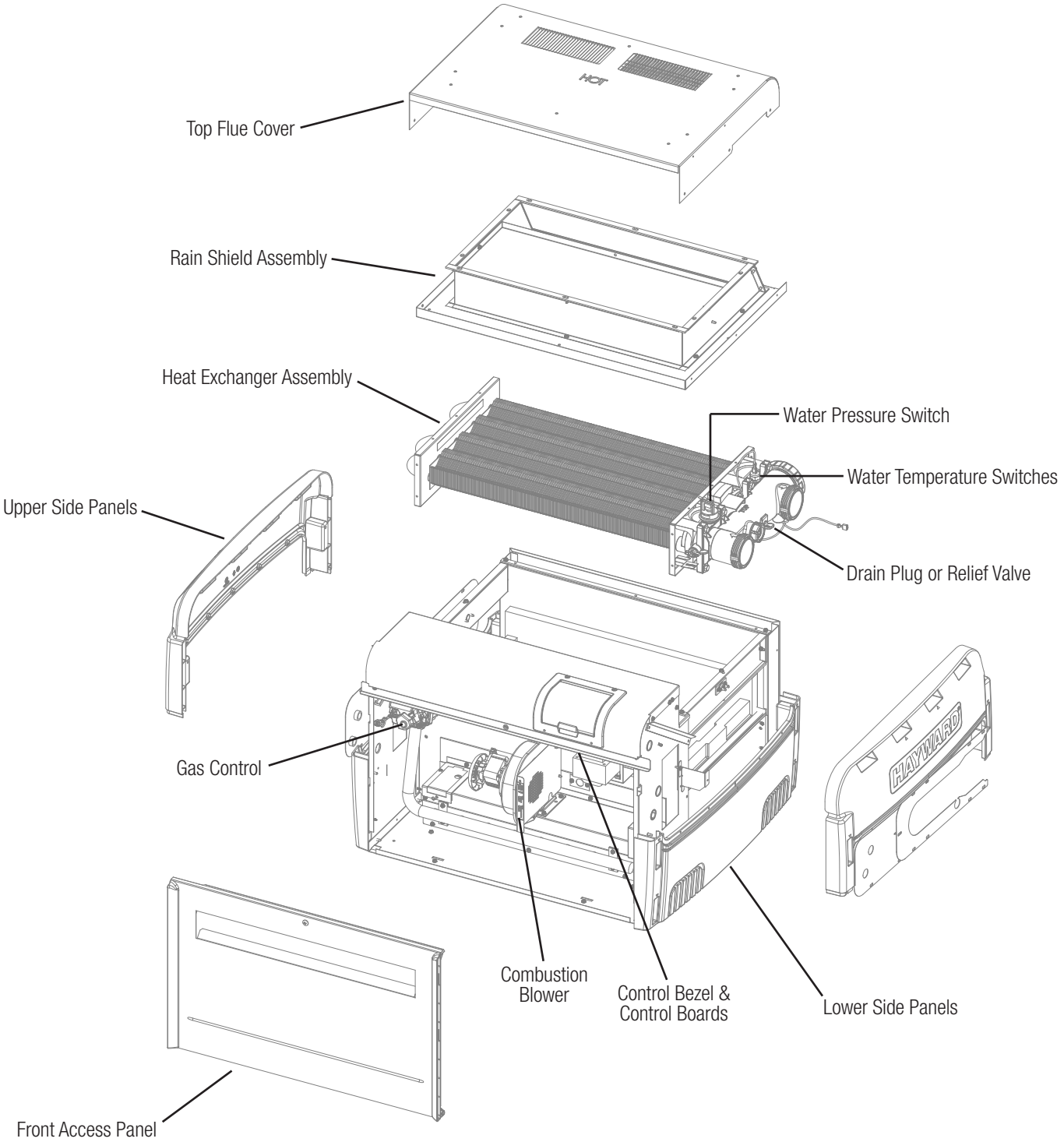
What To Expect When Operating Your Pool Heater

This flow chart provides guidance to protect pool users and product by maintaining good water quality.



Specifications

Heater Construction



Features

- 120 or 240VAC, 60Hz, 1-phase, 5.5A maximum current
- Forced draft combustion with silicon nitride hot surface ignition
- Cupronickel water tubes standard
- Integral low loss bypass, maximum water flow for all models is 125 GPM

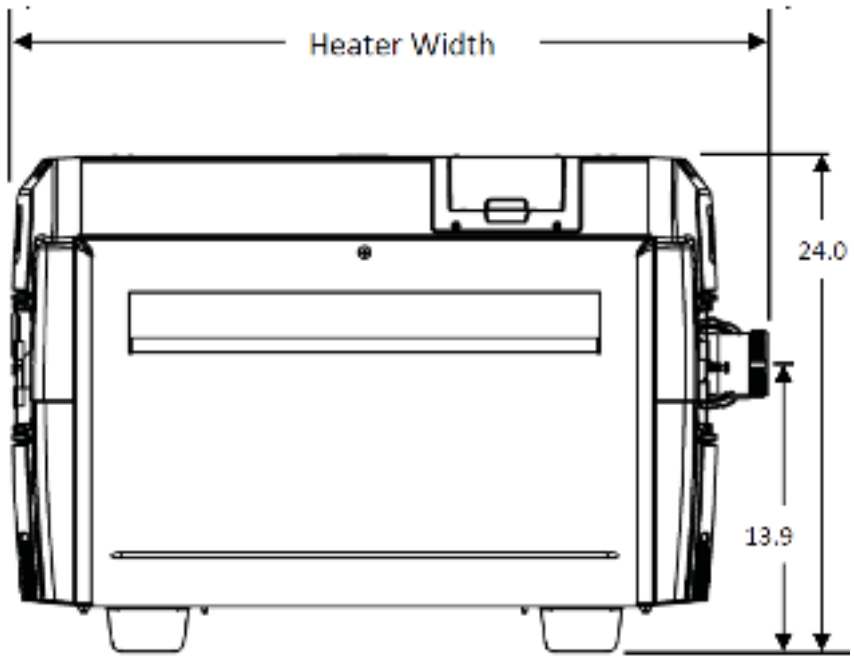
Model	Gas Input (Natural or Propane)	Minimum Water Flow	Thermal Efficiency	Heater Width	Heater Weight
xxx	but/hr	gpm	%	in.	lbs.
150	150,000	20	82.7	19	135
200	199,900	20	83	22	140
250	250,000	25	84	25	165
400	399,900	30	84	34	195
500	500,000	40	83	40	245
250ASME	250,000	25	84	28	195
400ASME	400,000	30	84	36.5	225
500ASME	500,000	40	83	40.5	260

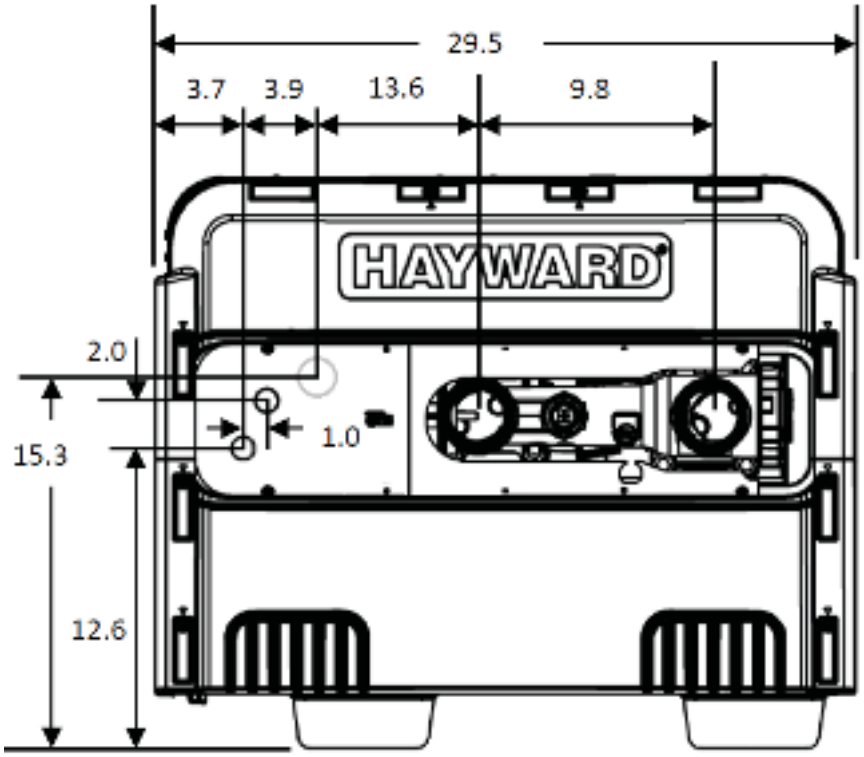
Gas Requirements

Operating Pressures	Natural Gas (inwc)	Propane Gas (inwc)
Gas Manifold Pressure*	1.8 - 2.2	6.8 - 7.0
Gas Inlet Pressure, Minimum	4.5	10.0
Gas Inlet Pressure, Maximum	10.5	13.0
Gas Orifice Drill Sizes	#25	#43
Gas Orifice Drill Sizes (500kbtu/hr)	#22	2.3mm

* Pressure range for allowable heating value variation

Dimensions





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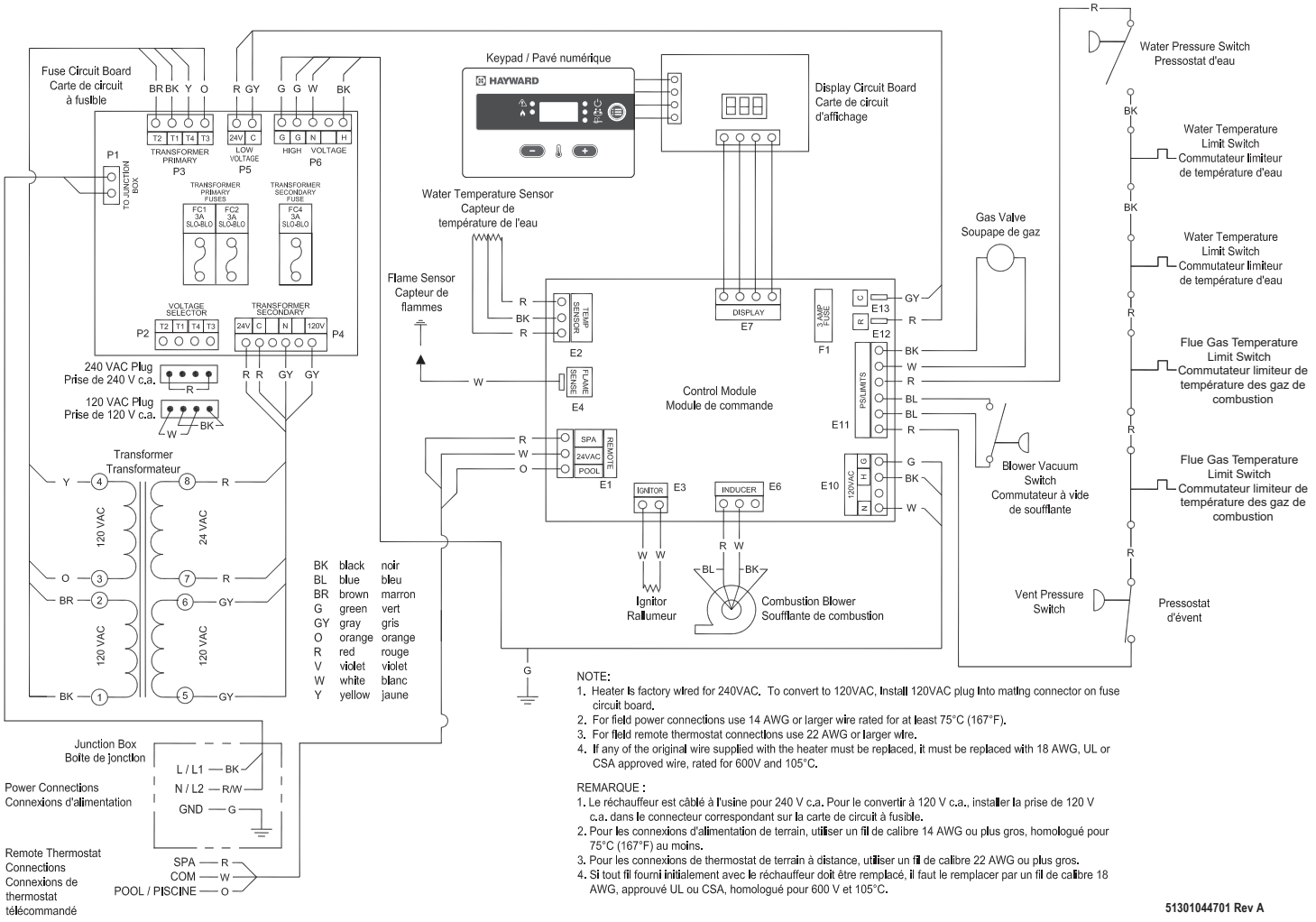
Wiring Connection Diagram

⚠ WARNING – **Risk of Electric Shock.** Before working on any electrical equipment, turn off power supply to the equipment.

⚠ WARNING – **Risk of Electric Shock.** All electrical wiring MUST conform to applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can cause death, shock, burn, and/or serious property damage. To reduce the risk of electric shock, do NOT use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. To reduce the risk of electric shock replace damaged wiring immediately. Locate conduit to prevent abuse from lawn mowers, hedge trimmers and other equipment. Do NOT ground to a gas supply line.

Wiring Connection Diagram / Schéma de Connexion de Câblage

HXXXFD Gas Heaters / Chaudière Gas à HXXXFD



NOTE:
1. Heater is factory wired for 240VAC. To convert to 120VAC, install 120VAC plug into mating connector on fuse circuit board.
2. For field power connections use 14 AWG or larger wire rated for at least 75°C (167°F).
3. For field remote thermostat connections use 22 AWG or larger wire.
4. If any of the original wire supplied with the heater must be replaced, it must be replaced with 18 AWG, UL or CSA approved wire, rated for 600V and 105°C.

REMARQUE :
1. Le réchauffeur est câblé à l'usine pour 240 V c.a. Pour le convertir à 120 V c.a., installer la prise de 120 V c.a. dans le connecteur correspondant sur la carte de circuit à fusible.
2. Pour les connexions d'alimentation de terrain, utiliser un fil de calibre 14 AWG ou plus gros, homologué pour 75°C (167°F) au moins.
3. Pour les connexions de thermostat de terrain à distance, utiliser un fil de calibre 22 AWG ou plus gros.
4. Si tout fil fourni initialement avec le réchauffeur doit être remplacé, il faut le remplacer par un fil de calibre 18 AWG, approuvé UL ou CSA, homologué pour 600 V et 105°C.

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Installation

This manual contains instructions for installation, operation, maintenance, troubleshooting, and parts lists for the proper operation of the swimming pool/spa/hot tub heaters. It is strongly recommended that the installer read the manual before installing the swimming pool/spa/hot tub heater. If after reviewing the manual any questions remain unanswered, contact tech services or local representative. Following heater installation, the installer should leave all manuals with the consumer for future reference.

> ⚠ **ATTENTION** – The installation instructions are intended for the use of a qualified technician, specifically trained and experienced in the installation of this type of heating equipment. Some states or provinces require that installer be licensed. If this is the case in the state or province where heater is located, the contractor must be properly certified.

THE USE OF A POOL COVER IS RECOMMENDED. A pool cover reduces heat loss, conserves chemicals, lowers the load on filter systems and may provide a valuable safety feature

EQUIPMENT INSPECTION: On receipt of the heater, inspect the heater carton(s) for damage. If any carton(s) is damaged, note it when signing for it. Remove the heater from the carton(s) inspect it and advise the carrier of any damages at once.

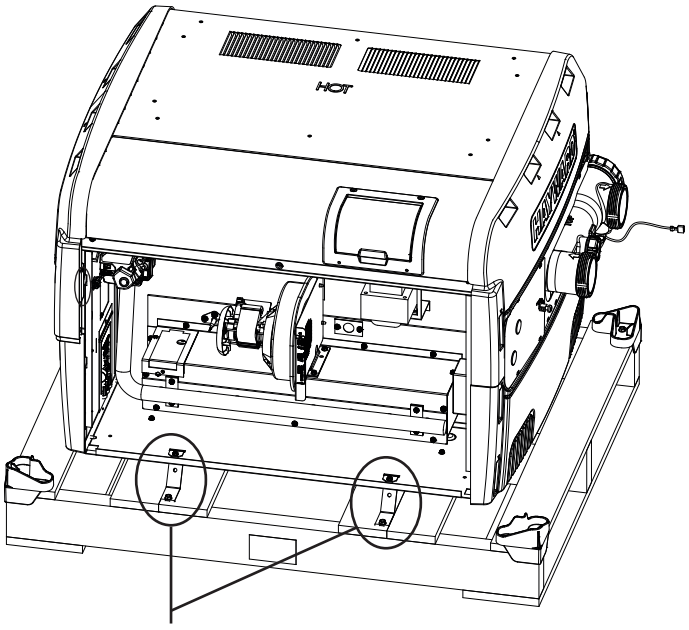
> ⚠ **ATTENTION** – Do not drop the heater from a pickup truck tailgate to the ground. This may damage the heater.

Uncrating The Heater

Follow these steps to remove the shipping carton from the heater:

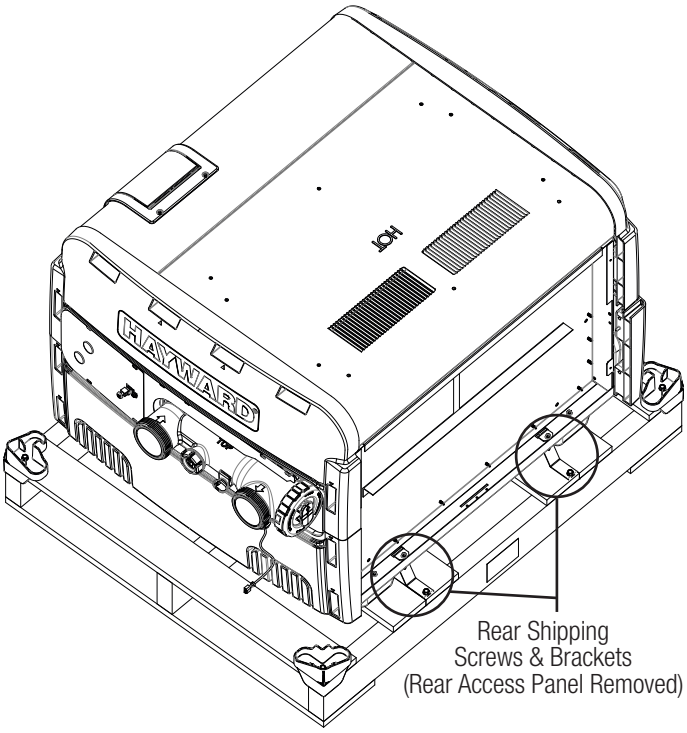
1. Remove the corrugated carton from the heater. The carton, top pad, bottom pad, and the four corner posts can be recycled.
2. There are four (4) external screws (see Figure 1 and 2) used to secure the heater to the wood pallet. All four must be removed to separate the heater from the pallet.
3. To access the four (4) internal screws (see Figure 1 and 2), open the front access panel by removing the single top screw. Then, remove the two (2) screws and brackets which hold the heater base pan to the pallet. Next, open the rear access panel by removing the four (4) screws holding this panel. Then remove the two (2) screws and brackets which hold the heater base pan to the pallet.
4. Lift the heater clear off the corrugated bottom pad and off of the pallet. Discard bottom corrugated tray and pallet appropriately.

Figure 1: Front Shipping Screws



Front Shipping Screws & Brackets
(Front Access Panel Removed)

Figure 1: Rear Shipping Screws



Rear Shipping
Screws & Brackets
(Rear Access Panel Removed)

Sprinkler Heads

The heater is designed to handle the wettest weather conditions that are typical of rain and high humidity. Sprinkler heads force high-pressure water into the unit from the side at an odd angle. Make sure there are no sprinkler heads near the heater that will spray on or into the unit. Many sprinkler systems are connected to a well system, whose water is high in minerals, Sulphur, salt and other aggressive contaminates, that will leave a buildup on the unit and electronics causing corrosion and shortens life.

> ⚠ **ATTENTION** - Damage from sprinkler interaction is not covered under the warranty agreement. Make sure that sprinklers are placed at a sufficient distance away so that normal wind will not carry the mist to the Heater.

> ⚠ **ATTENTION** - If located in an oceanfront area, the Heater should be placed out of direct spray of sand and salt. This will clog, damage, and corrode the unit. You may also consider protecting the unit by creating a physical barrier outside of the minimum clearances between the unit and the prevailing beach front wind. Damage caused by sand or salt spray is not covered by the warranty.

Locating the Heater

Locate the pool/spa heater in an area where leakage of the heat exchanger or connections will not result in damage to the area adjacent to the heater or to the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, with drain outlet, be installed under the heater. The pan must not restrict airflow. This heater must be installed at least (5) feet from the inside wall of a pool (in-ground or above-ground)/spa/hot tub unless separated from the pool/spa/hot tub by a solid barrier. The heater must be installed such that the location of the exhaust gas vent assembly outlet relative to adjacent public walkways, adjacent buildings, openable windows, and building openings complies with the National Fuel Gas Code (ANSI Z223.1/NFPA 54) and/or CAN/CGA B149 installation codes.

1. Level surface for proper rain water draining and removal.
2. Suitable electrical supply line. See rating plate on the heater for electrical specifications. A junction box is not needed at the heater; connections are made inside the unit electrical compartment. Minimum wire size to be selected per NEC.
3. Electric disconnect switch that will interrupt all power to the unit. This switch MUST be within line of sight of the heater.
4. The heater does not require additional vent piping when installed outdoors.
5. Do not install in a location where growing shrubs may in time obstruct a heater's combustion air and venting areas.
6. Do not install this appliance under an overhang less than 72in from the top of the appliance. The area under the overhang must be open on (3) sides.
7. Do not install the heater where water spray from ground level can contact the heater. The water could reach the controls causing electrical damage.
8. Do not install under a deck.
9. Do not install within 24in of any outdoor HVAC equipment.
10. Do not install where water may run-off a roof into the heater. A gutter may be needed to protect the heater.

> ⚠ **CAUTION** - Make sure the heater is not located where large amounts of water may run-off from the roof into the unit. Sharp sloping roofs without gutters will allow massive amounts of rainwater, mixed with debris from the roof to be forced through the unit. Failure to follow the instructions may result in property damage and void warranty.

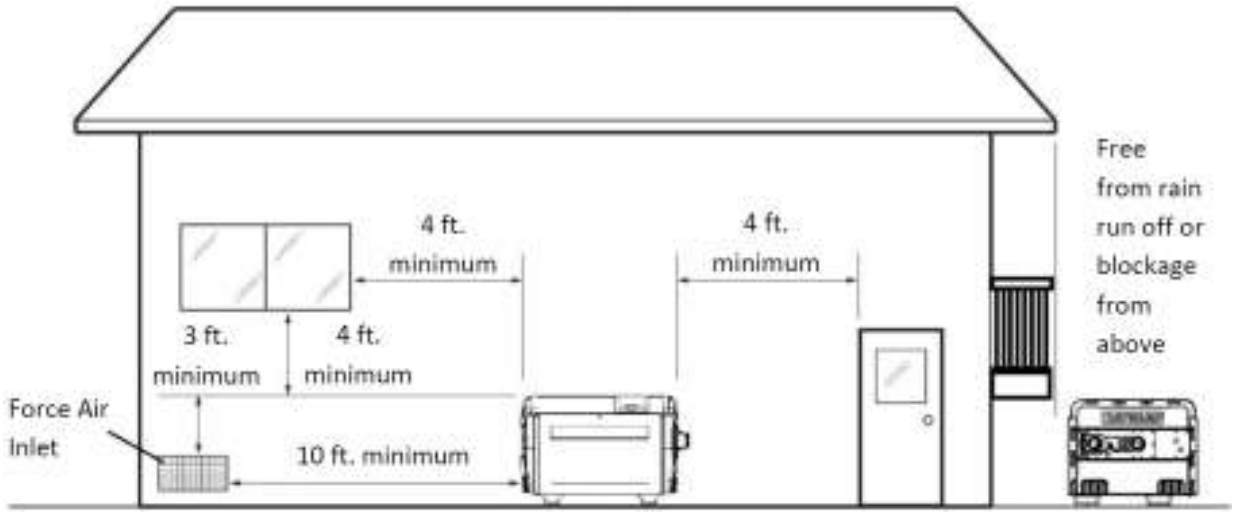
11. Any enclosure around the heater must provide a combustion air vent large enough to accommodate input ratings of all gas appliances in the enclosure.
12. For minimum exhaust vent clearances for all building openings, including but not limited to vented eaves, doors, windows, or gravity inlets, see Figure 3. In Canada, the heater must be installed with the top of the vent at least 10 feet (3m) below, or to either side of, any opening into a building.

OUTDOOR INSTALLATION AND SERVICE CLEARANCES: For outdoor installations, the installation clearances from combustible materials and service clearances shown in the table and Figure 3 must be maintained. Do not install heater in a closet or enclosed space (consult NFGC). These clearances provide for proper combustion air and flue product exhaust.

Installation Required Clearances (in.)		
Heater Panel	**Outdoor Clearance**	**Indoor Clearance**
Top	Unobstructed	36
Front	18	18
Back*	6	6
Water Side Connection	12	12
Opposite Water Side Connection	6	6

*If the heater is to be installed with vinyl siding at back,increase the clearance in Table3 to 12 inches to avoid potentialdiscoloration of siding

Figure 3: Outdoor Minimum Clearances



Equipment Pad

Place the heater on a level surface such as concrete or a fabricated slab (pad). This allows proper drainage of condensation and rainwater from the base of the unit. If possible, the pad should be placed at the same level or slightly higher than the filter system equipment pad.

Flooring

This heater may be installed on either non-combustible flooring or combustible flooring that does not reduce the bottom clearance of the heater. Ultralite™ or equivalent concrete-over-foam HVAC pads are acceptable.

Anchoring

The heater is equipped for installation of factory supplied tie-down brackets when required by local codes. Follow all relevant Local, State and National requirements regarding wind load anchoring. The brackets are shipped in the consumer kit. You will need the following to complete the installation:

Tie-down brackets	(FACTORY-SUPPLIED, qty = 4)
Sheet metal screws	(FACTORY-SUPPLIED, qty = 4)
Concrete tapping screws	(FIELD-SUPPLIED, Tapcons®, qty = 4, stainless steel, size to be ¼"diameter with a minimum length of 1-1/2")
Fender washers	(FIELD SUPPLIED, stainless steel, qty = 4, size to be at least 1-1/2")

Installing Tie-Down Brackets

1. Locate the tie-down brackets and the sheet metal screws.
2. Obtain the Tapcons®. Be sure the overall length of the concrete tapping screw is at least 1-1/2".
3. Remove the front (1 screw) and rear access panel (4 screws).
4. Position the heater on the pad so that all Tapcons® can "bite" into the pad. Observe local codes regarding pad construction,some jurisdictions specify a minimum thickness for concrete pads.
5. Position the tie-down brackets into the slots in the front of the heater base pan so they are positioned as shown in Figure 4a. Install the sheet metal screws through the holes in the bracket to secure the bracket to the heater base pan.
6. Install the Tapcons® through the inner set of holes in the tie-down brackets into the pad (see Figure 4b).
7. Repeat Steps 6 & 7 at the rear of the heater.
8. Tie down is completed when (4) brackets are secured to the heater and the pad. Re-install the access panels in locations (front and rear), front shown

Figure 4a: Tie-Down Installation Locations

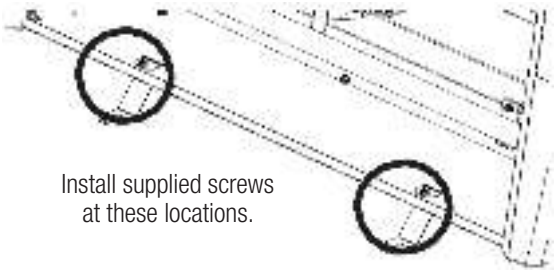
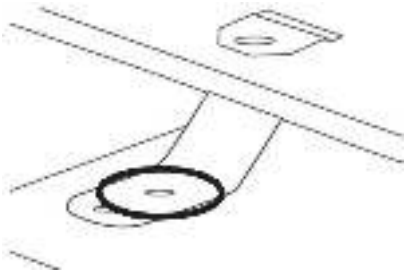


Figure 4b: Use 2nd Hole for Ground Mount of Tie-Down Brackets with 2 Holes



Gas Conversion

Where permitted by local codes, the factory-installed gas train may be changed from natural gas to propane or from propane to natural gas, using the appropriate conversion kits (FDXLGCK2###NP or FDXLGCK2###PN). Gas conversion kits shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. Detailed instructions are included with each kit.

Altitude of Installation

Heaters may be installed up to 2,000 ft. altitude above sea level AS SHIPPED FROM THE FACTORY. For installs at altitudes greater than 2,000 ft. high altitude conversion kit FDXLHAK1931 is available. High altitude conversion kits shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. Detailed instructions are included with each kit.

⚠ **WARNING** - Failure to comply with the appliance gas conversion or high altitude installation instructions and service instructions may result in equipment damage, fire, asphyxiation, or carbon monoxide poisoning. Exposure to products of incomplete combustion (carbon monoxide) can cause cancer and birth defects or other reproductive harm.

Gas Supply

The heater is shipped from the factory with the gas connection located on the left side of the heater cabinet. Insert the pipe to the gas valve through the grommet in the cabinet side (see Figure 6.) A union should be installed outside the heater cabinet for easy removal of the gas manifold assembly during service. A CSA certified main gas shutoff valve must be installed outside the cabinet and within 6 feet of the heater. This valve must have an I.D. large enough to supply the proper amount of gas volume to the heater. See Figure 5. Reduction of gas supply pipe or tubing to the inlet to the heater gas valve must be made at the valve only and must match the valve inlet size (3/4" or 1" NPT).If more than one appliance is installed on the gas line, consult the local gas company or appropriate technical service for the proper gas line size.

⚠ **CAUTION** - Apply joint compound (pipe dope) sparingly and only to the male threads of pipe joints. Do not apply joint compound to the first two threads. Use joint compounds resistant to the action of liquefied petroleum gas. Do not overtighten the gas inlet pipe or damage may result.

⚠ **ATTENTION** - Use Only CSA approved flexible outdoor gas appliance connectors marked with BTUH capacity (which must be equal to or greater than the heater rated input) and appropriate gas type (natural and/or LP).

Figure 5: Gas Piping with Shut Off & Trap

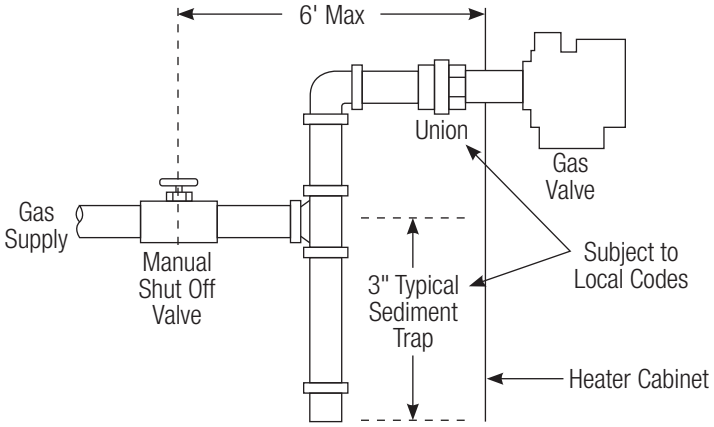
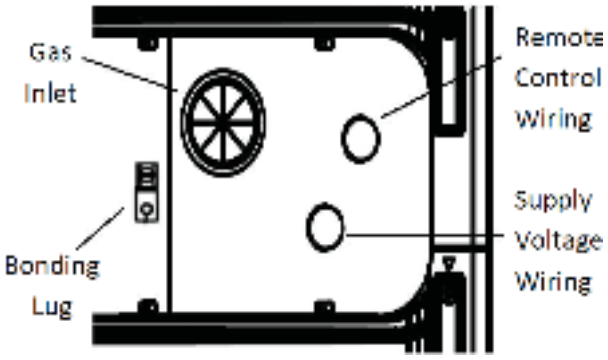


Figure 6: Gas Entry and Junction Box Cover



NATURAL GAS: The gas meter must have the capacity to supply enough gas to the pool heater and any other gas appliances if they are on the same pipeline (Example: 225 meter = 225,000 BTUH). If doubt exists as to the meter or regulation sizes, consult the local gas utility for assistance. Natural gas must be "pipeline quality" supplied from a natural gas utility company.

⚠ **ATTENTION** - Manufacturer is not responsible for heaters that are damaged if connected to a natural gas well.

PROPANE GAS: All propane gas tanks must be located outdoors and away from pool/spa structure and in accordance with the standard for storage and handling of propane gas, ANSI/NFPA 58 (latest edition) and applicable local codes. If the propane gas tank is installed underground, the discharge of the regulator vent must be above the highest probable water level. Propane tanks must have sufficient capacity to provide adequate vaporization for the full capacity of the equipment at the lowest expected temperatures. Consult a propane expert for accurate pipe and pressure sizing. Make sure that 1st and 2nd stage regulators are large enough to handle the BTUH input listed for the heater(s) being used.

⚠ **ATTENTION** - Manufacturer is not responsible for heaters that soot due to improper gas line or propane tank sizing or regulation control resulting in improper gas volume.

GAS SUPPLY AND PIPING: To properly size the gas piping for the heater, refer to Tables 1, 2, 3, and 4, depending on natural or propane gas, and single-stage or 2-stage regulation. Follow local gas codes for proper gas line material selection (copper, iron, plastic, etc.). It is VERY IMPORTANT when installing a propane heater on a 2-stage regulation system to follow the gas line sizing data in Tables 3 or 4 without exception

Table 1: Natural Gas Pipe Sizing (dia. in.), Low Pressure, Single-Stage Regulation

btu/hr Input		150,000	200,000	250,000	400,000	500,000
Gas Line Material		Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe
Distance from Gas Meter to Gas Valve Inlet (ft.)	0 to 50	3/4	1	1	1-1/4	1-1/4
	50 to 100	1	1	1-1/4	1-1/4	1-1/2
	100 to 200	1-1/4	1-1/4	1-1/4	1-1/2	2
	200 to 300	1-1/4	1-1/4	1-1/2	2	2

Based upon an inlet gas pressure of 0.5 psig or less at a pressure drop of 0.5 inwc

Table 2: Propane Gas Pipe Sizing (dia. in.), Low-Pressure, Single-Stage Regulation									
btu/hr Input		150,000		200,000		250,000		400,000	500,000
Gas Line Material		Iron Pipe	Tubing	Iron Pipe	Tubing	Iron Pipe	Tubing	Iron Pipe	Iron Pipe
Distance from Tank Regulator to Gas Valve Inlet (ft.)	0 to 50	3/4	7/8	3/4	7/8	1	1-1/8	1	1
	50 to 100	3/4	1-1/8	1	1-1/8	1	1-1/8	1-1/4	1-1/4
	100 to 200	1	1-1/8	1	--	1-1/4	--	1-1/4	1-1/4
	200 to 300	1	--	1-1/4	--	1-1/4	--	1-1/2	1-1/2

Based upon an inlet gas pressure of 11 inwc at a pressure drop of 0.5 inwc

Table 3: Natural Gas Pipe Sizing (dia. in.), High-Pressure, 2-Stage Regulation							
btu/hr input			150,000	200,000	250,000	400,000	500,000
Gas Line Material			Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe	Iron or Plastic Pipe
Distance of 1st Stage then 2nd Stage to Gas Valve Inlet (ft.)	First Stage*	0 to 50	1/2	1/2	1/2	1/2	1/2
		50 to 100	1/2	1/2	1/2	3/4	3/4
		100 to 150	1/2	1/2	1/2	3/4	3/4
	Second Stage**	0 to 10	3/4	3/4	3/4	3/4	1

*Based upon an inlet gas pressure of 2 psig at a pressure drop of 1 psi
** Based upon an inlet gas pressure of 10 inwc at a pressure drop of 0.5 inwc

Table 4: Propane Gas Pipe Sizing (dia. in.), High-Pressure, 2-Stage Regulation												
btu/hr Input			150,000		200,000		250,000		400,000		500,000	
Gas Line Material			Iron Pipe	Tubing	Iron Pipe	Tubing	Iron Pipe	Tubing	Iron Pipe	Tubing	Iron Pipe	Tubing
Distance or 1st Stage then 2nd Stage to Gas Valve Inlet (ft.)	1st Stage *	0 to 50	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
		50 to 100	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	1/2	5/8
		100 to 150	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	1/2	5/8
	2nd Stage **	0 to 10	1/2	5/8	1/2	5/8	1/2	3/4	3/4	7/8	3/4	1

*Based upon an inlet gas pressure of 10 psig at a pressure drop of 1 psi
** Based upon an inlet gas pressure of 11 inwc at a pressure drop of 0.5 inwc