6. Fuel System Installation

For efficient and safe operation of the heater, follow all recommendations for properly installing the fuel system.

DANGER: Never use gasoline in a heater. Use only #2 diesel, #1 stove oil or kerosene. The valves are factory calibrated to #2 diesel; if #1stove oil or kerosene is preferred you would need to order a valve stem or new valve specifically manufactured for your specific fuel viscosity.
*** If in colder temperatures it may be wise to burn kerosene or add fuel additives to your fuel to keep the fuel viscosity thin for correct operation. In some cases, a valve with a higher flow rate may be needed.

Fuel Supply & Overflow Feature
The fuel supply fitting on the oil metering valve is a 3/8" (10mm) flare fitting and the overflow is a 1/4" (6mm) flare fitting. To make these connections you will need a flaring tool to connect the 3/8" flare nut as well as a 1/4" flare nut. 3/8"OD and 1/4"OD ACR (refrigeration) copper tubing should be used for the first 3 feet of fuel line from the heater. Approved hose can be used for the remainder of the installation. Run the fuel lines as straight as possible to avoid air locks. Check all connections for any leaks.

The overflow safety feature is designed to allow the controlled escape of fuel from the heater in case of over pressurization. If dirt, debris, or too much pressure gets into the needle and seat inside the valve, the fuel will rise and overflow out of the valve and away from the heater. It is common to get a few drips now and then from the movement in rough waters, however, more then a few drops of fuel from the overflow indicates the need to service and clean the valve.

Under NO circumstances plug the overflow fitting!! A fuel line must be taken from the overflow fitting back to the main tank if the fuel is supplied from the main tank. If the fuel is supplied from a day tank, then run the overflow line to a container away from the heat source. The fuel overflow is a gravity escape. Do not install the overflow line so that is goes up or in loops as this will cause an air lock and block the fuel from escaping. Plastic, rubber or copper tubing may be used for the overflow line.

Note: If the your fuel tank vent or fill tube is higher than the valve of the heater, and the overflow of the heater goes back to the main tank, there may

be a chance when re-filling that the fuel will back flow up the overflow and out of the valve. For this reason a manual shut-off will need to be teed in the overflow line and closed when refilling tanks. Do not use a check valve. Remember to re-open the shut-off valve on the overflow line.

Fuel Filter & Manual Shut-off's

The fuel must be filtered before the fuel pump and before the oil metering valve to prevent dirt and debris from plugging up the check valves in the pump and the needle and seat in the valve. There also must be a manual shut-off by the tank and also close to the heater as the pressure on the needle in the valve will wear it out faster. We can supply a ¼" NPT fuel filter with a shut-off for close to your heater for this purpose. (Part# 20-010) The 15 micron stone element in the filter (part#20-020) should be replaced every 1-2 years.

Fuel Supply

The fuel can be supplied to your heater by either your main tank or a day tank and fed with either a fuel pump or gravity depending on your install.

Gravity Feed

When using a gravity tank, there should be a minimum head of 12" (30.48 cm) above the fuel level marked on the side of the oil-metering valve to operate correctly. The gravity feed tank must be vented and all fuel lines must be as straight as possible to avoid air locks. Do NOT use a pressurized tank.

The oil metering valve is rated to an incoming fuel pressure of 3 psi. If the pressure exceeds 4 psi, a pressure regulator will be needed in the supply line. (Part # 20-003) If installing a gravity tank larger then 30gal or higher than 8 feet above the valve of the heater, you will also need a pressure regulator.

Fuel Pump

When a low pressure fuel pump is used, a fuel line must be tee'd in as close to the fuel tank as possible, not from the engine supply line or engine filter. Use a check valve in the heater fuel line to stop the engine from pulling back the fuel and starving the heater.

7. Walbro Fuel Pump Installation

When installing a Walbro fuel pump you must ensure it is mounted approximately at the level of the valve on the heater. These pumps can "pull" fuel but have trouble "pushing" fuel so it must be gravity fed from the pump to the heater. The lift and the climate will then indicate if you need the standard pump (part#20-000) or the heavy duty pump (part#20-002). We highly recommend the heavy duty pump for all installs so you have the option of adjusting the pressure if needed.

The standard pump Walbro's FRD-2 part# 20-000 is a 12v DC pump with a pressure of 3psi. It is for a standard installation where the climate is fair and fuel run from the fuel supply to the pump is less then approx. 4ft vertical and 15ft horizontal.

The heavy duty pump part# 20-002 is Walbro's FRD-2 12v DC pump with a factory retrofitted pressure spring and an adjustable pressure regulator installed for a higher pressure pump for a heater installation in a colder climate and where the fuel run from the fuel supply to the pump is higher then approx. 4ft vertical and 15ft horizontal. This pressure regulator will adjust the pressure higher or lower to the oil metering valve.

*If using the heavy duty fuel pump part# 20-002, the adjustable pressure regulator attached has a thread size of 1/8" NPT. It is soft die cast aluminum so use caution when connecting the fittings. The numbered settings are only for reference because depending on the fuel supply installation and the climate will depend on the pressure of each setting. Disconnect the fuel line at the valve and allow the pump to push the air out of the fuel line to see a constant flow of fuel going into a bucket. Set the regulator to the lowest setting. Watch the flow of fuel. Adjust the regulator setting until there is a constant flow of fuel pouring into the bucket. If you have adjusted the regulator to the highest setting with still no constant flow of fuel, the regulator can be adjusted. Pierce a hole in the sticker on the center of the knob with a 5/64th Allen wrench and turn the adjusting screw clockwise ½ a turn.

To prime the pump, pump fuel into a container to remove all the air in the fuel lines. After a cup of fuel has been pumped, reconnect fuel line to the valve. If there is no fuel getting to the pump or there's air in the fuel line the pump can make a chattering noise.

Once the valve is full of fuel and the pressure has been reached the fuel pump will still continue to tick, but less frequent. Once the pressure drops in the valve the pump will then begin to tick more frequent depending on the demand of fuel from the valve. To lessen the noise of the pump pulsing, a rubber backing can be installed.

The pump should be included in a control circuit with a 5 amp fuse so it can be turned off when the heater is not in use. NOTE: If the power to the pump is shut off, the fuel could still flow through to the pump by way of siphon. The flow of fuel should be turned off using the shut-off valve near the heater as well as the oil metering valve.

The pumps can be installed with fuel inlets and outlets up or down, however mounting the pump with the fuel inlet (spout looking side) on top will give the pump extra pressure and is easier to clean. The pump will need to be primed the first time only to remove air in the fuel line. There are 3 check valves in the pump to prevent the back flow of fuel, so the pump should stay primed. If the pump does not stay primed then 1 of the check valves in the pump needs to be cleaned

The pump should be installed in a ventilated area and not near a hot exhaust. Connect the ground to a negative battery. This pump is not recommended for gasoline.

Walbro FRD-2 Fuel Pump Upgrade

To upgrade a Walbro FRD-2 (part#20-000) to a Heavty Duty pump (part#20-002) a factory spring & regulator must be installed. If you find you are not getting fuel to the valve with the FRD-2 standard pump you may need the stronger pump with the stronger pressure. Please contact Dickinson to order a stronger spring & regulator. info@dickinsonmarine.com

Once you have received a stronger spring and regulator from Dickinson, you can upgrade your pump to a stronger pressure. Unscrew the 3 torx screws (t-20) and with twisting the lid back and forth, pull it straight back off. Note the pump plunger, spring, check valve, and a very small amount of fuel will drop out if installed as per diagram. Place the check valve as shown in the diagram on top of the heavier replacement spring, and the spring on top of the pump plunger and push it back into the pump body holding it in with a finger. Note the magnetic part of the plunger is on the opposite end of the

spring. Replace the lid with the gasket on by lowering your finger on to the red O ring sleeve without the plunger falling out (the plunger is about 2" long so you have room to lower your finger out of the way). The red O ring sleeve will fit inside the pump tube and the black O ring will fit over the outside of the pump tube and will require twisting and pushing the lid straight back in. This is a little tight but that is what makes the seal. Rotate the gasket and replace the screws.

Now that your standard pump is upgraded to a heavy duty pump it must be primed. When priming the heavy duty pump hold down the knob of the pressure regulator to prime the fuel lines to take out the air. Then turn the dial to the lowest setting on the regulator and increase the pressure one increment at a time until the pump is just delivering a constant flow at the heater.