**RETURN PORT**
- Select a return port toward the rear of the engine.
- Select a return port away from the engine thermostat.
- Select a return port away from the supply port.

**HEATER MOUNTING**
- Mount the heater in the proper orientation.
- Mount the heater to a vibration-isolated surface.
- Mount the heater at least 6 inches (15 cm) below the lowest point of the water jacket.

**SUPPLY PORT**
- Select a supply port toward the front of the engine.
  For V-type engines, it is acceptable to select a supply port on the side of the engine opposite the heater as long as the supply hose is routed properly.
- Select a supply port away from the return port.

**HOSES & PORTS**
- Select proper port fittings.
  The following table shows the minimum port size fittings:
  
<table>
<thead>
<tr>
<th></th>
<th>1000–2500 watts</th>
<th>3000–12000 watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTM</td>
<td>3/8 inch NPT</td>
<td>3/4 inch NPT</td>
</tr>
<tr>
<td>CSM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Select proper hose inner diameter sizes.
  The following table shows the minimum hose inner diameters:
  
<table>
<thead>
<tr>
<th></th>
<th>1000–2500 watts</th>
<th>3000–12000 watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTM</td>
<td>5/8 inch</td>
<td></td>
</tr>
<tr>
<td>CSM</td>
<td></td>
<td>1 inch</td>
</tr>
</tbody>
</table>

For additional assistance, view the HOTSTART Engine Heater Installation and Troubleshooting videos at [www.hotstart.com/home/resources/videos](http://www.hotstart.com/home/resources/videos).

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**INSTALLATION PROBLEMS & HAZARDS FOR HOTflow™ HEATERS**

### RETURN PORT
- **Return port is installed toward the front of the engine.**
  - A return port too close to the front of the engine will reduce heating effectiveness.

- **Return port is too close to the engine thermostat.**
  - A return port installed too close to the engine thermostat can cause heated coolant to flow to the radiator, reducing heating effectiveness.

- **Return port is too close to the supply port.**
  - A return port too close to the supply port will cause heated coolant to flow through only a small portion of the engine.

### SUPPLY PORT
- **Supply port is installed toward the rear of the engine.**
  - A supply port mounted too close to the rear of the engine will reduce heating effectiveness.

- **Supply port isolation valve is closed.**
  - Operating the heater without the presence of coolant will cause overheating and damage the heater.

### HEATER MOUNTING
- **Heater is mounted upside down.**
  - An incorrectly oriented heater will reduce coolant flow and heating effectiveness.

- **Heater is mounted directly to the engine.**
  - Engine vibration will damage the heater.

- **Heater is not mounted at least 6 inches (15 cm) below the water jacket.**
  - A heater mounted too high will restrict coolant flow and reduce heating effectiveness.

### HOSES & PORTS
- **Return hose is kinked or damaged.**
  - Kinked or damaged hoses will reduce coolant flow.

- **Return hose does not continuously rise to the port.**
  - A return hose that does not continuously rise may create high points, restricting coolant flow.

- **Supply hose is unnecessarily long.**
  - Unnecessarily long hoses may create dips and bends, collecting air bubbles and restricting coolant flow.

For additional assistance, view the HOTSTART Engine Heater Installation and Troubleshooting videos at www.hotstart.com/home/resources/videos.