

## HOTflow® Heating System CTM



Hotstart's CTM HOTflow® heating system is a coolant preheater, developed to maintain optimal temperatures for diesel and gas engines in stationary land power, marine, and construction equipment applications.



### COMPACT CAPABILITY

Despite its small footprint, efficient forced circulation allows the CTM to heat engines up to 20 liters in displacement, allowing for a wide variety of small-engine applications.



### VERSATILE & ADAPTABLE

The CTM can be configured for almost any weather-protected application. Multiple options are available, including UL/C-US listed and CE-compliant models.



### EASY INSTALLATION

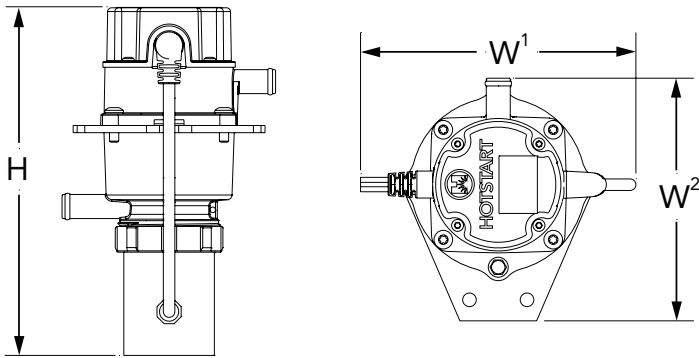
The CTM's inlet and outlet may be reoriented at 90° increments to accommodate heater plumbing. The included mounting kit is ideal for most installations; an optional vibration isolation kit is also available.



### LOWER TOTAL COST OF OWNERSHIP

Forced circulation provides uniform heat throughout the engine, reducing component maintenance and offering significant energy savings. The CTM may reduce end-user utility costs by up to 35%<sup>1</sup>.

<sup>1</sup> Savings are dependent on local utility rates and installation variables.



Height (H)	Width 1 (W <sup>1</sup> )	Width 2 (W <sup>2</sup> )	Weight
9.1"	5.7"	6.3"	3.5 lbs
230 mm	145 mm	161 mm	1.6 kg

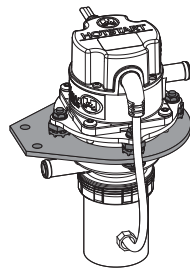
System	
Phase	single-phase (1 Ø)
Voltage (60 Hz)	120V   240V
Voltage (50 Hz)	240V
Ingress	IP44
Min./Max. Ambient Temp	-40 °F / 104 °F (-40 °C - 40 °C)
Application	for use in weather protected applications
Certification	UL/C-US recognized models available (E250789) CE-compliant models available

Coolant	
Fluid Type	Water   Coolant mix (50% water/50% glycol)
Heat Power	1 kW   1.5 kW   2.5 kW
Temp. Control	Fixed, 100 – 120 °F (38–49°C)
Temp. High Limit	300 °F (149°C)
Flow	3.5 gpm @ 4 psi (13.3 L/min @ 28 kPa)
Inlet/Outlet	0.625" (16 mm) hose barb

**Vibration Isolation Kit**

**CTM IMK**

Optional kit protects heating system from damaging engine vibration. For use in mobile applications or non-isolated stationary skid installations.



Ordering Information  
**CTM**

**CTM with 8' (2.4 m) cord and NEMA plug\* (-N00)**

Engine Displacement	Power Supply			Heating System	
	V	Hz	kW	Amps	Model Number
0–500 CID 0–8 L	120	60	1	8.8	CTM10110-N00
	240	50/60	1	4.4	CTM10210-N00
500–750 CID 8–12 L	120	60	1.5	13.0	CTM15110-N00
	240	50/60	1.5	6.5	CTM15210-N00
750–1000 CID 12–20 L	120	60	2.5	21.3	CTM25110-N00
	240	50/60	2.5	10.7	CTM25210-N00

**CTM with 9.8' (3 m) cord and Euro plug\*\* (-E00)**

Engine Displacement	Power Supply			Heating System	
	V	Hz	kW	Amps	Model Number
0–500 CID 0–8 L	120	60	1	8.8	CTM10110-E00
	240	50/60	1	4.4	CTM10210-E00
500–750 CID 8–12 L	120	60	1.5	13.0	CTM15110-E00
	240	50/60	1.5	6.5	CTM15210-E00
750–1000 CID 12–20 L	120	60	2.5	21.3	CTM25110-E00
	240	50/60	2.5	10.7	CTM25210-E00

**CTM with 9.8' (3 m) cord and no plug (-A00)**

Engine Displacement	Power Supply			Heating System	
	V	Hz	kW	Amps	Model Number
0–500 CID 0–8 L	120	60	1	8.8	CTM10110-A00
	240	50/60	1	4.4	CTM10210-A00
500–750 CID 8–12 L	120	60	1.5	13.0	CTM15110-A00
	240	50/60	1.5	6.5	CTM15210-A00
750–1000 CID 12–20 L	120	60	2.5	21.3	CTM25110-A00
	240	50/60	2.5	10.7	CTM25210-A00

\* – UL/C-US listed  
\*\* – CE compliant

Other voltages available.  
Consult the factory.

*Installation Instructions*

**HOTflow™ CTM Heating System**

READ CAREFULLY FOR PROPER INSTALLATION AND OPERATION

**ADDITIONAL SUPPORT CAN BE FOUND AT [WWW.HOTSTART.COM](http://WWW.HOTSTART.COM)**

The CTM forced circulation heater combines a pump, heating elements, and temperature control system. It is created to heat engine coolant that consists of 50/50 glycol and water mixture. The heater is designed to provide heating for engine displacements up to 20L in size. The forced circulation of the coolant provides uniform heating throughout the engine. The heater is used to heat diesel and gas engines for stationary land power, marine, large mining, and construction equipment. The heater is rated for 240V power supply with power output of 1000W, 1500W, and 2500W. The minimum ingress protection rating is IP44. The heater is rated for the conditions listed in EN 601010-1:2010 1.4.1. Special configurations per customer specification also apply.

**NOTICE**

**Please read carefully:** The safety of any system incorporating this heater is the responsibility of the assembler. The safe and proper use of this heater is dependent upon the installer following sound engineering practices. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. All work to be performed by qualified personnel only. Heater must be connected to a suitable protective earthing conductor. The power supply to be protected by a suitable overcurrent limiting device. A means of disconnection from power supply is required. Hotstart recommends that a power switch or circuit-breaker be located near the heater for safety and ease of use. Reference markings on the heater for specific ratings.

**CAUTION**

**Personal Injury:** PED (97/23/EC) compliant pressure relief is required in the EU. This product generates heat during operation. It is intended to be incorporated into a system containing fluid. It is the responsibility of the assembler to ensure that no unsafe condition can result from the generation of pressure.

**CAUTION**

**Personal Injury:** Hot surfaces are a potential injury hazard. It is the responsibility of the assembler to ensure that hot surfaces are not easily accessible to untrained personnel during operation.

**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**

**Heater Control:** If heater is configured for continuous pump operation; automatic disconnect is required during engine operation. See Figure 6. Customer supplied disconnect not shown.

**INSTALLATION RECOMMENDATIONS**

1. Drain and thoroughly flush cooling system.
2. Mount heater as shown in figure 1 with the pump at the bottom and the power cord connection at the top. Attach the heater as low as possible to the equipment frame or other suitable area. Heater should be below the lowest level of the engine water jacket. The heater inlet must be below the point where coolant is removed from the engine.

**NOTICE**

The heater will operate correctly only if mounted in the vertical orientation as shown in Figure 1.

**NOTICE**

**Vibration Damage:** The heater must be isolated from engine vibration. Do not mount the heater directly to the engine or any components directly connected to the engine.

3. Install 5/8" (15 or 16 mm) heater hose between the heater inlet (suction) and the engine.

**NOTICE**

The inlet hose must route continuously downward from the engine to the heater with no dips or humps that can trap air. The coolant draw must be as close to directly above the heater as possible. See Figures 1. This will enhance air evacuation from the heater at start up and will insure the heater has a supply of coolant at all times.

4. Install 5/8" (15 or 16 mm) heater hose between the heater outlet (discharge) and the engine block. Locate the discharge port as far as possible from the suction port to enhance heat distribution throughout the engine.
5. Secure cord at intervals with tape or wire ties to avoid contact with all hot or moving parts.
6. Fill cooling system following the engine manufacturer recommendation for coolant.

**WARNING**

This product has been tested using water and all concentrations of glycol mixed with water up to 60% glycol. See engine manufacturer recommendation for coolant. The suitability of this product for use with other liquids is the responsibility of the end user.

7. Start and run engine until the engine reaches operating temperature. Shut off engine. Check for leaks. Re-tighten hose clamps where necessary. Let engine cool. Check coolant level, add if necessary.
8. Connect the heater to electrical power.

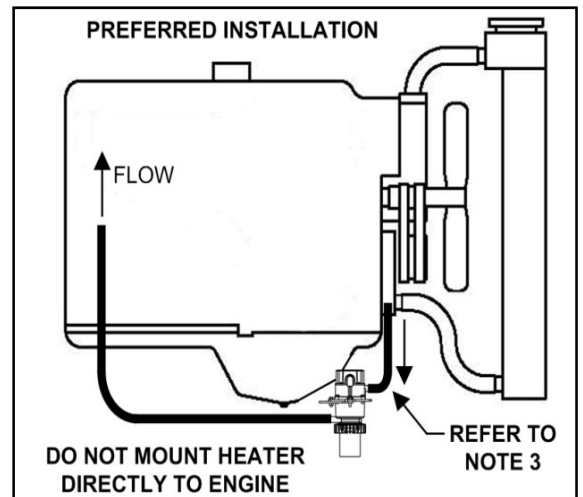


Figure 1

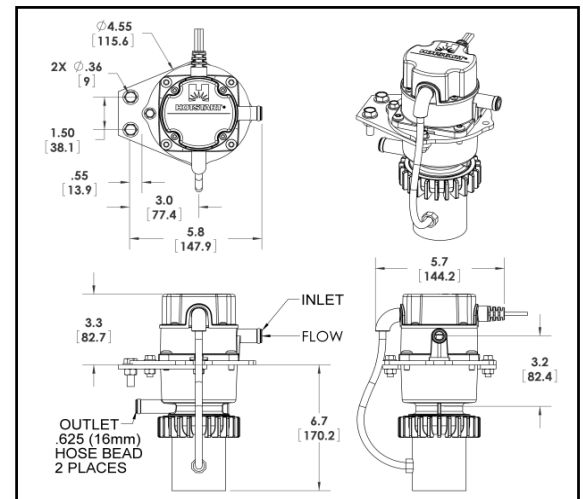


Figure 2

- Check heater for proper operation at regular intervals (up to an hour) by feeling the hoses. The temperature of the engine should warm up uniformly with just a few degrees difference between heater inlet and outlet. If one of the hoses becomes warm before the entire system, the coolant may not be circulating properly.

#### HEATER SERVICE:

**WARNING** Risk of Electric Shock - Disconnect electrical supply before removing cover – Service to be performed by qualified personnel only.

- If replacing/reorienting element assembly or replacing the pump - drain the cooling system or close the isolation valves. Steps 2 and 3 not needed for re-orienting ports.
- Remove the four screws holding the electrical cover in place as shown in Figure 5.
- While holding the two strain reliefs in place, remove the top electrical cover.
- Replace components:
  - Thermostat Replacement:** Remove the quick disconnects from the existing thermostat, element and ground connections. Remove cords from the slots in the base assembly.
  - Remove screw from the thermostat retainer. See Figures 3 and 4. Install new thermostat in reverse order.
  - Replace Element Assembly \* Or Re-Orient ports \*\*:**
    - \* Remove quick-disconnects and ground terminals from existing thermostat, element and ground connections. Remove cords from the slots in the base assembly.
    - Remove the four screws holding the tank body.
    - \* Replace element assembly with new unit.
    - \*\* Loosen pump nut. Orient inlet and outlet ports to the desired locations (90° increments). Hand-tighten the pump nut.
    - Reseat tank body o-ring in groove.

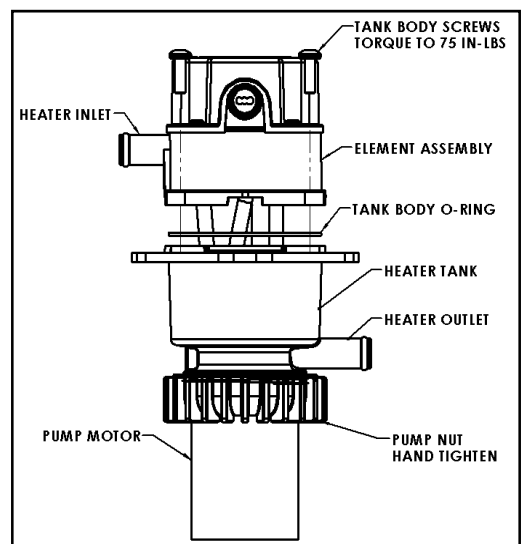
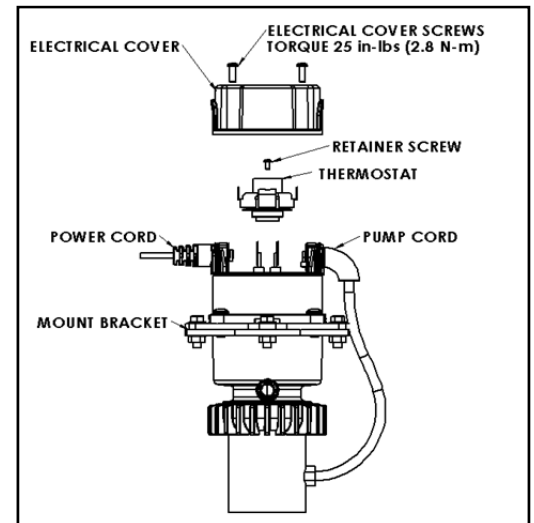
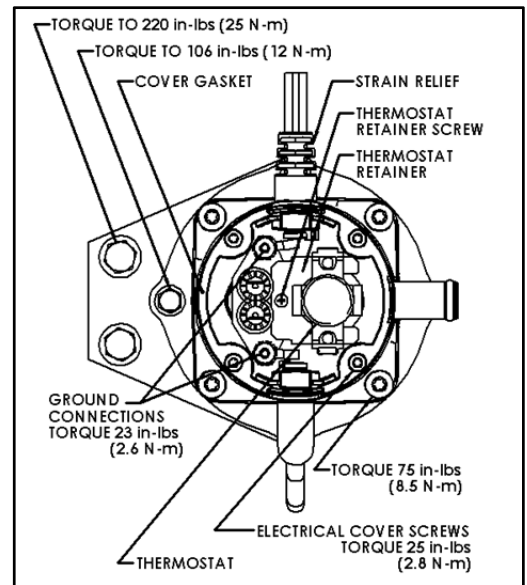
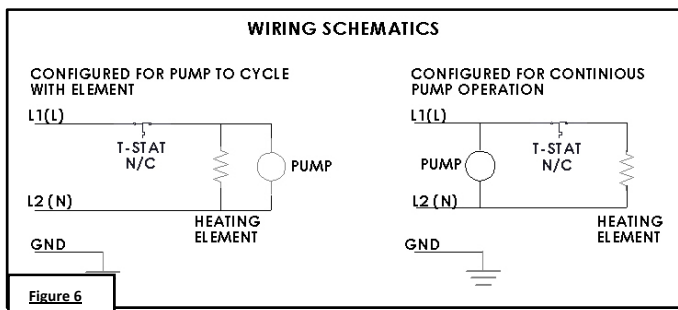
**WARNING** O-ring Damage: Ensure the o-ring is properly seated in the groove to prevent leakage from the heater. See Figure 5.

- Re-torque screws to 75 in-lbs (8.5 N-m), using a diagonal pattern. See Figure 3
- Note: The replacement element assembly includes a new element and new thermostat installed in a new base. A new o-ring and new enclosure gasket are also included.
- Re-attach electrical connections and cords in the reverse order. Torque the ground connection nuts to 23 in-lbs (2.6 N-m).
- Replace Pump:** Remove the pump cord connections and lift the pump cord out of the slot in the heater body. Unscrew the pump nut and install the new pump with the included o-ring and gasket. Hand-tighten the pump nut. Re-install the cord and connectors in reverse order. Torque the ground connection nut to 23 in-lbs (2.6 N-m).

- Replace the cover; torque the screws to 25 in-lbs (2.8 N-m) in a diagonal pattern.

**WARNING** Cover Gasket Damage: Ensure the gasket is properly aligned on the base before re-installing cover. See Figure 3.

- Re-fill the cooling system and purge air from the system per **INSTALLATION RECOMMENDATIONS** step 7.
- Re-connect the heater to electrical power. Verify proper heater operation per **INSTALLATION RECOMMENDATIONS** step 9.





## Return Port

- ✓ Select a return port high on the engine.
  - ✓ Select a return port toward the rear of the engine.
  - ✓ Select a return port away from the remote thermostat.
- If an optional remote thermostat is installed.*
- ✓ Select a return port away from the supply port.

## Hoses & Ports

- ✓ Select proper port fittings:

CTM	1000 – 2500 W	3/8 inch NPT
CKM	3000 – 6000 W	3/4 inch NPT
CSM	3000 – 12000 W	3/4 inch NPT

- ✓ Select proper hose inner diameter sizes:

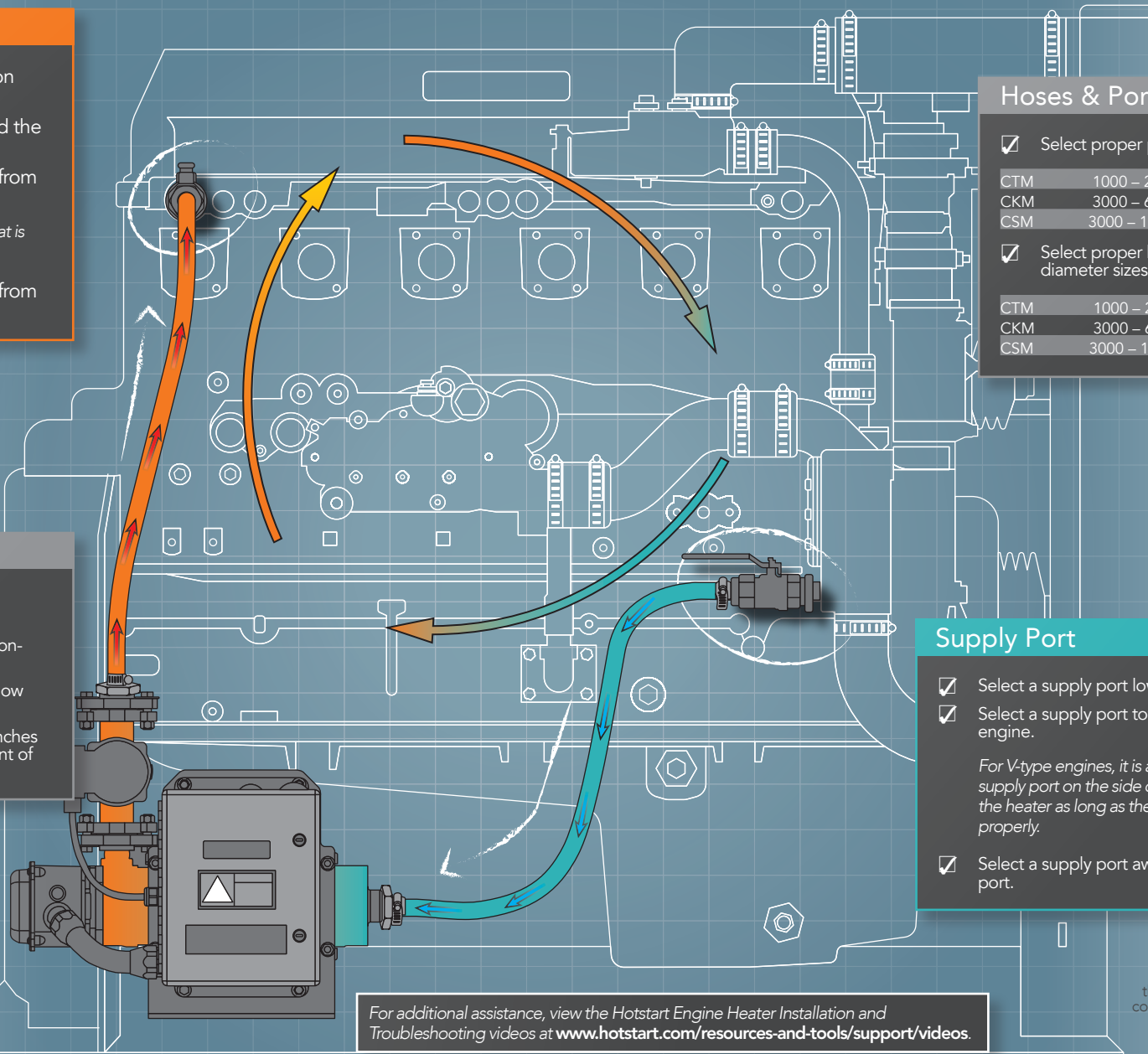
CTM	1000 – 2500 W	5/8 inch
CKM	3000 – 6000 W	1 inch
CSM	3000 – 12000 W	1 inch

## Heater Mounting

- ✓ Mount the heater in the proper orientation.
- ✓ Mount the heater to a vibration-isolated surface.
- ✓ Mount the heater directly below the return port.
- ✓ Mount the heater at least 6 inches (15 cm) below the lowest point of the water jacket.

## Supply Port

- ✓ Select a supply port low on the engine.
  - ✓ 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.



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



### 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 only flow through a small portion of the engine.*

### Supply Port

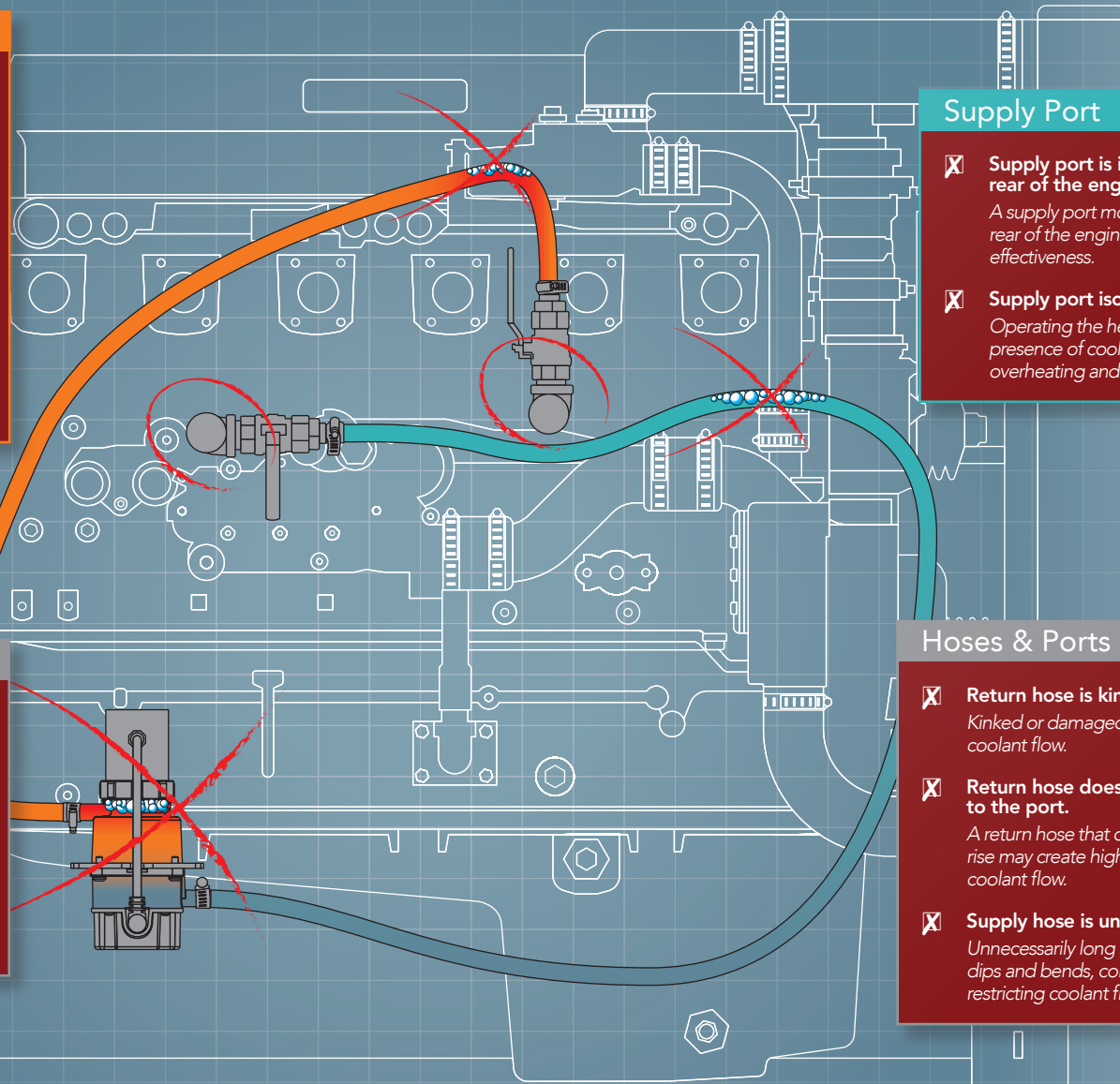
- ❌ **Supply port is installed toward the rear of the engine.**  
*A supply port mounted too close to the rear of the engine will reduce heating effectiveness.*
- ❌ **Supply port isolation valve is closed.**  
*Operating the heater without the presence of coolant will cause overheating and damage the heater.*

### Heater Mounting

- ❌ **Heater is 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 continually rise to the port.**  
*A return hose that does not continually rise may create high points, restricting coolant flow.*
- ❌ **Supply hose is unnecessarily long.**  
*Unnecessarily long hoses may create dips and bends, collecting bubbles and restricting coolant flow.*



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