HOTSTART ENGINE HEATING
Customer Support: (509) 536-8660
E-Mail: sales@hotstart.com

Installation Instructions

TPS Series Tank Heater

READ CAREFULLY FOR PROPER INSTALLATION AND OPERATION

INSTRUCTIONAL VIDEO CAN BE FOUND AT WWW.HOTSTART.COM

⚠ CAUTION **Heater Damage**: Do not connect unit to electricity until the following steps have been completed. Never operate heater in air (verify heater is full of coolant and properly plumbed).

NOTICE **Please read carefully:** Hotstart's tank style heaters operate on the simple principle that heated fluid expands slightly and rises. Reliable and efficient operation of the heater is dependent on proper mounting location and installation.

Mounting and installation:
Before selecting a mounting position, consider the impact of: mounting locations, heater inlet and outlet ports, engine coolant ports, as well as the routing for hoses and electrical cord. The supply hose to the heater and the return hose to the engine should preferably be on the same side of the engine and as far apart as possible with the port where coolant is returned to the engine should be higher than the port where the coolant is pulled from. This allows for maximum heat distribution throughout the engine. See Figure 1.

- **We recommend minimum 3/8" NPT Fittings and 5/8" (15mm) I.D. Hose**

1. Drain and thoroughly flush cooling system.

2. Using supplied hardware, mount heater to the engine frame or skid ensuring that the heater outlet is as close to directly below where the coolant will be returned to the engine as possible and that the heater is below the lowest point of the water jacket. See Figures 1 and 3.

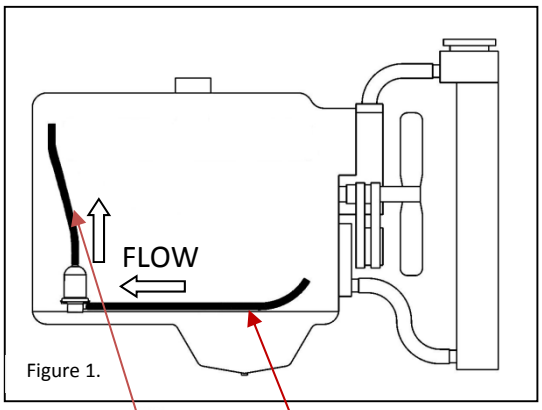

Figure 1.

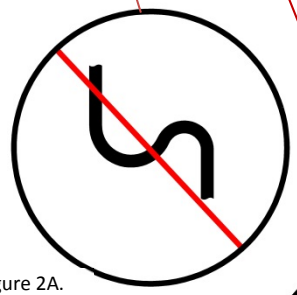
Figure 2A.

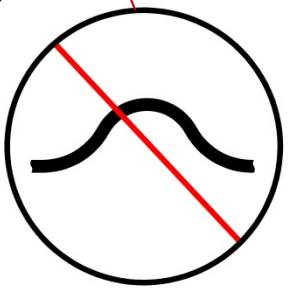

Figure 2B.

NOTICE **Isolate heater from vibration.** Do NOT mount heater directly to the engine or any components directly connected to the engine.

3. Heater Outlet: Install the hose between the outlet of the heater and where the coolant will be returned to the engine. The hose must be routed to have a continuous rise from the heater to the engine. See Figure 2A. **NOTE:** If isolation valves are installed, they must not increase flow restriction. Use only "full flow" type valves.

⚠ CAUTION **Personal Injury**: Do not energize heater with closed isolation valves. Excessive pressure could result.

4. Heater Inlet: Connect hose from the inlet of the heater to where the coolant will be pulled out of the engine. There must be no high spots in the routing of the hose. See figure 2B.

5. Refill the cooling system following the engine manufacturer specifications for coolant. Start engine and allow it to run until the engine thermostat opens. This will help purge the air out of the heater and plumbing. Once the engine has reached operating temperature, shut off and check for leaks. After the engine has cooled down, check coolant level and top off if needed.

6. Secure power cord at intervals with tape or wire ties to avoid contact with all hot or moving parts.

7. Connect heater to a properly grounded power source making sure to follow national and local electrical codes.

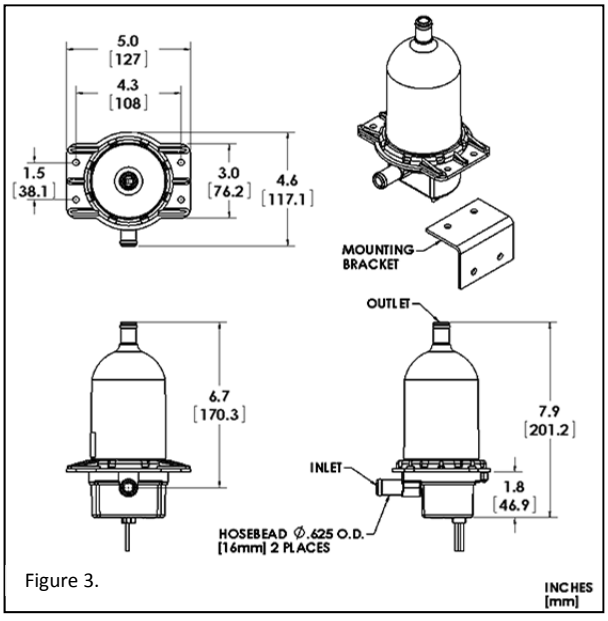

Figure 3.

Evaluating Heater Performance

To ensure that the Hotstart heater has been installed correctly, the coolant temperature going into the engine should be well below 200°F (93°C) and the heater should cycle on and off a maximum of 4 times per hour. An outlet temperature higher than 200°F or the inlet hose that is hotter than the outlet hose indicates limited or no circulation. This will result in decreased heater/hose life and poor engine heating.

If poor circulation is suspected, it could be due to one or more of the following:

- Airlocks may be present. Airlocks can form in hoses due to loops, routing over the top of the engine, excessive hose lengths, or kinks in hose.
- Heater is mounted too high relative to the engine water jacket.
- Heater is not mounted properly. Outlet neck must be pointed up.
- Contaminants in coolant restricting flow path.

The thermostats in Hotstart heaters are designed to measure the coolant as it enters the heater. This is the coolest water in the circuit. For example, if a heater has a thermostat rated for on at 100°F (38°C) and off at 120°F (49°C), the average engine temperature should be approximately 130°F (55°C). If desired, a remote heater control thermostat installed in the engine water jacket can provide a more direct means of controlling engine temperature. See Figure 4.

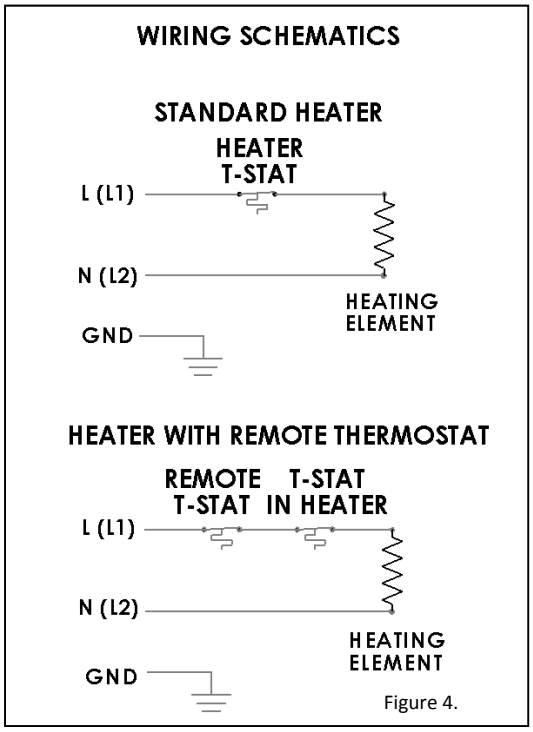

Figure 4.

Maintenance and Service

CAUTION **Personal Injury**: Disconnect and lockout electrical supply to heater before servicing the heater or any part of the installation.

Every two years:

- Drain, clean, and flush cooling system
- Check for cracked and/or weakened hoses and replace if necessary
- Check electrical wiring and connections for wear and excessive heat
- Remove element and clean element and tank

CAUTION **Personal Injury**: Do not energize heater with closed isolation valves. Excessive pressure could result.

Thermostat Replacement:

Thermostats have a finite life. We recommend that thermostats be replaced every 3 years or 25,000 hours of operation.

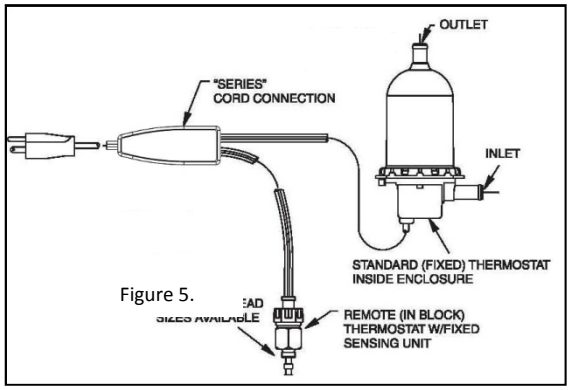

Figure 5.