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[www.heatwagon.com](http://www.heatwagon.com)

## Installation and Maintenance Manual

Please retain this manual for future reference.

# HVF180/HVF300

*Construction  
Heaters*



NRTL  
ANSI Z83.7  
CONST. HTR

*For your safety: Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored.*

## **CONSTRUCTION HEATER GENERAL HAZARD WARNING:**

Failure to comply with the precautions and instructions provided with this heater, can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and/or electrical shock.

Only persons who can understand and follow the instructions should use or service this heater.

If you need assistance or heater information such as an instruction manual, labels, etc., contact your local Heat Wagon dealer or the manufacturer.

## **W A R N I N G**

Fire, burn, inhalation, and explosion hazard. Keep solid combustibles, such as building materials, paper or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles or unknown chemicals.

**Not for home or recreational vehicle use!**

We cannot anticipate every use which may be made for our heaters. **CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT LOCAL REGULATIONS.**

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

### **FOR YOUR SAFETY**

**DO NOT USE THIS HEATER IN A SPACE WHERE GASOLINE OR OTHER LIQUIDS HAVING FLAMMABLE VAPORS ARE STORED OR USED.**

# Installation and Maintenance Manual Model HVF180-HVF300 Construction Heater

## Table of Contents:

	<b>Page</b>
Safety and Caution .....	3
Specifications .....	4
Installation .....	4
Operating Instructions .....	7
Maintenance .....	8
Troubleshooting .....	8
Wiring Diagrams .....	9
Illustrated Parts Breakdown .....	10-11
Advance Troubleshooting .....	12-17
Chimney/Exhaust Set-up .....	18
Accessories .....	19

## WARRANTY

All new Heat Wagon and Sure Flame heaters and fans are guaranteed against defective materials and workmanship for one (1) year from invoice date.

Warranty repairs may be made only by an authorized, trained and certified Heat Wagon dealer. Warranty repairs by other entities will not be considered. Warranty claims must include model number and serial number.

## LIMITATIONS

Warrant claims for service parts (wear parts) such as spark plugs, igniters, flame rods will not be allowed. Diagnostic parts such as voltage meters and pressure gauges are not warrantable.

Evidence of improper fuel usage, fuel pressures outside of manufacturer's specification, poor fuel quality, and improper electric power, misapplication or evidence of abuse may be cause for rejection of warranty claims.

Travel time, mileage and shipping charges will not be allowed. Minor adjustments of heaters are dealers' responsibility. Defective parts must be tagged and held for possible return to the factory for 60 days from date of repair. The factory will provide a return goods authorization, (RGA) for defective parts to be returned.

No warranty will be allowed for parts not purchased from Heat Wagon.



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## 1. GENERAL SAFETY RULES

READ INSTRUCTIONS CAREFULLY. READ AND FOLLOW ALL INSTRUCTIONS. PLACE INSTRUCTIONS IN A SAFE PLACE FOR FUTURE REFERENCE. DO NOT ALLOW ANYONE WHO HAS NOT READ THESE INSTRUCTIONS TO ASSEMBLE, LIGHT, ADJUST OR OPERATE THE HEATER.

IF THE INFORMATION IN THIS MANUAL IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

SERVICE MUST BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN.

UNVENTED PORTABLE HEATERS USE AIR (OXYGEN) FROM THE AREA IN WHICH IT IS USED. ADEQUATE COMBUSTION AND VENTILATION AIR MUST BE PROVIDED. REFER TO INSTRUCTIONS.

### WARNING

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

### WARNING

FIRE, BURN, INHALATION, AND EXPLOSION HAZARD.

KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER OR CARDBOARD, A SAFE DISTANCE

AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS.

### WARNING

COMBUSTION BY-PRODUCTS PRODUCED WHEN USING THIS PRODUCT CONTAIN CARBON MONOXIDE, A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS (OR OTHER REPRODUCTIVE HARM).

### WARNING

NOT FOR HOME OR RECREATIONAL VEHICLE USE

THE ELECTRICAL SYSTEM TO WHICH THE APPLIANCE IS CONNECTED MUST COMPLY WITH ALL SAFETY REGULATIONS IN FORCE. A RESIDUAL CURRENT CIRCUIT BREAKER MUST BE PROVIDED ON THE MAIN DISTRIBUTION BOARD.

UNPLUG THE HEATER BEFORE ATTEMPTING ANY SERVICE OR MAINTENANCE.

ALWAYS CHECK THE POWER SUPPLY CABLE BEFORE USE. IT MUST NOT BE BENT, CRUSHED, OR ANYWAY DAMAGED.

THE POWER SUPPLY CABLE MUST BE REPLACED ONLY BY QUALIFIED PERSONNEL.

ONLY USE AN ORIGINAL POWER CABLE WITH A 3-PIN GROUNDED PLUG.

DO NOT TOUCH THE EXHAUST GAS OUTLET. DANGER OF BURNS!

## 2. APPLIANCE DESCRIPTION

Mobile space heater with:  
closed combustion chamber and gas exhaust duct (indirect-fired heaters)

## 3. TECHNICAL SPECIFICATIONS

Model #	HVF180	HVF300
Firing rate (BTU/hr)	180,000	287,350
Air Flow Rate (CFM)	1594	2650
Range of fuel oils	Diesel / Kerosene / #1-2 Fuel Oil	Diesel / Kerosene / #1-2 Fuel Oil
Fuel Consumption (gal/hr)	1.29	2.06
Fuel Nozzle	1.00 80° H	1.50 80° W
Efficiency (%)	87.1	88.5
Noise Level at 6 ft.(dB(A))	73	73
Voltage (V)	115V 60Hz 1ph	115V 60Hz 1ph
Electrical Power (W)	460	800
Current Rating (A)	7.0	12.5
Weight (lb)	167	267
Length (in)	55	66
Width (in)	24	27
Height (in)	31	37
Flue Diameter (in)	6	6
Tank Capacity (gal)	14	26
Fuel Pressure (psi)	175	175
Air Lock Setting	2	5.5

## 4. INSTALLATION INSTRUCTIONS

### 4.1. General instructions

THE INSTALLATION OF THE EQUIPMENT SHALL BE IN ACCORDANCE WITH THE REGULATION OF AUTHORITIES HAVING JURISDICTION AND CSA B139.

The heater must be operated only by properly trained personnel. The manufacturer's instructions must be followed.

The heater must be installed and operated so that people are not exposed to dangers deriving from exhaust gases, from the hot air flow and in such a way that no fire risks exist.

It is forbidden to install the heater in the surroundings of flammable materials, combustible products, or in places where explosion risk exist.

When an indirect-fired heater connected to a flue pipe is used in a closed room, provide a minimum opening area of 1 square foot per US gallon capacity at the unit level.

When an indirect-fired heater not connected to a flue pipe is used in a closed room, provide a minimum opening area of 3 square feet per US gallon capacity at the unit level and a continuous, natural air circulation through windows and doors.

For the use of the heater the general and special fire safety regulations in force in all fields of applications must be followed. In any case the following minimum safety clearances from materials or objects in the surroundings of the heater must be ensured:

Sides:	2 ft	Air inlet:	2 ft
Top:	5 ft	Air outlet:	10 ft
Flue pipe:	3 ft		

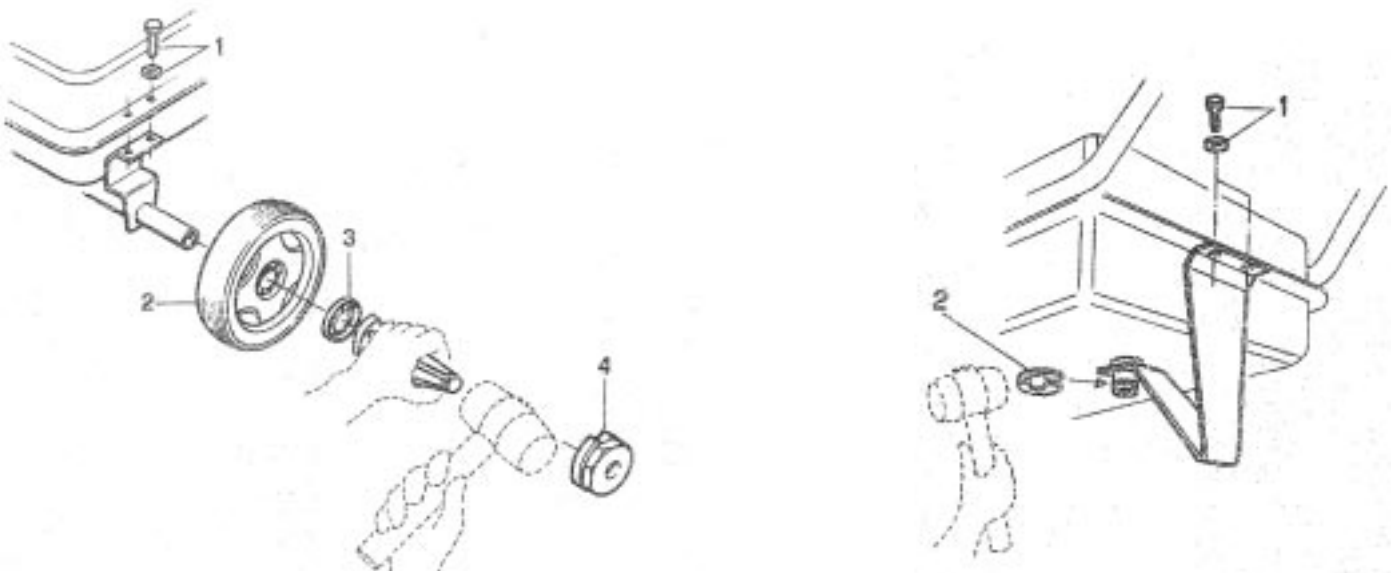
Floors and ceilings must be made of fireproof materials in the place where the heater is operated.

The air inlet and outlet must never be blocked for any reason.

Install the heater on a flat, level floor in a steady position.

## 4.2 Assembling the heater

Before operating the heater, assemble axle, wheels and lower support following the diagram below:



### Maintenance and checks

Depending on the operational conditions, usually every year, the heater should be checked by qualified personnel. Prior to start-up, the user must check for any evident non-compliance with rules of use, safety and protection.

## Indirect Oil Theory of Operation

When the on/off power switch is turned on, power is sent to a power indicator light on the control panel. Power is also received by the control board. The control board sends power out to a thermostat "socket". The socket must have a "jumper cap" or a remote thermostat plugged into the socket. The heater has a heating element in the fuel filter, the element will now receive power from the control board, and begin pre-heating the fuel.

When the thermostat jumper cap is in place, or the remote thermostat is turned up to call for heat, the control board will begin the start up sequence. During the first step of start up called the purge cycle, the control board powers the motor and transformer for a short period of approximately ten seconds. The turning motor provides airflow and the transformer provides spark to light and burn off any residual fuel remaining from prior operation. At this time the fuel solenoid valve receives no power and remains closed. All fuel pumped is sent back to the fuel tank thru the fuel pump's return line. During this purge cycle the photocell which is connected to the control board looks for the presence of flame in the combustion chamber. If flame is detected during the purge cycle, the control board "locks out" or removes power from all components. The heater is equipped with an air proving switch, air from the turning fan blade must close the switch, otherwise lock out will occur.

Once the purge cycle is completed successfully, the ignition cycle can begin. The control board now sends power to the fuel solenoid valve. The valve opens allowing fuel to flow thru to the nozzle. The photocell must now detect flame within several seconds or the control board will lock out. If flame is detected briefly and then lost, the purge and ignition cycles are repeated once more and if ignition is not achieved, lock out occurs. Control board removes power to the transformer a short time after ignition is achieved. If for any reason ignition is lost, the control board will remove power to the fuel solenoid valve and the purge and ignition cycles will begin. Once ignition is established the thermostat will cycle the heater on and off as needed.

If lock out occurs the reset button will trip. The heaters need a thirty second wait before the reset will function again.

## 5. INSTRUCTIONS FOR USE

### 5.1 Start-up

The heater is factory set for operation without room thermostat.

If operation with room (remote) thermostat is desired, remove the socket cover (Fig. 1) and insert the thermostat plug into the socket. **Note: Heater will not operate without socket cover or thermostat.**

Fill the tank with proper fuel.

Connect the supply plug to a 115V ~ 60 Hz single phase grounded socket. The green lamp indicates that the heater is powered.

**WARNING: THE APPLIANCE MUST BE GROUNDED**

- Connect the heater to a chimney or to a exhaust duct. To get a proper draft (at least 0.04 water inches) in the chimney the exhaust gas path must rise. Avoid any elbows and bends in the first part of the exhaust ducts for at least 9 feet.

- If a room (remote) thermostat is used, set maximum temperature on it.
- Turn switch to position "ON"
- Set the desired temperature on room thermostat.

### 5.2. Reset after lockout – Safety air pressure switch

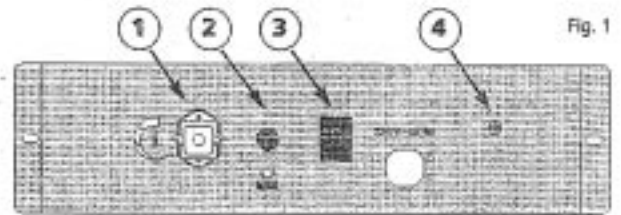
The heater is equipped with a Reset pushbutton. When the heater locks out, the red lamp on the pushbutton (fig. 1 n°2) lights up. In this case push the Reset button (see also clause 7 "Troubleshooting") to restart the heater.

The heater is also equipped with an air pressure switch that controls the airflow pressure and locks the heater out in the event of duct restriction. If this occurs, detect and eliminate the cause before using the heater again. Have the heater inspected by a qualified technician if required. See point above for resetting.

### 5.4 Shut Down.

Set switch to "OFF" to shut the flame off. The fan will go on rotating for about 1 min 45 sec to cool the heater down. The fan motor will automatically stop at the end of the aftercooling time, then the unit can be disconnected from mains.

Never disconnect the supply plug to stop the heater while in operation. The heat accumulation could damage the components: allow the cooling sequence to be carried out.



- Fig. 1
- 1- Remote thermostat socket
  - 2- RESET pushbutton
  - 3- ON/OFF switch
  - 4- Power lamp

**Go to page 18 for proper chimney/exhaust pipe installation.**

### 5.3 Heat Ducting

There are a few things to keep in mind when ducting a heater. First, ensure that the duct is rated high enough for the heater's discharge temperature. Second, make sure that the duct I.D. is equal to the diameter of the heater discharge. A larger I.D. solid wall or wire duct (no lay-flat) duct can be used. When dealing with duct length, remember that the owner's manual will list a MAXIMUM duct length and this length must be adhered to at all times! The maximum duct length is the total length straight out from the nose of the heater. As a general rule of thumb, for every bend in the duct, it cuts the maximum length allowed in half. Also, to achieve the highest heating efficiency and to alleviate static pressure issues, keep the elbows and bends down to the absolute minimum.

### 5.5 Outdoor use

If the heater is used outdoors, follow the general installation instructions detailed above (see point 4). Moreover, the heater should not be directly exposed to the weather. Provide proper protection from rain, snow, wind, humidity etc. the use of a vent cap is also required.

## 6. MAINTENANCE

Before carrying out any maintenance operation, disconnect the power plug.

Maintenance must be carried out by qualified personnel (see also par. 7)

The appliance must be thoroughly cleaned once a year to ensure good combustion and long life.

Clean periodically

the oil spraying nozzle and its filter;

the oil pump filter

the main fuel filter cartridge

the ignition electrodes

the fan blades

the inside of the appliance, using compressed air

the flame sensor with a mild detergent

the combustion chamber, to keep it free from soot

Periodically check cables and electrical connections

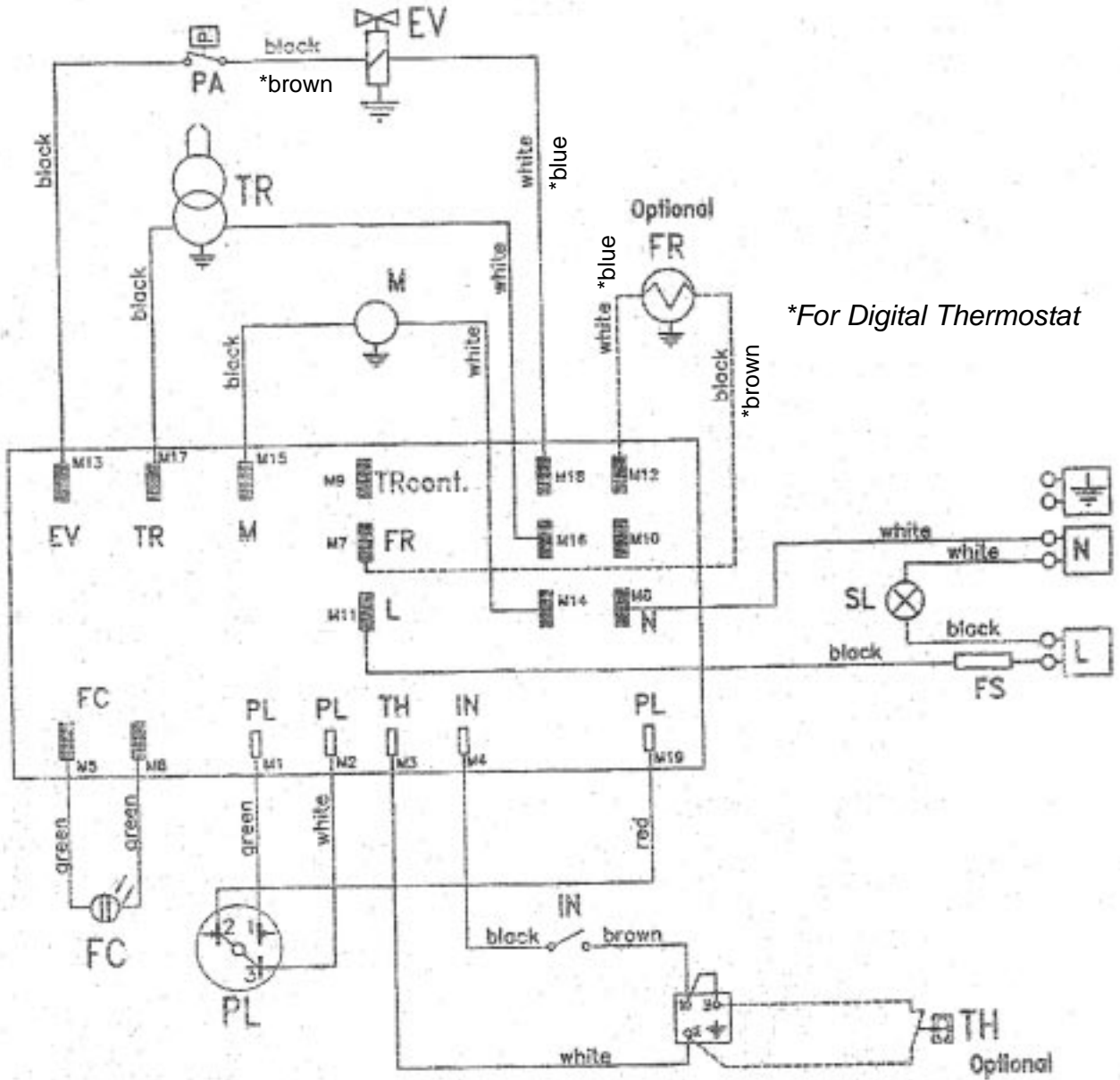
Check the oil filter and replace if necessary.

## 7. TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY
Heater does not start (Fan does not run)	No power	Check main distribution board and power supply line
	Faulty cable/connections	Check/have cable replaced by a qualified electrician
	Burnt fuse	Check and replace if required
	Room thermostat set too low	Set remote thermostat on a higher temperature
	Room thermostat socket cap not inserted	Insert cap into the thermostat socket
	Heater in lock-out state	Reset by disconnecting power, then reconnect power.
Heater starts, flame ignites but then heater locks out	Dirty or faulty flame sensor	Clean or replace
	Faulty burner control unit	Contact Heat Wagon
Heater starts, flame does not ignite and then heater locks out	Clogged nozzle	Clean using compressed air only or replace if necessary
	Flame sensor receives an external light signal during ignition sequence	Check for external lights (sun, lamps, etc.)
	Faulty burner control unit	Contact Heat Wagon
	No fuel /Lack of fuel	Fill tank /Check solenoid valve at pump & check supply hose for leaks
	Ignition fault, dirty or incorrectly spaced electrodes	Clean electrodes, contact service personnel if required
	Air switch fault	Remove ducting/check voltage at control board
Heater starts, but combustion is not good	Dirty or blocked nozzle	Clean using compressed air only or replace if necessary
	Clogged filters	Clean or replace
	Leaks in fuel circuit	Check and eventually replace
	Oil pump provides low pressure	Contact service personnel
	Insufficient combustion air	Wrong air lock setting
	Insufficient ventilation air	Contact service personnel

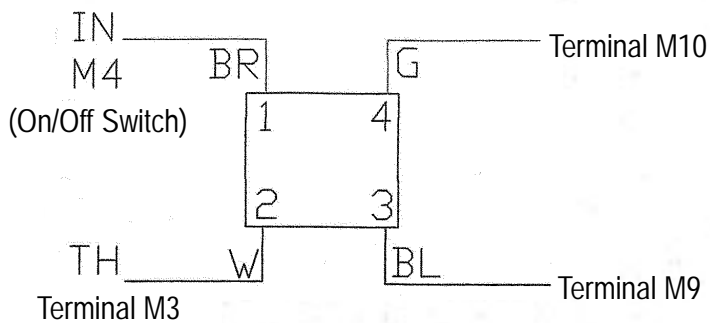


# 8. WIRING DIAGRAM



*\*For Digital Thermostat*

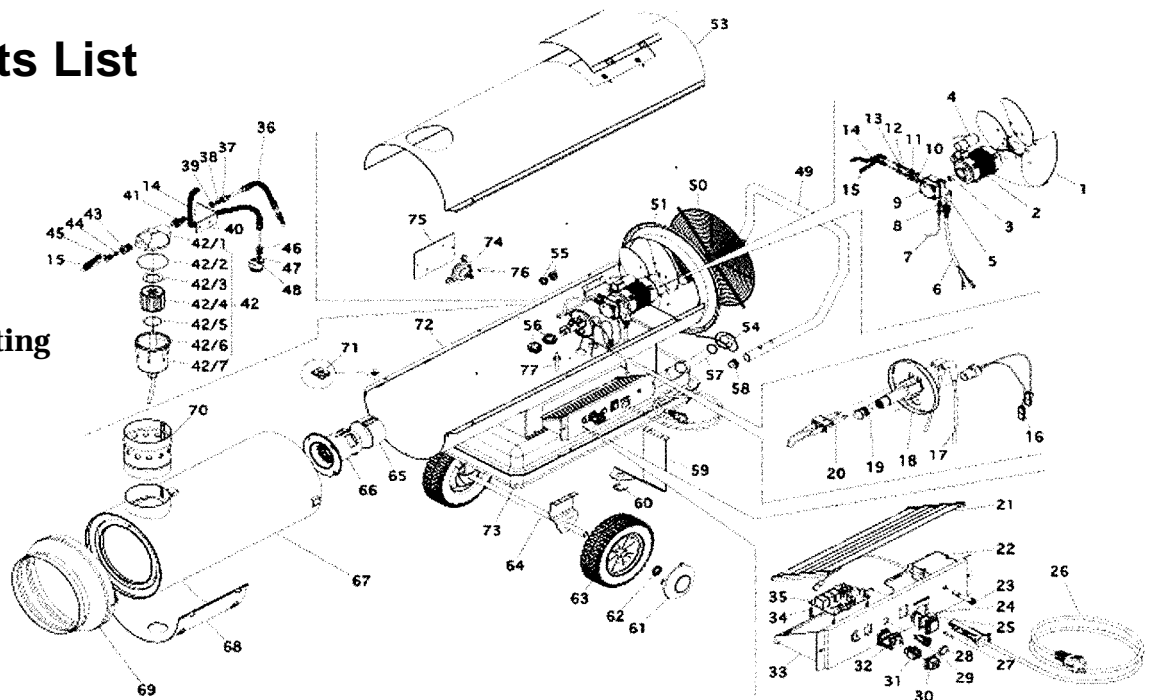
## Digital Thermostat



- EV Fuel Solenoid Valve
- TR Ignition Transformer
- M Motor
- SL Warning Lamp
- PA Air Pressure Switch (normally open)
- FS Fuse
- FC Flame Sensor
- PL Reset Button
- IN Switch
- TH Room Thermostat (Optional)

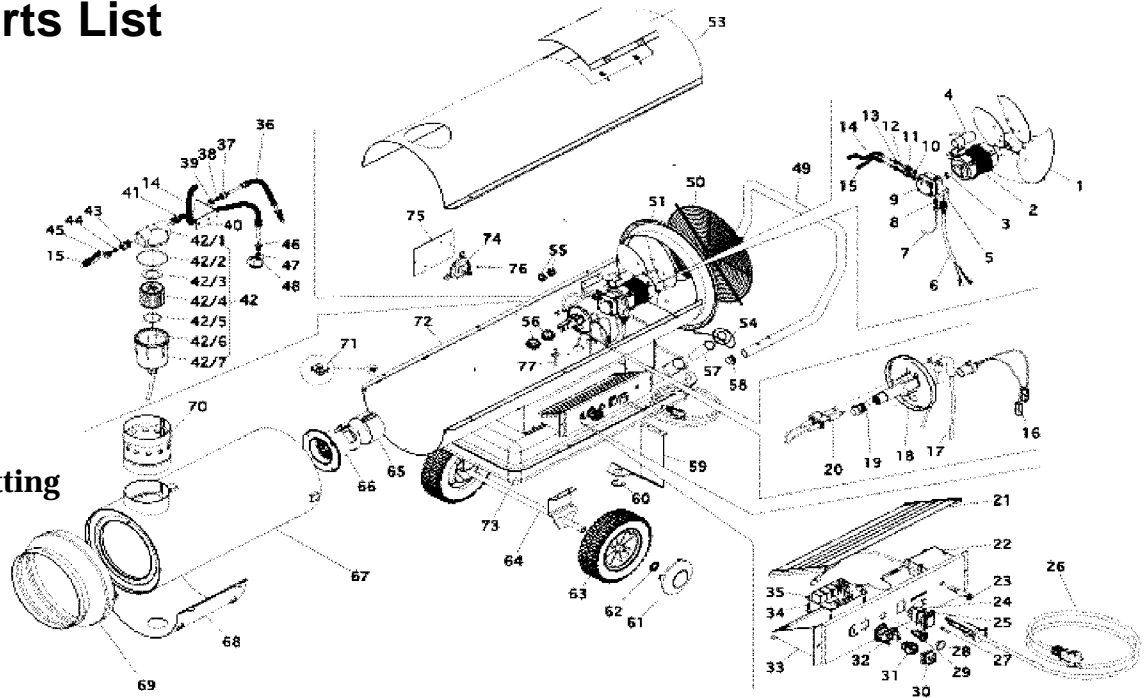
# HVF180 Parts List

**Pump Pressure Setting**  
175 PSI



Key No.	Part No.	Description	Key No.	Part No.	Description
1	1087008133	FAN	42/1	1135000500	COVER
2	1040012900	MOTOR	42/2	1002004200	O-RING
3	1001001300	JOINT	42/3	1002005100	GASKET
4	1049000419	CAPACITOR	42/4	1086002800	CARTRIDGE
5	1089007200	COIL	42/5	1002005200	O-RING
6	1043004500	CABLE + CONNECTOR	42/6	1052004900	HEATING ELEMENT
7	1076004300	MICROHOSE	42/7	1135000600	FILTER GLASS
8	1067004100	FITTING	43	1066001300	FITTING
9	1089007100	PUMP	44	1067009100	OGIVE
10	1018002900	WASHER	45	1066001600	FITTING
11	1066001300	FITTING	46	1066001600	FITTING
12	1067009100	OGIVE	47	1067009100	OGIVE
13	1066001600	FITTING	48	1066001200	SUCTION FITTING
14	1078000600	BACKFLOW HOSE	49	1095011800	HANDLE
15	1078000100	INFLOW HOSE	50	1090007533	GUARD
16	1050001000	FLAME SENSOR	51	CONVGEN#MIR05536	AIR INLET
17	1039043600	HT CABLE	52	PORTISP#TOMM436	INSPECTION COVER
18	1094135533	BURNER HEAD	53	COPGEN#MIR05536	UPPER SHELL
19	1088012100	NOZZLE	54	1005000100	TANK CAP
20	1030002100	ELECTRODE	55	1002002000	GASKET
21	1001017700	COVER	56	1002002100	GASKET
22	1033004600	TRANSFORMER	57	1086001000	FILLING FILTER
23	1041001700	LAMP	58	1005000900	HANDLE CAP
24	1032001700	ON/OFF SWITCH	59	1094046500	TANK SUPPORT
25	1002002600	CAP	60	1023001500	SPRING
26	CAVAL#US10400USAP2	POWER SUPPLY CABLE	61	1005002000	WHEEL CAP
27	1035001800	FUSE	62	1022000300	SEEGER RING
28	1002002855	CAP	63	1004001300	WHEEL
29	1032005500	RESET PUSHBUTTON	64	1094134100	AXLE
30	1052001800	SOCKET CAP	65	1094135733	AIR LOCK
31	1043000400	SOCKET BODY	66	1095011233	CHAMBER INLET
32	1043000600	SOCKET CASING	67	CAMGEN#MIR055	COMBUSTION CHAMBER
33	1001017200	CONTROL PANEL	68	PROCAMGEN#MIR5H	CHAMBER SHIELD
34	1001015680	SPACER	69	CONOMIR#055A36	AIR OUTLET
35	1047004600	BURNER CONTROL	70	1094138733	FLUE COLLAR
36	1078000300	SUCTION HOSE	71	1017002200	FIXING CLIP
37	1066001700	FITTING	72	CRPGEN#MIR18036	LOWER SHELL
38	1067009100	OGIVE	73	SERBGEN#MU20	TANK
39	1017002800	NUT	74	1046001500	AIR PRESSURE SWITCH
40	1094134900	FILTER BRACKET	75	1094171300	PLATE
41	1066001500	FITTING	76	1080002600	AIR HOSE
42	1086000800	OIL FILTER	77	1046001036	HOSE FITTING
			NOT SHOWN		
				1067007000	DRAIN PLUG FOR TANK
				1002006000	O-RING KIT FOR FILTER
					Includes (42/2, 42/3, 42/5)

# HVF300 Parts List



**Pump Pressure Setting**  
175 PSI

Key No.	Part No.	Description	Key No.	Part No.	Description
1	1087008233	FAN	42/2	1002004200	O-RING
2	1040013000	MOTOR	42/3	1002005100	GASKET
3	1001017400	JOINT	42/4	1086002800	CARTRIDGE
4	1049002800	CAPACITOR	42/5	1002005200	O-RING
5	1089007200	COIL	42/6	1052004900	HEATING ELEMENT
6	1043004500	CABLE + CONNECTOR	42/7	1135000600	FILTER GLASS
7	1076004300	MICROHOSE	43	1066001300	FITTING
8	1067004100	FITTING	44	1067009100	OGIVE
9	1089006100	PUMP	45	1066001600	FITTING
10	1018002900	WASHER	46	1066001600	FITTING
11	1066001300	FITTING	47	1067009100	OGIVE
12	1067009100	OGIVE	48	1066001200	SUCTION FITTING
13	1066001600	FITTING	49	1095011700	HANDLE
14	1078000500	BACKFLOW HOSE	50	1090007633	GUARD
15	1078000100	INFLOW HOSE	51	CONVGEN#MIR08536	AIR INLET
16	1050001000	FLAME SENSOR	52	PORTISP#TOMG436	INSPECTION COVER
17	1039043600	HT CABLE	53	COPGEN#MIR08536	UPPER SHELL
18	1094135633	BURNER HEAD	54	1005000100	TANK CAP
19	1088014000	NOZZLE	55	1002002000	GASKET
20	1030002100	ELECTRODE	56	1002002100	GASKET
21	1001017700	COVER	57	1086001000	FILLING FILTER
22	1033004600	TRANSFORMER	58	1005000900	HANDLE CAP
23	1041001700	LAMP	59	1094141600	TANK SUPPORT
24	1032001700	ON/OFF SWITCH	60	1023001500	SPRING
25	1002002600	CAP	61	1005002000	WHEEL CAP
26	CAVAL#US10400USAP2	POWER SUPPLY CABLE	62	1022000300	SEEGER RING
27	1035000800	FUSE	63	1004001300	WHEEL
28	1002002855	CAP	64	1094141500	AXLE
29	1032005500	RESET PUSHBUTTON	65	1094135733	AIR LOCK
30	1052001800	SOCKET CAP	66	1095011333	CHAMBER INLET
31	1043000400	SOCKET BODY	67	CAMGEN#MIR085	COMBUSTION CHAMBER
32	1043000600	SOCKET CASING	68	PROCAMGEN#MIR8H	CHAMBER SHIELD
33	1001017200	CONTROL PANEL	69	CONOMIR#085A36	AIR OUTLET
34	1001015680	SPACER	70	1094138733	FLUE COLLAR
35	1047004600	BURNER CONTROL	71	1017002200	FIXING CLIP
36	1078001000	SUCTION HOSE	72	CRPGEN#MIR08536	LOWER SHELL
37	1066001700	FITTING	73	SERBGEN#G420	TANK
38	1067009100	OGIVE	74	1046001500	AIR PRESSURE SWITCH
39	1017002800	NUT	75	1094171300	PLATE
40	1094134900	FILTER BRACKET	76	1080002600	AIR HOSE
41	1066001500	FITTING	77	1046001036	HOSE FITTING
42	1086000800	OIL FILTER			
42/1	1135000500	COVER	NOT SHOWN		
				1067007000	DRAIN PLUG FOR TANK
				1002006000	O-RING KIT FOR FILTER
					Includes (42/2, 42/3, 42/5)

## ADVANCED TROUBLESHOOTING

### Motor and transformer do not operate.

#### Causes:

1. Incorrect or low voltage supplied to the heater.
2. Fuse in heater is blown.
3. Thermostat defective, or not turned up to call for heat.
4. Thermostat jumper cap not in place.
5. Control board is defective.
6. Reset button has not been reset.

#### Solutions:

1. Incorrect or low voltage supplied to the heater. Most indirect oil heaters require a minimum of 108 volts to operate properly. A multi-meter set to measure volts can be used to check the amount of voltage at the end of the extension cord(s). If the measured voltage is too low, the length of the extension cord (s) must be shortened or a thicker gauge extension cord must be used.
2. Fuse in heater is blown. Locate and remove the in-line fuse of the heater. Set a multi-meter to measure ohms of resistance. Place a multi-meter probe on each end of the fuse. The multi-meter should read zero ohms (continuity) or the fuse is blown. If a new fuse blows immediately, check for possible causes. Check for incorrect voltage to the heater. Make sure the total amperage draw of all equipment running on the circuit is not too great. If the supplied voltage and total amperage draw are correct, check the wiring in the heater for correctness and possible shorts.
3. Thermostat is defective or not turned up to call for heat. Turn the thermostat up to the highest possible setting and try to start the heater. Next set a multi-meter to measure voltage coming out of the thermostat. If approximately 120 volts is not measured, the thermostat is defective.
4. Thermostat jumper cap not in place. Indirect oil heaters have a female socket used to attach an optional remote thermostat. If the remote thermostat is not being used, a jumper cap or "plug" must be inserted into the female socket to complete a voltage circuit, or the heater will not run.
5. Control board is defective. Using a multi-meter set for volts, check the hot and neutral wires which bring voltage into the control board. If proper voltage is reaching the board then the control board is defective.
6. Reset button has not been reset. Push the reset button and try to start the heater.

### Motor does not start, but ignition spark is present

#### Causes:

1. Control board is defective.
2. Motor is defective.
3. Motor start capacitor is defective.
4. Fuel pump seized

#### Solutions:

1. Control board is defective. Locate the terminals of the control board that connect to the motor wires. Use a multi-meter set to read voltage and check for approximately 120 volts to the motor when the heater is turned on. If no voltage is observed the control board is defective.
2. Motor is defective. If the control board and the motor start capacitor check ok and the fuel pump is not seized, the motor is defective.
3. Motor start capacitor is defective. The capacitor may be tested using a multi-meter set to the lowest possible ohm range. First "short" the capacitor by momentarily placing a screwdriver across the two capacitor terminals. Then place the multi-meter probes on the two capacitor terminals. The multi-meter should read close to zero ohms (continuity) first, then slowly move to infinity on the multi-meter. If not then the capacitor is defective.
4. Fuel pump seized. With the heater unplugged, stand behind the heater and attempt to turn the fan blade clockwise by hand. If the fan blade is difficult to turn, undo the connection between the motor shaft and the pump shaft. Attempt turning the fan blade again. If the motor now turns freely, the pump has seized up. If the fan blade is still difficult to turn, the motor is defective.

## Motor runs, spark is present, but there is no fuel spray

### Causes:

1. Spray nozzle clogged.
2. Fuel pump is defective/or broken pump coupling
3. Air entering the fuel pump thru the inlet line.
4. Solenoid valve is defective.
5. Control board is defective.
6. Fuel filter is dirty.
7. Safety thermostat defective or tripped or improper ducting.
8. Air proving switch defective.
9. Fuel gel.

### Solutions:

1. Spray nozzle clogged. Remove and inspect the spray nozzle. Clean or replace as needed. Do not clean the nozzle orifice with anything metal as this may enlarge the orifice.
2. Fuel pump is defective. The output pressure of the fuel pump can be checked by placing a high pressure fuel gauge into the gauge port of the fuel pump. Use a gauge with enough capacity to measure the high pressure your particular heater can produce. Use the adjustment on the pump to set the pump pressure to the manufacturer's specification. If you do not have a fuel gauge, you may slightly loosen the pump's output line connection and place a rag there. Run the heater briefly and see if fuel reaches the rag. If no fuel is pumped, check the connection between the motor and the fuel pump to make sure the motor can turn the pump. Also check the external and internal fuel filters for blockage, and clean or replace if necessary. The fuel pumps internal filter is usually located where the fuel inlet line enters the pump. Check to make sure motor is rotating pump.
3. Air entering the fuel pump thru the fuel inlet line. If air enters the pump it will lose its prime and will not maintain adequate pump pressure. First make sure all fittings, including the fuel filter on the inlet line are tight. If you still suspect air is entering the pump, start eliminating portions of the inlet line until the air leak is found. Start this process at the fuel tank end of the inlet line. It may be necessary to draw fuel from a small container rather than the fuel tank.
4. Solenoid valve is defective. Use a multi-meter set to measure volts. Check for approximately 120 volts at the ends of the two wires that carry voltage to the solenoid valve. If proper voltage is read, try cleaning the valve if it is dirty. If the valve will not open fully to allow fuel spray, the solenoid valve is defective. If proper voltage is not read, check for voltage on the control board terminals that the solenoid valve wires connect to. If proper voltage is read, the solenoid valve wires are defective. If voltage is not read on the board terminals, the control board is defective.
5. Control board is defective. Use a multi-meter set to measure voltage. Check for proper voltage on the two board terminals that the solenoid valve wires connect to. If proper voltage is read, the control board is ok. If proper voltage is not read, the control board is defective.
6. Fuel filter dirty. Check the external and internal fuel filters and clean or replace as necessary. Most fuel pumps contain an internal fuel filter located where the inlet line enters the fuel pump.
7. Safety thermostat defective or tripped. Also called overheat switch. Some indirect oil heaters have a safety thermostat wired between the control board and the solenoid valve. If the heater becomes too hot this normally closed switch will open and interrupt power to the solenoid valve. Use a multi-meter set to measure ohms. Place the multi-meter probes on the two male terminals of the safety thermostat. If the multi-meter shows infinity (no continuity) the safety thermostat is defective. If the switch opens up before the heater becomes hot, the safety thermostat is defective.
8. Air proving switch is defective. Try to start the heater without ducting. Indirect oil heaters have an air proving switch wired between the control board and the solenoid valve. The air proving switch is normally open and requires air from the turning fan blade to close the switch and send power to the solenoid valve. Set a multi-meter to measure voltage. With the fan blade turning, check for voltage coming out of the air proving switch to the solenoid valve. If no voltage is read, next check for voltage at the control board terminals out to the air proving switch. If voltage at the control board is read, the air proving switch is defective. If no voltage is read at the board, the control board is defective.
9. Examine condition of fuel in filter and tank. Diesel fuel may "gel" below 30°F. See fuel blend guide, page 18. Plug in heater and allow preheater to warm fuel (15 min).

## **Motor runs, fuel sprays, but no spark is observed**

### **Causes:**

1. Electrodes damaged or gapped incorrectly.
2. Transformer defective.
3. Control board defective.

### **Solutions:**

1. Electrodes damaged or gapped incorrectly. Inspect the electrode tips for melting. Make sure there are no cracks in the porcelain insulation. Check the electrodes with the manufacturer's specifications for gapping and spacing. Adjust or replace the electrodes as needed.
2. Transformer defective. Transformers require a ground connection to function properly. Check the transformer's ground wire or mounting tabs for a good ground connection. Use a multi-meter set to measure voltage. Check the voltage in to the transformer from the control board for approximately 120 volts. Do not attempt to measure the transformer's output voltage with an ordinary multi-meter. The transformer may also be bench tested for proper output arc.
3. Control board defective. Use a multi-meter set to measure voltage. Take a voltage reading on the control board terminals that send input power to the transformer. If proper voltage is not present, the control board is defective.

## **Motor runs, fuel sprays, spark is present, but heater will not ignite**

### **Causes:**

1. Pump pressure incorrect.
2. Electrodes damaged or gapped incorrectly.
3. Nozzle dirty or worn.
4. Air damper setting is incorrect.
5. Transformer output is weak.
6. Ducting is improper.
7. Venting is improper.
8. Fuel contains water or contaminants.

### **Solutions:**

1. Pump pressure incorrect. Using a high pressure fuel gauge, check the output pressure of the fuel pump. If necessary, use the pump's adjustment to set the pump pressure to the manufacturer's specifications.
2. Electrodes damaged or gapped incorrectly. Inspect the electrode tips for melting. Make sure there are no cracks in the porcelain insulation. Check the electrodes with the manufacturer's specifications for gapping and spacing. Adjust or replace the electrodes as needed.
3. Nozzle dirty or worn. Clean the nozzle using compressed air. Never use anything metal to clean the nozzle as this may enlarge the orifice. With enough use, fuel traveling under high pressure thru the nozzle orifice can enlarge the orifice. This is especially true when diesel fuel is used. Clean or replace the nozzle as needed.
4. Air damper setting is incorrect. Use the manufacturer's specifications for the air damper setting and adjust as needed.
5. Transformer output is weak. Remove the transformer and perform a bench test.
6. Ducting is improper. Follow the manufacturer's recommendations concerning maximum duct length and diameter.
7. Venting is improper. Follow the manufacturer's guidelines for venting.
8. Fuel contains water or contaminants. Visually inspect the fuel in the tank for water bubbles or contaminants. Drain, flush, and re-fill tank as needed.

## Heater ignites, runs less than one minute and shuts down

### Causes:

1. Photocell is dirty, misaligned or defective.
2. Control board is defective.
3. Fuel pump defective.
4. Fuel filter dirty.

### Solutions:

1. Photocell is dirty, misaligned or defective. Check that the photocell is aimed correctly and is free of dirt. If necessary, clean the photocell "eye" with a soft, dry cloth. Unfortunately no test exists for the photocell. Attempting to "jumper out" the photocell will not test the function. You must either replace the photocell or borrow a known functioning photocell from an identical heater.
2. Control board is defective. If the heater's spray and spark are correct, the photocell and control board must work together to recognize the combustion flame has become established. Therefore if a new photocell does not correct this symptom, the control board is defective.
3. Fuel pump is defective. If the fuel pump will not achieve or maintain proper output pressure, the fuel pump is defective. Check the pump's output pressure with a gauge.
4. Fuel filter dirty. Inspect the internal and external fuel filters and clean or replace as needed.

## Heater ignites, runs several minutes, then shuts down.

### Causes:

1. Fuel pump is defective.
2. Solenoid valve is defective.
3. Overheat thermostat is defective.
4. Ducting is improper.
5. Venting is improper.
6. Nozzle is dirty.
7. Fuel filter is dirty.
8. Control board is defective.
9. Fuel contains water or contaminants.

### Solutions:

1. Fuel pump is defective. If the fuel pump will not achieve or maintain proper output pressure, the pump is defective. Check the fuel pump output pressure with a gauge.
2. Solenoid valve is defective. Use a multi-meter set to measure voltage. Check for proper voltage at the solenoid valve. If proper voltage is read and the solenoid valve will not stay open and allow fuel spray, the solenoid valve is defective.
3. Overheat thermostat is defective. Also called a safety thermostat or limit switch. Some heaters are equipped with this. Set a multi-meter to measure ohms of resistance. Perform this test immediately after the heater shuts down and the overheat thermostat is still hot. Place the multi-meter probes on the two male terminals of the safety thermostat. If the multi-meter reads infinity (no continuity) the safety thermostat is defective. Remember that if the heater is over firing due to high pump pressure, worn nozzle, or is improperly ducted or vented, the safety thermostat will heat enough to shut the heater off.
4. Ducting is improper. Always follow the manufacturer's recommendations regarding maximum duct length and diameter. Failure to do so can result in heat building up in the heater until the safety thermostat contacts open and shut the heater off.

5. Venting is improper. Follow the manufacturer's recommendations concerning proper venting. Failure to do so can result in heat building up in the heater until the safety thermostat contacts open and shut the heater off.
6. Nozzle is dirty. If dirt reaches the nozzle, the spray can be adversely affected and cause a shut down. If possible observe the spray pattern and clean the nozzle as needed.
7. Fuel filter dirty. Check the internal and external fuel filters. Clean or replace as needed.
8. Control board is defective. For the heater to function, the control board must send proper voltage to three components: motor, transformer and solenoid valve. Using a multi-meter set to measure voltage, check the appropriate control board terminals for proper voltage out to these three components. If proper voltage to any of these three components is not observed, the control board is defective.
9. Fuel contains water or contaminants. Visually inspect the fuel in the tank for water bubbles or contaminants. Drain, flush, and re-fill as needed.

### **Heater ignites, but combustion is poor or uneven**

#### **Causes:**

1. Fuel pump pressure is incorrect.
2. Nozzle dirty or worn.
3. Electrodes damaged or gapped incorrectly.
4. Fuel filter is dirty.
5. Air damper setting incorrect.
6. Whirl disk dirty or mis-aligned.
7. Ducting is improper.
8. Venting is improper.
9. Fuel contains water or contaminants.

#### **Solutions:**

1. Fuel pump pressure is incorrect. The output pressure of the fuel pump can be checked by placing a high pressure fuel gauge into the gauge port of the fuel pump. Use a gauge with enough capacity to measure the high pressure your particular heater can produce. Use the adjustment on the pump to set the pump pressure to the manufacturer's specifications.
2. Nozzle dirty or worn. Clean the nozzle using compressed air. Never use anything metal to clean the nozzle as this may enlarge the orifice. With enough use, fuel traveling under high pressure thru the nozzle orifice can enlarge the orifice. This is especially true when diesel fuel is used. Clean or replace the nozzle as needed.
3. Electrodes damaged or gapped incorrectly. Inspect the electrode tips for melting. Make sure there are no cracks in the porcelain insulation. Check the electrodes with the manufacturer's specifications for gapping and spacing. Adjust or replace the electrodes as needed (page 5/17).
4. Fuel filter is dirty. Inspect the internal and external fuel filters and clean or replace as needed.
5. Air damper setting incorrect. Use the manufacturer's specifications for the air damper setting and adjust as needed. (see Diagram B, page 17)
6. Whirl disk dirty or mis-aligned. Inspect the whirl disk and clean if necessary. If the disk is warped or mis-aligned, replace or adjust as needed.
7. Ducting is improper. Follow the manufacturer's recommendations concerning maximum duct length and diameter.
8. Venting is improper. Follow the manufacturer's guidelines for venting.
9. Fuel contains water or contaminants. Visually inspect the fuel in the tank for water or contaminants. Drain, flush, and re-fill tank as needed.



## Heater ignites but flame is excessive

### Causes:

1. Fuel pump pressure is too high.
2. Nozzle is worn.
3. Incorrect fuel.

### Solutions:

1. Fuel pump pressure is too high. Attach a high pressure fuel gauge to the fuel pump and check the pump pressure. Adjust the pressure to the manufacturer's specifications with the adjustment on the fuel pump.
2. Nozzle is worn. With enough use, the impurities in the fuel traveling under high pressure thru the nozzle orifice can enlarge the orifice. This is especially true when diesel fuel is used. A worn nozzle can cause the heater to run "rich" and possibly over fire the heater enough to activate the safety thermostat and cause a shutdown. Replace after 400 hours of operation.
3. Incorrect fuel. Only use the manufacturer's recommended fuels. Never use gasoline, paint thinner, solvents, or other flammable liquids. If you suspect the fuel is incorrect, drain, flush and re-fill the tank with proper fuel.

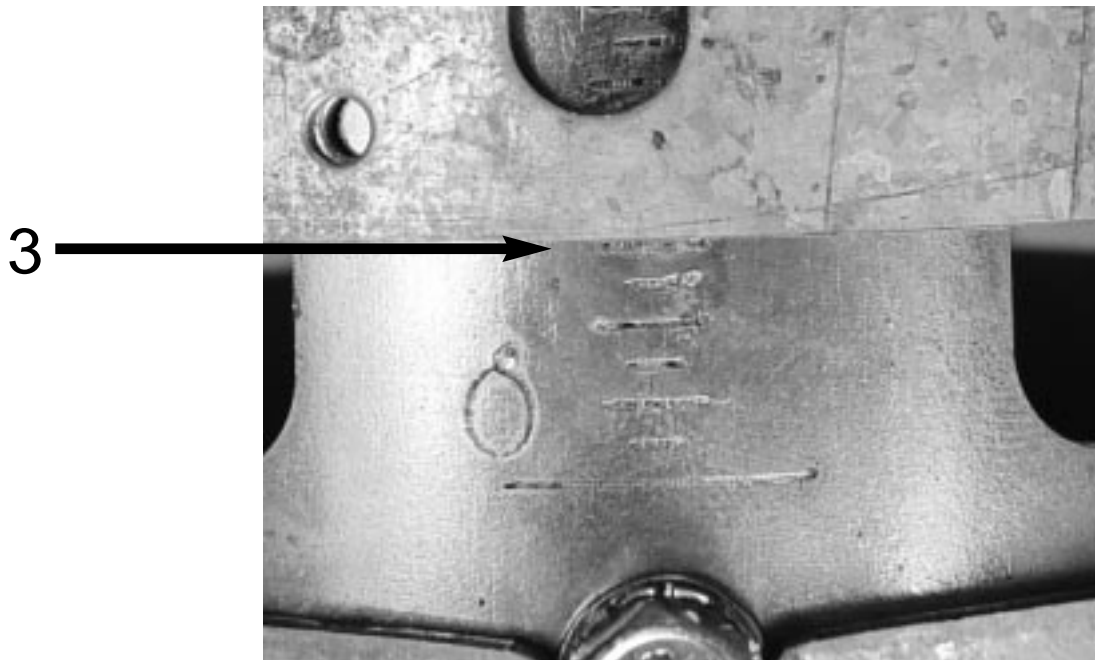
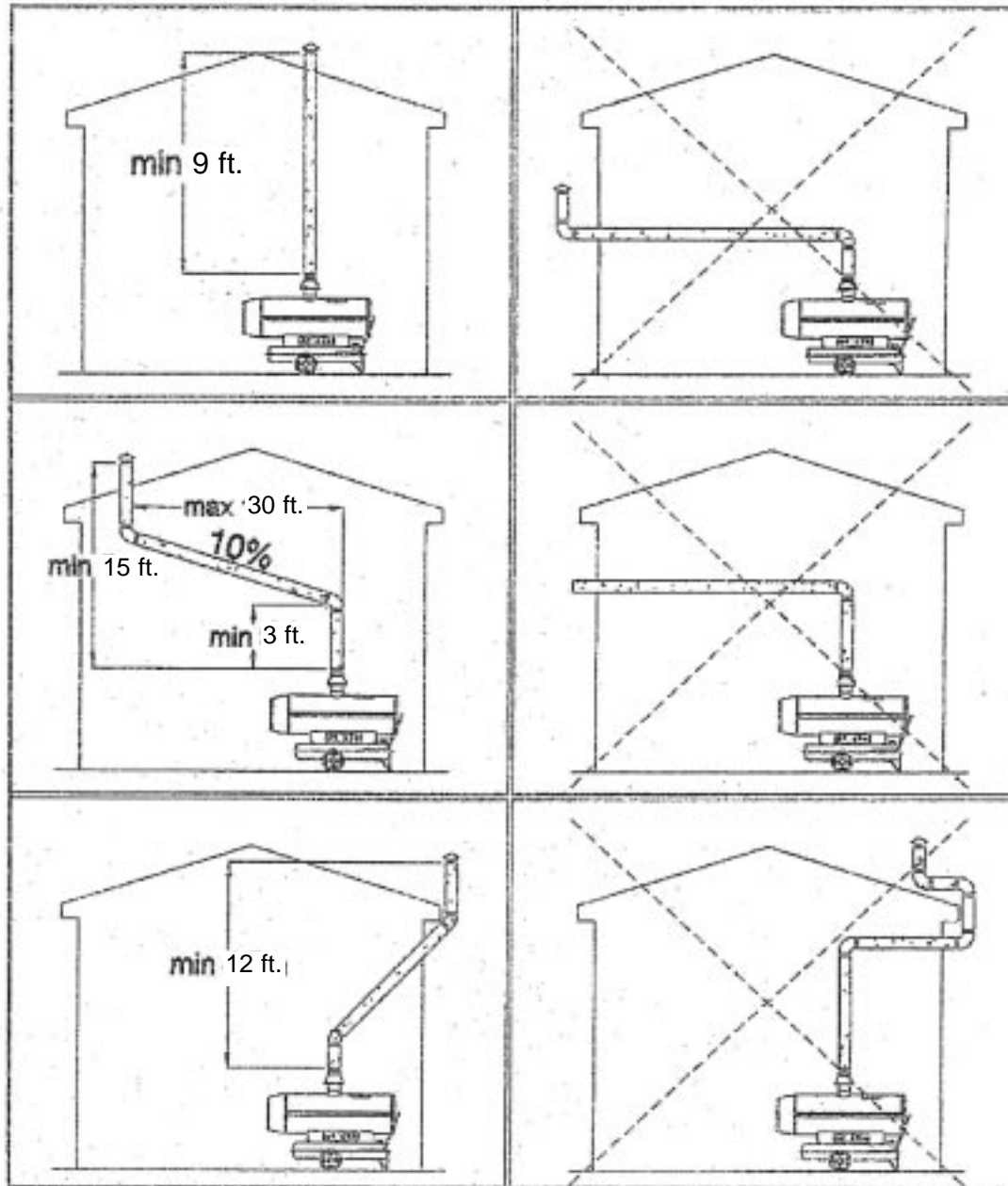


Diagram B

# Chimney/Exhaust Set-Up



Fuel Blend Guide	
Temperature Range	Fuel Blend
15° to 30°F	80% #2 : 20% #1
0° to 15°F	70% #2 : 30% #1
-15° to 0°F	50% #2 : 50% #1
below -15°F	30% #2 : 70% #1

## Accessories



**DUCTING**  
HVF180 - #WD1225  
12" Diameter, 25' Long

HVF300 - #WD1825  
18" Diameter, 25' Long



**FLUE STACK**  
#EF1



**FUEL PRESSURE GAUGE**  
#BIE99AM003



**DUCT ADAPTER**  
HVF180 - #AR180

HVF300 - #AR300



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**THERMOSTAT**  
#THIDF

