

INSTALLATION INSTRUCTIONS

CIRCULATION TANK HEATER



Never connect heater to electricity until the following steps have been completed and proper plumbing has been verified.



DANGER: ELECTRIC SHOCK – TO PROVIDE CONTINUED PROTECTION AGAINST RISK OF SHOCK; CONNECT TO PROPERLY GROUNDED OUTLETS ONLY. DO NOT OPERATE HEATER WITHOUT THE PROTECTIVE COVER SECURED IN PLACE.



WARNING – HEATER IS DESIGNED FOR INSTALLATION IN WEATHER PROTECTED AREAS. DO NOT EXPOSE TO RAIN, SPLASH, OR EXCESSIVE MOISTURE.



WARNING: FIRE HAZARD – USE WITH ENGINE COOLANT ONLY.



WARNING: ELECTRIC SHOCK: NO OPERATOR SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL. DISCONNECT HEATER FROM POWER BEFORE SERVICING.



WARNING: ELECTRIC SHOCK: DO NOT ENERGIZE HEATER WHILE STANDING IN WATER OR IF POWER PLUG IS WET. USE GFCI 3-WIRE GROUNDED OUTDOOR EXTENSION CORD. USE 14 GAGE WIRE EXTENSION CORD FOR HEATERS HIGHER THAN 1500 WATTS.



CAUTION: NEVER ENERGIZE HEATER IF ELEMENT IS NOT FULLY IMMERSSED IN COOLANT AS SHORTENED HEATER LIFE OR DAMAGE TO THE HEATER OR ENGINE COULD RESULT.



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, KEEP EXTENSION CORD CONNECTION DRY AND OFF THE GROUND.

INSTALLATION RECOMMENDATIONS:

1. Drain and flush the cooling system to remove contaminants. Recycle or dispose of engine coolant properly to prevent environmental contamination.
2. Mount the heater as shown in figure 1. with the power cord connection at the bottom.

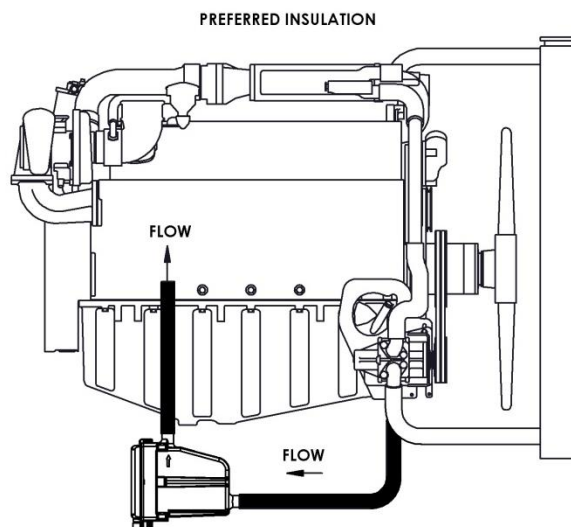


Figure 1

NOTICE: THE HEATER WILL OPERATE CORRECTLY ONLY IF MOUNTED IN THE ORIENTATION AS SHOWN IN FIGURE 2. ATTACH THE HEATER AS LOW AS POSSIBLE TO THE EQUIPMENT FRAME OR OTHER SUITABLE AREA. HEATER MUST BE BELOW THE LOWEST LEVEL OF THE ENGINE COOLING SYSTEM. THE HEATER INLET MUST BE BELOW THE POINT WHERE COOLANT IS REMOVED FROM THE ENGINE. THE HEATER OUTLET SHOULD BE CONNECTED TO THE HIGHEST ACCESSIBLE POINT IN THE ENGINE BLOCK ON THE PRESSURE SIDE OF THE COOLANT SYSTEM PUMP. KEEP THE OUTLET HOSE AS SHORT AS POSSIBLE AND STILL MAINTAIN A MINIMUM RISE OF 12 INCHES TO ENSURE PROPER CIRCULATION.

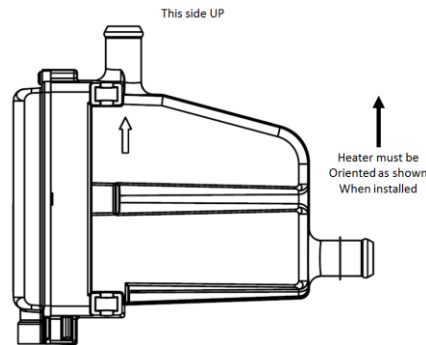


Figure 2



CAUTION: THE HEATER MUST BE ISOLATED FROM ENGINE VIBRATION OR SHORTENED HEATER LIFE WILL RESULT. **DO NOT MOUNT THE HEATER DIRECTLY TO THE ENGINE OR ANY COMPONENTS DIRECTLY CONNECTED TO THE ENGINE.**

NOTICE: USE THE PROVIDED BRACKET, BOLTS, NUTS, AND WASHERS TO MOUNT THE HEATER. TORQUE THE FASTENERS TO 14.9 NM (11 FT-LB).

3. Install heater hose between the heater inlet and the engine.

NOTICE: USE 16MM (5/8") HEATER HOSE FOR 1000 WATT HEATERS AND 19MM (3/4") FOR 1500-2250 WATT HEATERS.

NOTICE: USE ONLY HEATER HOSE RATED FOR AUTOMOTIVE APPLICATIONS AND APPROPRIATELY SIZED/RATED FITTINGS AND VALVES. CUT HOSE CLEANLY AND SQUARELY TO LENGTH. SLIDE CLAMPS ONTO HOSE. PUSH HOSE ON FITTING COMPLETELY. POSITION HOSE CLAMP 3.4MM (1/8") FROM END AND SECURE WITH A SCREWDRIVE OR WRENCH. MAXIMUM RECOMMENDED HOSE CLAMP TORQUE IS 3.4 NM (30 IN-LB). DO NOT OVER TIGHTEN.



CAUTION: DO NOT USE HOSE SMALLER THAN THE RECOMMENDED SIZE AS COOLANT FLOW WILL BE RESTRICTED AND SHORTENED HEATER LIFE WILL RESULT.

NOTICE: THE INLET HOSE MUST ROUTE CONTINUOUSLY DOWNWARD FROM THE ENGINE TO THE HEATER WITH NO DIPS, HUMPS OR SHARP BENDS. SEE FIGURE 3.

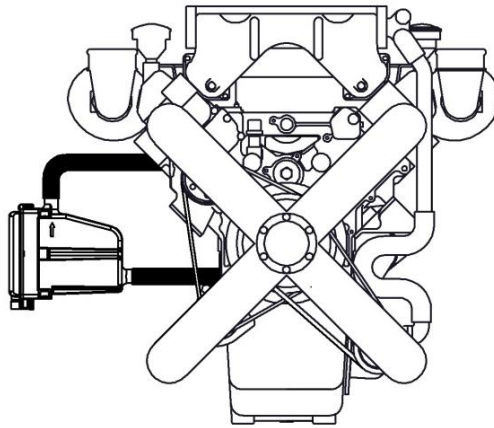


Figure 3

4. Install heater hose between the heater outlet (discharge) and the engine block.

NOTICE: NEVER LOOP THE OUTLET HOSE OVER THE TOP OF THE ENGINE TO MAKE A HEATER OUTLET (DISCHARGE) CONNECTION AS THIS COULD RESULT IN DAMAGE TO THE HEATER. SEE FIGURE 4.

NOTICE: SHARP BENDS IN THE HEATER OUTLET (DISCHARGE) HOSE SHOULD BE AVOIDED AS THIS COULD RESULT IN DAMAGE TO THE HEATER. THE COOLANT DRAW SHOULD BE AS CLOSE TO DIRECTLY ABOVE THE HEATER AS POSSIBLE. THIS WILL ENSURE THAT THE HEATER HAS A SUPPLY OF COOLANT AT ALL TIMES. SEE FIGURE 5.

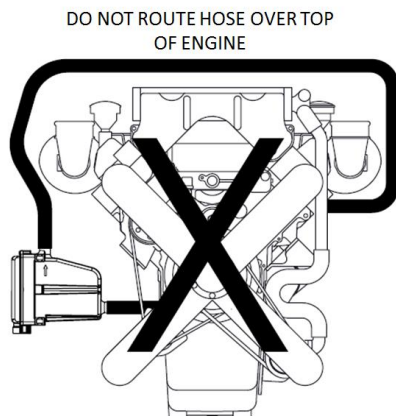


FIGURE 4

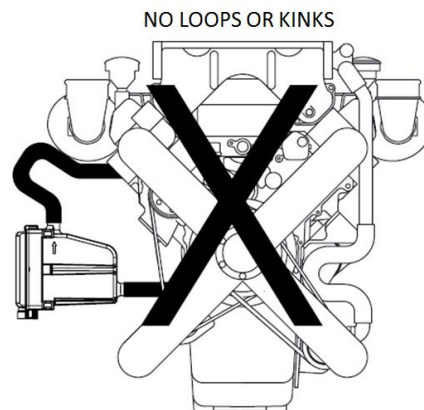


FIGURE 5

Secure the power cord at regular intervals with tape or ties to prevent contact with all hot or moving parts.



WARNING: ELECTRIC SHOCK – ENSURE POWER CORD IS FASTENED SECURELY TO PREVENT DAMAGE FROM CONTACT WITH HOT OR MOVING PARTS.

5. Fill cooling system following the engine manufacturer's recommendation for coolant.

NOTICE: THIS PRODUCT IS DESIGNED FOR ENGINE COOLANT SOLUTIONS UP TO A MAXIMUM OF 60% GLYCOL.

NOTICE: DO NOT USE HEATER IN COOLING SYSTEMS CONTAINING ANY FORM OF ANTI-LEAK ADDITIVE, AS A SHORTENED HEATER LIFE MAY RESULT.

6. Start and run the engine until it reaches operating temperature. Shut off the engine and check for leaks. Check the coolant level and add if necessary.



CAUTION: DO NOT ENERGIZE THE HEATER WITH CLOSED ISOLATION VALVES AS EXCESSIVE PRESSURE COULD RESULT IN SEVERE INJURY.

7. Connect the heater to electrical power.



WARNING: DO NOT ENERGIZE THE HEATER WHILE STANDING IN WATER OR IF POWER PLUG IS WET, AS ELECTRIC SHOCK OR SEVERE INJURY MAY OCCUR. [Electric shock/injury may occur]

8. Re-check all heater connections for leakage.
9. Check the heater for proper operation at regular intervals by feeling the hoses. The heater case will warm up quickly and become hot to the touch. The outlet hose should be warm and the inlet hose comparatively cool if the coolant is circulating properly. If the inlet hose gets very warm before the entire system, the coolant may not be circulating properly.

Heater Maintenance Instructions:



WARNING: TO AVOID ELECTRICAL SHOCK, ENSURE THAT THE HEATER IS DISCONNECTED FROM THE POWER SOURCE PRIOR TO PERFORMING ANY INSPECTION OR MAINTENANCE. SERVICE IS TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

- Regular maintenance – Periodically check all hoses for damage due to aging, elevated temperatures (particularly the portion of hose immediately above the heater outlet), over-torqued hose clamps, abrasion, weathering, and leaking engine fluids. Replace damaged hoses as required. Seasonally check hose clamp torque and adjust accordingly.
- Biannual maintenance – Engine manufacturers recommend that the coolant system be flushed and inspected once every two years.
 1. Unplug the heater from the electrical power source.
 2. Drain and flush the cooling system to remove contaminants. Recycle or dispose of engine coolant properly to prevent environmental contamination.
 3. Re-fill cooling system following the engine manufacturer recommendation for coolant.
 4. Start and run the engine until it reaches operating temperature. Shut off the engine and check for leaks. Check the coolant level and add if necessary.
 5. Re-connect the heater to electrical power.



WARNING: DO NOT ENERGIZE THE HEATER WHILE STANDING IN WATER OR IF POWER PLUG IS WET AS ELECTRIC SHOCK OR SEVERE INJURY MAY OCCUR.

6. Check the heater for proper operation at regular intervals by feeling the hoses. The heater case will warm up quickly and become hot to the touch. The outlet hose should be warm and the inlet hose comparatively cool if the coolant is circulating properly. If the inlet hose gets very warm before the entire system, the coolant may not be circulating properly.

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The Company's products are warranted against defects in materials and workmanship for a period of one year from date of purchase by purchaser. The exclusive and sole remedy for any product found to be defective under this limited warranty consists of the repair or replacement of the defective product. This limited warranty does not apply to defects which arise from normal wear and tear, accident, misuse, abuse, neglect, mishandling, misapplication, improper installation, modification, improper or extraordinary use or use inconsistent with any instruction or recommendation issued by the Company.

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To obtain performance of this limited warranty, the alleged defective product must be returned, together with reasonable proof of purchase, postage or freight prepaid directly to:

In **U.S.A.**
Warranty Department
Phillips and Temro Industries Inc.
9700 West 74th St.
Eden Prairie, MN 55344

In **CANADA**
Phillips and Temro Industries
c/o Purolator
1151 Martin Grove Road
Door 50
Etobicoke, Ontario, M9W 4W7

The company will return the repaired or replaced product, postage or freight prepaid. Final determination of defects shall be made in accordance with procedures established by the Company.

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The Company reserves the right to make changes in design, additions or improvements to any of its products at any time without incurring any obligation whatsoever to install or replace the same or improve upon products previously manufactured.