



# 21A AIR HEATER



**Technical Description**

**Installation Instructions**

**Operating Instructions**

**Troubleshooting**

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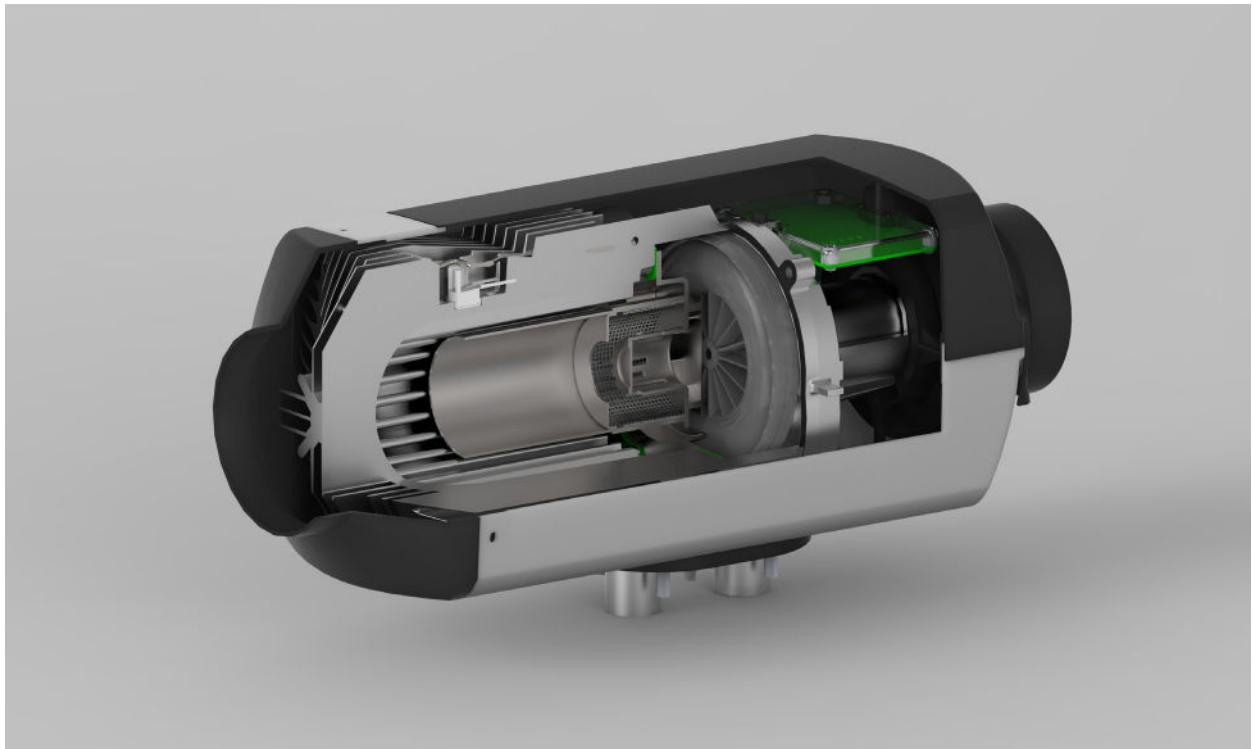
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# Introduction

Thank you for purchasing our 21A heater.

The 21A heater is designed to provide cabin heating for trucks, off-highway equipment, RVs and boats by using on-board diesel fuel and battery systems. Operation is simple and the heater provides a safe and reliable alternative to engine idling or need for electrical plug ins.

Please take a moment to familiarize yourself with this manual, safety warnings and heater requirements before installing or operating your heater.



# Heater Warnings

## Special Notes

**Note:** Highlight areas requiring special attention or clarification.

### Caution

Indicates that personal injury or damage to equipment may occur unless specific guidelines are followed.

### Warning

Indicates that serious or fatal injury may result if specific guidelines are not followed.

#### **Warning - Installation Hazards**

- The installation of this kit requires trained decision making concerning locating and integrating components, tying components together, rerouting, or relocating OEM components, etc. It is impossible to describe all of the safety and operational considerations in the installation instructions, therefore, the technician must exercise professional judgment to achieve a safe and quality installation.
- Read and understand this manual before attempting to install the heater.
- Failure to follow all these instructions could cause serious or fatal injury.

#### **Warning - Explosion Hazards**

- Heater must be turned off while re-fueling.
- Do not install heater in enclosed areas where combustible fumes may be present.

#### **Warning - Fire Hazards**

- Exhaust pipe must maintain a minimum a distance of 50mm (2") from any flammable or heat sensitive material.
- Ensure there are no leaks in the fuel system.

#### **Warning - Asphyxiation Hazards**

- Ensure that exhaust fumes cannot enter passenger compartments.
- The heat exchanger should not be used for more than 5 years. After expiration, it must be replaced with genuine parts and replaced by the heater manufacturer.

#### **Warning - Burn Hazards**

- Exhaust pipe will become very hot during heater operation.
- Avoid touching exhaust pipe during operation.
- Route exhaust pipe in a manner to shield it from anyone making contact with it.

### Caution - Operational Considerations

#### **Bio-Diesel**

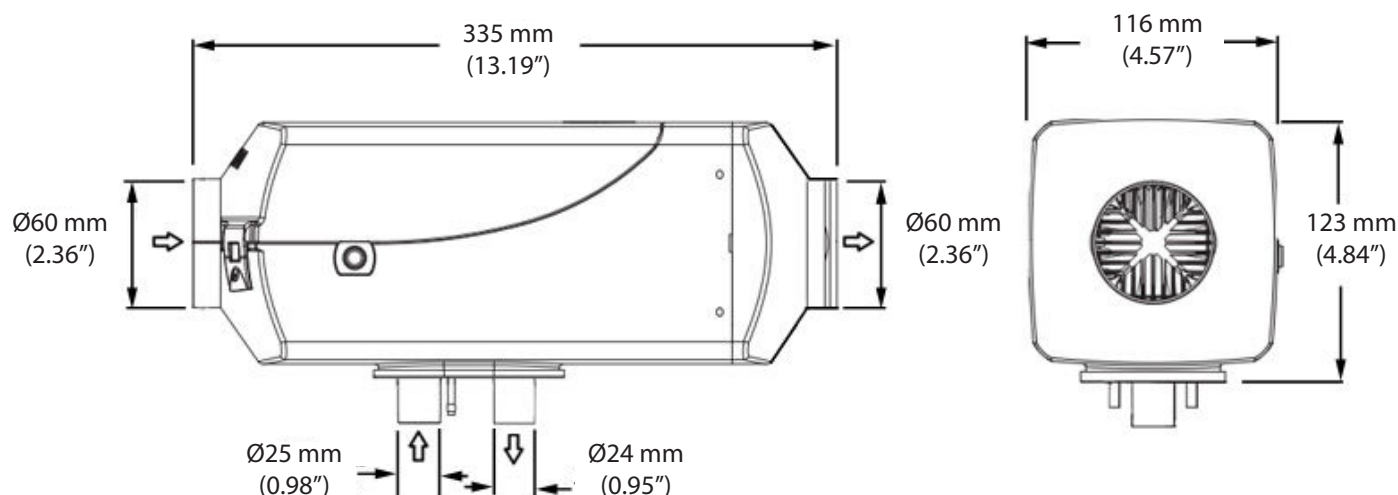
This heater is not designed for use with straight bio-diesel (Blends of bio-diesel up to 10% are acceptable) Operating outside of these conditions may plug the heater with soot and result in combustion failure.

#### **High Altitudes**

This heater is not designed to operate continuously at altitudes above 1500 meters (4920'). Operating in these conditions may plug the heater with soot and result in combustion failure.

# Specifications

## Principal Dimensions



### Performance Specifications



Heating Mode	Super	High	Medium	Low
Heating Capacity kW/hr (BTUs/hr)	2.0 (6,850)	1.5 (5,800)	1.1 (4,437)	0.9 (3,072)
Fuel Consumption L/hr (US Gal/hr)	0.21 (0.07)	0.16 (0.06)	0.12 (0.04)	0.10 (0.02)
Air Flow M <sup>3</sup> /min (CFM)	1.65 (58)	1.19 (42)	0.72 (26)	0.47 (16)
Power Consumption - watts	34	23	13	9
Power Consumption at Start - watts	≤ 100			
Fuel Type	Diesel			
Nominal Voltage	12 Volt			
Lower Voltage Limit	9 Volts over 20 seconds			
Upper Voltage Limit	16.0 Volt over 20 seconds			
Overheat Protection	115° C (239° F)			
Allowed Ambient Temperature	-40° C to 76° C (-40° F to 168° F)			
Weight	2.6 kg (5.7 lbs)			

Above Specifications (± 10%)

# Heater Kit List

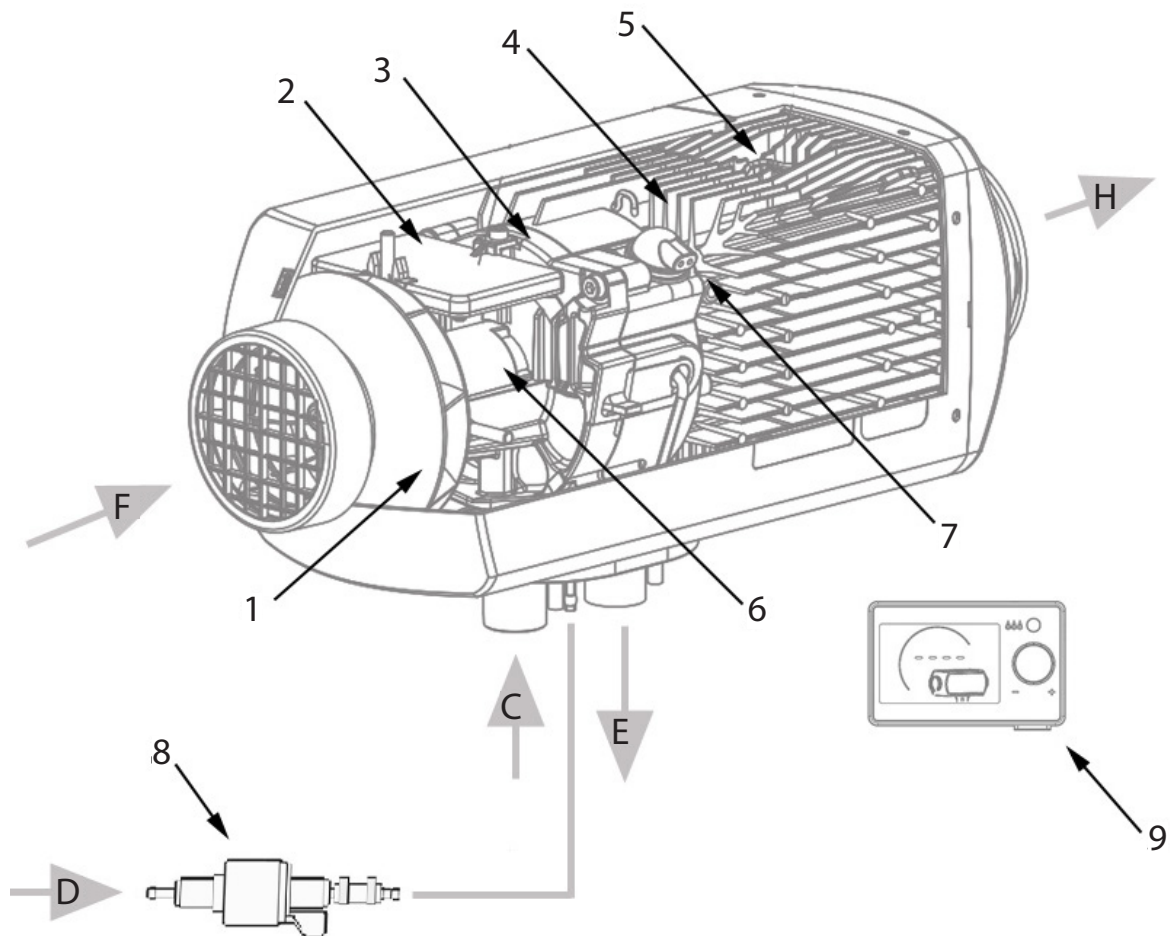
	QTY 1	Description 2Kw Air Heater	Part Number P21A-T801
	QTY 1 1	Description Operating Switch Mount Bracket	Part Number P65A-X310 NPN
	QTY 1	Description Heater Mounting Plate & Seal	Part Number U65A-X702
	QTY 1	Description Wiring Harness 4.5M (15') Power Harness, 20A Fuse 4.5M (15') Fuel Pump Harness 6M (20') Switch Harness	Part Number P65A-X303
	QTY 1 1 1	Description 24mm Flexible Stainless Steel Exhaust 25mm Combustion Air Intake Tube, 1M Combustion air intake cap	Part Number U65D-X518 U65D-X507 U65D-X509
	QTY 1 1 4 1	Description 60mm Hot Air Ducting 1M (3') Length 60mm Air Outlet Adjustable Vent 60mm Hose Clamps 60mm Return Air Inlet	Part Number U20A-X603 U20A-X602 U20A-X604 U20A-X601

# Heater Kit List

	QTY	Description	Part Number
	1	Fuel Metering Pump	P21A-T401
	1	Fuel Pickup Tube & Fuel Tube Hardware Kit	U65D-X405
	1	Fuel Pump Holder	U65D-X407
	1	Black Rubber Fuel Line, 4.5mm ID x 0.5M	U65D-X414
	6	4.5mm ID x 50mm Fuel Line Connectors	U65D-X409
	1	Clear Nylon Fuel Line, 8M (26'), 1.5 - 2.0 mm ID	U65D-X403
	12	Small Fuel Line Clamps, 9-11 mm x 9mm wide	U65D-X401
	1	Fuel Filter	U65D-X402
	10	Cable Ties, Medium Grade, Black, 20cm	U65D-X705
	1	Exhaust Clamp, 26 – 28 mm	U65D-X502
	2	28mm "P" Routing Clamp	U65D-X701
	1	"Z" Mounting Bracket	U65D-X707
	2	"L" Brackets	U65D-X706
	1	Combustion air tube clamp	U65D-X702
	7	TEKS Mounting Screws ¼" -14 x 1"	NPN
	6	M6-1 x 25 Hex Head Screw, Grade 8 Zinc Plated	NPN
	10	M6-1 Hex Nuts – Grade 8, Zinc Plated	NPN
	10	6mm wave washers	NPN
	6	#8 x 20mm, Self Drilling, Phillips Head Cap	NPN
	2	#6 x 12 mm (½") Self-Drilling, Phillips Head Cap	NPN



## Main Components and Operating Concept



1) Process Air Blower	6) Blower Motor	C. Combustion Air
2) Control Unit	7) Glow Pin	E. Exhaust Gas
3) Combustion Air Blower	8) Fuel Metering Pump	F. Fresh Air Intake
4) Combustion Chamber & Heat Exchanger	9) Operating Switch	H. Hot Air Outlet
5) Overheat Sensor		D. Fuel Intake

- The fuel pump delivers fuel to the combustion chamber.
- The combustion air blower delivers air to the combustion chamber.
- A glow pin is used to ignite the fuel-air mixture.
- The heat from the flame is transferred through the heat exchanger while the exhaust gases are expelled to the exterior of the vehicle.
- The process air blower transfers air from the cabin, over the outside of the heat exchanger and blows hot air into the cabin.
- The heater automatically maintains the desired set temperature in the cabin by regulating through multiple heat output modes.



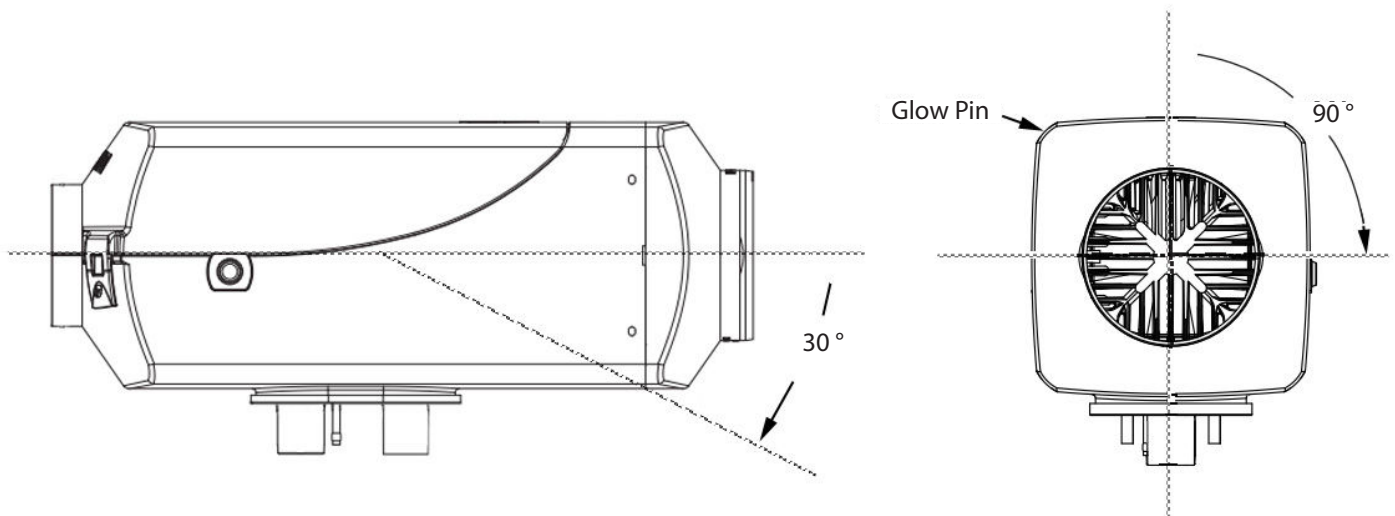
# Heater Mounting

## Heater Location

Typically, air heaters are mounted inside a tool compartment with the OEM HVAC System. However, the heater may be mounted anywhere inside the cabin provided you adhere to the following conditions:

- Combustion air intake, exhaust and fuel inlet connections must be on outside of the vehicle.
- Heater must be mounted on flat surface and provide an air tight seal between heater and vehicle.
- Refer to Figure M1 for permissible mounting orientations.

Figure M1

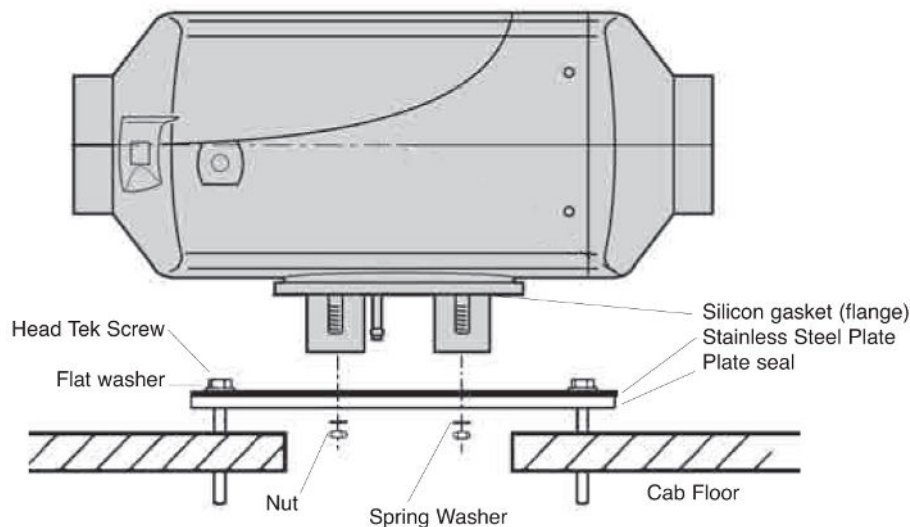


# Heater Mounting

## Mounting

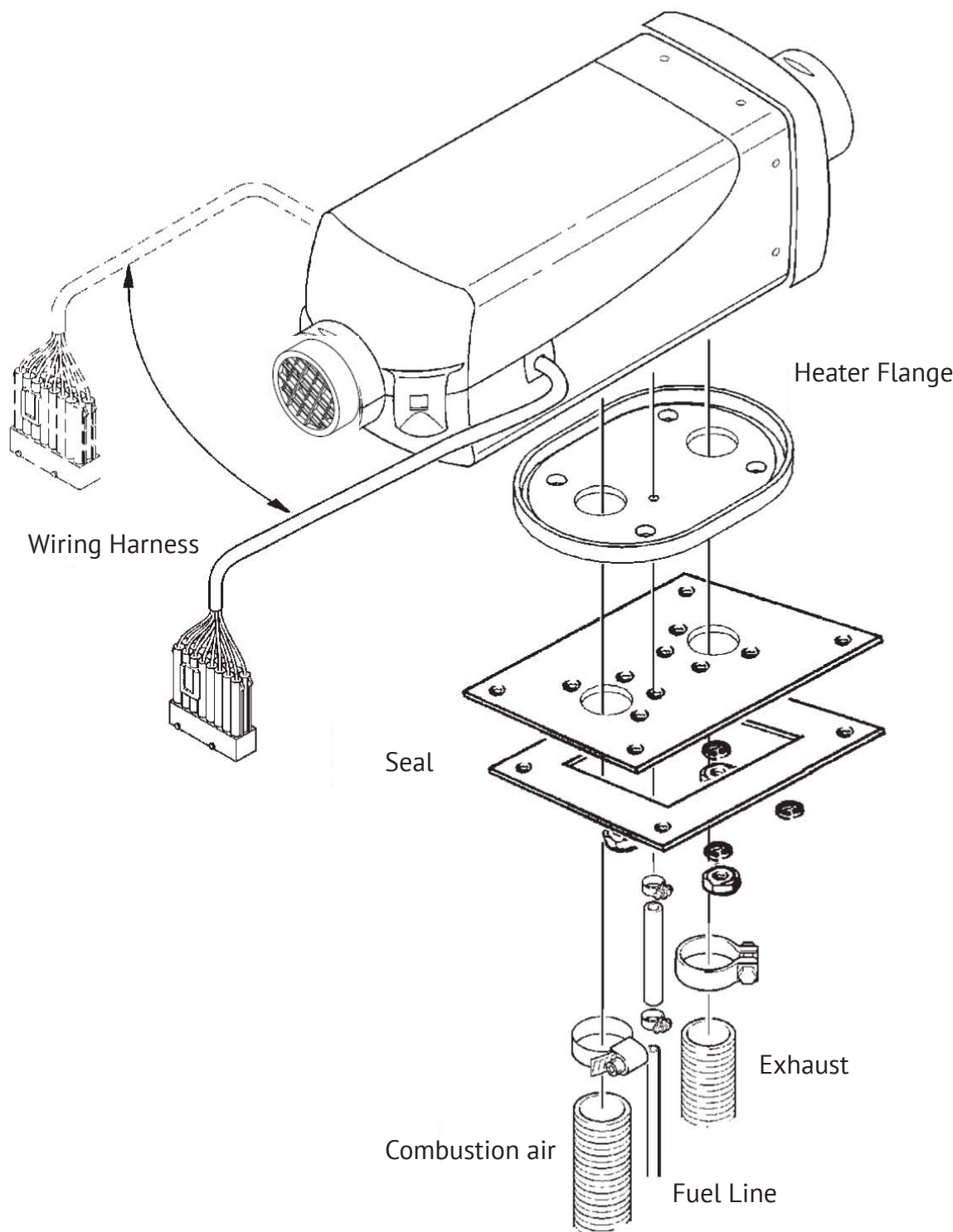
- A mounting plate and hardware are provided with the truck heater kit.
- Refer to Figures M2 & M3 for assembly orientation. Note: If the mounting plate will not be used, the heater flange can be used as a template to mark where the individual components openings should be made.
- For ease of installation fasten the mounting plate to the heater and make exhaust, combustion air intake and fuel connections at the base of the heater before mounting the assembly to the vehicle.
- Cut a two 3" holes or a 4"x 5" rectangular opening on the cabin floor to accommodate mounting plate and seal. Refer to Figure M4.
- Secure mounting plate to vehicle with self tapping "Tek" screws provided.

Figure M2



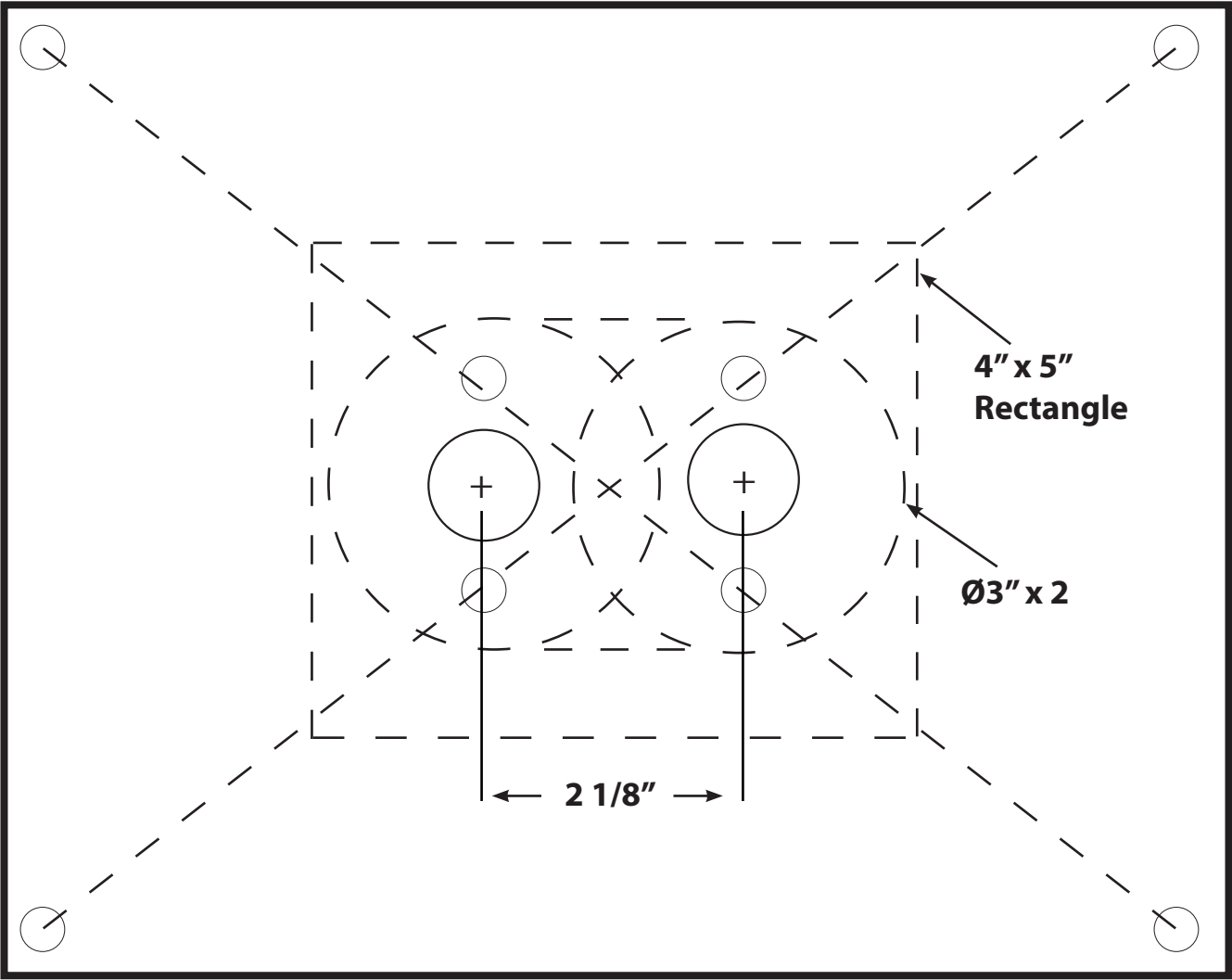
# Heater Mounting

Figure M3



# Heater Mounting

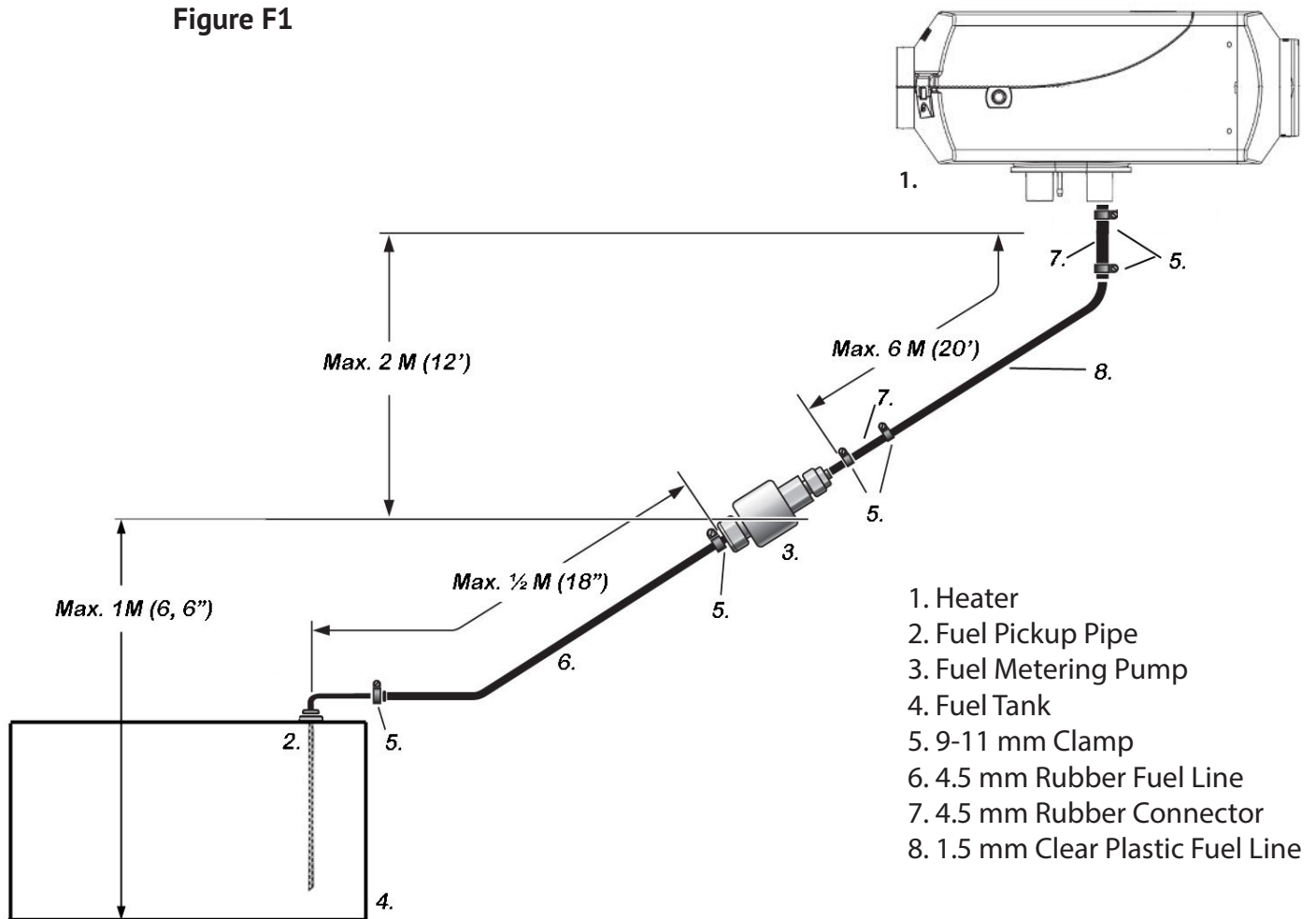
Figure M4



# Fuel System

The 21A fuel pump and fuel system are the heart of the heater. The fuel pump not only delivers fuel to the heater but also controls the amount of fuel delivered. The pump is designed to operate like an electric solenoid and works using electric pulses. Each time it is energized, it provides a measured dose of fuel. It is critical to the heater's operation to stay within parameters outlined in Figure F1 and only use the components provided.

**Figure F1**



## System Layout & Considerations

- Keep the length of the fuel system short as possible.
- Mount the fuel pump as close to the fuel pickup as possible (pump pushes better than it sucks).
- Minimize vertical rise.
- Mount the fuel pump in a protected location away from road spray.
- Choose a mounting location for the fuel pickup pipe that is close to the heater and offer installation access.
- Design your fuel system so that Figure F1 fuel line limits are not exceeded.

# Fuel System

Figure F2

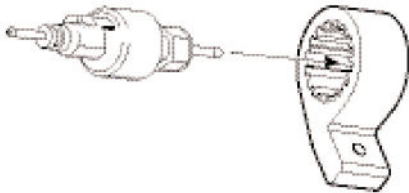
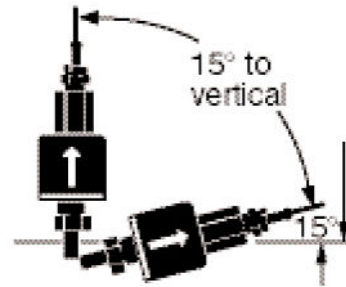


Figure F3

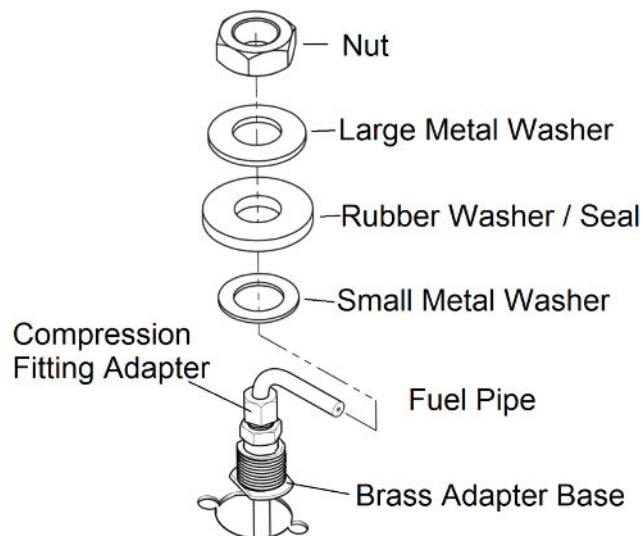


## Fuel Pump Mounting

- Using the bracket and rubber mount provided, install fuel pump as shown in Figure F2.
- Isolating the pump with the rubber holder helps to minimize noise created during operation.
- Ensure that the proper mounting angle is observed to avoid cavitation. (Figure F3)

## Fuel Pickup Pipe

Figure F4



## Fuel Source

- Connect directly into the fuel tank using our dedicated fuel pickup tube. (Figure F4)
- Teeing into the existing vehicle fuel lines is not recommended.
- There are three common methods to install a fuel pickup tube.
  - o Use NPT / compression fittings if available
  - o Use spare fuel gauge plate if available
  - o Drill dedicated holes into the tank.

# Fuel System

## Fuel Pick-Up Pipe Installation (Drill Option)

- Drill mounting holes in tank to accommodate pick-up pipe as shown in Figure F4
- Drill the two (1/4") holes first as shown in Figure F5.
- Drill a 7/8" hole as shown in Figure F6.
- Mount the fuel pick-up assembly pipe as shown in Figure F4.
- Position fuel pick-up 4" from bottom of tank for round tanks and 1" for flat tanks (cut tube as necessary)

## Fuel Line Connections

- Route fuel lines from the fuel pick-up pipe to the heater.
- Use only fuel lines provided (Other sizes or types of fuel lines may inhibit proper fuel flow)
- Make proper butt joints using clamps and connector pieces as shown.
- Use a sharp utility knife to cut plastic fuel lines to avoid fuel line pinching.

Figure F5

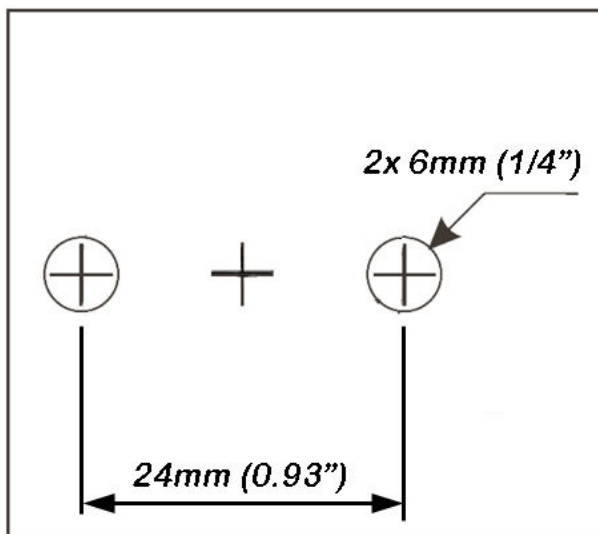
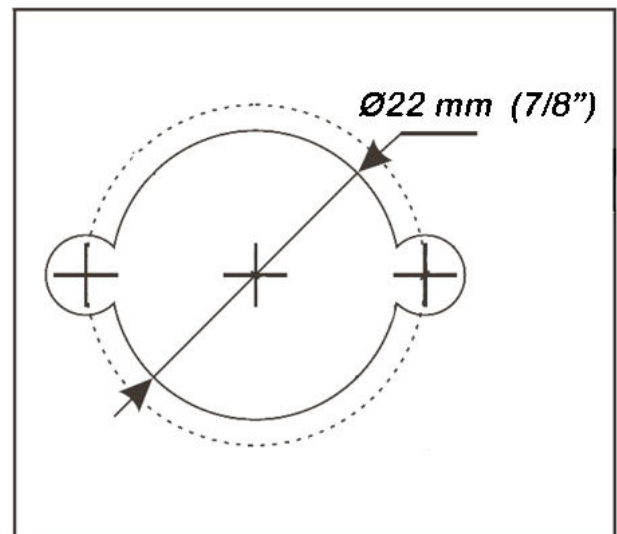


Figure F6



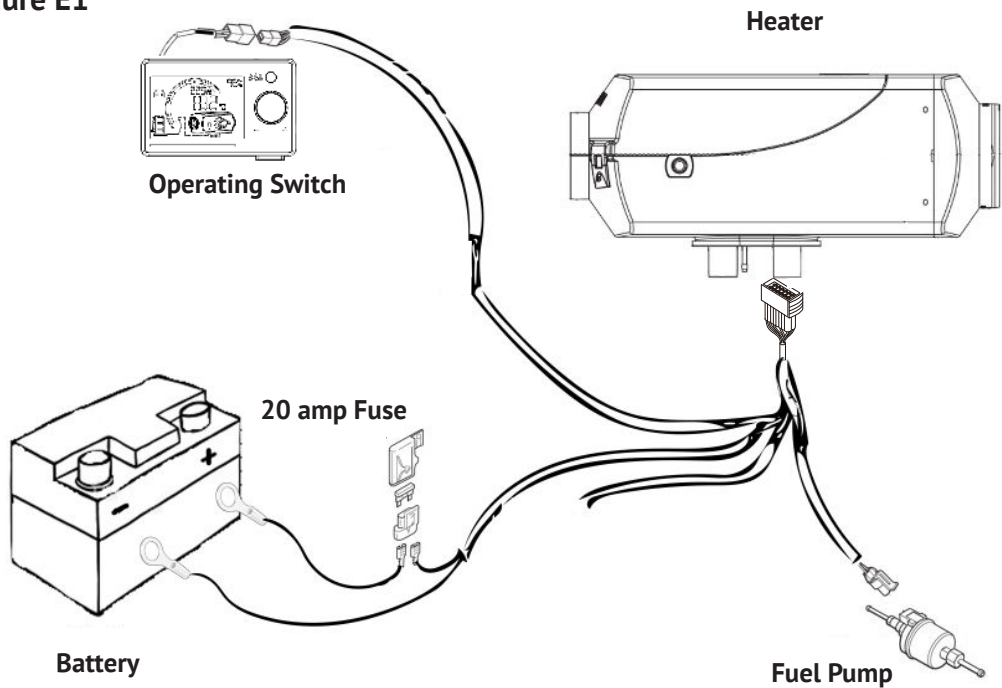


# Electrical Connections

## Electrical System Installation

- The heater harness has all the electrical connections pre-assembled for easy installation.
- Route cables using either an existing cable passage or drill holes as required.
  - Seal the hole around the cables and make sure they are protected from chaffing and pinching.
  - Below is a summary of the wiring connections required.

Figure E1



A. Main Heater Harness	Combines switch, fuel and power harness. Connects to the heater's main connector. Refer to Main Harness Wiring Legend for details.
B. Power Harness	2 Core, 4.5M (15') Long Red (+), Brown (-) <ul style="list-style-type: none"><li>• Route power harness section from heater to vehicle batteries.</li><li>• Connect red wire to battery (+)</li><li>• Connect brown wire to battery (-)</li><li>• Install 20 amp main fuse (Last step of installation)</li></ul>
C. Switch Harness	4 Core, 6M (20') Long Yellow, Brown/White, Red, Grey/Red, Grey, Blue/White, Brown <ul style="list-style-type: none"><li>• Route switch harness section from heater to switch location.</li><li>• Connect to operating switch harness</li></ul>
D. Fuel Metering Pump Harness	2 Core, 4.5M (15') Long Green / Red, Brown <ul style="list-style-type: none"><li>• Route fuel metering pump harness to fuel pump.</li><li>• Connect to fuel pump</li></ul>

# Electrical Connections

## Main Harness Wiring Legend

Terminal	Wire Color	Function
1.	Red	Main Power “ + ”
2.	Brown / White	Switch
3.	Blue / White	Switch
4.	Yellow	Switch
5.	Open	
6.	Red	Switch “ + ”
7.	Grey	Switch
8.	Open	

Terminal	Wire Color	Function
9.	Open	
10.	Green / Red	Fuel Metering Pump
11.	Brown	Fuel Metering Pump
12.	Open	
13.	Open	
14.	Brown	Switch
15.	Open	
16.	Brown	Main Power “ = ”

Open end view of main heater harness connector

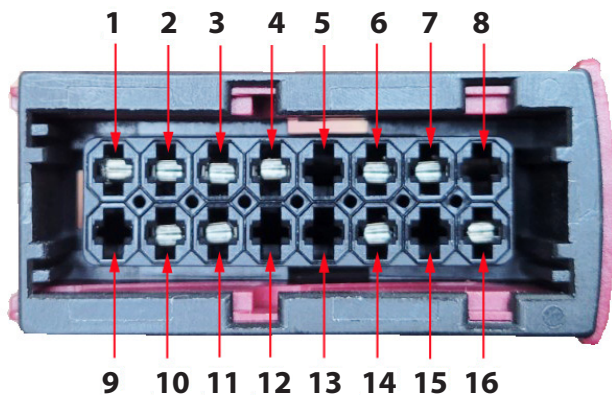
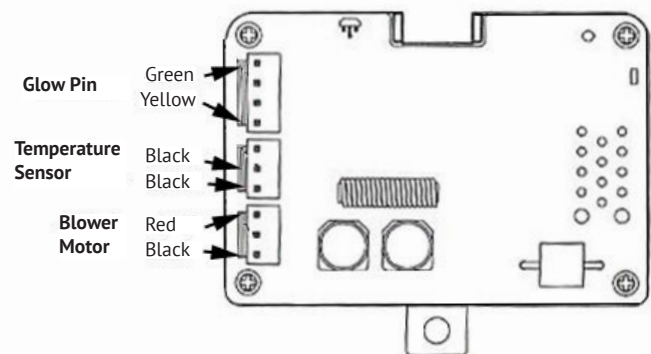


Figure E4

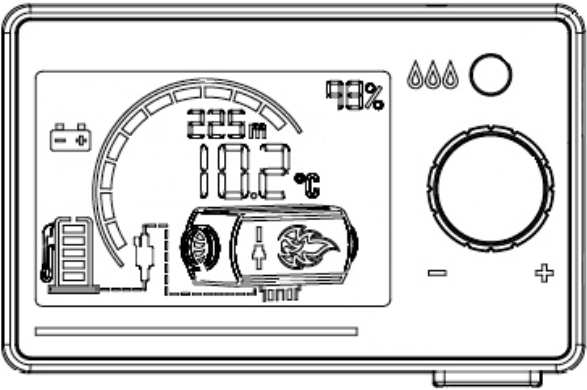
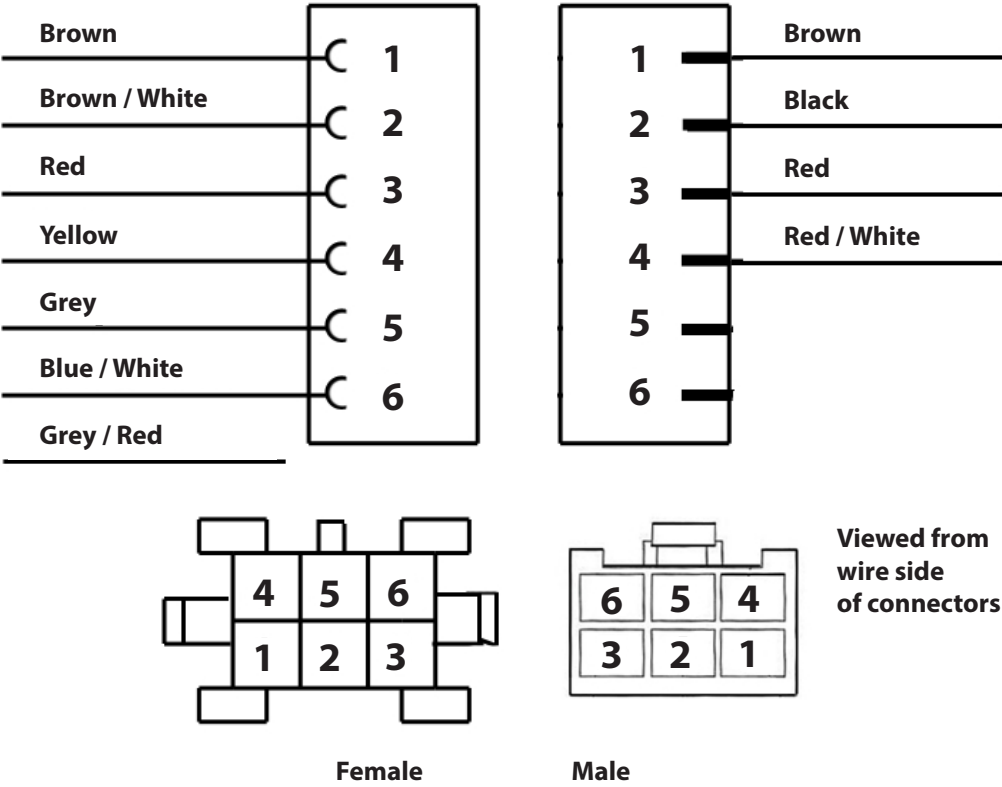
## ECU Electrical Connections



# Electrical Connections

## Operating Switch Wiring

Figure E5

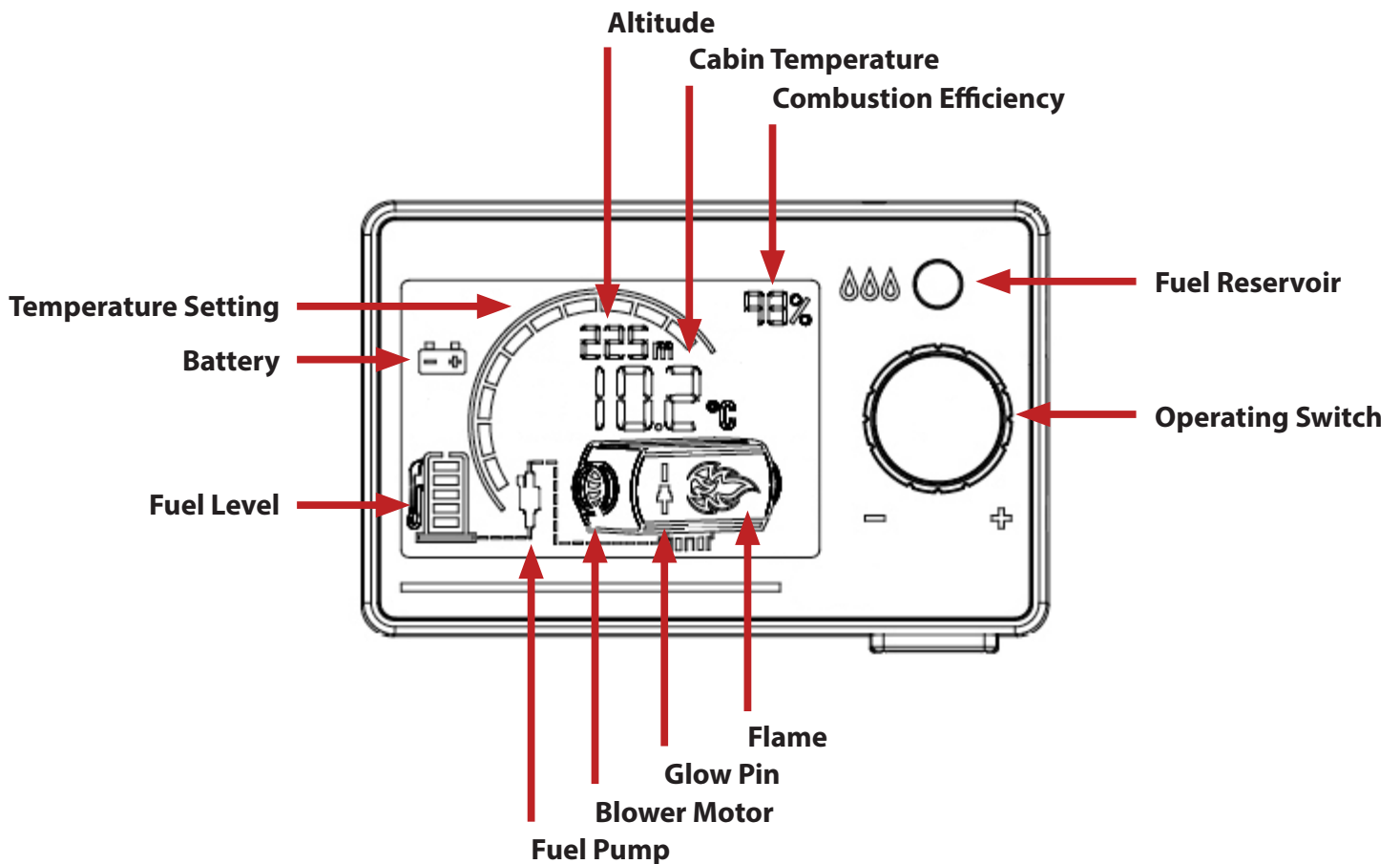


# Operating Switch Instructions

## Overview:

The PHP Operating Switch allows you to regulate cabin temperature, set operating mode, monitor heater operations and access diagnostic information.

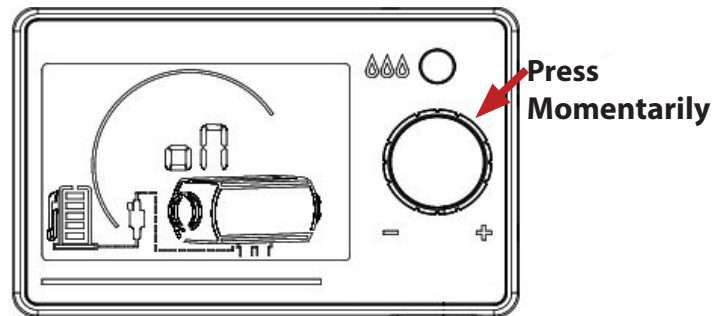
## Operation Buttons & Display Icons:



# Operating Switch Instructions

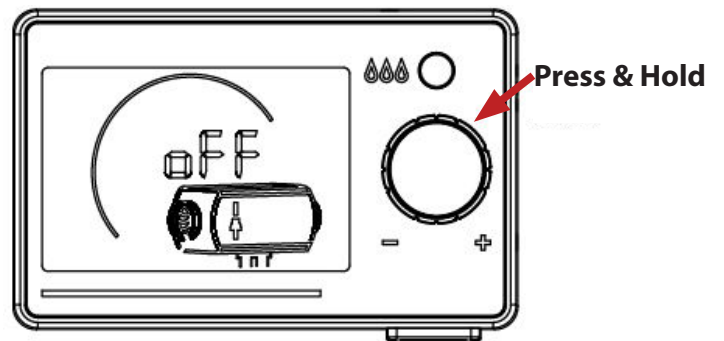
## On / Off Control:

Momentarily press the Operating Switch to turn the heater ON



Press and hold the Operating Switch for 3 seconds to turn the heater OFF.

**Note: Once combustion process starts, switching off heater will initiate a 4 minute cool down period.**



## Operating Modes:

The heater has two different operating modes.

**"Power Mode"** Controls the heat output level.

**"Automatic Mode"** Establishes target cabin temperature for heater to maintain. (Primary operating mode for cargo and cabin heating applications)

## Note:

**Internal temperature sensor inside heater is used to regulate the cabin temperature. Temperature displayed on switch, only reflects temperature at operating switch.**

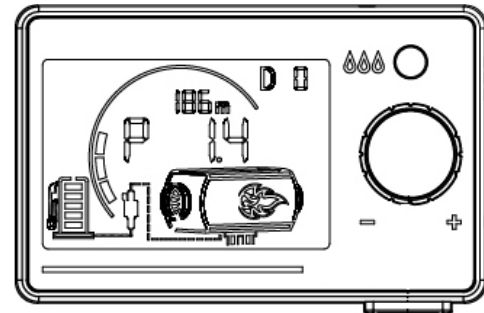
# Operating Switch Instructions

## Operating Mode Adjustments:

Switch between operating modes by momentarily pressing the Operating Switch

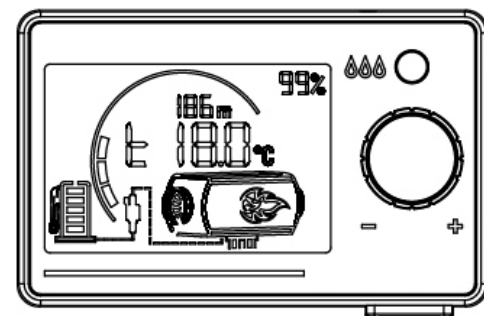
### Power Mode:

Adjust heat output level by rotating switch Output level range is 1.1 -2.0 (0.1 intervals)



### Automatic Mode:

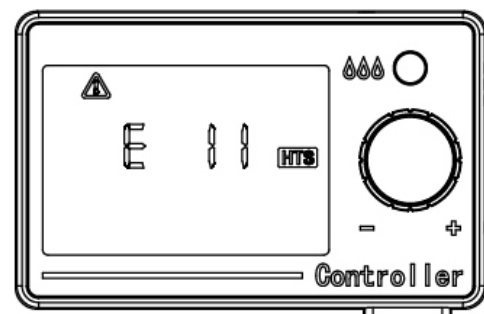
Adjust target temperature by rotating switch Target temperatures range is 10° C to 35° C (1° intervals)



## Self Diagnostics

If ECU detects a problem during operation a fault code will be displayed.

Refer to the diagnostics fault code legend for further information.



# Operating Switch Instructions

## Auxiliary Fuel Reservoir Monitor

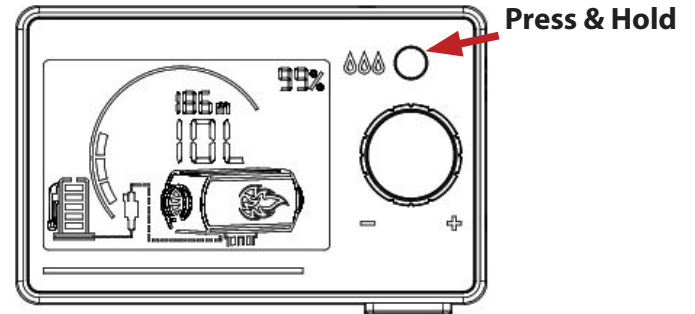
If an auxiliary fuel reservoir is used;

Operating Switch can monitor fuel levels to advise when refueling is necessary.

Press and hold the Fuel Reservoir button to select a 5L, 8L or 10L reservoir.

Repeat to advance to the next selection.

Once selected, the Fuel Level gauge is reset to the capacity selected.





# Exhaust & Combustion Air Intake Connections

The combustion air intake tube channels clean air into the heater.

The exhaust tube channels exhaust safely away from the heater and vehicle.

It also assists in providing a required amount of back pressure required to balance the combustion process.

Connect the combustion air intake tube and exhaust as shown in Figure A1

## Exhaust Considerations:

- The exhaust is made using a heat resistant, 24mm flexible, stainless steel tube.
- Secure the exhaust tube to the heater using the exhaust clamp provided.
- Discharge exhaust away from passenger compartment.
- Ensure exhaust fumes cannot be sucked into combustion air intake.
- Install exhaust pipe with incline for moisture run off.
- Drill a small drain hole at low point if proper incline cannot be maintained.
- Route the exhaust pipe from the heater using "p" clamps provided.
- Route away from the vehicle slip stream.

## Combustion Air Intake Considerations:

- The combustion air intake is made from a 25mm flexible, water resistant, paper / aluminum compound.
- Secure the combustion air intake tube to the heater using the clamp provided.
- Draw air from a clean air source away from water, dust and exhaust.
- The combustion air opening must be kept free at all times.
- Install combustion air intake tube with an incline for moisture run off.
- Route the combustion air intake using "p" clamps provided.
- Route away from the vehicle slip stream.

## Warning - Fire Hazards

The exhaust is hot, keep a minimum of 5 cm (2") clearance from any heat sensitive material.

## Warning - Asphyxiation Hazards

Route exhaust beyond the skirt of the cab and outside of the frame area.

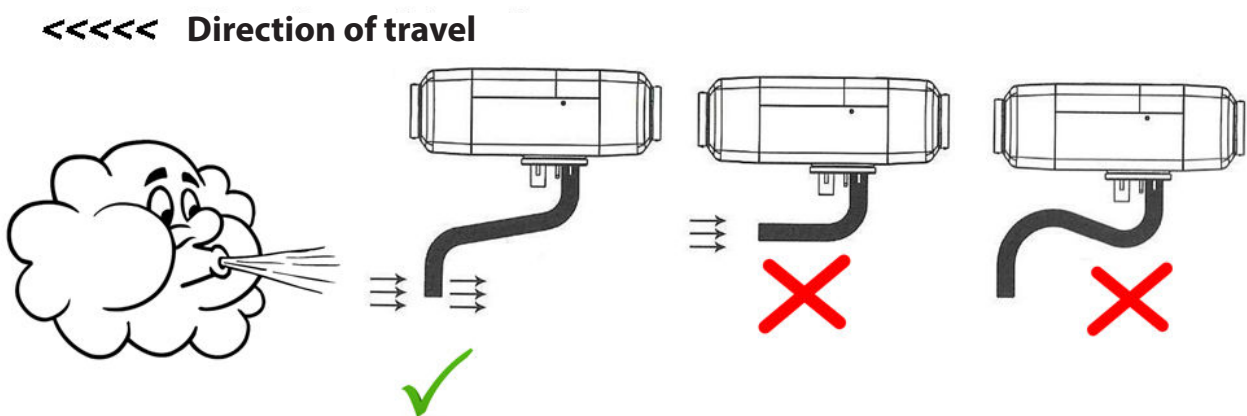
Failure to comply with this warning could result in Carbon Monoxide Poisoning.

# Exhaust & Combustion Air Intake Connections

Figure A1



Figure A2



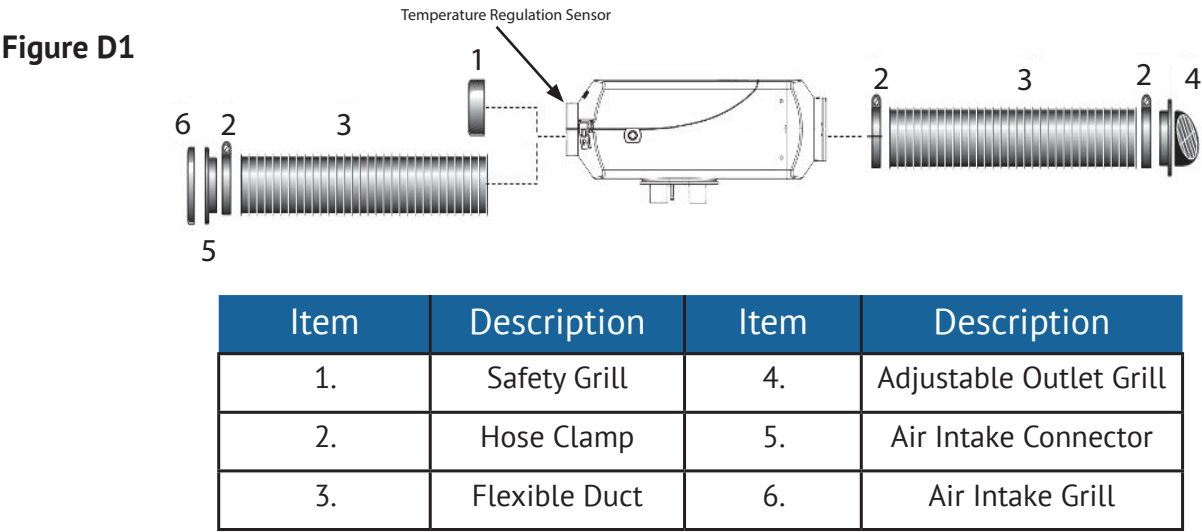
# Heater Ducting

## Hot Air Ducting

Distribute heat efficiently throughout the cabin by using the high temperature, 60mm flex-ducting and rotatable outlet and return air inlet provided in the installation kit.

**IMPORTANT NOTE:**  
The heater uses a temperature sensor on the inlet side of the heater to regulate the cabin temperature. Use return air ducting for best heating regulation and efficiency.

- Route ducting with smooth bends to avoid crushing.
- Ensure ducting components will not come in contact with combustible materials
- Install protective covers or shields as required.
- Position hot air outlet so that it cannot be blocked or otherwise obstructed it should not point directly towards operator.
- When not using return ducting, use the air intake grille.



**⚠ Warning - Fire Hazards**

Do not use existing vehicle ducting or outlets.  
This heater produces temperatures much hotter than a water based heating system.  
Ducting components must be capable of withstanding a minimum of 150°C (300°F) operating temperatures.

**⚠ Warning - Burn Hazards**

Position outlet so that it will not blow hot air directly at operator.

# Heater Operation

## Starting The Heater

**Note:** It is important to understand that this heater does not simply turn on and turn off. Rather, it has a sophisticated operating system similar to a household furnace to provide reliable heating comfort. The operator should familiarize themselves with the normal operation of the heater.

### Start Up

1. Systems Check Phase
  - When switched on, the heater conducts a self check.
  - Component integrity (Glow Pin, Blower, Fuel Pump, Flame and Overheat Sensor)
  - Voltage (Must be with 10.5-16 volts)
  - Upon satisfactory systems check, the heater will continue to the Preheat Phase.
2. Preheat Phase – Glow pin will switch on to preheat for 50 seconds.
3. Ignition Phase – Fuel and combustion air are slowly introduced to the combustion chamber and flame is established typically within 2-3 seconds.
4. Stabilization Phase – To further establish combustion, the glow pin remains on and the fuel / air mixture is slowly increased. The flame sensor monitors the increasing temperature at the heat exchanger (Typically 2 ½ minutes).
5. Running Phase – Once the flame is established, the glow pin will switch off. Incoming fuel / air will be ignited by the established flame inside the combustion chamber.

### Running Mode

The heater is designed to function in two different operating modes. Refer to the Operating Switch Instructions for details.

**“Power Mode”** Controls the heat output level.

The operator can adjust heat output level in a range from 1.1 -2.0 in 0.1 intervals.

**“Automatic Mode”** Establishes target cabin temperature for heater to maintain.

(Primary operating mode for cargo and cabin heating applications)

Target temperatures range is 10° C to 35° C (1° intervals)

#### **Note:**

Internal temperature sensor inside heater is used to regulate the cabin temperature.

Temperature displayed on switch, only reflects temperature at operating switch.

We recommend the use of return ducting (ducting on both ends of heater) for best temperature regulation

# Heater Operation

## Shut Down Process

### Caution

**The heater should only be controlled using the operating switches provided. Switching the heater off by interrupting its power source will bypass the heater's normal cool down process and will cause stress and premature wear of the combustion components.**

Switching Off – Heater can be switched off either manually, via timer control or through its own temperature regulation. Refer to Operating Switch Instructions for details.

Purge Cycle – Once switched off, the heater will switch into high operating mode for a short duration to clear its combustion chamber (Approximately 100 seconds).

Cool Down Cycle – Upon completion of the Purge Cycle, the fuel pump will switch off, blower will slow down and the flame will quickly extinguish. The blower will switch to high speed and continue to operate to further purge the combustion chamber and cool down the heat exchanger. The cool down cycle will last approximately 4 minutes.

## Safety Systems

The heater is equipped with several control features to protect itself and the operator.

### Systems Check:

The heater will not attempt to start if one of the components is detected by the control unit to be defective. If the heater detects a problem during operation it will shut down and depending on the fault it will either restart automatically or it will turn off completely.

### No Start Safety Time:

If the heater does not ignite on the first start attempt, it will shut off the fuel pump and the start sequence will repeat. After two unsuccessful starting attempts the controller will turn the heater off in order to prevent fuel flooding the burner chamber. You can restart the process by switching the heater OFF and then ON again.

### Flame Out:

If the flame goes out during operation, the heater will shut down and then attempt to restart automatically. If the heater does not ignite, it will shut down. It will need to be turned OFF and ON manually.

# Heater Operation

**Voltage:**

If the lower or upper voltage limit is reached, the heater will turn OFF after a 20 second delay.

**Fan Speed:**

The fan speed is continuously monitored. If the fan motor does not start or if the speed deviates by more than 40%, the heater will turn OFF after 60 seconds.

## Emergency Shut Down

In event of an emergency, shut down the heater as follows:

1. Turn the heater OFF with the control switch.
2. Pull the fuse out.
3. Disconnect battery power.

# Maintenance

- Switch heater ON at least once monthly for 10 minutes
- Clear combustion air supply and the exhaust system after longer standstill periods.
- Ensure that the vehicle batteries are maintained
- Inspect and clean all electrical connections and apply dielectric grease.
- If the heater has excessive smoking or carbon build up, disassemble and clean the heater.
- Remove the glow pin using the special socket tool. Inspect the glow pin for any damage to wires or wire connections and scratches or buildup on the heating element. Wipe the glow pin clean with a soft cloth only, do not use anything abrasive to clean the glow pin. If the glow pin shows any signs of wear or damage it must be replaced.
- Remove the atomizer screen with a hook-pick or pick and needle nose pliers. The atomizer screen cannot be reused and must be replaced annually.
- Inspect the atomizer screen chamber for buildup and clean with a small wire brush and vacuum out debris if required. Confirm the small air inlet hole on the side of the atomizer screen chamber is not obstructed with debris or buildup and clean as necessary.
- Inspect and clean hot air ducting, inlet and outlet.



# Troubleshooting

Troubleshoot heater by first conducting a Basic Inspection, then proceed to the appropriate section below for further direction.

## Basic Inspection

### *Power*

- Check that all the electrical connections are intact and not damaged or corroded.
- Check the fuse.
- Ensure voltage going to the heater is 10.5 -16.0 volts while the heater is switched on.

### *Fuel*

- Ensure there is ample clean fuel supply
- Check for restrictions or loose connection in fuel system
- Visual inspection to see fuel in the clear plastic fuel lines (Should see bubbles)

### *Combustion Air*

- Check for restrictions in combustion air intake or exhaust tubes

### *Ducting*

- Visual inspection of hot air ducting to ensure there are no blockages.

## Self Diagnostics

The 21A has an automatic built in error code detection system. When the heater detects a fault, it should display a two-digit error code on the Operating Switch. Refer to the Fault Codes section of this manual for further direction.

## No Error Codes Detected

If the heater does not attempt start and there is not an error code on the operating switch, follow these procedures in order shown:

- 1) Ensure that the ambient temperature does not exceed the settings on the operating switch.
- 2) Reconfirm that you have checked the power supply to the heater as noted in Basic Inspection.
- 3) Reboot the ECU by removing the power to the heater for 5 minutes or more. Remove the fuse at the battery and then reinstall the fuse and turn the heater on to test.
- 4) Install and test the heater with a new control switch.
- 5) Install a new electronic control unit into the heater and test.

## Combustion Issues

If the heater proceeds through a start up cycle but fails to establish a flame, runs intermittently or exhibits excessive smoking, there is most likely a combustion related problem. In these situations, the operating switch should display either error code E01, E02 or E05. Combustion issues are caused by a deficiency of one or more of these required components; Fuel, Combustion Air, Source of Ignition or Mixing. Review each of these and rectify as required.

# Troubleshooting

## Fuel

Ensure you are supplying a good quality diesel fuel.

Fuel is not frozen or gelled

Fuel system falls within parameters outlined in installation section.

All connections are secure and there are no air leaks

Try removing the fuel line at the heater during start up to ensure that fuel is being delivered.

Check for fuel filter or fuel metering pump blockage.

## Combustion Air

Ensure that combustion air intake tube and exhaust tubes are clear from obstructions.

Air intake and exhaust tubes meet parameters outlined in installation section.

Try placing your hand in front of the exhaust while the heater is attempting to start to determine if there is air flow (Should be able to blow out a candle held within 12" of end of exhaust)

## Source of Ignition

The heater uses a glow pin as a source of ignition. Normally when this fails, it will create an open or short circuit and yield error code E09 or E12. However, in some cases the glow pin may have a partial failure and will just not get hot enough. Glow pins can be bench tested by applying 12 volts and observing how they heat up. They should exhibit a consistent red throughout the length of the pin. We recommend replacing the glow pin and glow pin screen on a seasonal basis as part of maintenance program.

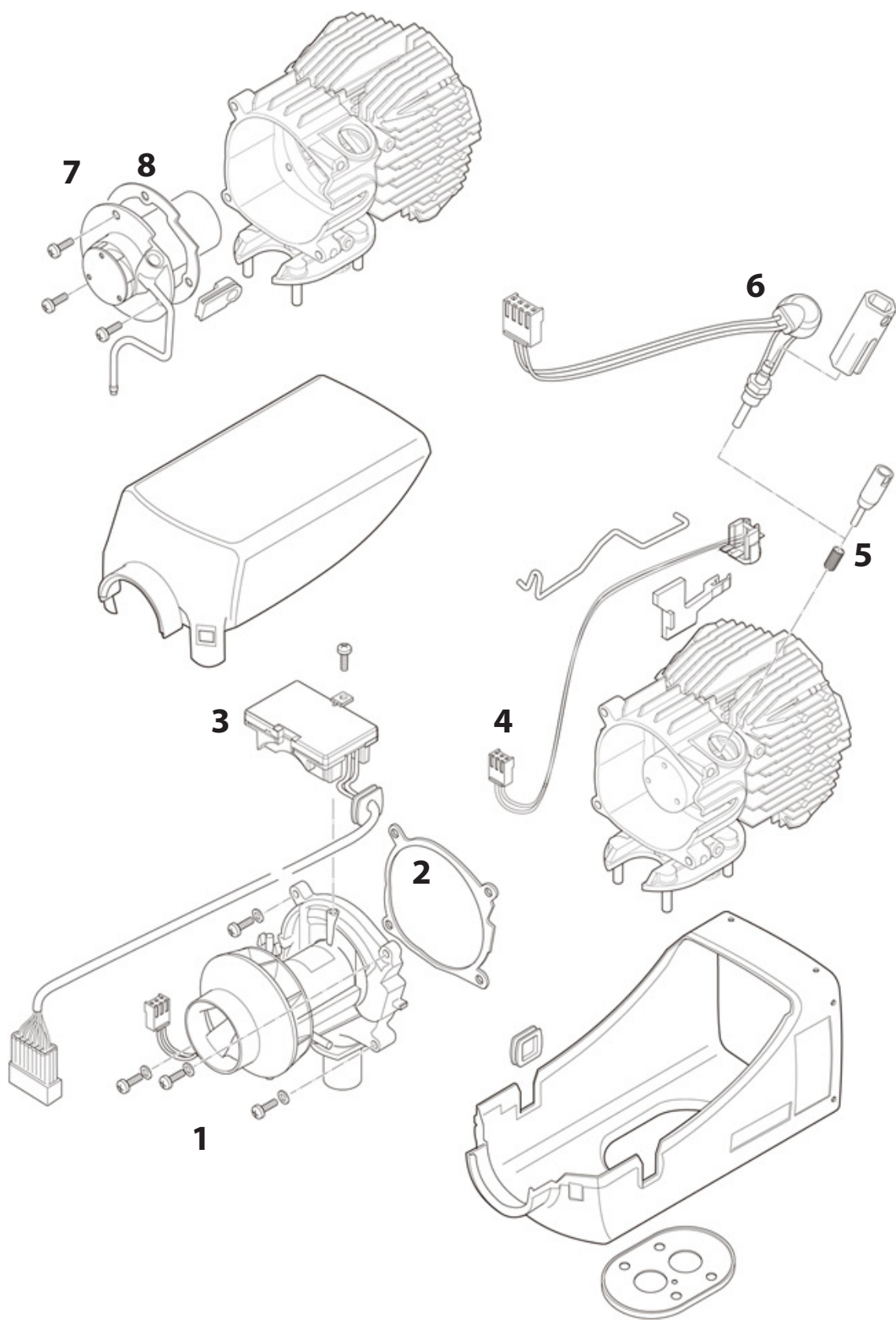
## Mixing

If we have confirmed that we have an appropriate amount of fuel and combustion air and a ignition source, then there is a problem with the heater's ability to mix these components. Start by replacing the glow pin screen. This is the primary mixing point. If the glow pin chamber appears to be heavily sooted, disassemble the heater and clean the combustion chamber using carburetor cleaner suitable alternative.

# Fault Code Chart

Error Code	Description of Error	Diagnostic Instruction & Correct Action & Repair
E00	Communications Error	Check all wiring to heater. Reboot ECU by removing main fuse for 5 minutes. Replace ECU as necessary
E01	Failed Ignition (Two attempts)	Heater does not start successfully within start up period. Refer to Combustion Issues in manual.
E02	Flame Extinguished (Three successive failures)	Heater establishes a flame then detects a flame out condition. Refer to Combustion Issues in manual.
E03	High or Low Voltage	Voltage at ECU must be less than 16.0 volts and more than 10.5 volts Repair vehicle electrical system as required
E04	Premature Ignition	Heater detect flame prior to fuel pump operation. Unburnt fuel in combustion chamber during start up. Refer to Combustion Issues in manual.
E05	Thermal Efficiency Failure	Heater detects a poor combustion Refer to Combustion Issues in manual.
E06	Temperature Sensor Open or Short Circuit	Check sensor resistance. Should be approximately 1.0 k $\Omega$ at room temp. Replace as necessary
E07	Fuel Pump Open / Short Circuit	Check fuel pump wiring connections & resistance across fuel pump terminals and main harness pins 10 & 11. Should be 7.5-8.5 $\Omega$ Repair wiring or replace fuel pump as required
E08	Blower Motor Open / Short Circuit or blockage	Check blower motor wiring & blower motor for free rotation Repair wiring or replace blower as required
E09	Glow Pin Short Circuit	Check glow pin connectors and resistance across glow pin Should be 0.8 $\Omega$ . Replace glow pin as required.
E10	Over Temperature	Check fan operation & for blockage of hot air ducting air flow (in and out) Check Flame / Overheat sensor resistance. Should be approximately 1.0 k $\Omega$ at room temp. Replace as necessary
E11	Temperature Sensor Short Circuit	Check Temperature sensor resistance. Should be approximately 1.0 k $\Omega$ at room temp. Replace as necessary
E12	Glow Pin Open Circuit	Check glow pin connectors and resistance across glow pin Should be 0.8 $\Omega$ . Replace glow pin as required.
E14	Temperature Sensor Open Circuit	Check positioning of sensor to ensure proper contact with heat exchanger Check Temperature sensor resistance. Should be approximately 1.0 k $\Omega$ at room temp. Replace as necessary
E15	Open Circuit in Operating Switch potentiometer	Replace operating switch.

# Heater Components



# Heater Components

## 21A Replacement Parts

**Note:** Refer to Kit List section for additional part listing.

Item	Description	Part Number
1	Blower Motor Assembly	P21A-T101
2	Blower Gasket	E20A-X102
3	ECU	P21A-T301
4	Temperature Sensor	P65A-X104
5	Glow Pin Screen (Includes Insert Tool)	P65A-X102
6	Glow Pin (Includes Split Socket)	P65A-T102
7	Burner with gasket	E20A-X101E
8	Burner Gasket	E20A-X103
9	Maintenance Kit – Includes: 2. Blower Gasket 5. Glow Pin Screen 6. Glow Pin 8. Burner Gasket	P21A-T803





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