

Section 4

Thermostat Controls

Pressure Switch

Magnetic Contactors

Junction Boxes

Complete Control Systems – for manual and automatic start engines



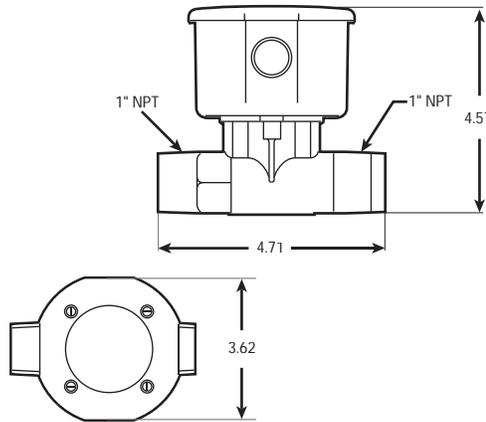
Temperature Controls

Weathertight

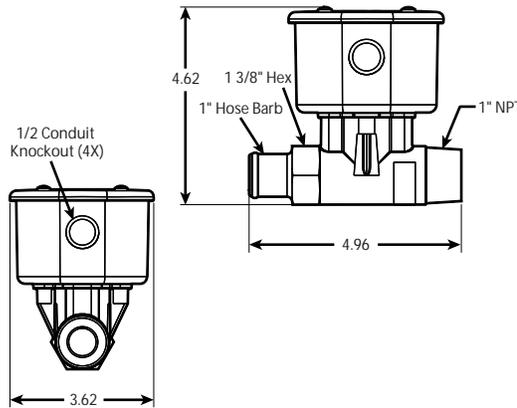
NOTE: When using a thermostat above 277 volt or on 3 phase applications, select the proper control box with transformer and contactor as shown on pages 37 or 38.



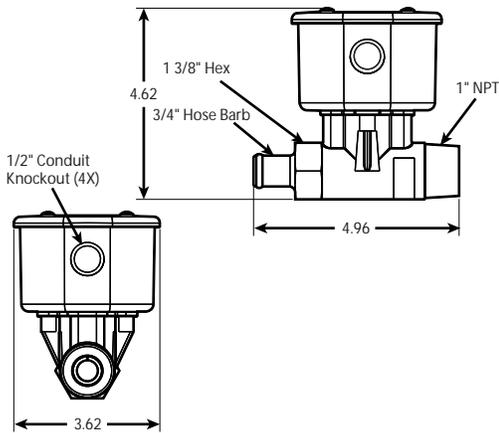
Fixed Setting



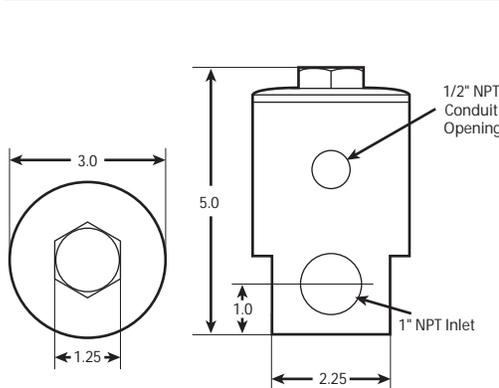
1" NPT x 1" NPT CONDUIT TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240Volt	277 Volt
TFTC6-1NPT	60°F	80°F	25 amps	22 amps
TFTC8-1NPT	80°F	100°F	25 amps	22 amps
TFTC10-1NPT	100°F	120°F	25 amps	22 amps
TFTC12-1NPT	120°F	140°F	25 amps	22 amps
TFTC14-1NPT	140°F	160°F	25 amps	22 amps



1" NPT x 1" HOSE BARB CONDUIT TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240Volt	277 Volt
TFTC6-1HB	60°F	80°F	25 amps	22 amps
TFTC8-1HB	80°F	100°F	25 amps	22 amps
TFTC10-1HB	100°F	120°F	25 amps	22 amps
TFTC12-1HB	120°F	140°F	25 amps	22 amps
TFTC14-1HB	140°F	160°F	25 amps	22 amps



1" NPT x 3/4" HOSE BARB CONDUIT TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240Volt	277 Volt
TFTC6-3HB	60°F	80°F	25 amps	22 amps
TFTC8-3HB	80°F	100°F	25 amps	22 amps
TFTC10-3HB	100°F	120°F	25 amps	22 amps
TFTC12-3HB	120°F	140°F	25 amps	22 amps
TFTC14-3HB	140°F	160°F	25 amps	22 amps



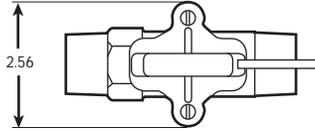
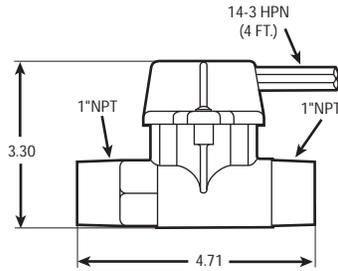
CLASS 1, GROUP D CONDUIT TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240Volt	277 Volt
TFT6ER	60°F	80°F	25 amps	22 amps
TFT8ER	80°F	100°F	25 amps	22 amps
TFT10ER	100°F	120°F	25 amps	22 amps
TFT12ER	120°F	140°F	25 amps	22 amps
TFT14ER	140°F	160°F	25 amps	22 amps



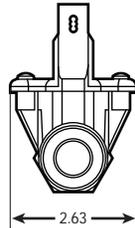
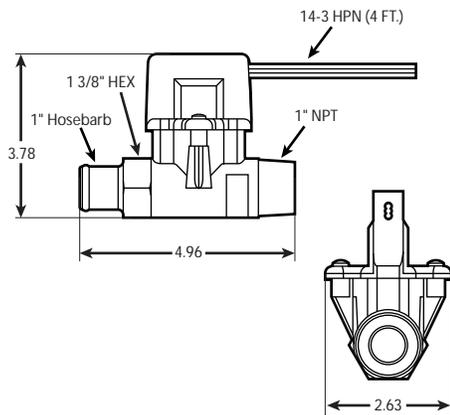
Temperature Controls

Weathertight

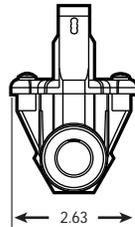
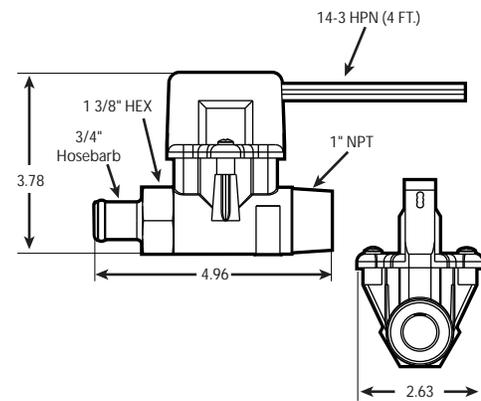
NOTE: When using a thermostat above 277 volt or on 3 phase applications, select the proper control box with transformer and contactor as shown on pages 37 or 38.



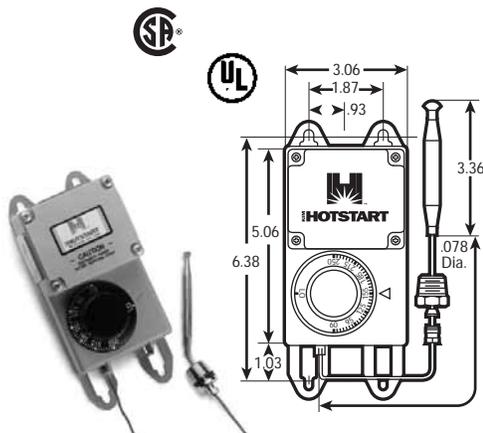
1" NPT x 1" NPT CORD TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240 Volt	277 Volt
TFT6-1NPT	60°F	80°F	25 amps	22 amps
TFT8-1NPT	80°F	100°F	25 amps	22 amps
TFT10-1NPT	100°F	120°F	25 amps	22 amps
TFT12-1NPT	120°F	140°F	25 amps	22 amps
TFT14-1NPT	140°F	160°F	25 amps	22 amps



1" NPT x 1" HOSE BARB CORD TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240 Volt	277 Volt
TFT6-1HB	60°F	80°F	25 amps	22 amps
TFT8-1HB	80°F	100°F	25 amps	22 amps
TFT10-1HB	100°F	120°F	25 amps	22 amps
TFT12-1HB	120°F	140°F	25 amps	22 amps
TFT14-1HB	140°F	160°F	25 amps	22 amps



1" NPT x 3/4" HOSE BARB CORD TYPE ENCLOSURE				
Part Number	Temp. Setting		Maximum Capacity Ratings	
	On	Off	120/240 Volt	277 Volt
TFT6-3HB	60°F	80°F	25 amps	22 amps
TFT8-3HB	80°F	100°F	25 amps	22 amps
TFT10-3HB	100°F	120°F	25 amps	22 amps
TFT12-3HB	120°F	140°F	25 amps	22 amps
TFT14-3HB	140°F	160°F	25 amps	22 amps



REMOTE-MOUNT ADJUSTABLE With 60" Capillary Probe	
Part Number	Adjustable Range 65°F to 250° (Open or Off Setting) Differential 7°F (Close or On Setting)
AT6525	Maximum Capacity Ratings 120/240 Volt – 25 Amps 277 Volt – 22 Amps
ATW Aluminum Protective Well for AT6525	 .5 inch NPT

Temperature Controls

Adjustable Thermostat

Reduce engine heater cycle time in both warm and cold ambient temperatures.

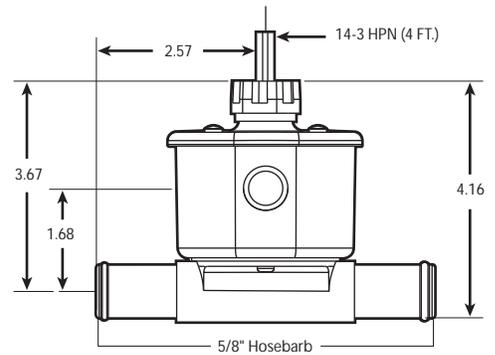


HOTSTART offers an adjustable thermostat as an option on weathertight engine preheaters and as a stand-alone unit. Control your optimum desired temperature with Kim Hotstart's adjustable thermostat.

- Adjustable from 90°F to 130°F.
- Stock one thermostat to fit all needs.
- 5/8" hose barb or 1" NPT thread connections allow for easy in-line installations on a variety of heating units.
- Weather resistant enclosure.
- Rated up to 480 volts.



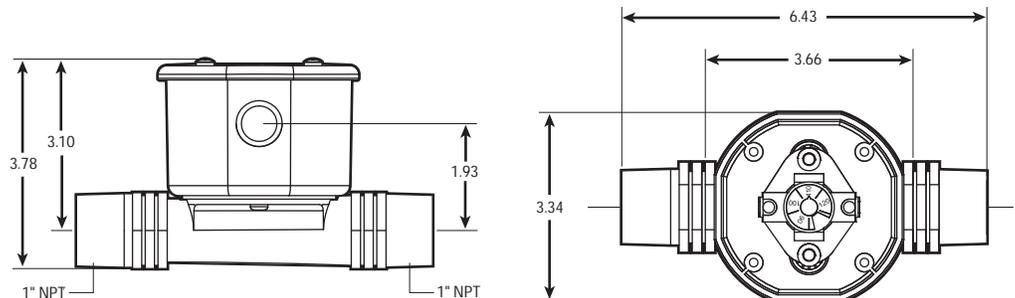
Cord Type



Conduit Type Model Number	Type Plumbing Connections	Cord Type Model Number
TFTCA-1NPT TFTCA-5/8HB	1" NPT X 1" NPT 5/8" HB X 5/8" HB	TFTA-1NPT TFTA-5/8HB

Adjustable Range	Electrical Rating
90°F to 130°F (Open or Off Setting) Differential 20°F (Close or On Setting)	120/240 Volt — 25 Amps 277 Volt — 22Amps 480 Volt — 12.5 Amps

Conduit Type



Oil Pressure Switches

For automatic cut-off of heaters when engine starts

Maximum Current Capacity:
 120V/208V/240V/277V — 25 Amps
 380V/480V/575V — 15 Amps
 Two pole single throw.

To prevent overheating of the heating element on standby equipment and automatic start engines, HOTSTART recommends turning the coolant heater off when the engine is running. A pressure switch that senses engine oil pressure is utilized to shut the heater off on increase of oil pressure and to turn the heater on when engine oil pressure drops.

Kim Hotstart Model Number	Enclosure Type
PS252	Dry Locations
PS252R	Dry Locations (Reverse Action)
PS252WT	Wet Locations
PS252EP	Hazardous Locations

PS252



Magnetic Contactors

30 AMPS	Kim Hotstart Model Number	Coil Voltage
	DRY LOCATIONS	
	MC330L MC330	120V 240V
WET LOCATIONS		
	JBW11-000 JBW12-000	120V 240V
HAZARDOUS LOCATIONS		
	JBE11-000 JBE12-000	120V 240V

Inrush Voltamps (VA) 35 VA
 Holding Voltamps (VA) 8 VA

60 AMPS	Kim Hotstart Model Number	Coil Voltage
	DRY LOCATIONS	
	MC360L MC360	120V 240V
WET LOCATIONS		
	JBW11-060 JBW12-060	120V 240V
HAZARDOUS LOCATIONS		
	JBE11-060 JBE12-060	120V 240V

Inrush Voltamps (VA) 92 VA
 Holding Voltamps (VA) 10 VA

MC330

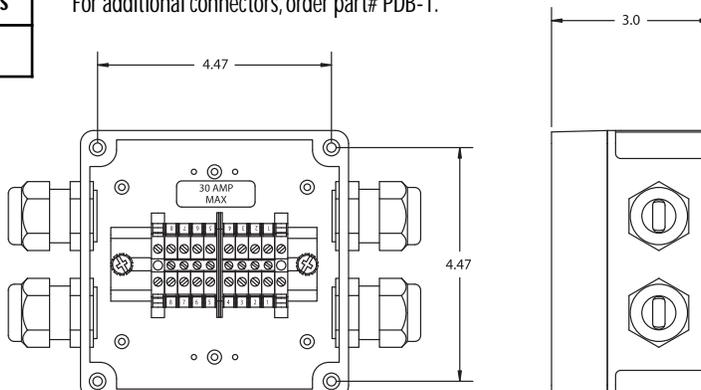


Junction Boxes

Use to simplify wiring on equipment when a variety of heaters and controls are required. All models have ten, 25 Amp terminal blocks.

Part Number	Number of Openings
PDB-000	8*

* Box comes assembled with 4 strain relief connectors. For additional connectors, order part# PDB-1.



PDB-000



PDB-1



Control Components

Complete Control Systems

For heater protection and power savings HOTSTART recommends de-energizing the heater when engine is running. On automatic start engines this can be accomplished with a control system using an Oil Pressure Switch or a 24 Volt Relay.

Volts	HOTSTART Model Number MANUAL START ENGINES	Amps	HOTSTART Model Number AUTOMATIC START ENGINES	Volts				
Single Ø — One Heater and Thermostat Per Engine								
120V 208V 240V 277V	Use thermostat only. See pages 32 through 36.	25 Amps or Less	Use oil pressure switch (PS252) & thermostat. See pages 32-36 and page 37.	120V 208V 240V 277V				
Three Ø — One Heater and Thermostat Per Engine								
120V 208V 240V 380V 480V 575V	JBW11-000 JBW18-000 JBW12-000 JBW13-000 JBW14-000 JBW15-000	A A A B B B	30 Amps Maximum	JBW11-100 JBW18-100 JBW12-100 JBW13-100 JBW14-100 JBW15-100	B B B B B B	JBW11-200 JBW18-200 JBW12-200 JBW13-200 JBW14-200 JBW15-200	C C C C C C	120V 208V 240V 380V 480V 575V
120V 480V	JBW11-060 JBW14-060	A B	60 Amps Maximum	JBW11-160 JBW14-160	B B	JBW11-260 JBW14-260	C C	120V 480V
Single Ø — Two Heaters and Two Thermostats Per Engine								
120V 208V 240V 277V	Use one thermostat with each heater. See pages 32 through 36.	25 Amps Per Heater or Less	Use one oil pressure switch (PS252) & thermostat with each heater. See pages 32 through 36 and page 37.	120V 208V 240V 277V				
380V 480V 575V	JBW23-000 JBW24-000 JBW25-000	D D D	JBW23-100 JBW24-100 JBW25-100	D D D	JBW23-200 JBW24-200 JBW25-200	D D D	380V 480V 575V	
120V 208V 240V 380V 480V 575V	JBW21-000 JBW28-000 JBW22-000 JBW23-000 JBW24-000 JBW25-000	C C C D D D	30 Amps Per Heater Maximum	JBW21-100 JBW28-100 JBW22-100 JBW23-100 JBW24-100 JBW25-100	D D D D D D	JBW21-200 JBW28-200 JBW22-200 JBW23-200 JBW24-200 JBW25-200	D D D D D D	120V 208V 240V 380V 480V 575V
Three Ø — Two Heaters and Two Thermostats Per Engine								
208V 240V 380V 480V 575V	JBW28-000 JBW22-000 JBW23-000 JBW24-000 JBW25-000	C C D D D	30 Amps Per Heater or Less	JBW28-100 JBW22-100 JBW23-100 JBW24-100 JBW25-100	D D D D D	JBW28-200 JBW22-200 JBW23-200 JBW24-200 JBW25-200	D D D D D	208V 240V 380V 480V 575V

All control boxes are available for Class 1 Group D hazardous locations, change prefix "JBW" to "JBE". Consult factory for price and availability.

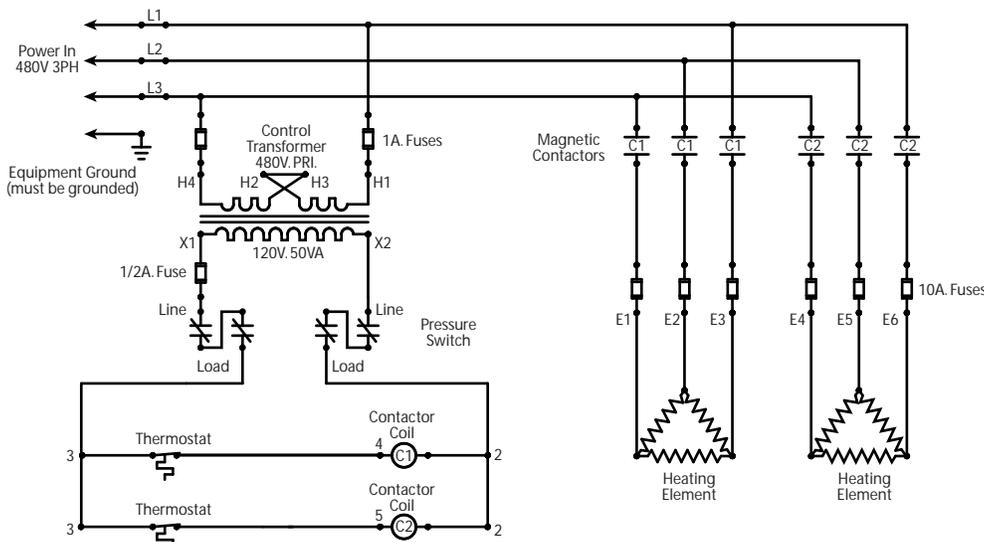
Box Size Code: A – 6 x 6 x 4, B – 8 x 8 x 4, C – 10 x 8 x 4, D – 12 x 10 x 5

All 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.

These control systems allow for quick electrical installation of all HOTSTART engine preheaters. They are designed as a time and labor saving component. They are especially useful on installations that require two coolant heaters or combinations of a coolant heater and oil heater/hydraulic heater etc.

All control boxes on this and preceding page are NEMA 12 & 13.

All control boxes are available for Class 1 Group D hazardous locations. Change prefix "JBW" to "JBE" and consult factory for price and availability.

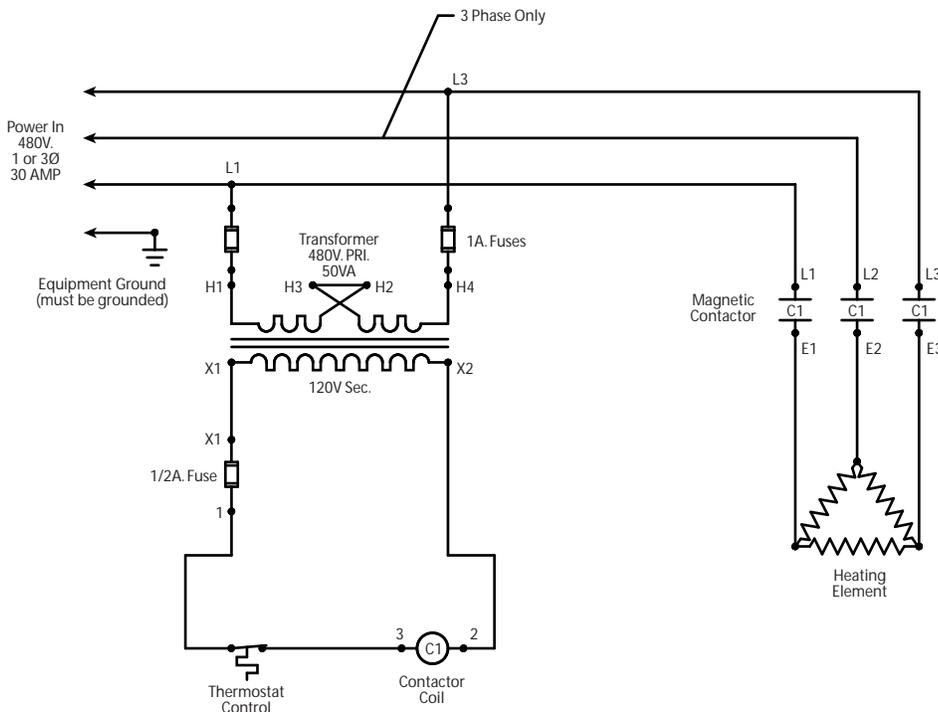


To control two 480 volt heaters at maximum 30 amps on automatic start engines.

Typical Control Box System Components



Model JBW24-200
With pressure switch
or
Model JBW24-100
With 24 volt relay



To control one 480 volt heater at maximum 30 amps on manual start engine.



Model JBW14-000
No automatic control

Technical Information & Heater Installation Instructions

OPERATING PRINCIPLE

The HOTSTART engine heater operates on the principle of a thermosiphon. 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 and the cycle is repeated. A flow-through thermostat is available for the inlet of the engine heater that keeps coolant within the preset temperature range.

CAUTION

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, deionized water, and low silicate supplemental coolant additives. Do not exceed a concentration of more than 60% antifreeze, as element failure may result. A cooling system containing anti-leak additives can cause premature element failure.

MOUNTING

Mount the tank heater in a horizontal position with the outlet neck pointed up. The heater can also be mounted vertically with the inlet neck as the low point (see figure 1).

Bolt the heater to the truck frame or skid frame on a generator package with the mounting straps provided. See Figure 2. The heater must be mounted below the lowest level of the engine water jacket to ensure a good gravity flow of coolant to the heater.

CAUTION

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

Connect the heater intake to the lowest accessible point of the water jacket. If a connection point is unavailable in the water jacket area, connect heater intake line to lower radiator hose. This hose should run down to heater intake.

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 Figure 3.

CAUTION

DO NOT route outlet hose above engine block connection, or loop or kink hoses. This will cause air locks in the hose and block circulation of the coolant by the heater. See Figure 3.

To eliminate air locks in the heater and hoses, refill the engine with the heater outlet line disconnected at the engine until outlet line is full of coolant. See Figure 4-1. Then connect the outlet line to the engine and finish filling the engine. See Figure 4-2.

Before energizing heater, all air must be bled out of the system by running the engine. If not, air could be trapped in the block causing the heater to fail.

CAUTION

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. Kim Hotstart recommends NOT running the engine with the engine heater energized.

On standby and automatic start engines, heaters should be de-energized when engine starts. This requires an oil pressure switch or other automatic cut-off. These systems are often operated at voltages above the 277 Volt rating of the Kim Hotstart thermostat and are also often 3 Phase. All heaters above 277 Volt should be used in conjunction with a contactor and control transformer. All three phase heaters must be used with a contactor. See pages 37, 38, and 39.

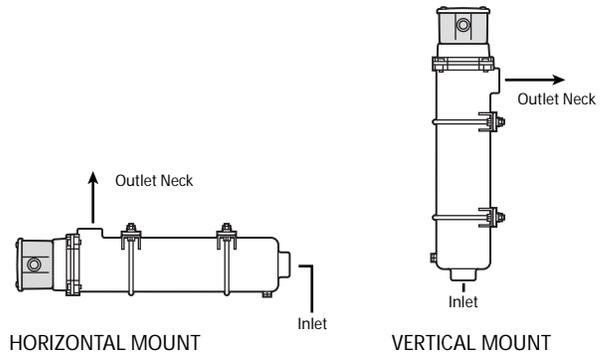


FIGURE 1

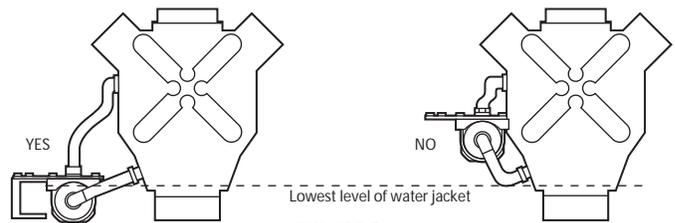


FIGURE 2

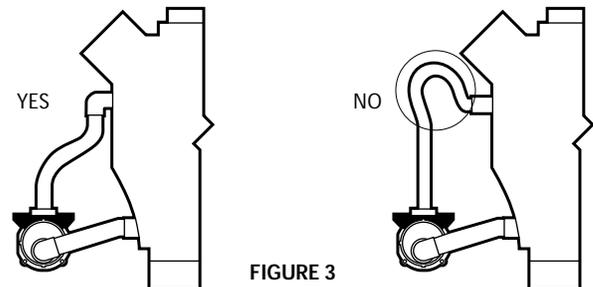


FIGURE 3

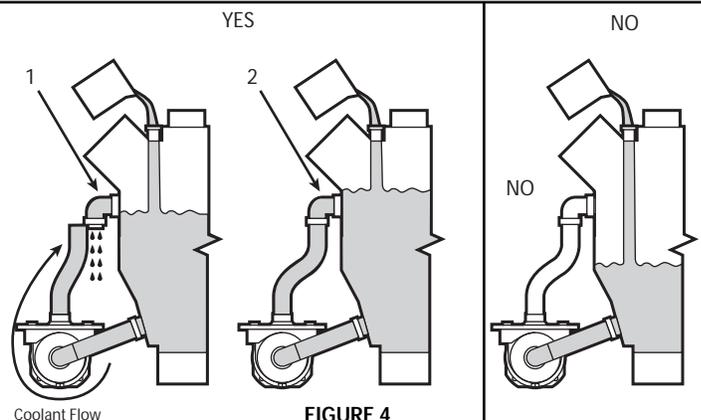


FIGURE 4

Note: It is recommended for "V" engines larger than eight cylinders or over 1000 C.I.D. that 2 heaters of equal wattage be used. One heater installed on each bank of the "V".

Example: To adequately heat a 1000 cubic inch "V" engine for ambient temperature above -20°F use (2) 2000 watt heaters — total 4000 watts.

For the most efficient heating of this size engine and electrical savings, see the forced circulating heating system on pages 16 & 17.