



Electric Water Heater

OWNER'S MANUAL

FORCE 10 MARINE COMPANY
23080 HAMILTON ROAD
RICHMOND, BC CANADA V6V 1C9
TEL: (604) 522-0233
FAX: (604) 522-9608



If your water Heater is Damaged or you have questions regarding installation, performance or operation please contact Force 10 Marine Customer Service at 1-800-663-8515 or sales@force10.com.

INTRODUCTION

Thank you for selecting a Force 10 Marine Electric Water Heater. Your unit was carefully inspected and tested at our factory. We take pride in producing one of the finest Water Heaters for marine use. Please take the time to read this manual carefully; many of its instructions are essential to the safe operation of your unit.

Because of the continuing refinement of our product designs, your Water Heater may possess features not discussed in the manual. We have tried to supply all the information you might need, so please take time to read this manual before using your Water Heater.

Force 10 advises strongly against unauthorized modification of this product, but we do encourage you to correct problems which may arise.

Please make note of the model and serial number of your Water Heater for future reference.

Model # _____ **Serial #** _____

Any recommendation or advice by Force 10 Marine Company, or any of its employees, is given with the understanding that it is solely as an accommodation to the customer, and should not be relied upon by the customer without an independent verification of its applicability to the customer's particular situation.

IMPORTANT SAFETY INSTRUCTIONS

When using electrical appliances, basic safety precautions to reduce the risk of fire, electric shock, or injury to persons should be followed, including:

- Read all Instructions before Operating.
- This water heater must be grounded. Connect only to properly grounded circuit.
- Install or locate this water heater only in accordance with the provided installation instructions.
- Use this water heater only for its intended use as described in this manual.
- Do not use an extension cord set with this water heater.

- Do not operate this water heater if it has a damaged power line, if it is not working properly, or if it has been damaged or dropped.
- This water heater should be serviced only by qualified service personnel. Contact nearest authorized service facility for examination, repair, or adjustment.

WARNING:

*This is an electrical appliance that requires a specific energy source. Each unit is manufactured to run on either 120 **OR** 240 volt circuitry. Be sure you have purchased the correct unit based on your power source.*

This heater is equipped with a heat exchanger so that the water may be heated by the coolant from your engine. This may cause the water temperature to get excessively hot unless your unit is equipped with a Temperature Control Valve which holds the temperature at approximately 140 deg F.

Do not operate this water heater if there is damage to the heater or if not performing properly. Contact Force 10 for assistance.

The tank and heat exchanger are aluminum. Do not use any chemicals in the heat exchanger that may cause damage to it. Use only the engine manufacturer's recommended coolant. Do not use raw water in heat exchanger circuit. Damage caused by a damaging chemical or salt reaction is not covered under warranty.

CAUTION

Hydrogen gas is produced in a hot water system served by this heater that has not been used for a long period of time (2 weeks or more). Hydrogen gas is extremely flammable. To reduce the risk of injury under these conditions, it is recommended that the hot water faucet be opened for several minutes at the kitchen sink before using any electrical appliance connected to the hot water system. When hydrogen is present, there will probably be an unusual sound such as air escaping through the pipe as the water begins to flow. There should be no smoking or open flame near the faucet at the time it is open.

NOTE: Small DC electric currents move between boat and shore through the safety ground wire in the shore cord, causing galvanic damage to your water heater. To prevent galvanic damage, this product should be used in conjunction with a galvanic isolator. These devices are inexpensive and easily installed. Galvanic corrosion is not covered by warranty.

INSTALLATION

CAUTION

*To reduce the risk of excessive pressures and temperatures in this water heater, install temperature and pressure protective equipment required by local codes and no less than a combination temperature and pressure relief valve certified by a nationally recognized testing laboratory that maintains periodic inspection of production of listed equipment or materials, as meeting the requirements for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22-1986. This valve must be marked with a maximum set pressure not to exceed the marked maximum working pressure of the water heater. Install the valve into an opening provided and marked for this purpose in the water heater, and orient it or provide tubing so that any discharge from the valve exits only within 6 inches above, or at any distance below, the structural floor, and does not contact any live electrical part. The discharge opening must not be blocked or reduced in size under any circumstances.) **For your convenience, this device has already been installed on you unit.***

MOUNTING

1. If you are using the heat exchange feature, locate the water heater as close to the engine as possible. The heat exchanger port (or TCV inlet if equipped) must be lower than the coolant output port of the engine.
2. Your unit is equipped with mounting brackets located either on the sides of the tank or the front and back of the tank. Use stainless steel screws to securely fasten the heater.

PLUMBING

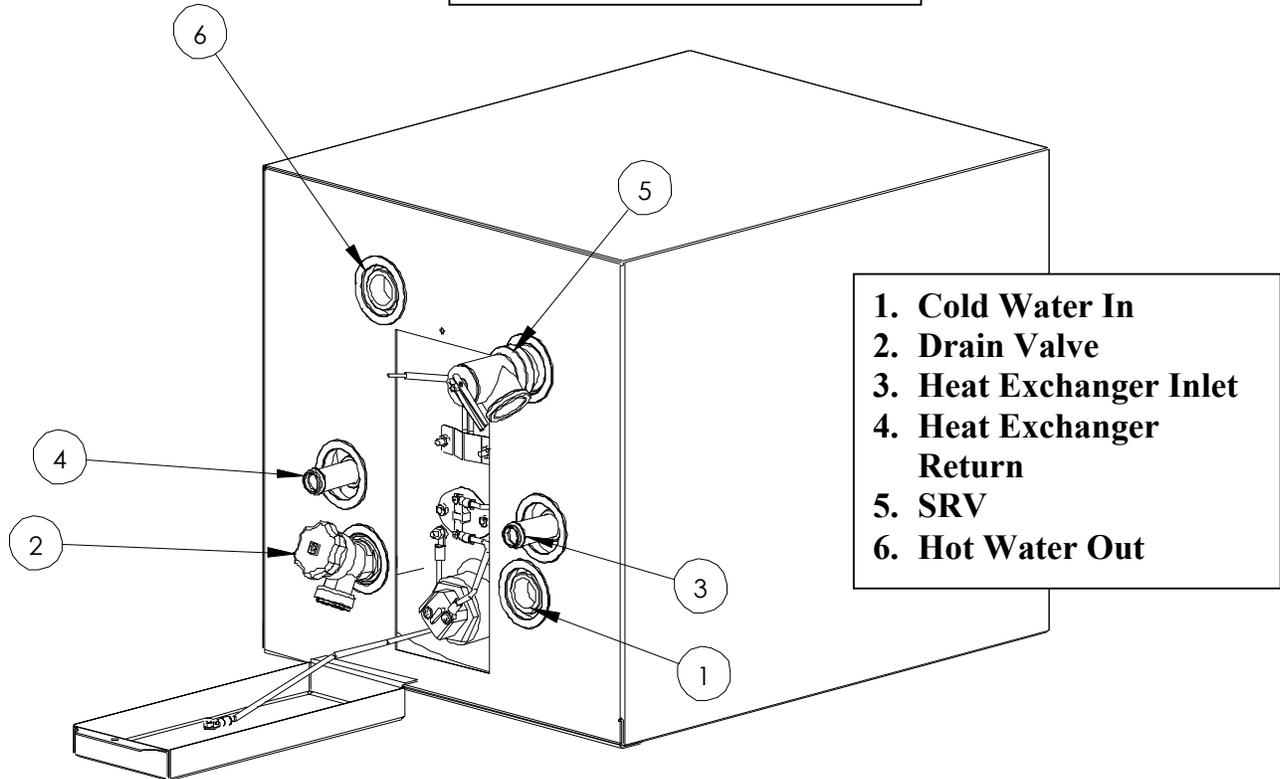
1. Connect cold water supply and hot water outlet to the heater as indicated on the front of the tank. (The tank is supplied with 1/2" NPT Female fitting) Force 10 recommends the installation of a check valve on the cold water inlet. Seal all pipe fittings with Teflon tape or Loctite thread sealant.

Thermal Expansion: When a Water Heater is installed in a closed water-supply system, such as one having a back flow preventer in the cold water supply, means shall be provided to control thermal expansion.

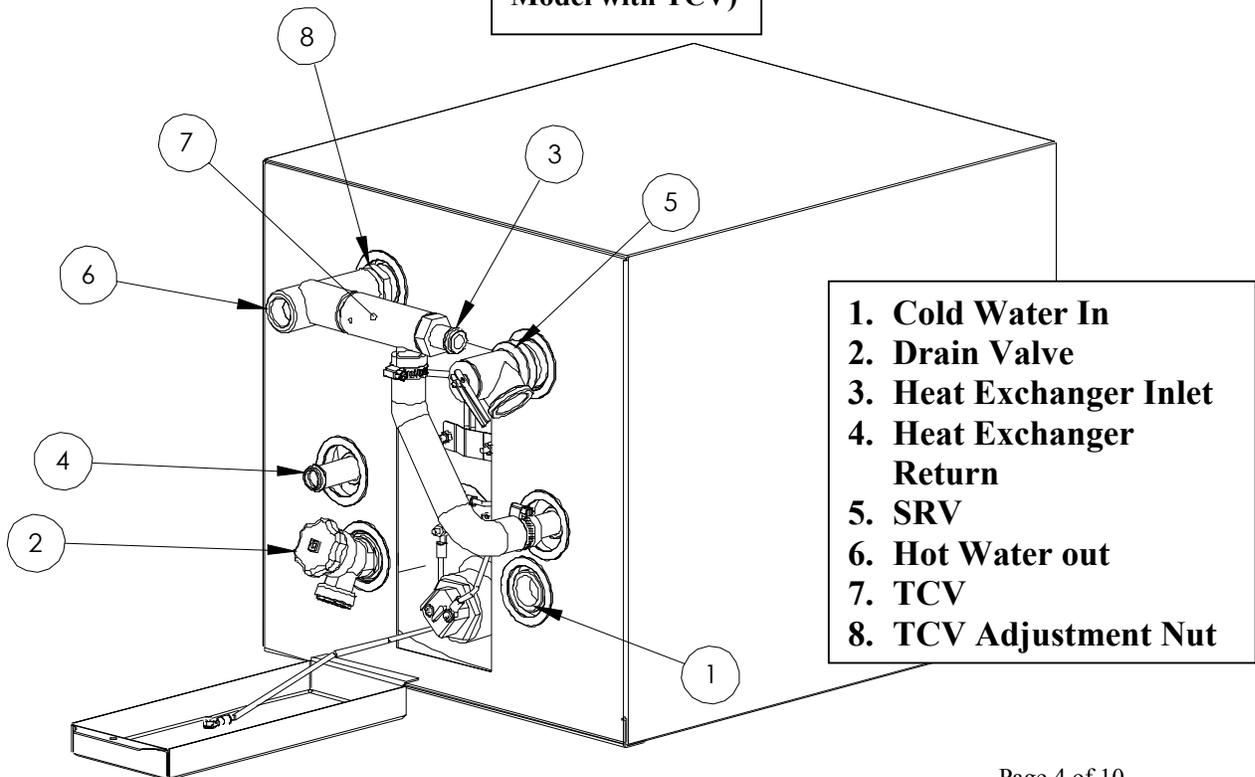
2. The heat exchanger inlet or TVC inlet (if equipped) and the outlet is a 5/8" hose barb fitting. Connect hoses to the hose barb fitting using stainless steel hose clamps.
3. If your unit is equipped with a TCV (Temperature Compensation Valve) the coolant loop to the water heater exchanger must be an auxiliary loop in the engine coolant circulation system. The TCV can not be installed inline with the engine coolant system. **Figure 1 on page 5**

PLUMBING CONNECTIONS

Standard model without (TCV)

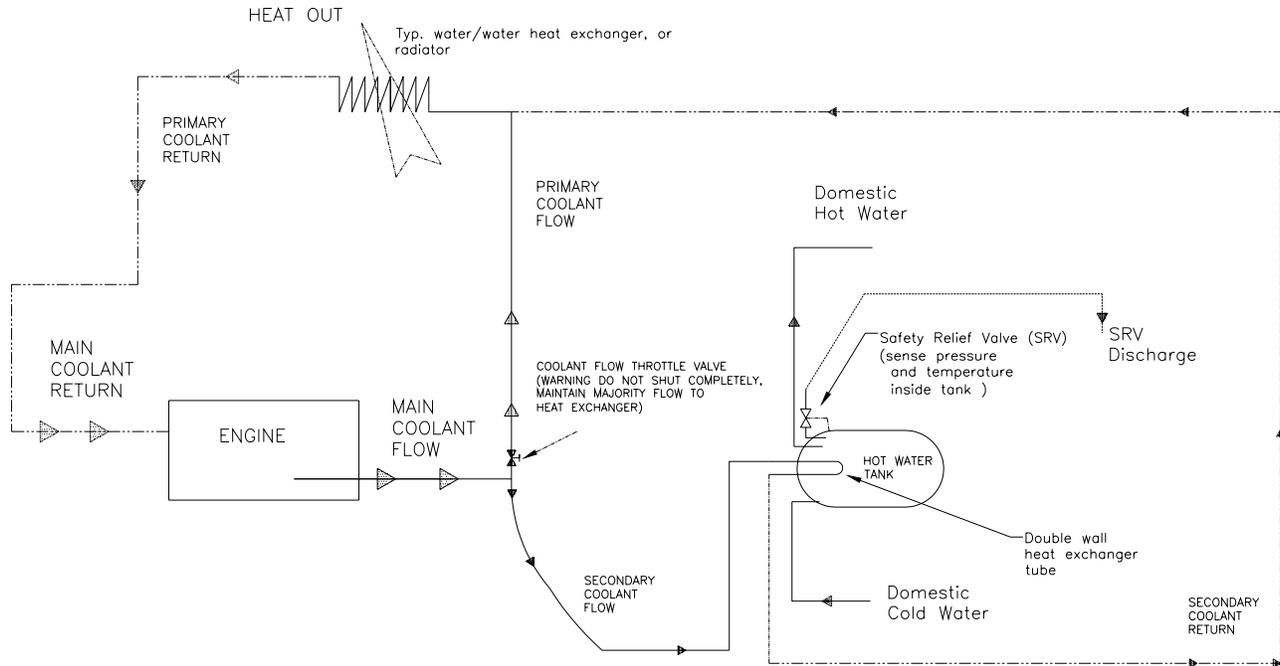


Model with TCV)



HEAT EXCHANGER INSTALLATION DIAGRAM

(Figure1)



4. A Temperature / Pressure relief valve (SRV) is factory installed. A drain hose should be installed to comply with ABYC standards. (*Section H-23 (23.7.4.2) in the Installation of Potable Water Systems chapter.*) Due to thermal expansion the SRV may weep slightly. This is normal operation.

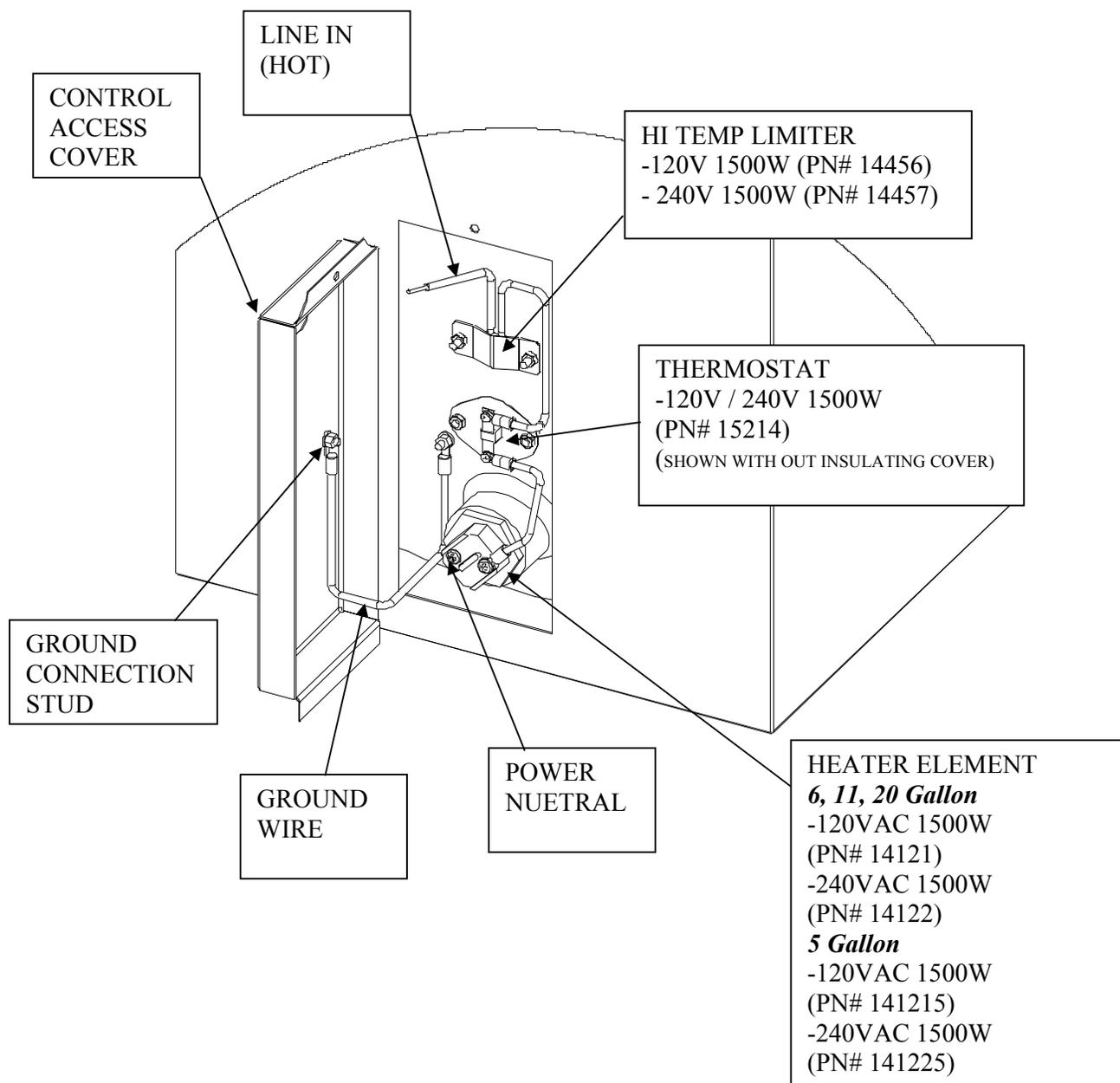
ELECTRICAL

1. Remove the AC wiring access cover by unscrewing the screw at the top of the cover. The bottom is held in by a tab. The tab should be between the front case and the insulation.
2. Connect the electrical supply by a qualified electrician. The electrical supply shall be armored cable or conduit per NEC code ANSI/NFPA 70-1993. *See figure 2 on page 7 for Wiring Diagrams.*

Note: Wiring diagram is located on the inside of the removable access panel.

3. Connect Line (Hot) to the pigtail wire coming from the High Temperature Limiter. Connect the Neutral to the unused screw terminal on the heating element marked with a white "N".
4. A strain relief should be installed in the hole on the front of the access panel to secure the AC wire.
5. Ground the water heater using the ground connection screw on the inside of the access cover. Do not use a switch in the grounding circuit.

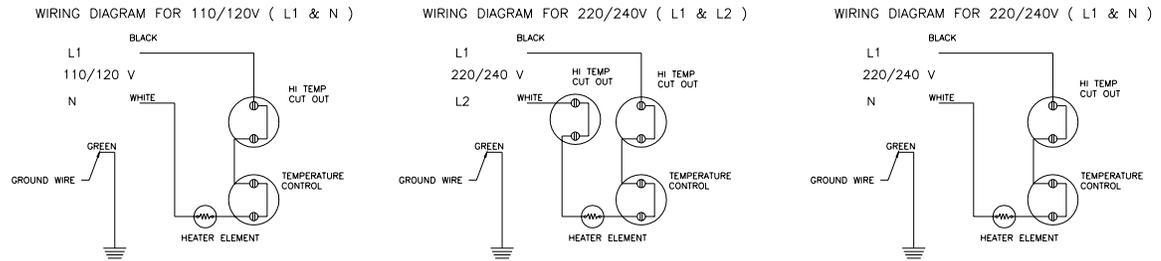
ELECTRICAL CONNECTIONS



WIRING DIAGRAMS

(Figure 2)

USE COPPER CONDUCTORS ONLY



DO NOT CONNECT LINE (HOT) DIRECTLY TO THE ELEMENT

OPERATION

ELECTRIC

When the Water Heater is operating from the AC Power, water temperature in the tank is regulated at 140 deg F (60 deg C). The thermostat is non-adjustable.

HEAT EXCHANGER

When the Water Heater is operating from the Heat Exchanger, water temperature in the tank will approach the temperature of the engine coolant. If the Heater is equipped with a Temperature Control Valve (TCV) the water temperature in the tank will be regulated at approximately 140 deg F (60 deg C).

The Temperature Control Valve (TCV) regulates the flow of coolant through the Heat Exchanger by sensing the output temperature of the water in the tank. As the output water temperature rises, the thermal actuator closes the valve and restricts the coolant flow through the Heat Exchanger limiting the water temperature to approximately 140 deg F (60 deg F) . When the output water temperature cools the valve opens and allows engine coolant to flow through the heat exchanger.

START-UP

1. Completely fill the tank and entire water system. Flush water through the tank to eliminate any trapped air.
2. Check all connections for leaks.
3. Apply power to the Water Heater and check to ensure the water is hot. The water will meet maximum temperature within (2) hour.

Caution: Do not operate water heater without the heating element submerged in water.

MAINTENANCE

1. Disconnect AC Power prior to draining the water system.
2. Flush Tank periodically.
3. If the temperature in the tank environment is going to drop below 32 deg F (0 C), drain the tank to prevent freezing and possible damage.

TROUBLE SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
No output from the tank	Air Lock in the system	Bleed all the water lines
Water does not get hot when plugged into AC Power	High Limiter switch has tripped	Cycle AC Power
	Failed Thermostat	Replace Thermostat
	Element has burned out	Replace Element
Water Dripping from SRV	Thermal Expansion	Install Expansion tank
	Valve poppet not seated properly	Lift lever to flush valve and reseal.
Leaking from TCV Connection	Loose Connection	Tighten the collar hex nut on the TCV.
	Bad seal	Replace "O" Ring
Leak from TCV vent hole	Failed temperature sensor seal	Replace TCV
	Leaking shaft seal	Replace TCV

SPECIFICATIONS

		405XXX	406XXX	411XXX	418XXX
Capacity		5 Gallon	6 Gallon	11 Gallon	20 Gallon
Tank Material		Aluminum	Aluminum	Aluminum	Aluminum
Case Material		Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Weight (Dry)		22 lb	25 lb	30 lb	47 lb
Overall Size including mounting plate (W/D/H)					
	Front /Back Mount	N/A	13.6" / 20" / 13.6"	16" / 22.5" / 16"	N/A
	Front /Back Mount w/ TCV	N/A	13.6" / 20.5" / 13.6"	16" / 23" / 16"	N/A
	Side Mount	15.5" / 16.5" / 13.6"	15.5" / 19.5" / 13.6"	18.75" / 21.5" / 16"	N/A
	Side Mount w/ TCV	15.5" / 16.75" / 13.6"	15.5" / 20" / 13.6"	18.75" / 22" / 16"	N/A
	Cross Mount	N/A	N/A	N/A	18.75" / 18.75" / 29.5"
Standard Heat Exchanger Location		Front	Front	Front	Front
Electrical Rating	120 V	1500 Watts / 12.5A			
	240 V	1500 Watts / 6.25A			
Ignition Protection		Yes	Yes	Yes	Yes
Certification	120 V	UL 174 (Including Marine Supplement) CSA C22.2 No. 110-94	UL 174 (Including Marine Supplement) CSA C22.2 No. 110-94	UL 174 (Including Marine Supplement) CSA C22.2 No. 110-94	UL 174 (Including Marine Supplement) CSA C22.2 No. 110-94
	240 V	CE	CE	CE	CE
Fittings	Water Inlet	1/2" NPT F	1/2" NPT F	1/2" NPT F	1/2" NPT F
	Water Outlet	1/2" NPT F	1/2" NPT F	1/2" NPT F	1/2" NPT F
	Heat Exchanger	5/8" Hose Barb	5/8" Hose Barb	5/8" Hose Barb	5/8" Hose Barb
	SRV	3/4" NPT F	3/4" NPT F	3/4" NPT F	3/4" NPT F
Warranty		2 Years	2 Years	2 Years	2 Years

Specifications subject to change without notice

Limited Warranty

Force 10 Marine Company warrants the Hot Water tank to the original consumer to be free from defective material(s) and workmanship while under normal use and service for a period of (2) year.

During the warranty period, Force 10 Marine Company will, at its option and without charge, repair and/or replace but not remove or re-install the faulty product.

The purchaser will return defective products to the address stated below. No product will be accepted by Force 10 Marine Company without a Return Authorization Number. Return of defective products must be accompanied by written details of the problems and proof of purchase.

The buyer shall be responsible for shipping and insurance charges, if any, on the products returned for repair under the terms of this warranty. Force 10 Marine Company will pay shipping of products returned to the buyer.

This limited warranty applies only to products that have been installed and used in accordance to printed instructions of Force 10 Marine Company and does not cover improper use, vandalism, negligence or accidents.

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WARRANTY REGISTRATION

Name: _____

Address: _____

City: _____

State/Province: _____

Country: _____

Zip / Postal Code: _____

Telephone: _____

Email address: _____

MODEL # _____ **Purchase Date:** _____

SERIAL # _____

Manufacture of Boat: _____

Model of Boat: _____

Purchased from (Dealer Name): _____

Signature: _____ **Date:** _____

Mail to: Force 10 Marine Company
23080 Hamilton Rd.
Richmond, BC Canada
V6V 1C9

Fax to: (604) 522-9608