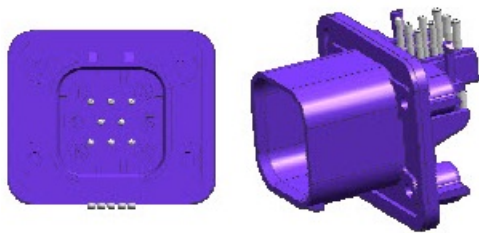


DELPHI 2.2 kW DC-DC Converter





Pin	Name	Function	Signal
1	CAN1_L	CAN-bus Lo	CAN
2	CAN1_H	CAN-bus Hi	CAN
3	U2C Wakeup	U2C Wakeup	IGNITION
4	CAN1_L	CAN-bus Lo (spare)	CAN
5	CAN1_H	CAN-bus Hi (spare)	CAN
6	CAN1_L Term	CAN-bus Low Termination	CAN
7	CAN1_H Term	CAN-bus High Termination	CAN
8	No Connect		

The Delphi DC-DC converter gives you extreme performance and highly efficient power when and where you need it. The manufactured 2.2kW unit creates DC voltages in hybrid and electric vehicles necessary to power 12VDC based components. Liquid- cooled, the DC/DC converter operates at input voltages from 216 to 422VDC with a bi-directional power range max 2.2kW.

- Highly efficient conversion using synchronous rectification
- Applicable to multiple vehicle platforms without re-engineering
- Analog output voltage is adjustable through CAN serial communication; 11V – 15.5V
- Bi-directional capability supports charging of high-voltage battery from low voltage sources such as solar panels.
- Over-voltage, over-current, and over-temperature protection with
- CAN serial interface at a fixed data rate of 500kbps.

Input/Output Input: HV (VDC) 216 – 422V

LV (VDC) 7 – 15.5V

Output: Buck (HV->LV): 2.2kW, max 175A @ 12.5V

Boost (LV->HV): 900W, max 2.35A on HV

Bus: CAN serial data bus for control and communications at 500 kbps

Efficiency: 90%

Packaging Dimensions: 253mm x 257mm x 80 (56)mm

Volume: 4.2L

Weight: 5.0kg

Cooling Coolant fluid: 50/50 mixture H2O /Glycol (max 75°C)

Coolant flow rate, pressure drop: 10 l/min, max pressure drop = 0.07 bar

Ambient Environment Body-mounted, underhood

Operating temperature: -40°C to 110°C

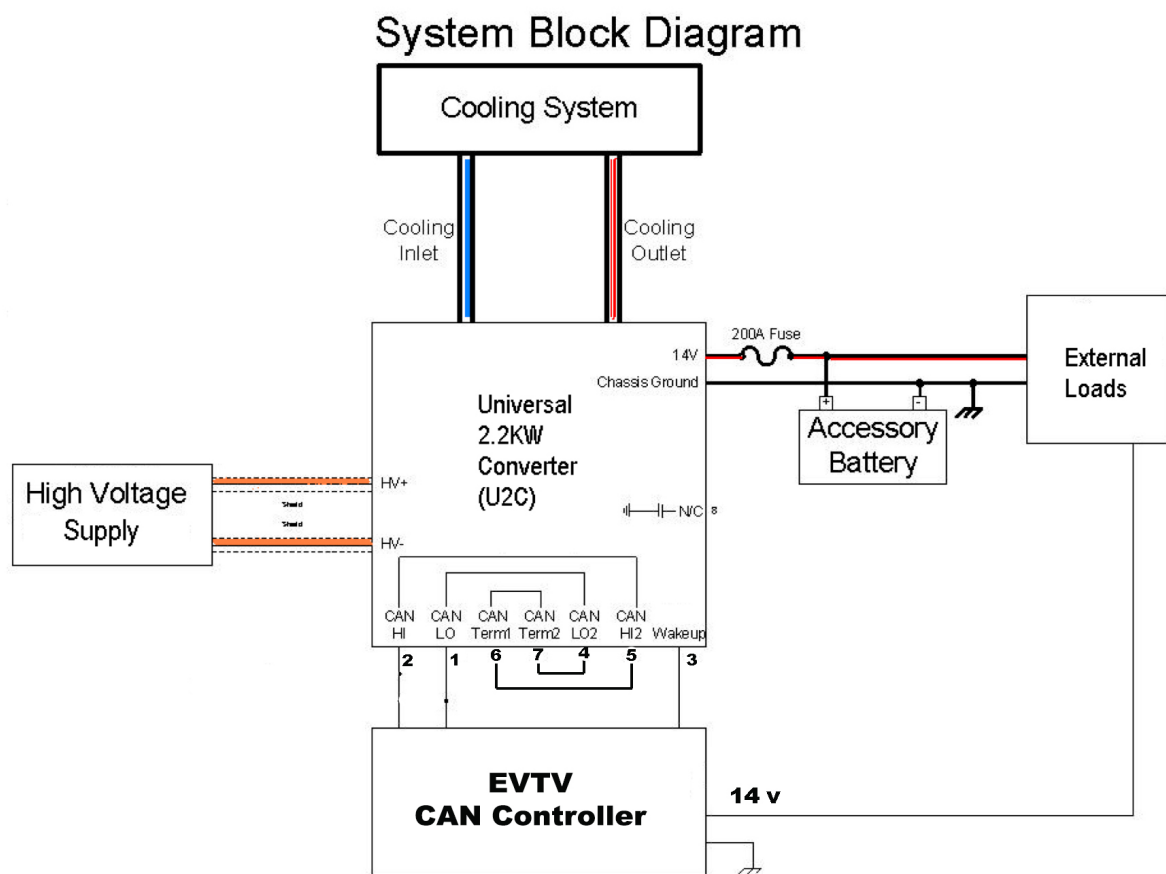
Lifetime Operating life (over 15 years): >10,000h

The DC-DC converter uses standard buck converter technology, it will efficiently convert power from a high-voltage DC source (typically a 300V battery pack) into 14V power. The unique feature is its ability

to run the converter backwards as a boost converter to provide low current charging (2.35 amps maximum) to the high-voltage source/battery pack from the 14V supply.

Electrical interface to the vehicle is very simple. The internal controller derives its internal power from the vehicle 14V battery only. The DC-DC converter uses a switching power supply to produce regulated 5V and 12V power. Aside from a discrete 12v IGN hardware (wake-up input) and the high power outputs, all other interface to and from the DC-DC converter is through high speed CAN.

The DC-DC will wake up with IGN but requires enabling CAN messages before normal operation can occur. Once normally operating, the production of 14V power is independent of the low voltage input.



Cooling Notes

The converter is robustly protected from "over temp" conditions. There are two thermistors. One measures inlet coolant temperature ("heat plate temperature"), the other measures the temperature of the electronics ("14V temperature"). A fault occurs when the heat plate temperature reaches 85°C.

To protect the converter when the temperature reaches 87°C, the output is derated (reduce available power). If the heat plate temperature should reach 105°C converter shuts down. It will start up again in a "de-rated" mode when the temperature falls below 100°C and the "14V Enable" is toggled.

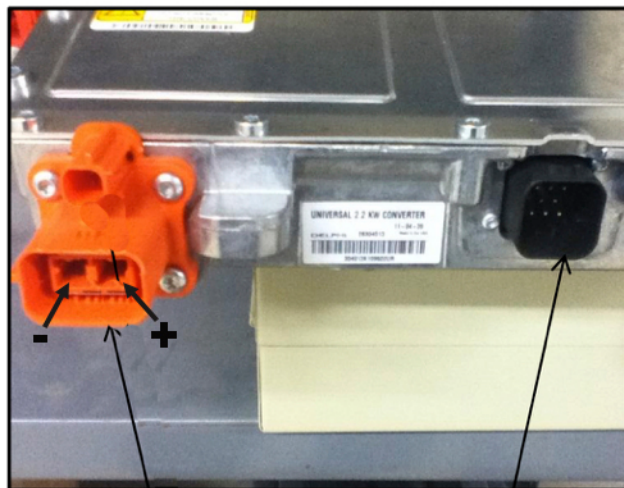
If the electronics temperature reaches 95°C it also sets a fault. "De-rating" due to the electronics temperature begins at 95°C, and shut down occurs at 125°C. It will start up again in a "de-rated" mode when the temperature falls below 105°C.

Both temperatures are reported continuously (every 250msec).

When the Converter is operating in a "de-rated" condition, the heat plate temperature has highest priority on setting the de-rated output.

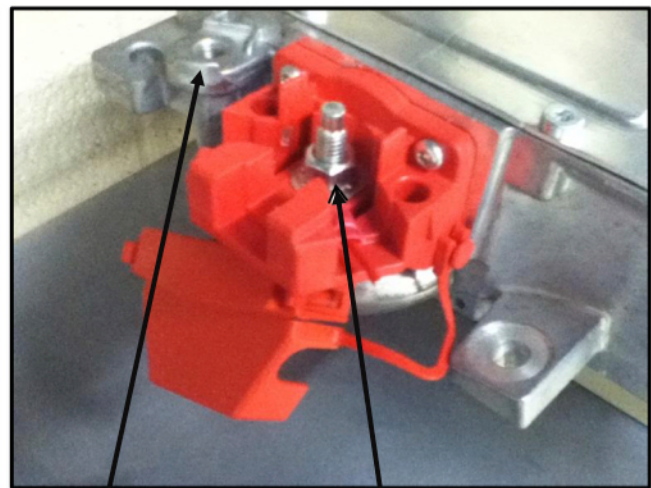
The DC-DC converter was designed and tested to have the coolant flow from the labeled inlet to the outlet. For this reason it is inadvisable to reverse coolant flow.

CONNECTIONS



HV Connectors

CAN Connector



Frame
Ground

Adjustable 14v

ALTERNATE HV INPUT CONNECTOR

Amphenol 1332 M294 AFSM386



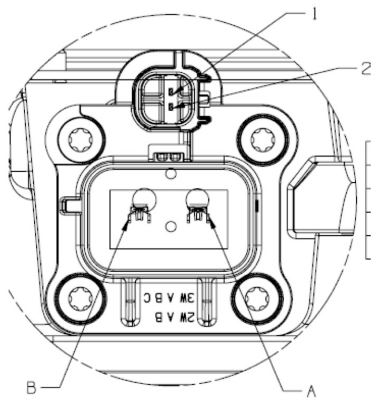
1332E294MSM320



1332M294FS



Pin-out for Delphi DC-DC converter



HIGH VOLTAGE CONNECTOR	
PIN A	HV POSITIVE
PIN B	HV NEGATIVE
PIN 1	SHUNTED
PIN 2	SHUNTED

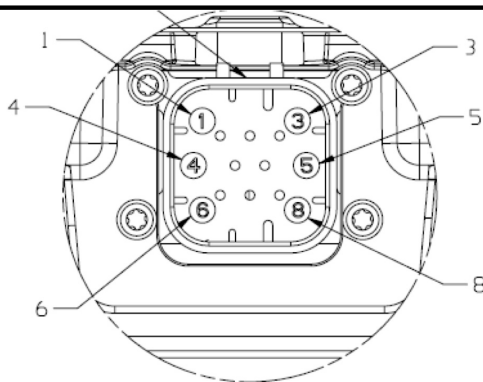
SUPPLIER: DELPHI PACKARD ELECTRIC

P/N: 28284678-REF

MATING PN:

HV CONN: 13737728

HVIL CONN: 13738743



DETAIL B
SCALE 2:1

SIGNAL CONNECTOR	
PIN 1	CAN_LOW
PIN 2	CAN_HI
PIN 3	APM_WAKEUP
PIN 4	CAN_LOW
PIN 5	CAN_HI
PIN 6	CAN_TERM1
PIN 7	CAN_TERM2
PIN 8	N/C

SUPPLIER: AMP INCORPORATED
P/N: 28152189 REF.

MATING TYCO P/N: 776286-1

CAN CONTROLLER

The EVTVCAN controller comes with a cable harness with the proper Tyco connector to plug into the communications interface of the Delphi DC-DC converter.

There are two extra wires in this wire harness, red and black for connection to 12vdc (red) and ground (black).

Once these are connected, the controller begins operation. It will automatically set the DC-DC converter to the last output voltage specified.

If you subsequently remove 12v from the controller, it will cease communications with the Delphi. The Delphi will actually continue producing output but will most likely fall back to its default 13.5vdc at the output.

There is really only one thing to set on the Delphi converter but quite a bit of information you can get from it. To do so, connect a USB cable to the EVTVCAN Controller and bring up a terminal program at 115,200 bps, 8 data bits No parity, 1 stop bit.

```
Startup successful. EVTVC Motor Werks - Delphi Controller Version 1.01

===== Delphi DC-DC Converter CAN Controller Version 1.01 =====
***** List of Available Commands *****

? or h - Print this menu
v - set target output voltage (11.00-15.50) or BOOST voltage (194-358)
z - Zero amhours and kilowatt hours
*****
=====

Using CAN1 - initialization completed at 500000 kbps
SetVDC:13.8v LoV:0.0vdc LoVCurrent:0.0A HiV:nanvdc HiVcurrent:0.00A
Temp:0C Power:0.00W Loss:0.00W Eff:0.00 HiV-AH:0.00 LoV-Wh:0.00 00:00:02.703

SetVDC:13.8v LoV:0.0vdc LoVCurrent:0.0A HiV:nanvdc HiVcurrent:0.00A
Temp:0C Power:0.00W Loss:0.00W Eff:0.00 HiV-AH:0.00 LoV-Wh:0.00 00:00:05.355

SetVDC:13.8v LoV:0.0vdc LoVCurrent:0.0A HiV:nanvdc HiVcurrent:0.00A
Temp:0C Power:0.00W Loss:0.00W Eff:0.00 HiV-AH:0.00 LoV-Wh:0.00 00:00:08.007

SetVDC:13.8v LoV:0.0vdc LoVCurrent:0.0A HiV:nanvdc HiVcurrent:0.00A
Temp:0C Power:0.00W Loss:0.00W Eff:0.00 HiV-AH:0.00 LoV-Wh:0.00 00:00:10.659
```

A brief menu appears followed by a series of two line advisories.

```
SetVDC:13.8v LoV:0.0vdc LoVCurrent:0.0A HiV:nanvdc HiVcurrent:0.00A
Temp:0C Power:0.00W Loss:0.00W Eff:0.00 HiV-AH:0.00 LoV-Wh:0.00 00:00:10.659
```

The first line lists a SetVDC value of 13.8. This is actually the only thing you can change in the Delphi DC to DC converter. To select any value between 7 and 16vdc output, simply enter the character v immediately followed by the desired number. **v12.8** would set this system for a

12.8vdc output. Full power is available at voltages above 11v. At 16v the Delphi produces a fault.

The next field LoV shows the ACTUAL 14v low voltage output in volts.

LoVCurrent shows the actual current output on the low voltage side in amperes.

This is followed by the High Voltage or battery pack voltage and current.

The second line of the recurring display output:

```
Temp:21C Power:750.00W Loss:75.00W Eff:90.00 HiV-AH:1.15 LoV-Wh:123.21 00:00:10.659
```

The first value is the internal temperature of the Delphi converter.

Power indicates the total power output of the Delphi Converter.

Loss is the loss in watts internal to the Delphi.

Eff is an efficiency calculation based on current voltage, current and power loss.

HiV-AH is the number of high voltage pack Ampere-Hours that have been consumed in making the 14v output.

LoV-Wh is the number of Watt-Hours produced by the system on the 12v output.

The last entry is a timestamp since the program started.

You can zero the kWh and AH values by entering “z” and return.

Once you have set the SetVDC value, you may disconnect the laptop and continue. The value will be held in the controller’s internal EEPROM memory. The ONLY time you need to connect to the USB port is to set this value into memory.

But you might find all the diagnostic info of use.

In theory, you can also disconnect the 12v output from the battery. Delphi is making its own internal 12v and 5v power from the high voltage conversion at this point. You could even remove the controller. Once in operation, if the converter loses CAN commands, it will default to 13.5vdc.

