



PRESSURE TRANSDUCER	TSB #:	60
	Date:	1/5/2012
Initial Once Read:		

We first started to see A/C pressure transducers replacing A/C pressure switches with the introduction of the electronic fuel injection systems using Electronic Control Modules (ECM). The ECM would receive a number of signals from the vehicle through sensors located in various components. These sensors would signal the ECM in low voltage feedback signals as to the coolant temperature, A/C switch on/off, road speed, ambient temperature, throttle position and much more. The ECM would have a "look up" table for all these sensor readings telling it what the sensor range should be and what to activate or deactivate.

An example: The driver pushes the A/C button on. The compressor clutch will not activate via the compressor relay until the ECM has confirmed that the pressure in the A/C system is not too high or too low or the coolant temperature is below a certain degrees, or the throttle position is not above 98% (WOT) or the blower fan is operating. If all of the example criteria is met the ECM will give the compressor relay an earth and the compressor will then operate.

Now lets look at the pressure transducer, the main identifier of a pressure transducer is that they have three electrical terminals:

Terminal one—supply power normally 5 volts for the ECM.

Terminal two—ground.

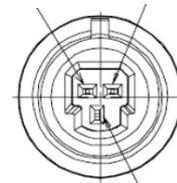
Terminal three—feedback voltage to the ECM to be used in the "look up" table. Feedback is 0 to 5 volts (supply voltage).

The pressure transducer has a two piece ceramic diaphragm which changes capacitance under influence of the refrigerant pressure onto the diaphragm. These capacitance changes are converted by the signal electronics into an analogue output signal to the ECM.

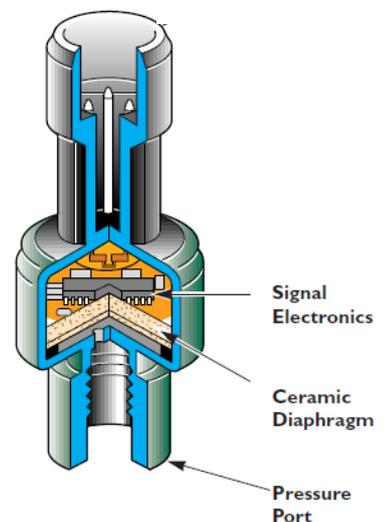
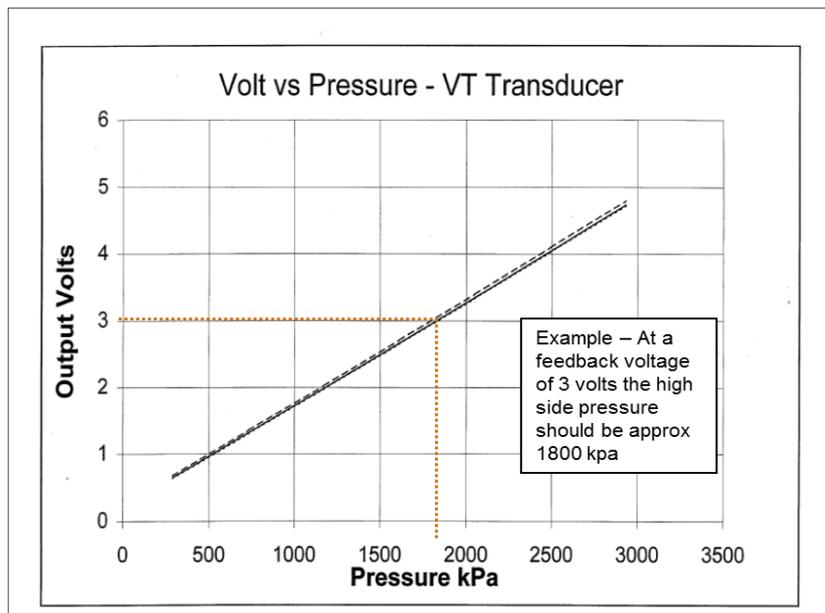
On the upper section of the pressure transducer are located the electronics that are fixed to a PCB. The lower section senses the A/C system high side refrigeration pressure via the pressure port.

The benefits of using a pressure transducer over a normal pressure switch are, constant monitoring of the A/C system pressure and the ability of the ECM to disengage the compressor when the monitored pressure corresponds to a function such as compressor cut out to prevent internal damage and activation of the radiator / condenser fans at various speeds depending on the A/C system pressure.

- 2. Ground
- 1. Supply voltage



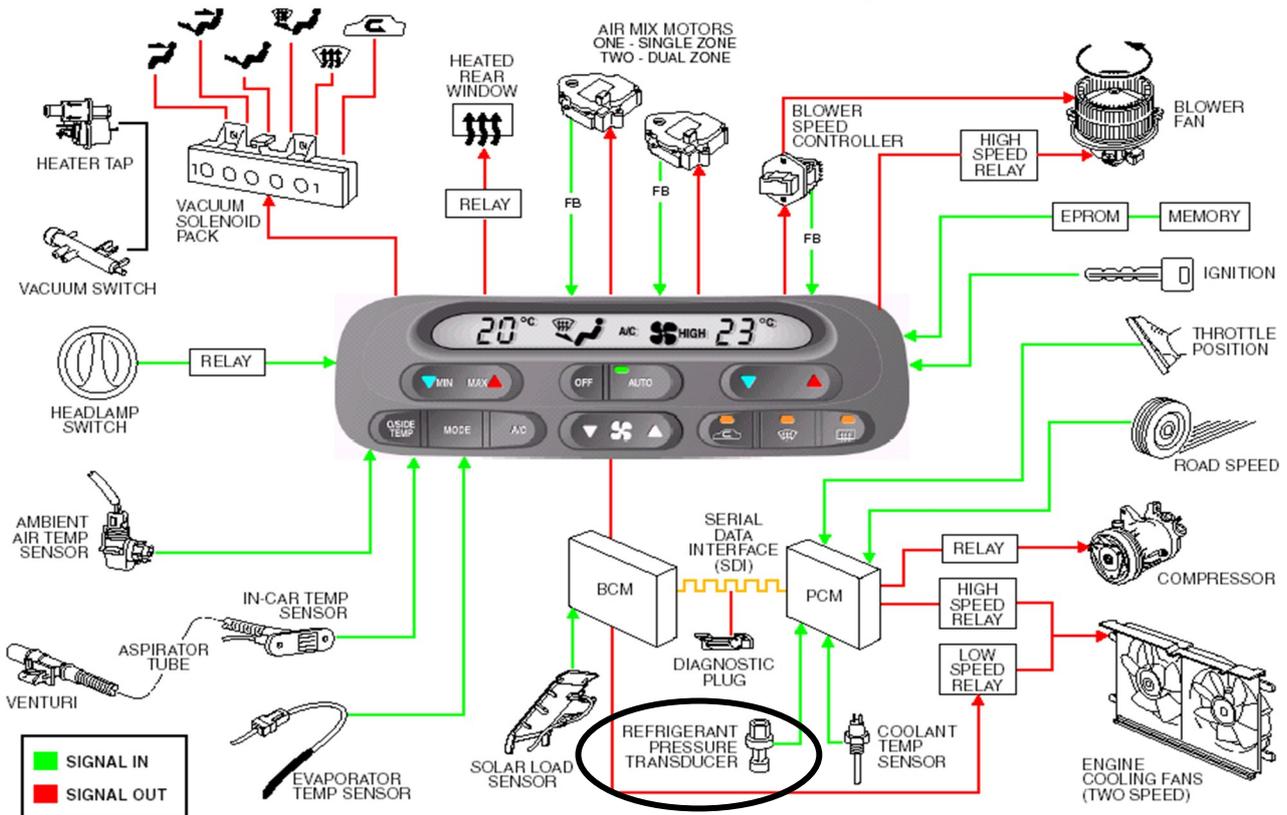
- 3. Feed back voltage to ECM



Example - Holden Commodore, Astra, Vectra



ELECTRONIC CLIMATE CONTROL (ECC)



Location of the pressure transducer in the Holden VT-VZ A/C system (courtesy of Air Internal Thermal Products)

Using the Holden series 1 as an example

As you can see above the pressure transducer is provided with supply voltage from the PCM (power train module). A constant feedback voltage is created by the refrigerant pressure and sent to the PCM. The PCM uses that feedback value along with all the other signals going into it to carry out a function. Note also the other components that are sending feed back information and also receiving activation / deactivation commands from the PCM.

- ⇒ High side pressure increases to 2900 kPa. The PCM removes the earth from the compressor relay and the compressor turns off to prevent any internal damage occurring. At 2400kPa the PCM provides that earth for the relay and the compressor re-engages.
- ⇒ Low side pressure decreases to 180 kPa. The PCM removes the earth from the compressor relay and the compressor disengages to prevent any internal damage occurring. At 240kPa the PCM provides that earth for the relay and the compressor re-engages
- ⇒ Both engine cooling fans operate on low speed with the A/C on if the road speed is below 64 kmph (vehicle speed signal) and the refrigerant pressure is above 1770kPa. The cooling fans are turned off when the refrigerant pressure is below 1370kPa.

The aforementioned is only a small example of the importance of accurate constant feedback voltage from the pressure transducer being sent to a control module for calculation . When diagnosing the accuracy of a pressure transducer, connect a high pressure gauge to the A/C system, this will be the “actual” pressure. Connect a scan tool to the vehicle and compare the module “calculated” pressure from the scan tool data.

The actual and calculated pressure should be the same or +/- 10% if they are not replace the pressure transducer. On some vehicles you may have to recover the refrigerant and other vehicles have a schrader valve in the port.