High Altitude Compensator

Espar Heater Systems

Espar Products, Inc.
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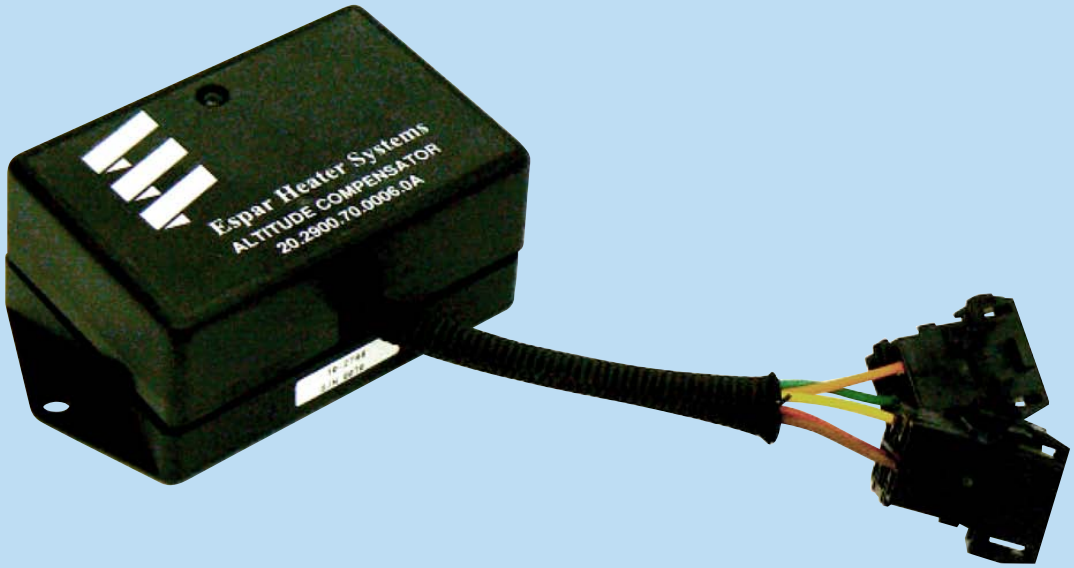
www.espar.com

HIGH ALTITUDE COMPENSATOR	**20 2900 70 00 06**	
HIGH ALTITUDE ASSEMBLY	**20 2900 70 00 07**	**(Includes High Altitude Compensator)**



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Visit us at: **www.espar.com / help**

Parts list, Technical descriptions, Troubleshooting manuals, Software, Installation suggestions, Heat calculator and more.

This publication was correct at the time of print. However, Espar has a policy of continuous improvement and reserves the right to amend any specifications without prior notice.

Special Notes

Note: Highlighted areas require 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.

Warnings

Warning To Installer

- Correct installation of high altitude compensator is necessary to ensure safe and proper operation.
  Read and understand heater's manual before attempting to install the compensator module. Failure to follow all instructions could cause serious or fatal injury.
- Heater must be turned off while installing altitude compensator.

Caution: *During electrical welding work on the vehicle disconnect the power to the heater in order to protect the electronic parts.*

Note: All measurements contained in this manual contain metric and approximate SAE equivalents in brackets eg 25mm (1").

Direct questions to Espar Heater Systems:

Canada & U.S.A. **1-800-387-4800**

Altitude Compensator

The Espar High Altitude Compensator is used in conjunction with the most Espar heaters using a dosing pump in 12 or 24 volts. This includes Airtronic 2/4/5 (gasoline or diesel version) D8LC, Hydronic 4/5 (in gasoline or diesel version) and Hydronic 10 models.
New Hydronic M-II series 8/10/12 kW heaters can be used with Compensator only if external resistor (10-12 Ohms for 12V heater) substituting fuel pump is installed between ground wire and pump wire on the heater.
The device automatically adjusts the fuel pump rate in relation to increasing altitude. As the altitude increases the fuel pump rate decreases.

The Altitude Compensator is an electronic altitude sensing device intended for fuel-rate altitude compensation of vehicle cabin heater units. It is designed to be powered from a vehicle's 12VDC or 24VDC electrical system, installed in-line between the heater controller's fuel-pump drive output and the fuel pump. Ambient atmospheric pressure and the heater controller's fuel pump drive output are continuously monitored, and the vehicle's approximate altitude above sealevel is calculated and updated every 5 seconds based on a linear pressure-versus-altitude algorithm.
The module's fuel pump drive output is then adjusted to provide a corresponding fuel rate that optimizes fuel combustion efficiency and minimizes exhaust emissions.

Features

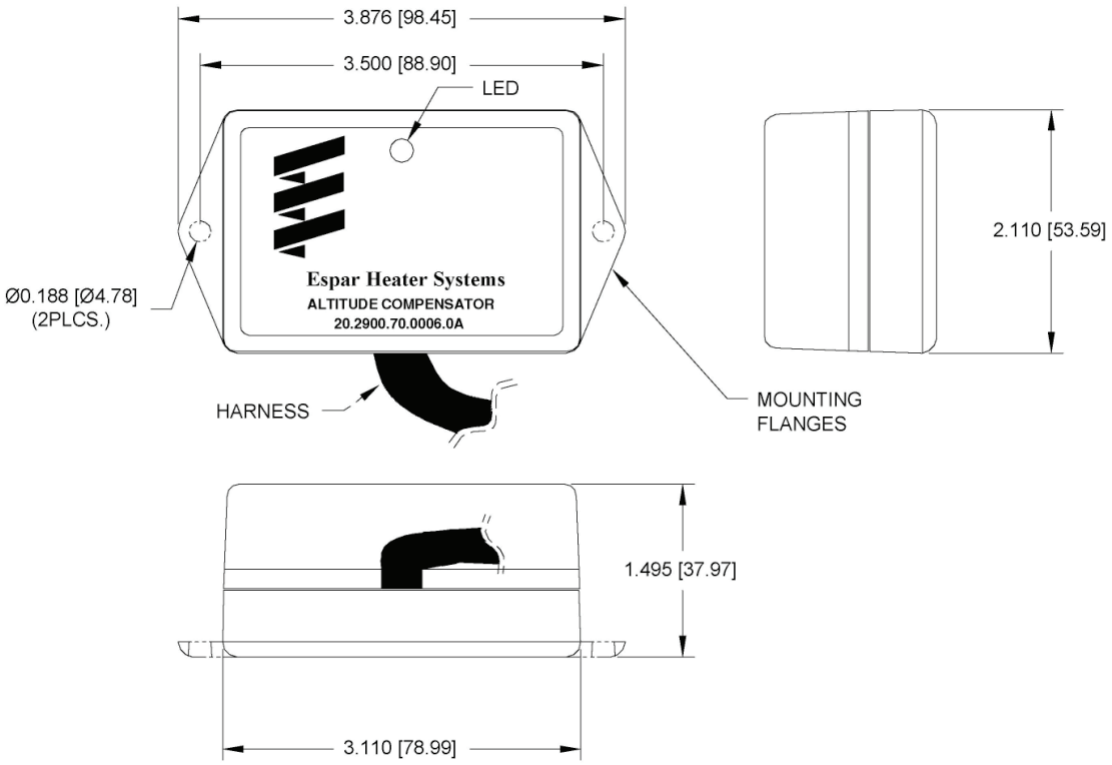
- High Reliability Automotive Air-Pressure Sensing Element
- Pulsating Fuel Pump Drive Output, with LED Monitor
- Universal Pump Output for multiple fuel pump models
- Extended Operating Temperature Range
- Split Harness Connectors for Module Bypass, during fuel pump diagnostics
- Separate Module and Pump-Output Supply Lines
- Flame Retardant ABS Enclosure, with encapsulated circuitry

Specifications table:

Parameter	@	Min.	Typ.	Max.	Units
Supply Voltage (V_s)		7.5	12	35	VDC
Supply Current (I_s)	V_s = 12VDC		40	50	mA
Storage Temperature (T_s)		-40		+125	°C
Operating Temperature (T_o)		-40		+85	°C
Controller Input Resistance (R)	T_o = +25C		140		ohms
Pump Drive Output Current (I_o)	V_s = 24VDC			3	A
Altitude Range (Alt)		0		3000	m
Fuel-Rate Compensation	Alt = 3000m	-28	-30	-32	%

Dimensions

Module Mechanical Drawing: (dimensions in inches [millimetres])



Ordering Information: **P/N: 20 2900 70 00 06** (Compensator only)
20 2900 70 00 07 (High altitude assembly)

Specifications subject to change

High Altitude Compensator

Note: The High Altitude Compensator **MUST BE KEPT DRY.**

The High Altitude Compensator is open to the atmosphere to read atmospheric pressure. It MUST be installed in a well protected dry environment. In the case of the Airtronic D2/4, it can be mounted in the vicinity of the heater.
In the case of coolant heaters the Compensator can be mounted in the heater box, well protected from any water or debris. (Temperature is NOT an issue)

The Compensator comes with two connectors installed onto it's harness.

1- 8 pin Female connector Block:
Plugs into Diagnostic Pigtail of Airtronic D2/4/5 harness, (when available)

2- 4 pin Female connector block:
Must be integrated into fuel metering pump circuit. (See instruction below)

Included in the High Altitude assembly:

1- High Altitude Compensator: 20.2900.70.0006
4- Pin Male Junior connector: 206 31 296
8- Pin Male Junior Connector: 206 31 298
7- Female Junior terminals: 206 00 180

Installation:

Find a suitable mounting location for the Altitude Compensator. The Compensator is NOT position sensitive. It must be installed in such a location that its harness can connect with the heater's diagnostic pigtail (Airtronic 2/4/5).
The Altitude Compensator must be kept dry and if possible clean. The Compensator monitors barometric pressure. Keep clean so the opening does not get blocked.
The 8 PIN BLOCK FROM ALTITUDE COMPENSATOR will plug directly into the diagnostic pigtail on the heater harness. The wire colours Red, Yellow and Brown must line up with each other. Ignore the other wires.
If the diagnostic pigtail is not available please follow the wiring instructions on the sheet provided for required power and signal inputs. The Altitude Compensator requires battery power, ground and enable signal from the harness "Yellow Wire", as well.

Fuel pump harness interface:

1- Espar fuel pumps are dosing or impulse pumps. The control unit sends out short pulses or bursts of electricity for every impulse or "pump" of fuel.
The electrical burst comes from the control unit to one terminal of the pump. The other terminal on the pump is connected directly to ground.

2- Use an Ohm meter to find the Ground lead on the pump.
a- Remove the connector on the pump.
b- Place the black lead of the ohm meter to a good ground or the negative terminal of the battery.

c- Using the red lead of the ohm meter test the two pump connector terminals and find the terminal with the result: 0.01 Ohm reading. **This is the wire leading to ground.**

WHAT IS THE COLOUR OF THE OTHER WIRE?
This wire comes from the control unit and is the one that will be used by the High Altitude Compensator.
REMEMBER THIS COLOUR!!

3- Cut open the Fuel pump harness loom at a point close to the High Altitude Compensator 4-pin connector

4- Look for the wire colour that will be used by the High Altitude Compensator remembered from above.
(Hint: The ground wire found in "2" above may have been a brown wire. Brown wires go to the battery ground terminal. **(DO NOT CUT THE BROWN WIRE!)**

5- Find the female terminals and a 4-pin male connector block that came with the kit.

6- The wire going to the fuel metering pump from the heater control unit will have to be cut and a female terminal installed on the wire ends.

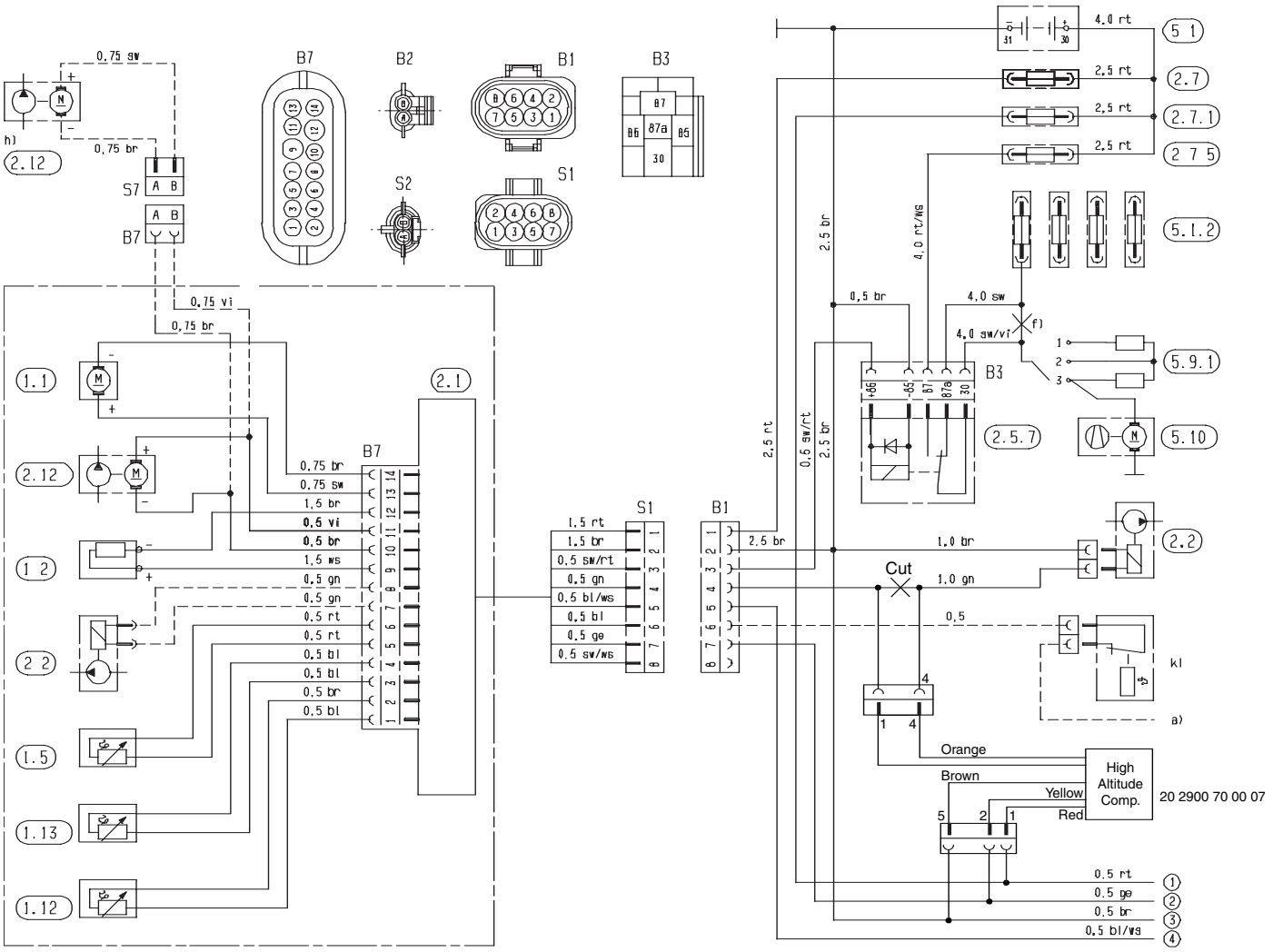
7- Place the male connector block against the mating block on the High Altitude Compensator.

8- The fuel pump wire end coming from the control box will have to be mated with the GREEN wire from the Altitude Compensator.

9- The fuel pump wire going to the fuel pump will have to be mated with the ORANGE wire from the Altitude Compensator.
Join the 4-pin connector blocks. Does the fuel pump harness wire from the control unit join with the green wire of the compensating devise? Does the wire going to the fuel pump join with the orange wire? If YES continue. If NO make adjustments so that it is as required.

Turn the heater on. The heater will start and run normaly. The Altitude Compensating Device will adjust fuel pump rate automatically as the vehicle travels into higher altitudes and also going back into lower levels.
A green LED on the devise will flash for every pulse sent to the pump.

HYDRONIC D 5 W SC - 24 Volt



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Parts list

1.1 Burner motor
1.2 Glow plug
1.5 Overheating sensor
1.12 Flame sensor
1.13 Temperature sensor
2.1 Controller
2.2 Dosing pump
2.5.7 Relay, vehicle fan
2.7 Main fuse 15 A
2.7.1 Fuse, actuation 5 A
2.7.5 Fuse, vehicle fan 25 A
2.12 Water pump
5.1 Batterie
5.1.2 Fuse strip in vehicle
5.9.1 Switch, vehicle fan
5.10 Vehicle fan

a) for auxiliary heating option connect to D+
f) cut open wire
h) external water pump
k) switch (auxiliary heating, e.g. outside temperature < 5 °C or change-over switch for summer / winter)

Length ‘plus’ + length ‘minus’:
< 5 m: cross section 4 mm²
> 5 m < 8 m: cross section 6 mm²

Cable ends that are not being used must be isolated.

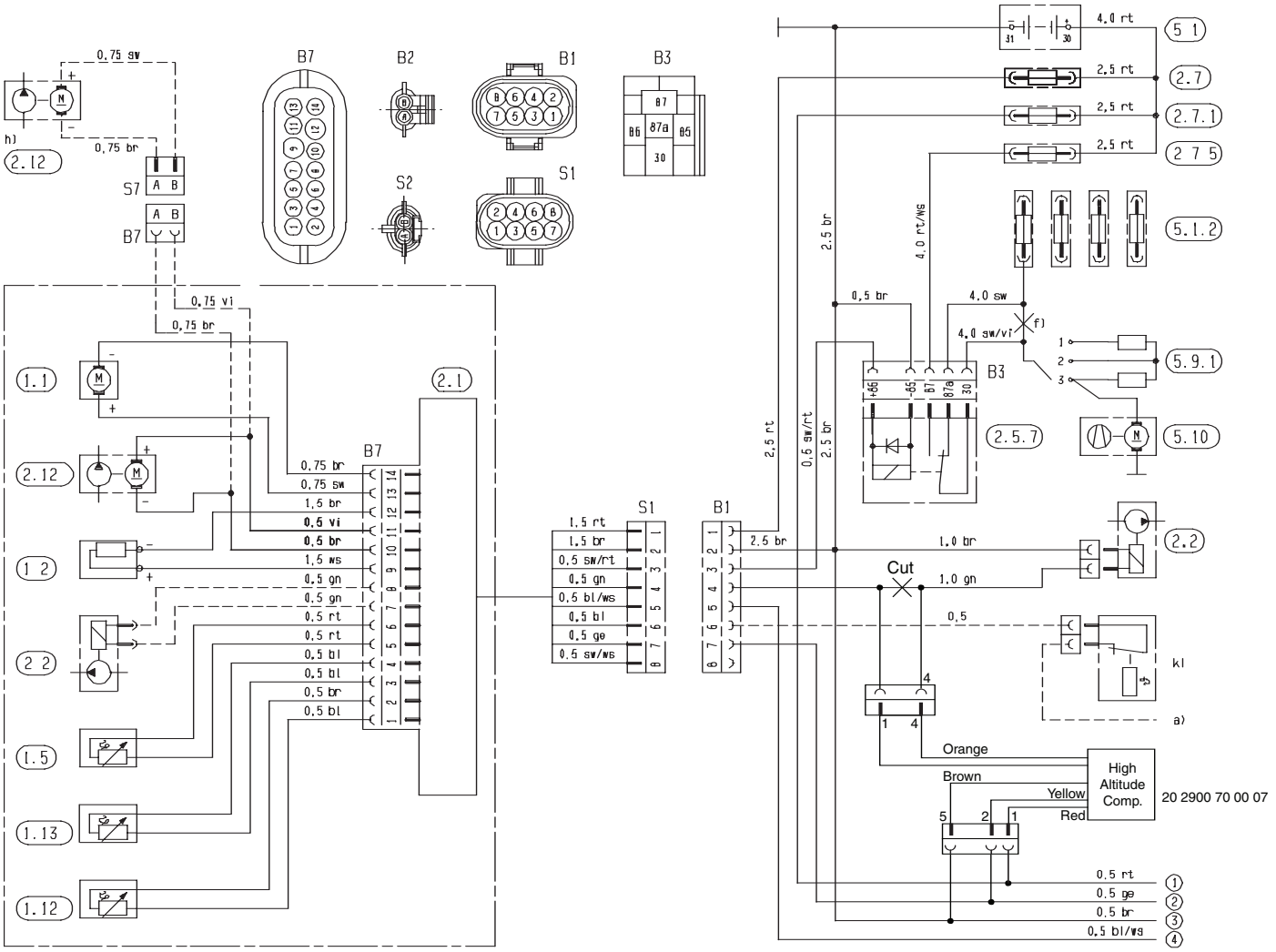
Plug and socket case are shown from the cable entry side.

Cable colours

sw = black
ws = white
rt = red
ge = yellow
gn = green
vi = violet
br = brown
gr = grey
bl = blue
li = purple

Circuit Diagram:

HYDRONIC D 5 W SC - 12 Volt



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5.9.1 Switch, vehicle fan
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a) for auxiliary heating option connect to D+
f) cut open wire
g) only with petrol
h) external water pump
k) switch (auxiliary heating, e.g. outside temperature < 5 °C or change-over switch for summer / winter)

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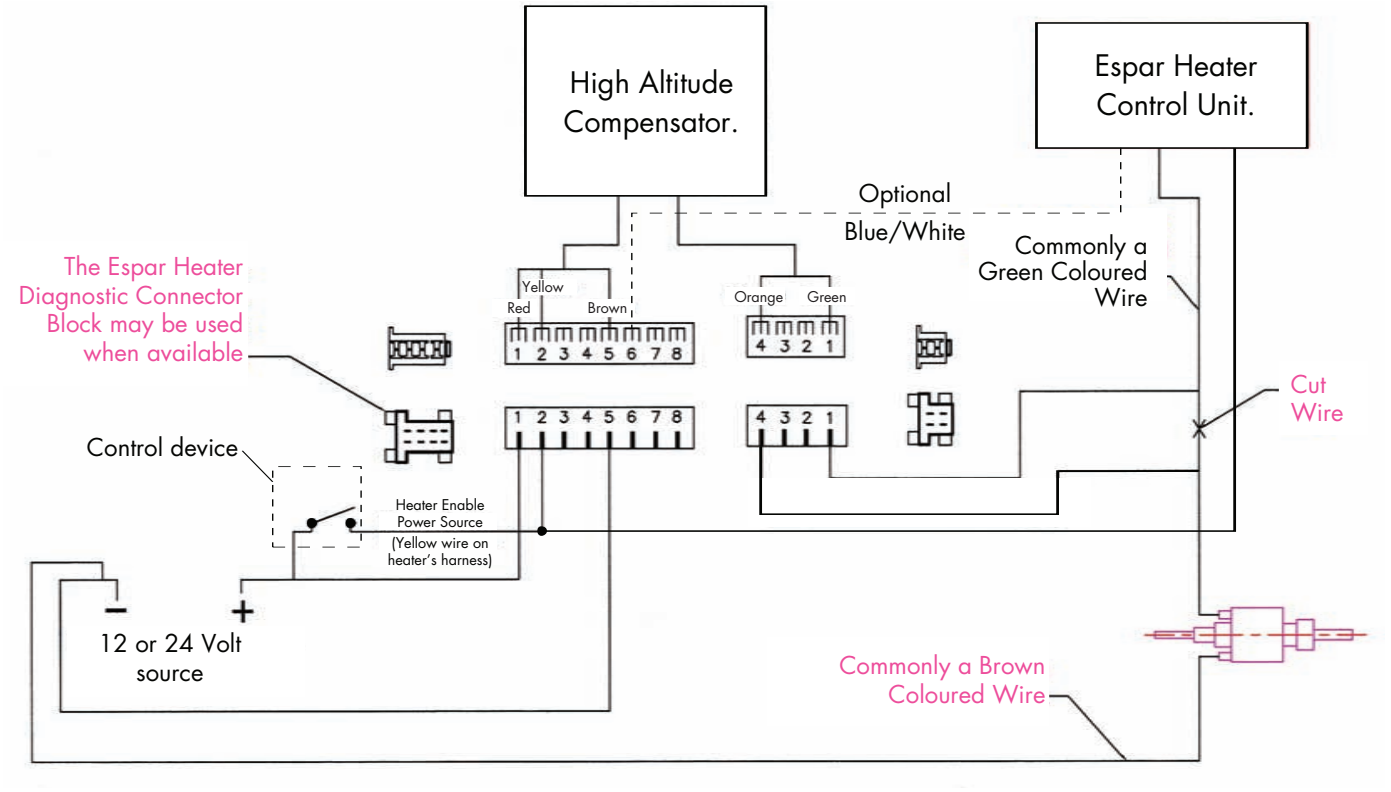
Using diagnostic tools

To use a diagnostic tool, heater's diagnostic wire must be connected to pin #6 of 8-pin connector.

1- Unplug the high altitude compensator and install the FCRD. (Fault Code Retrieval Device).
2- Use the FCRD normally. Normal fuel rates to the fuel pump have been re-established automatically.
3- When done with the FCRD, unplug FCRD. Plug in the High Altitude Compensator. The heater will run normally and the fuel flow will be compensated by the High Altitude Compensator.

Wiring for HAC Devise



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