



INSTALLATION INSTRUCTIONS

TANK STYLE ENGINE HEATERS

WARNING READ CAREFULLY FOR PROPER INSTALLATION & OPERATION

Customer Support: 509-536-8660

Operating Principle

The Kim Hotstart Engine Heater operates on the principle of a thermosiphon as shown in Figure 1. As the temperature of the coolant in the heater tank increases, its density decreases causing it to rise through the outlet of the tank to the engine. The coolant leaving the heater tank is replaced with coolant drawn from the engine in a continuous cycle. A high-limit thermostat (to prevent abnormally high temperatures) is included on many of the CL and SL models. It is located in the element enclosure as shown in Figure 1.

NOTICE

The high-limit thermostat is not designed to control the temperature of the engine coolant (it is strictly to prevent hazardous heater temperatures or excessive coolant temperatures if the heater is operated improperly). For coolant temperature control, optional flow-through thermostats are available for the inlet of the tank (see Figure 2).

Figure 2 shows an engine heater installation drawing cold water from the block through the coolant bypass and pump via a connection to the lower radiator pipe.

The desired circulation pattern of an external tank type heater is shown in Figure 3. Cold water is taken from the bottom of the engine block, heated in the tank heater and returned back to the top rear area of the block.

The bi-directional ball check valve located in the inlet of the heater allows a reduced amount of coolant to reverse flow through the heater when the engine is running. This will maintain a full coolant level in the tank at all times to protect the element from overheating. This is a safety device only.

NOTICE

Operation of the system during engine operation may cause damage to the heater.

NOTE: Kim Hotstart recommends the use of an oil pressure switch or other automatic shut-off device on all heaters on automatic start, stand-by or remote engine sites.

NOTICE

Prior to heater installation, check the cooling system. Poor coolant conditions will interfere with proper function of the heater and can also cause element failure. If there is sediment or foreign matter present or the coolant does not meet the engine manufacturer's specifications, the system should be drained, cleaned, flushed and refilled with a 50/50 mixture of low silicate antifreeze, de-ionized or distilled water, and low silicate supplemental coolant additives. Do not exceed a concentration of more than 60% antifreeze, as element failure will result. A cooling system containing anti-leak additive will also result in element failure.

Figure 1

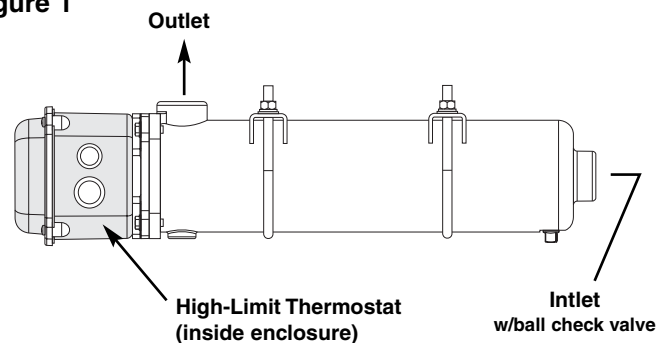


Figure 2

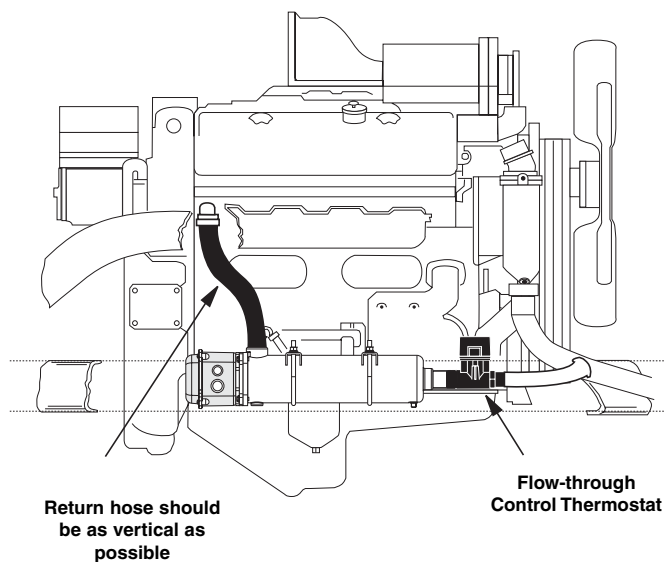
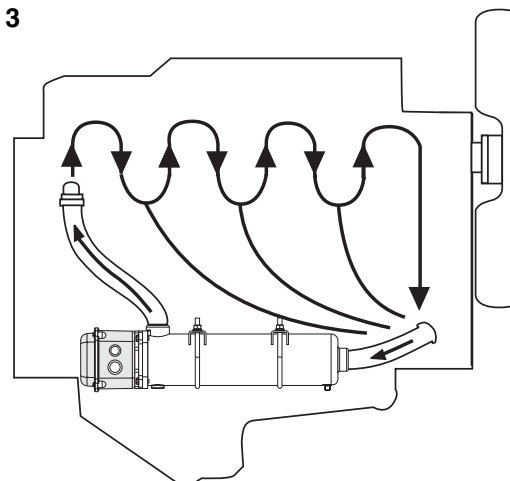


Figure 3



Mounting The Kim Hotstart Engine Heater

NOTE: The following mounting instructions apply to both truck engines and industrial applications. For additional instructions specific to industrial and stationary engine applications, reference page 4.

Step 1

Mount the tank heater in a horizontal position with the outlet neck pointed up. Position the heater outlet directly under (or as close as possible) the engine port to which the coolant is being returned. This will eliminate horizontal sections or dips in the outlet hose which prevent circulation. See Figure 2 and 7. Slightly elevating the outlet end of the tank (by about 1/2 to 1") will improve circulation and help eliminate backflow through the ball check valve that can cause the thermostat to open prematurely. If mounted in a vertical position, outlet neck must be at top end. See Figure 4.

Step 2

The Kim Hotstart engine heater has adjustable mounting feet (See Figure 5). The mounting hardware can be adjusted in various positions given that the heater is oriented as shown in Figure 4.

Step 3

Bolt the heater to the truck frame (or skid frame on a generator package) with the mounting straps provided. See Figure 6. The heater must be even with or below the lowest level of the engine water jacket to ensure a good vertical rise of heated coolant to the engine.

NOTICE

DO NOT mount the heater to the engine. Engine vibration can damage the heater and void the warranty.

NOTICE

There MUST be adequate vertical rise of coolant leaving the heater. DO NOT mount the heater above lowest point of engine water jacket. Mounting requirements for some industrial applications may differ from those shown here. For additional information, contact Kim Hotstart Manufacturing Company, (509) 536-8660 or sales@kimhotstart.com

Step 4

Route the cord to any convenient point and tie the cord down to prevent damage and strain. Be sure to route the cord away from hot surfaces and moving objects. A flush-mount electrical receptacle with flip cover is available to replace the plug.

Plumbing The Kim Hotstart Engine Heater

Kim Hotstart recommends that you follow the minimum plumbing sizes listed below. Smaller hose will reduce performance. If engine openings are smaller than the recommended minimum size, reduce the plumbing at the engine, not the heater or flow-through thermostat. If the heater and flow-through thermostat are installed with pipe, use a section of hose in both lines to isolate the heater from engine vibration.

A high temperature hose should be used. Use red jacket EPDM type hose (Goodyear Contender, Gates 1B or equal).

Minimum Plumbing Sizes:

500-3000 Watt — 1/2" NPT Fittings, 3/4" ID Hose
3750-5000 Watt — 3/4" NPT Fittings, 1" ID Hose

Figure 4

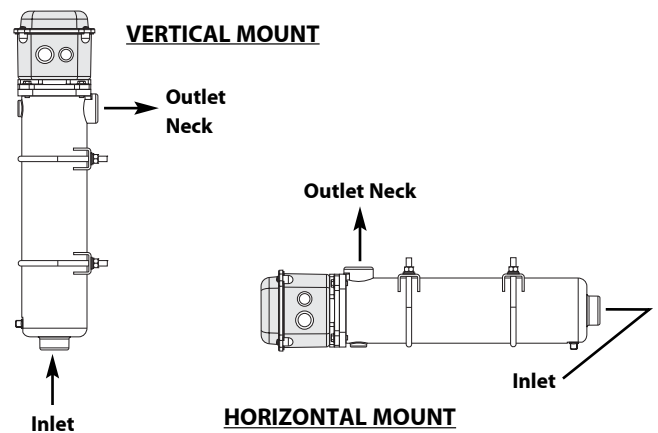


Figure 5

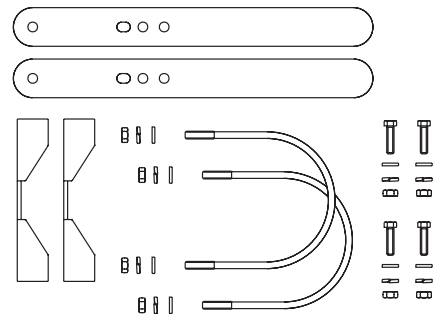


Figure 6

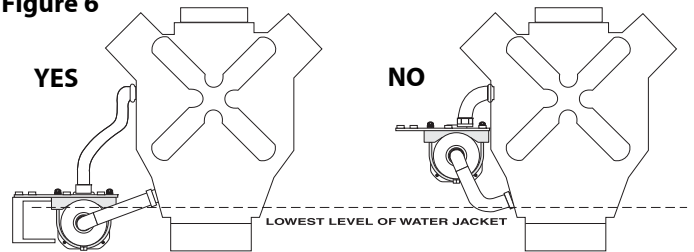


Figure 7

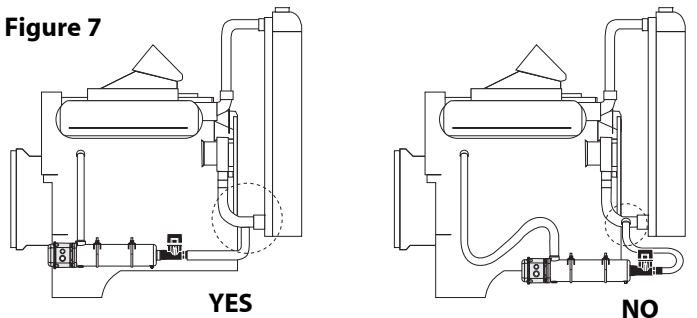
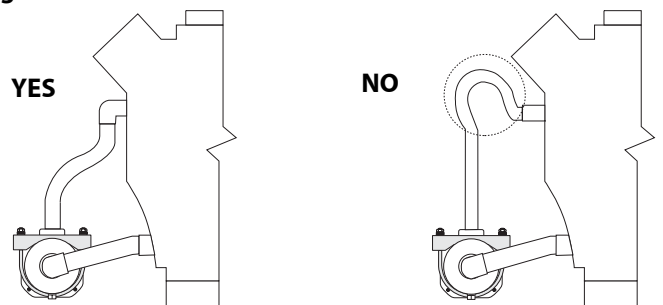


Figure 8



Step 1

Drain the engine coolant. Flush system with fresh water to remove any internal particulates.

Step 2

Connect the heater intake to the lowest possible point of the water jacket. If a connection point is unavailable in the water jacket area, connect heater intake line to the lower radiator hose. See Figure 7.

Step 3

Connect heater outlet to the highest accessible point in the engine's water jacket area at the furthest point from the engine's thermostat. The heater outlet must be connected at a higher point on the engine than the intake. See Figures 3 & 8.

NOTICE

DO NOT route outlet hose above engine block connection, or loop or kink hoses. This will cause air locks in the hose and stop circulation of the coolant by the heater. See Figure 8.

Step 4

To eliminate air locks in the heater and hoses, refill the engine with heater outlet line disconnected at the engine until outlet line is full of coolant. See Figure 9. Then connect the outlet line to the engine and finish filling the engine. See Figure 9.

NOTICE

DO NOT energize the heater at this point! All air must be bled out of the system by running the engine. If not, air could be trapped in the heater or engine, preventing the heater from operating.

Step 5

Run the engine until it reaches operating temperature and the engine thermostat opens. This will purge air from the cooling system. Check installation for leaks, shut down the engine and allow it to cool down.

Step 6

After engine is cool, check coolant level and top off as needed.

Testing The Kim Hotstart Engine Heater Installation

Step 1

Energize the Kim Hotstart engine heater

Step 2

Feel the outlet hose at the engine connection. It should get hot. See Figure 10.

NOTE: If tank is hot and the top of the outlet is not, disconnect power to the heater. Disconnect and bleed the outlet line at the engine (reference Step 4 of the plumbing instructions).

Step 3

If the outlet hose is hot, the block and intake hose should begin to warm up as the circulation back to the heater is completed. See Figure 11.

Figure 9

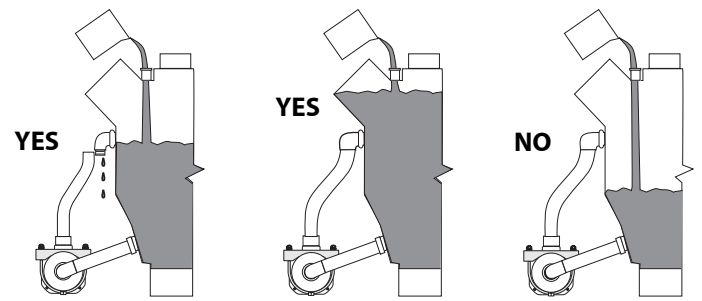


Figure 10

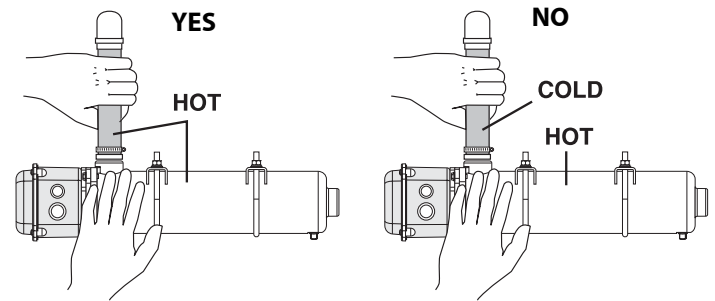


Figure 11

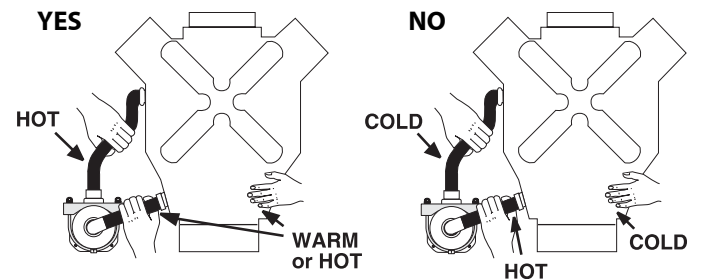
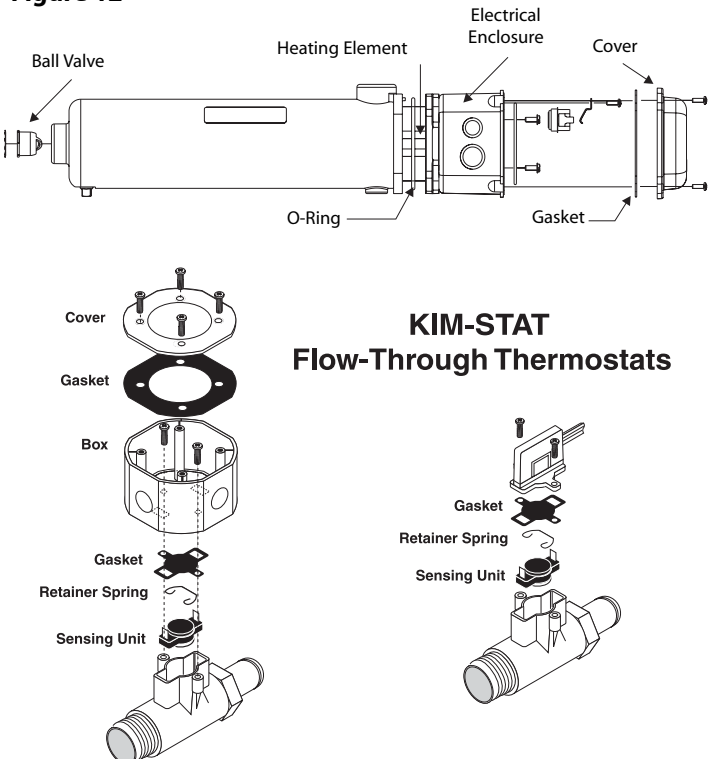


Figure 12



If the block and intake hose do not begin to warm up, the coolant is not circulating freely due to one or more of the following reasons:

- Airlocks may be present in the engine. Or airlock in the hose due to loops, routing over the top of the engine, excessive lengths, or kinks in hose.
- Heater is mounted too high. Heated coolant can't rise enough for proper circulation.
- Heater is not mounted properly. Outlet neck must be pointed up if mounted horizontally and must be at the top if mounted vertically (see Figure 4). In some cases, adjusting horizontal installations to slightly elevate the outlet end of the tank (by about 1/2 to 1 inch) will help eliminate backflow through the ball check valve.
- Flow problems can occur due to contamination or restrictions. Check the flow path.

Preventive Maintenance For The Kim Hotstart Engine Heater

Step 1

Periodically check hoses and replace as required.

Step 2

Once per year:

- Remove electrical box cover and inspect the electrical connections (see Figure 12).
- Remove the heating element of the Kim Hotstart engine heater. Be careful not to damage the O-rings. Clean and flush the interior of the tank and clean the element's surface of any coolant deposits.
- Shake the tank while viewing the valve and listen for valve movement. If the valve does not move freely, replace valve assembly and retaining ring (see Figure 12).

Replace damaged and worn parts with Kim Hotstart replacement parts. Reassemble heater with the O-rings and four 1/4-20 bolts. See Figure 12.

NOTE: Before energizing the engine heater, refer to step 4, 5 and 6 of "Plumbing the Kim Hotstart Engine Heater" and step 1, 2 and 3 of "Testing the Kim Hotstart Engine Heater Installation" sections.

Industrial And Stationary Engine Applications

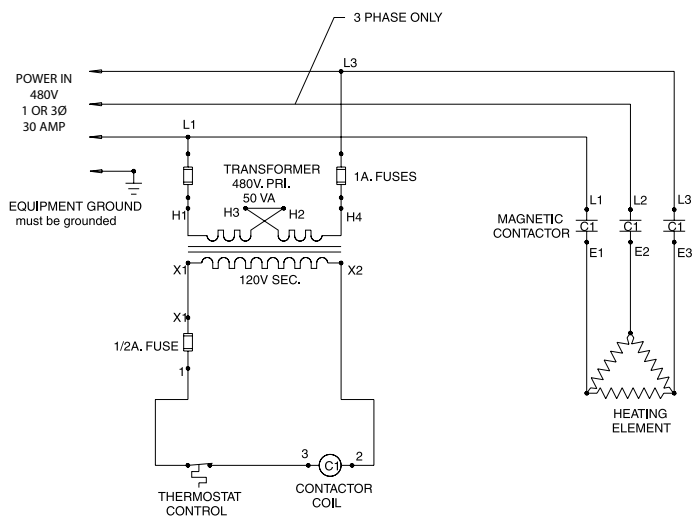
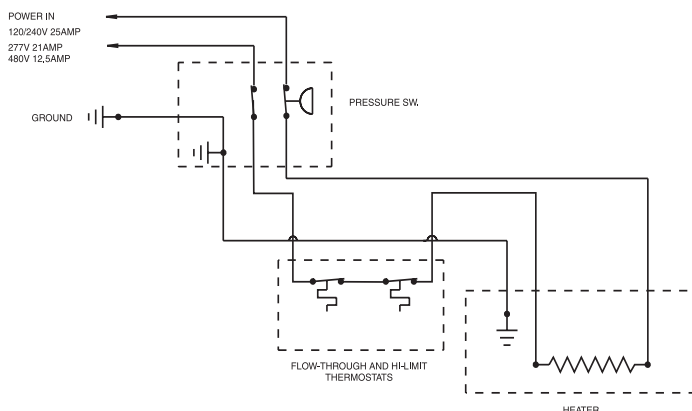
All information in this instruction sheet must be followed when installing a heater on an industrial or stationary engine such as a generator set, emergency fire pump, marine or off-road construction equipment. However, due to special factors common to these applications, certain options and requirements must be considered.

For V-engines larger than 8 cylinders or over 1000 C.I.D., Kim Hotstart recommends using a circulating type heating system with pump. However, if standard tank type heaters are installed we recommend the use of two heaters of equal wattage. One heater should be installed on each side of the V-engine. For example, to operate a 1000cu. in. V-engine in ambient temperature above -20°F, use TWO 2,000 watt heaters (for a total of 4,000 watts) with 1 heater mounted on each side of the engine.

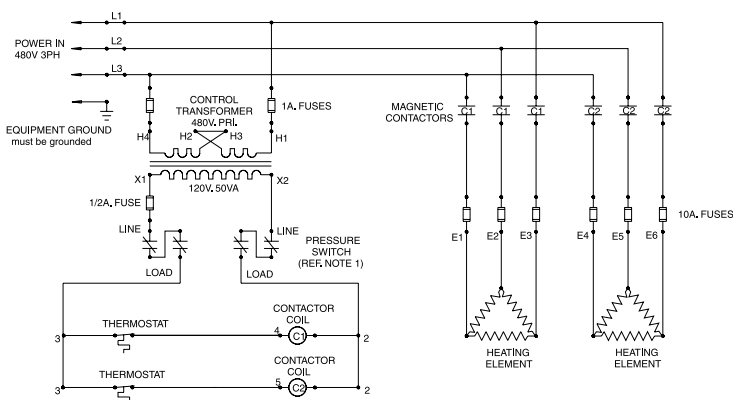
Typical Wiring Diagrams

NOTES:

- Heaters must be wired according to NEC and local codes.
- All Kim Hotstart heaters with thermostats designed to operate on 3-phase current (at any voltage), require the use of a control system with a 3-pole contactor. All Kim Hotstart heaters with thermostat designed to operate over 480 volt (1 phase or 3 phase), require a control system to reduce the primary voltage to 120 volts for the control circuit. For increased thermostat life, use a control system on all heaters above 277 volts either single or three phase.
- On automatic start engines, a control box with an automatic shut-off device is recommended.



Shown with Model JBW14-000 Control Box



Shown with Model JBW24-200 Control Box