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# Mahindra Truck and Bus

Diagnostic Manual ( EMS)

LCV MDI BSIII CRDe

Rev 01- Mar 14

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## Diagnostic Manual

## MDI BSIII CRDe



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## Contents

- **Conditions where Engine will not start**
- **Relay checking**
- **List of DTC codes**
- **ECU Electrical schematic diagram**

## Conditions where Engine will not start

### 1) No Check Lamp

- Battery Voltage less than 9 Volts :Engine does not start
- Maxi Fuse 60 A Fuses :Engine does not start
- Fuse no 7 in Main fuse box fuses :Engine does not start
- Fuse No 1,3 &4 in Auxiliary fuse box fuses :Engine does not start
- Engine Management relay fails :Engine does not start
- ECU Itself fails :Engine does not start

### 2) Check Lamp Normal

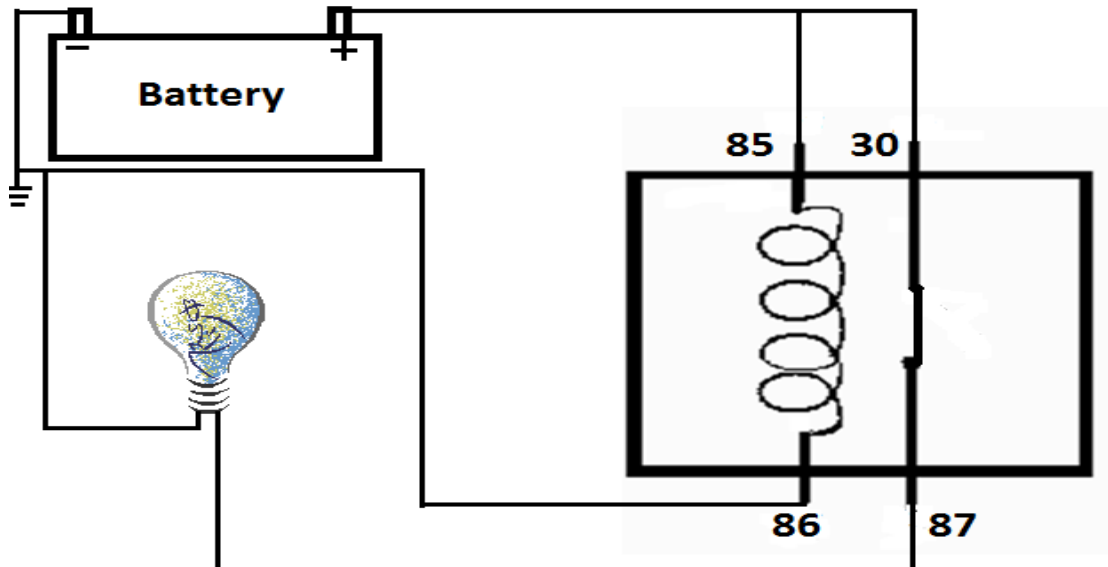
- Fuel pump , its relay or 5nofuse :Engine does not start
- Engine speed sensor / CKP :Engine does not start
- Cam phase sensor :Engine does not start

### 3) Check Lamp ON

- Rail pressure sensor :Engine starts & goes off in 30 sec will not start
- Metering unit : Engine starts & goes off in 30 sec
- Fuel injectors ( if all are not okay) : Engine does not start
- Accelerator pedal sensor [APS] : Engine goes to limp home mode

## Relay checking

### 4 Pin Normally Open Relay Checking



**Note:** Please verify the polarity of Relay pin 85 & 86 and connect accordingly. Else Diode inside relay will be burnt.

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## List of DTC codes

Group	Code	Label
Crank shaft sensor	P0335	Crankshaft sensor no signal error
	P0336	Crankshaft sensor signal error
	P0371	F_M_Aps_crank_early_fault_rec
	P0372	Shifted/Missing cam edge
Cam shaft sensor	P0340	Camshaft sensor no signal error
	P0341	Camshaft sensor signal error
Boost Pressure Sensor	P0236	Calculated Boost pressure is not in the expected range.
	P0237	Signal range check for intercooler downstream pressure sensor below minimum limit
	P0238	Signal range check for intercooler down stream pressure sensor above maximum limit.
	P1235	Analogue to Digital convertor fault.
	P1236	Boost pressure variation exceeds the max boost pressure Gradient value.
	P1237	Raw boost pressure falls below the calibrated min value
	P1238	Raw boost pressure exceeds the calibrated max value
	P0097	Boost temperature signal falls below a calibrated value
	P0098	Boost temperature signal falls above a calibrated value
	P007C	Signal range check for intercooler downstream temperature sensor below minimum limit
	P007D	Signal Range Check for coolant temperature sensor below minimum limit
Coolant Temperature Sensor	P0117	Signal Range Check for coolant temperature sensor below minimum limit
	P0118	Signal Range Check for coolant temperature sensor above maximum limit

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<b>Coolant Temperature Sensor</b>	<b>P0119</b>	Coolant temp. Exceeds the max coolant temp. Gradient value.
	<b>P0115</b>	Analogue to Digital convertor fault.
<b>Rail Pressure Sensor</b>	<b>P 0192</b>	Signal range check for rail pressure sensor below minimum limit
	<b>P 0193</b>	Signal range check for rail pressure sensor above maximum limit
	<b>P1190</b>	Analogue to Digital Convertor fault.
	<b>P0194</b>	Rail Pressure sensor - Pressure drop.
	<b>P1191</b>	Rail pressure signal-sensor drift.
	<b>P1192</b>	Rail pressure signal falls below the calibrated min value (Ignition ON)
	<b>P1193</b>	Rail pressure signal exceeds the calibrated min value (Ignition ON)
	<b>P0087</b>	Rail pressure does not build within the speculated time
	<b>P0088</b>	Rail pressure exceeds the Calibrated pressure limit in absence of fault in pressure measurement
	<b>P1253</b>	Rail pressure control error (pressure error too high) – Negative
	<b>P1254</b>	Rail pressure control error (pressure error too high) – Positive
	<b>P1256</b>	Rail pressure control error (IMV current trim drift) – Low fuel low fault
	<b>P1257</b>	Rail pressure control error (IMV current trim drift) – Low fuel high fault
	<b>P1258</b>	Rail pressure control error (IMV current trim drift) – High fuel low fault
	<b>P1259</b>	Rail pressure control error (IMV current trim drift) – High fuel high fault
<b>Accelerator Pedal</b>	<b>P0122</b>	Signal range check for APP1 below minimum limit
	<b>P0123</b>	Signal range check for APP1 above maximum limit
	<b>P2135</b>	Plausibility with APP2 violated.
	<b>P0222</b>	Signal range check for APP pedal sensor2 below minimum limit.

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<b>Accelerator Pedal</b>	<b>P0223</b>	Signal range check for APP pedal sensor2 above maximum limit
	<b>P1120</b>	Pedal sensor Fault(electrical,track1)
	<b>P1220</b>	Pedal sensor Fault(electrical,track2)
<b>Metering Unit</b>	<b>P0001</b>	Metering Unit open load error
	<b>P0003</b>	Metering unit short circuit to ground error
	<b>P0004</b>	Metering unit short circuit to battery error
<b>Check Lamp</b>	<b>P1654</b>	System lamp no load
	<b>P1655</b>	System lamp short circuit to ground
	<b>P1656</b>	System lamp short circuit to battery
<b>Injector</b>	<b>P2147</b>	Injector bank short circuit to battery
	<b>P2148</b>	Injector bank short circuit to ground
	<b>P0201</b>	Cylinder1 injector open load error
	<b>P0203</b>	Cylinder2 injector open load error
	<b>P0204</b>	Cylinder3 injector open load error
	<b>P0202</b>	Cylinder4 injector open load error
	<b>P0261</b>	High side - Low side short circuit for cylinder1 injector
	<b>P0267</b>	High side - Low side short circuit for cylinder2 injector
	<b>P0270</b>	High side - Low side short circuit for cylinder3 injector
	<b>P0264</b>	High side - Low side short circuit for cylinder4 injector
	<b>P0263</b>	Combustion Imbalance in cyl 1
	<b>P0272</b>	Combustion Imbalance in cyl 2
	<b>P0266</b>	Combustion Imbalance in cyl 3
	<b>P0269</b>	Combustion Imbalance in cyl 4
	<b>P1286</b>	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 1
	<b>P1287</b>	Measured resistance value equal to or greater than the calibrated threshold value -INJECTOR Cyl 1
<b>P1290</b>	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 3	
<b>P1291</b>	Measured resistance value equal to or greater than the calibrated threshold value - INJECTOR Cyl 3	

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<b>Injector</b>	<b>P1292</b>	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 4
	<b>P1293</b>	Measured resistance value equal to or greater than the calibrated threshold value - INJECTOR Cyl 4
	<b>P1288</b>	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 2
	<b>P1289</b>	Measured resistance value equal to or greater than the calibrated threshold value - INJECTOR Cyl 2
	<b>P0268C</b>	Incorrect or No I2C / I3C written on 1st Cylinder
	<b>P0268E</b>	Incorrect or No I2C / I3C written on 3rd Cylinder
	<b>P0268F</b>	Incorrect or No I2C / I3C written on 4th Cylinder
	<b>P0268D</b>	Incorrect or No I2C / I3C written on 2nd Cylinder
<b>Fuel Pump</b>	<b>P0627</b>	Feed pump relay - Open circuit
	<b>P0629</b>	Feed pump relay - Short circuit to Vbat
	<b>P0628</b>	Feed pump relay - Short circuit to Ground
<b>Vehicle speed sensor</b>	<b>P0501</b>	Vehicle speed sensor output not consistant (erratic)
	<b>P0503</b>	Vehicle speed sensor fault (speed too high)
	<b>P0502</b>	Vehicle speed sensor fault (signal lost)
	<b>P0500</b>	Vehicle speed fault(global)
<b>Water in fuel sensor</b>	<b>P2269</b>	Water in fuel detected.
	<b>P2266</b>	fault due to Short circuit
	<b>P2264</b>	fault due to open circuit or VBAT
<b>ECU</b>	<b>P0685</b>	ECU Relay Struck Time
	<b>P1685</b>	Supply Relay Open Circuit-unexpected.
	<b>P1603</b>	Memory failure - in the coding region of the ECU.
	<b>P1604</b>	Memory failure - in the calibration region of the ECU.
	<b>P1605</b>	Memory failure - in the RAM region of the ECU.
<b>Battery</b>	<b>P0562</b>	Battery Voltage falls below 6 volts.
	<b>P0563</b>	Battery Voltage falls below 18 volts.
	<b>P1560</b>	Analogue to Digital Convertor Fault.
<b>Sensor 5V</b>	<b>P0642</b>	Sensor Supply voltage falls below the calibrated value.
	<b>P0643</b>	Sensor Supply voltage exceeds the calibrated value.
	<b>P1641</b>	Analogue to Digital Convertor Fault.
	<b>P0652</b>	Sensor Supply voltage falls below the calibrated value.
	<b>P0653</b>	Sensor Supply voltage exceeds the calibrated value
	<b>P1651</b>	Analogue to Digital Convertor Fault.

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<b>Atmospheric Pressure fault</b>	<b>P1107</b>	Global Atmospheric pressure fault
	<b>P0107</b>	Atmospheric sensor low fault
	<b>P0108</b>	Atmospheric sensor high fault
	<b>P1105</b>	Atmospheric sensor ADC fault
	<b>P0109</b>	Atmospheric sensor gradability fault

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## Index of Code coming as group & Behavior

Symptom/ Behavior	Codes	Possible Pin	Reason
Vehicle goes into limp home and then after ignition Off cannot be started	P0340	20	Though the pin 20 is also for shield of camshaft/crank shaft . At the same time it is earth for APP, Hence due to APP it goes to limp home and then due to synchronization issue land up with engine not starting
Vehicle goes into limp home and then after ignition Off cannot be started	P0340 P0122	76	The pin 76 is voltage which is shared with APP, Cam shaft,
Torque reduction and after some time the engine switches Off	P007D P0237	59	The pin is the shared ground for the boost pressure and coolant sensor
Engine shut off	P0193, P0223	16	The ground for the rail pressure is also shared with the APP track 2
	P0193, P0222, P1253	78	The supply for the rail pressure is also shared with the APP 2.
Engine will go into limp home. At the next crank it can not be started	P0123 P0340	76	The supply is common for APP1, cam phase.
Engine will go into limp home. At the next crank it cannot be started	P0123 P1406 P0340	20	The ground is common for APP1 & cam phase.
Engine will switch off	P0222	78	The supply is common for

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and the last known good rail pressure value will be frozen	P0193 P1253		APP2, rail pressure,
Engine will switch off and the last known good rail pressure value will be frozen	P0223 P0193	20	The ground is common for APP1, rail pressure
Engine shut off. Lamp continuously ON	P0201 P0202 P0203 P0204	7	Pin 7 is the high side for the injectors and is shared with all the injector
No Lamp, No DTC , engine will not start	No code	46	Fuel pump is not getting energised

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## Crankshaft Sensor

P0335  
P0336  
P0371  
P0372

### Description -

In order that the ECU can control the engine at all the position of the crankshaft must be known so that the cylinder in compression and the timing of the next fuel injection can be calculated. The CKP is an inductive pulse generator, which scans protrusions on the flywheel. Two teeth are missing, and this gap is situated at 90° before TDC.

DTC	Diagnostic item
P-0335	Crankshaft sensor No signal Error
P-0336	Crankshaft sensor signal error
P 0371	F_M_APS_Crank_early_fault_rec
P 0372	Crank signal fault - missing tooth

DTC detection condition	Probable cause
<p><b>Background</b></p> <ul style="list-style-type: none"><li>When the engine is running, the Crankshaft Position sensor outputs a pulse signal.</li><li>The ECU checks whether the pulse signal is input while the engine is cranking.</li><li></li></ul> <p><b>Normal Operating condition</b></p> <ul style="list-style-type: none"><li>Engine is being cranked.</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>Normal signal pattern has not been input for cylinder identification from the crankshaft position sensor signal for 4 sec.</li><li>No synchronization between crankshaft &amp; camshaft signal.</li></ul> <p><b>Reaction</b></p> <ul style="list-style-type: none"><li>System lamp continuously on.</li><li>Engine will not start.</li><li>If engine is running &amp; this fault occurs, engine will stop immediately.<ul style="list-style-type: none"><li>The error will be in active mode during cranking only.</li></ul></li></ul>	<ul style="list-style-type: none"><li>Open, shorted or wrong connection crankshaft Position sensor circuit.</li><li>Failed or damaged crankshaft position sensor.</li><li>Sensor teeth too close</li></ul>

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P0335

P0336

P0371

P0372

## **P 0335: Crankshaft sensor – No signal**

**Possible Causes** : Open circuit of the positive or the negative cable

**Corrective Action** : Check for Open circuit between 2 &15; 1 & 14

## **P 0336 : Crankshaft sensor signal error.**

**Possible cause** : This error can only come if any teeth signal is missing or Improper.

**Corrective Action** : Look for damage on toner wheel teeth damage

## **P0371: F\_M\_Aps\_crank\_early\_fault\_rec**

**Possible Cause** : This error can only come when the teeth are too close. It is not expected to happen in a running vehicle.

**Corrective Action** : If reported check if the flywheel and the toner ring changed just prior to the failure. Take corrective actions accordingly.

## **P0372 : Crank signal fault - missing tooth**

**Possible Cause** : This error can only come when the teeth is shifted or missing. It is not expected to happen in a running vehicle.

**Corrective Action** : If reported check if the flywheel and the toner ring changed just prior to the failure. Take corrective actions accordingly.

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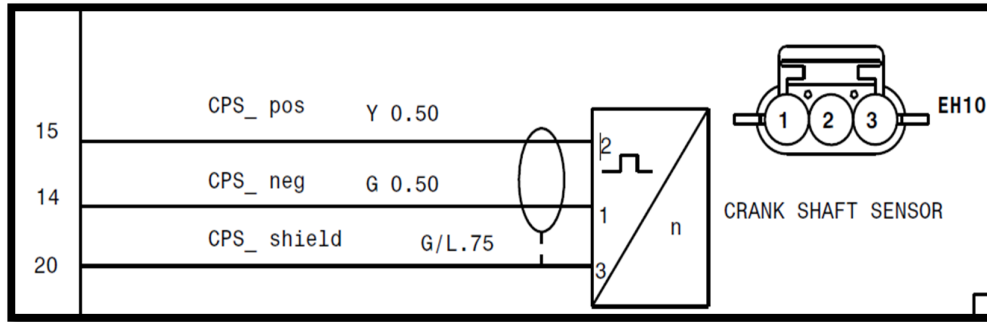
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TO CHECK	TO RECTIFY
1. Crank Sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. Sensor malfunctioning	3.Clean / Change sensor
4. Air Gap	4.Put Copper washer
5. Engine Cam shaft / Crank Shaft timing	5.Check timing and rectify
6. Flywheel Teeth Dimension / Flywheel reference	6. Clean / Change wheel. Check flywheel reference

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## Camshaft Sensor

P0340  
P0341

### Description -

The Hall effect camshaft position sensor senses the Top dead center (TDC) point of the # 1 cylinder in the compression stroke. Which allows the ECU to determine when to start the injection

DTC	Diagnostic item
P-0340	Camshaft sensor no signal error
P-0341	Camshaft sensor signal error

DTC detection condition	Probable cause
<p><b>Normal Operating condition</b></p> <ul style="list-style-type: none"><li>When the engine is running, the Camshaft Position sensor outputs a pulse signal.</li><li>The ECU checks whether the pulse signal is input</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>Normal signal pattern has not been input for cylinder identification from the camshaft position sensor signal for 4 sec. (Engine should be cranked to check this error)..</li></ul> <p><b>Reaction</b></p> <ul style="list-style-type: none"><li>Engine will not start</li><li>System lamp will be continuously on.</li></ul>	<ul style="list-style-type: none"><li>Open or shorted camshaft position sensor circuit, loose or wrong connection.</li><li>Camshaft Position Sensor malfunction.</li></ul>

### **P 0340 – Camshaft sensor – no signal error.**

If the signal strength is less than 3.5 V it will register as an error.

**Possible causes** : If the Signal circuit – goes to open / short and if the engine is running then no reaction but the engine can not be started.

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P0340  
P0341

**Corrective action :** Check for pin back out at pin 34 of EMS ECU or the pin 1. Check the 34-1 for open circuit or short to ground

**Possible cause :** If the Ground wire is having problem. If the vehicle is running then the engine will go into limp home mode and then after ignition OFF the engine can not be started.

**Corrective action :** Check for the pin back out at Pin 20 & Pin 2  
Check for open circuit in Pin 20 of EMS ECU to Pin 2 of cam phase sensor

**Possible cause :**

If the Reference voltage wire is having problem. If the engine is running it will go into limp home mode ( 1300 RPM) . After ignition off the engine can not be started.

**Corrective Action :** Check for pin back out, oxidation at pin 76 of EMS ECU and pin 3 at the Cam shaft sensor.

## **P 0341- Camshaft sensor signal error**

**Reason:** This error is registered when there is mismatch between the Crankshaft signal and the camshaft signal.

**Probable causes:**

1. Camshaft mounting bolts loose.
2. Wrong Cam gear.
3. Wrong camshaft gear fitted.



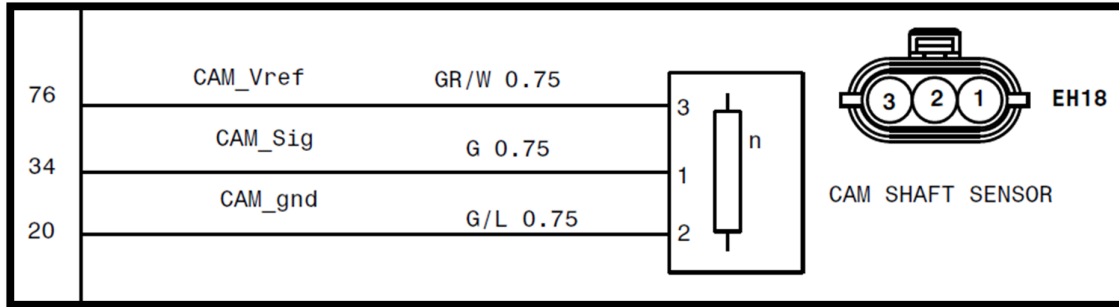
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P0340  
P0341



TO CHECK	TO RECTIFY
1.CAM sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Cam Target wheel position with TDC	4. Take necessary action
5. Crank missing teeth position w.r.t TDC	5. Take necessary action

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## Boost Pressure Sensor

### Description -

The boost pressure signal is monitored. The signal is converted, linearized and then monitored.

P0236  
P0237  
P0238  
P1235  
P1236  
P1237  
P1238  
P0097  
P0098  
P007C  
P007D

DTC	Diagnostic item
P0236	Signal range check for intercooler downstream pressure sensor below minimum limit
P0237	Signal range check for intercooler downstream pressure sensor below minimum limit
P0238	Boost pressure exceeds the calibrated max threshold.
P1235	Analogue to Digital convertor fault.
P1236	Boost pressure variation exceeds the max boost pressure Gradient value.
P1237	Raw boost pressure falls below the calibrated min value
P1238	Raw boost pressure exceeds the calibrated max value
P0097	Boost temperature signal falls below a calibrated value
P0098	Boost temperature signal falls above a calibrated value
P007C	Signal range check for intercooler downstream temperature sensor below minimum limit.
P007D	Signal range check for intercooler downstream temperature sensor above maximum limit

DTC detection condition	Probable cause
<p><b>Background</b></p> <p>The ECU monitors the Boost pressure . This sensor also monitors the air temperature.</p> <p><b>Malfunction; out-of-range</b></p> <ol style="list-style-type: none"> <li>1. When the measured value is above or below a range.</li> <li>2. When the pressure gradient exceeds a value.</li> <li>3. When an ADC or electrical fault is present.</li> </ol> <p><b>Reaction</b></p> <ul style="list-style-type: none"> <li>• System Check lamp is ON</li> <li>• Engine torque is limited.</li> </ul>	<p>Short circuit to battery or ground.</p> <p>Defective sensor</p>

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## **P 0237- Signal range check for the intercooler downstream sensor below the lower limit**

**Reason:** This error is registered when the value is less then the range or when there is an electrical fault.

### **Effect :**

1. Torque reduction and System Check lamp ON
2. If with the torque reduction and some delay there is engine switch off then it is indication fault is in Ground line.It will also give other error ( refer the list of the other errors)

Check for pin back out or open circuit of the voltage in the line 3-75  
Check for pin back out or open circuit of the voltage in the line 4-69  
Check for pin back out or open circuit of the voltage in the line 1-59  
Check for signal short with either supply or ground

**Probable causes :** Sensor defective

## **P 0238- Signal range check for the intercooler downstream sensor below the upper Limit**

**Reason:** This error is registered when the value is less then the range or when there is an electrical fault.

### **Effect:**

1. Torque reduction and System Check lamp ON
2. If with the torque reduction and some delay there is engine switch off then it is indication fault is in Ground line.It will also give other error ( refer the list of the other errors)

Check for signal short circuit with supply 3-75 & 4-69

### **Probable causes:**

Short between Signal and voltage line  
Sensor defective

P0236  
P0237  
P0238  
P1235  
P1236  
P1237  
P1238  
P0097  
P0098  
P007C  
P007D

## **P 007C- Signal range check for the intercooler downstream temperatures sensor below the upper limit**

**Reason:** This error is registered when the value is less then the range or when there is an electrical fault.

### **Effect:**

1. Torque reduction and System Check lamp ON

### **Possible Cause:**

Short between signal & ground

Check for the short of pin at 73 & 59 ( bent pin)

Check for wire 1 - 59 & 2-73

## **P 007D- Signal range check for the intercooler downstream temperatures sensor above the upper limit.**

**Reason:** This error is registered when the value is less then the range or when there is an electrical fault.

### **Effect:**

1. Torque reduction and System Check lamp ON

### **Possible Cause:**

Short between signal & ground.

### **Corrective Action:**

Check for pin back out in the line 2-73

Check open circuit in the line 2 & 79

Check short between pin 73 & pin 75

Check short between wire 2-73 & 3-75

P0236

P0237

P0238

P1235

P1236

P1237

P1238

P0097

P0098

P007C

P007D

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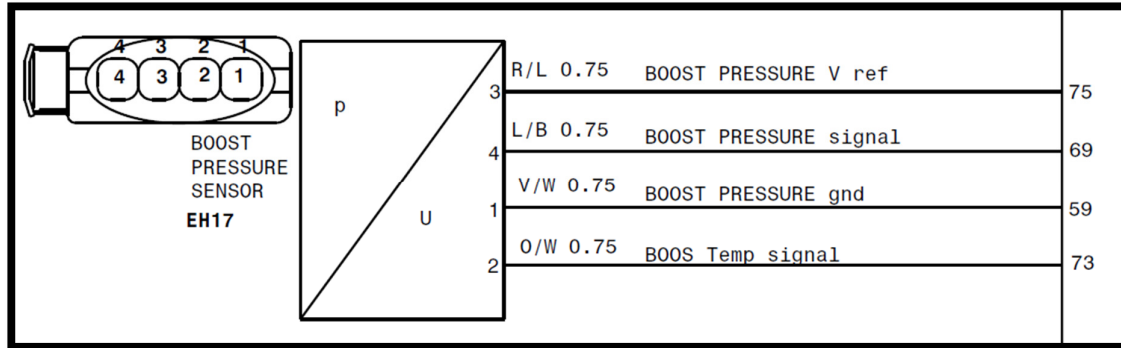
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Note Pin no 69 is the signal for the Boost Pressure.

Pin no 73 is the signal for the air temperature



P0236  
P0237  
P0238  
P1235  
P1236  
P1237  
P1238  
P007C  
P007D

TO CHECK	TO RECTIFY
1. Boost Sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Boost sensor malfunctioning .	4. Change sensor.
5. In case of P1235 check for Vext fault	5. Follow the fault tree of P0652, P0653 & P1651

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## Coolant Temperature Sensor

### Description -

P0117  
P0118  
P0119  
P0115

The Water temperature sensor (WTF) is located in the coolant pipe of the cylinder head. The WTF sensor is a variable resistor whose resistance changes as the temperature of the engine coolant flowing past the sensor changes. (NTC resistor) When the coolant temperature is low, the sensor resistance is high; when the coolant temperature is high, the sensor resistance is low. The ECU checks WTF voltage and uses the information to help smoothen the engine operation.

DTC	Diagnostic item
P0117	Signal Range Check for coolant temperature sensor below minimum limit
P0118	Signal Range Check for coolant temperature sensor above maximum limit
P0119	Coolant temp. Exceeds the max coolant temp.Gradient value.
P0115	Analogue to Digital convertor fault.

DTC detection condition	Probable cause
<p><b>Background</b></p> <ul style="list-style-type: none"> <li>The engine coolant temperature sensor converts the engine coolant temperature to a voltage and outputs it.</li> <li>The ECU checks whether the voltage is within a specified range. In addition, it checks that the engine coolant temperature (signal) does not drop while the engine is warming up.</li> </ul> <p><b>Malfunction; out-of-range</b></p> <ul style="list-style-type: none"> <li>Sensor output voltage has continued to be 5V or higher for 4 sec.</li> <li>Sensor output voltage has continued to be 0.1V or lower for 4 sec.</li> </ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"> <li>System lamp will be on.</li> <li>Engine will continue to run with water</li> <li>temperature of 112 deg C. For P 0118, engine will switch off after some time</li> </ul>	<ul style="list-style-type: none"> <li>Open or shorted Engine Coolant Temperature sensor circuit, or loose or wrong connection</li> <li>Engine Coolant Temperature sensor failed.</li> </ul>

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## P 0117 Signal Range Check for coolant temperature sensor below minimum limit

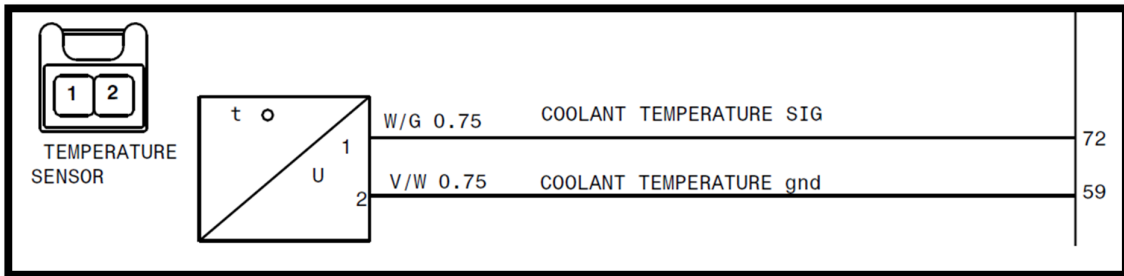
P0117  
P0118  
P0119  
P0115

**Possible cause :** Open circuit. Sensor defective

### Corrective Action

- Check for the pin back out at 59 or 2
- Check for the pin back out at 72 or 1
- Check the open circuit between – 2-59 & 1-72

If does not resolve , replace the coolant temp sensor



TO CHECK	TO RECTIFY
1. Coolant sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Coolant Sensor malfunctioning	4. Change sensor.

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## Rail Pressure Sensor

DTC	Diagnostic item
P0192	Signal range check for rail pressure sensor below minimum limit
P0193	Signal range check for rail pressure sensor above maximum limit.
P1190	Analogue to Digital Convertor fault.
P0194	Rail Pressure sensor - pressure drop
P1191	Rail pressure signal-sensor drift.
P1192	Rail pressure signal falls below the calibrated min value (Ignition ON)
P1193	Rail pressure signal exceeds the calibrated min value (Ignition ON)
P0087	Rail pressure does not build within the speculated time.
P0088	Rail pressure exceeds the Calibrated pressure limit in absence of fault in pressure measurement.
P1253	Rail pressure control error (pressure error too high) – Negative
P1254	Rail pressure control error (pressure error too high) – Positive
P1256	Rail pressure control error (IMV current trim drift) - Low fuel low fault
P1257	Rail pressure control error (IMV current trim drift) - Low fuel high fault
P1258	Rail pressure control error (IMV current trim drift) - High fuel low fault
P1259	Rail pressure control error (IMV current trim drift) - High fuel high fault

P0192  
P0193  
P1190  
P0194  
P1191  
P1192  
P1193  
P0087  
P0088  
P1253  
P1254  
P1256  
P1257  
P1258  
P1259

DTC detection condition	Probable cause
<ul style="list-style-type: none"> <li>When ignition is ON rail pressure sensor getting supply from ECU.</li> <li>ECU reads the rail pressure in terms of voltage.</li> <li>Engine is starting properly.</li> <li>Building pressure in rail.</li> </ul> <p><b>Malfunction; out-of-range</b></p> <ul style="list-style-type: none"> <li>Rail pressure output voltage is below 4.7 V or if the ground is not connected..</li> </ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"> <li>Engine is switched off.</li> <li>Rail pressure value is frozen to the last known good value</li> </ul>	<ul style="list-style-type: none"> <li>Open, shorted or wrong connection of rail pressure sensor circuit.</li> <li>Rail pressure sensor failed.</li> </ul>

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## P0192: Signal range check for rail pressure sensor below minimum limit

This error is registered when the signal is below the limit.

**Effect:** Engine will shut off

**Possible causes:** Voltage line is short to ground. i.e. Pin 16 & Pin 40 are short to each other either at the pin end or the wires

### Corrective action:

Check for pin bend.

Check for the wires getting short to each other.

Defective sensor.

## P 0193 –Signal range check for rail pressure sensor above the maximum limit.

**Possible causes:** Open circuit in either signal or ground or voltage. or the signal is short to ground

**Hint:** If only P0193 is registered then it is either signal line is open or signal is short to ground.

i.e. pin 40 is short to either pin 78 or either pin 40 or pin 78 is having open circuit

**Effect:** Engine will switch off.

Open circuit of either ground or voltage is combined with other errors. Refer to the table.

Symptom/ Behavior	Codes	Possible Pin	Reason
Engine shut off	P0193,P0223	16	The ground for the rail pressure is also shared with the APP track 2
	P0193,P0222,P1253	78	The supply for the rail pressure is also shared with the APP 2.

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P0192  
P0193  
P1190  
P0194  
P1191  
P1192  
P1193  
P0087  
P0088  
P1253  
P1254  
P1256  
P1257  
P1257  
P1258  
P1259

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## Corrective action:

Check for pin back out.  
Check for open circuit.  
Replace the rail pressure sensor along with the rail.

**P0087: Rail pressure does not build within the speculated time.**

**P0088: Rail pressure exceeds the Calibrated pressure limit in absence of fault in pressure measurement**

**P1253: Rail pressure control error (pressure error too high) – Negative**

**P1254: Rail pressure control error (pressure error too high) – Positive**

**P1256: Rail pressure control error (IMV current trim drift) – Low fuel low fault**

**P1257: Rail pressure control error (IMV current trim drift) – Low fuel high fault**

**P1258: Rail pressure control error (IMV current trim drift) – High fuel low fault**

**P1259: Rail pressure control error (IMV current trim drift) – High fuel high fault**

P0192  
P0193  
P1190  
P0194  
P1191  
P1192  
P1193  
P0087  
P0088  
P1253  
P1254  
P1256  
P1257  
P1258  
P1259

## Corrective action:

1. IMV fault present Refer fault tree P 0251, 0253 & 0255.
2. HP sensor fault present Refer fault tree P 0192, 0193, 0194 & 190.
3. LP Circuit Problem Low pressure checks:
  - A. Fuel level in diesel tank (check physically) Fill if it is empty
  - B. Air in the circuit - Remove air entrapment (Do not loosen HP pipes)
  - C. Filter connection and LP fuel lines - Connect properly.
  - D. Strainer in Fuel tank -
    - Strainer checks:
      - i. Remove & replace strainer if choked, Tighten strainer & banjo joint properly
      - ii. Change if found defective
      - iii. Connect properly
4. HP Circuit Problem - 4. Perform High Pressure Diagonistics

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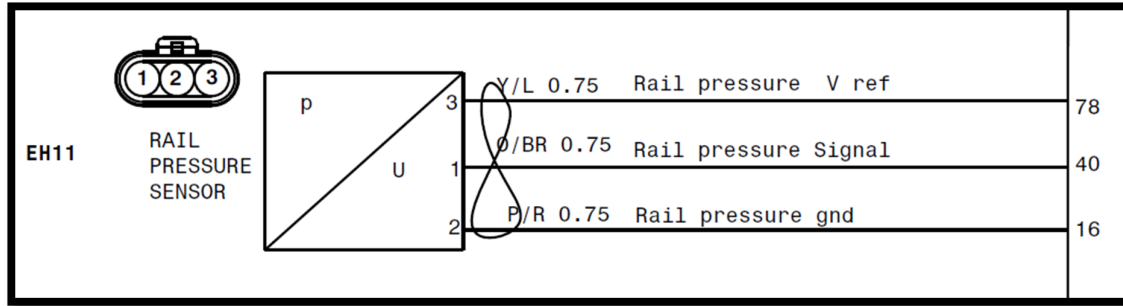
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P0192  
 P0193  
 P1190  
 P0194  
 P1191  
 P1192  
 P1193  
 P0087  
 P0088  
 P1253  
 P1254  
 P1256  
 P1257  
 P1258  
 P1259

TO CHECK	TO RECTIFY
1. Rail sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Wiring connector breakage	4. Change connector
4. Rail pressure Sensor malfunctioning	5.Change Rail + Sensor

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## Accelerator Pedal Module

### Description:

The Accelerator pedal module (APM) is directly connected to the Accelerator pedal. It is connected to the ECU by wires. The APM sensor is a variable resistor (potentiometer) whose resistance changes according to the pedal position. ECU applies a reference voltage to the APM sensor and then measures the voltage that is present on the APM sensor signal circuit. The ECU uses the APM sensor signal for further calculation of fuelling & other engine operational parameters.

P0122  
P0123  
P2135  
P1120

.DTC	Diagnostic item
P0122	Signal range check for APP1 below minimum limit
P0123	Signal range check for APP1 above maximum limit
P2135	Plausibility with APP2 violated
P1120	Pedal sensor fault(electrical,track1)

DTC detection condition	Probable cause
<p><b>Normal Operation:</b></p> <ul style="list-style-type: none"><li>The Accelerator pedal module (APM) outputs a voltage, which is proportional to the Position of accelerator pedal.</li><li>The ECU checks whether the voltage output by the Accelerator pedal module is within a specified range.</li></ul> <p><b>Proper Performance</b></p> <ul style="list-style-type: none"><li>Sensor output voltage has continued to between 0 to 5V, varying accelerator pedal position.</li></ul> <p><b>Malfunction; out-of-range</b></p> <ul style="list-style-type: none"><li>With the changing Accelerator pedal position, the sensor output voltage has continued to be 5V or 0V.</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>The engine speed not varying with changing accelerator pedal position. (Constant 1300 rpm)</li><li>In addition to that if the P0123 is registered then in that drive cycle the vehicle will go into limp home. But in the next drive cycle the engine cannot be started.</li></ul>	<ul style="list-style-type: none"><li>Open or shorted Accelerator pedal module circuits, loose or wrongs connections.</li><li>Accelerator pedal module failed</li></ul>

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P0122  
P0123  
P2135  
P1120

## **P 0122: Signal range check for APP1 below minimum limit**

This error is registered when the signal is below 4.7 V i.e. in Open also.

**Effect:** Engine will run at continuous speed of 1300 RPM

**Possible causes:** When there is open circuit in the signal of APP1 i.e at Pin 37

**Corrective action:** Check for pin back out at IC or the APP module or EMS.

Check for pin bend or oxidation. Wire cut.

## **P 0123: Signal range check for APP1 above maximum limit**

### **Possible causes:**

1. Pin 37 & 76 are short i.e. the signal and the supply.
2. Pin 37 & 20 are short i.e. the signal and the ground
3. Open circuit in the supply i.e. from Pin 76 of EMS to pin D of APP1( grouped with other codes).

**Effect:** Engine will run at continuous speed of 1300 RPM. However at next drive cycle the engine cannot be started . The check lamp will be continuously ON

**Corrective action:** Check for pin back out at IC or the APP module or EMS.

Check for pin bend or oxidation.

Wire cut.

## **P 2135: Plausibility with APP2 violated**

**Possible causes:** If pin 37 & 78 are short i.e. signal of APP1 & supply of APP2 are short. (Externally or internally)

**Effect:** Engine will run at continuous speed of 1300 RPM. However at next drive cycle the engine cannot be started. The check lamp will be continuously ON

**Corrective action:** Check for pin back out at IC or the APP module or EMS.

Check for pin bend or oxidation.

Wire cut.

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Open circuit of either ground or voltage is combined with other errors. Refer to the table.

P0122  
P0123  
P2135  
P1120

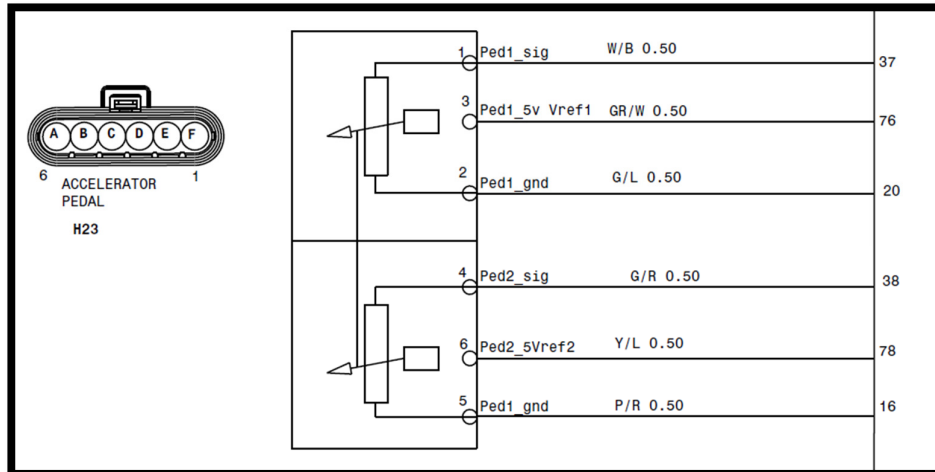
Symptom/ Behavior	Codes	Possible Pin	Reason
Engine will go into limp home but at the next crank it cannot be started	P0123 P0340	76	The supply is common for APP1, cam phase sensor
	P0123 P0340	20	The ground is common for APP1, cam phase

**Corrective action:**

Check for pin back out.

Check for open circuit.

Replace the Accelerator pedal unit. (Note the APP 1 values at idle and full throttle)



TO CHECK	TO RECTIFY
1. Pedal sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Pedal Sensor malfunctioning	4.Change Sensor

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## Accelerator Pedal Module

### Description:

The Accelerator pedal module (APM) mounts in place of accelerator pedal and is connected to the ECU by wires. The APM sensor is a variable resistor (potentiometer) whose resistance changes according to the pedal position. ECU applies a reference voltage to the APM sensor and then measures the voltage that is present on the APM sensor signal circuit. The ECU uses the APM sensor signal for further calculation of fuelling & other engine operational parameters.

P0222  
P0223  
P1220

DTC	Diagnostic item
P0222	Signal range check for APP pedal sensor2 below minimum limit.
P0223	Signal range check for APP pedal sensor2 above maximum limit
P1220	Pedal sensor fault(electrical,track2)

DTC detection condition	Probable cause
<p><b>Proper Performance</b> Sensor output voltage has continued to between 0 to 2.5V,with varying accelerator pedal position.</p> <p><b>Malfunction; out-of-range</b> With the fully pressed Accelerator pedal module, the sensor output voltage has continued to be 2.5V or 0 for 4 sec.</p> <p><b>Reaction</b></p> <ul style="list-style-type: none"><li>• The engine speed not varying with changing accelerator pedal position. (Constant 1300 rpm)- for P0221</li><li>• The system lamp is continuously on.</li><li>• Engine can switch off for P 0223In addition to that if the P0123 is registered then in that drive cycle the vehicle will go into limp home. But in the next drive cycle the engine cannot be started.</li></ul>	<ul style="list-style-type: none"><li>• Open or shorted Accelerator pedal module circuits, loose or wrongs connections.</li><li>• Accelerator pedal module failed</li></ul>

### **P 0222: Signal range check for APP2 below minimum limit**

This error is registered when the signal is below 4.7 V i.e. in Open also.

**Effect:** Engine will run at continuous speed of 1300 RPM

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**Possible causes:** When there is open circuit in the signal of APP2 i.e at Pin 38

**Corrective action:** Check for pin back out at IC or the APP module or EMS.

Check for pin bend or oxidation.

Wire cut.

P0222

P0223

P1220

## P 0223: Signal range check for APP2 above maximum limit

**Possible causes:**

1. Pin 38 & 16 are short i.e. the signal and the earth.
2. Pin 38 & 78 are short i.e. the signal & supply.
3. Open circuit in the supply i.e. from Pin 76 of EMS to pin D of APP2( grouped with other codes.)

**Effect:** Engine will run at continuous speed of 1300 RPM. However at next drive cycle the engine cannot be started. The check lamp will be continuously ON

**Corrective action:** Check for pin back out at IC or the APP module or EMS.

Check for pin bend or oxidation.

Wire cut.

Open circuit of either ground or voltage is combined with other errors. Refer to the table

Symptom/ Behavior	Codes	Possible Pin	Reason
Engine will switch off and the last known good rail pressure value will be frozen	P0222 P0193 P1235	78	The supply is common for APP1, cam phase,

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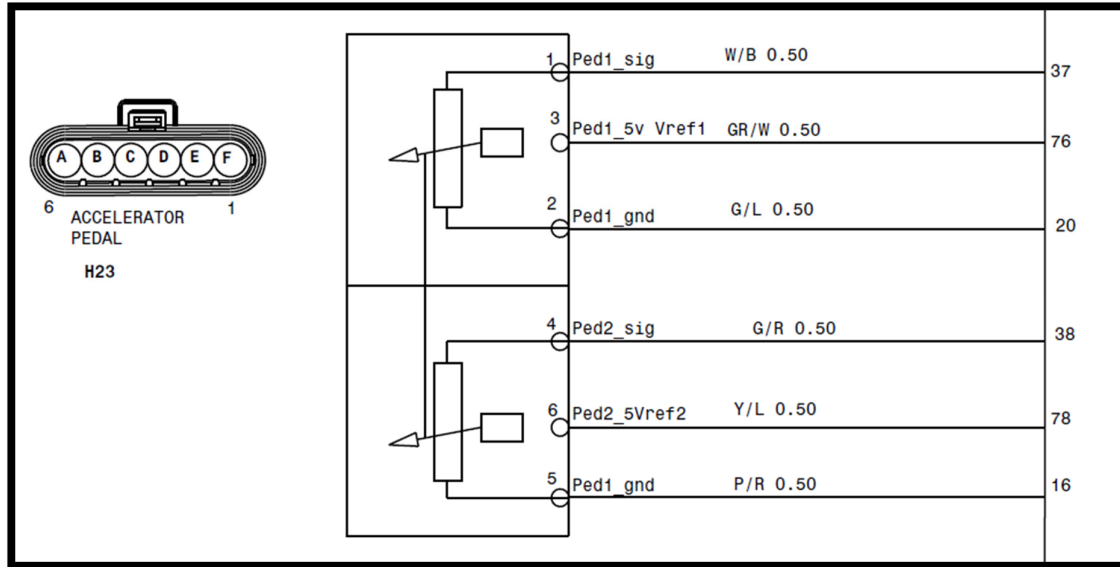
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P0222  
P0223  
P1220



TO CHECK	TO RECTIFY
1. Pedal sensor connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. Pedal Sensor malfunctioning	4.Change Sensor

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## Metering Unit

### Description:

The metering unit is used to control the amount of the fuel going to the Pump. This ensures that the pump does not pump extra quantity to higher pressure. Thus reducing the energy being consumed by the pump and improve the system performance.

P0001  
P0003  
P0004

DTC	Diagnostic item
P0001	Metering Unit open load error
P0003	Metering unit short circuit to ground error
P0004	Metering unit short circuit to battery error

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"><li>* The metering unit receives the signal through the pin 11</li></ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"><li>Ignition switch: ON</li><li>Malfunction lamp: OFF after 2 Sec</li><li>Battery voltage is 8V –16V.</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>If the EMS does not receive the confirmation.</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>System lamp will be continuously ON</li><li>Engine will switch off</li></ul>	<ul style="list-style-type: none"><li>Open connector.</li><li>Short to battery</li><li>Short to ground</li></ul>

### **P 0001: Metering unit open load error**

This error is registered the pin no 11 does not get any signal

**Effect:** Lamp continuously ON. Engine will switch off

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**Possible causes:** Open circuit

**Corrective action:** Check for pin back out at metering unit or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

P0001  
P0002  
P0004

**P 0004: Metering unit short circuit to battery error.**

This error is registered the short circuit to battery is detected

**Effect:** Lamp continuously ON. Engine will switch off

**Possible causes:** Check the wire from metering unit to EMS ECU.  
Metering Unit  
EMS ECU

**Corrective action:** Check for pin back out at metering unit or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

**P 0003: Metering unit short circuit to ground error.**

This error is registered the short circuit to ground is detected

**Effect:** Lamp continuously ON. Engine will switch off

**Possible causes:** Check the wire from metering unit to EMS ECU.  
Metering Unit  
EMS ECU

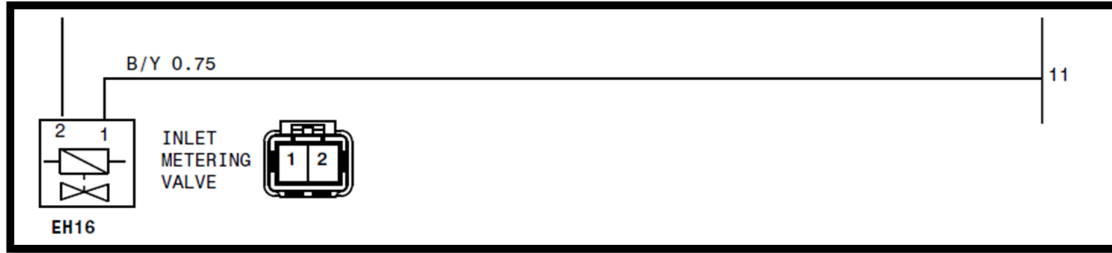
**Corrective action:** Check for pin back out at metering unit or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

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P0001  
P0002  
P0004

TO CHECK	TO RECTIFY
1 IMV connection	1.Remove and connect again
2. Electrical wiring	2.Terminal backout, wire open circuit & short circuit
3. ECU connection	3. Connect properly
4. IMV electrical resistance on HP pump (5.3 max)	4.Change IMV

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## Service Check Lamp

### Description:

The Service Check lamp gives an indication to the customer to service the vehicle.

P1654  
P1655  
P1656

DTC	Diagnostic item
P1654	System lamp short circuit to
P1655	System lamp short circuit to ground
P1656	System lamp no load

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"><li>In normal condition the lamp is lit for 2 seconds every driving cycle to indicate the self check.</li><li>It will also be lit when any error is reported for which lamp has to be lit to inform customer to service</li></ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"><li>Ignition switch: ON</li><li>Malfunction lamp: OFF after 2 Sec</li><li>Battery voltage is 8V –16V.</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>If the lamp does not glow during the beginning of the drive cycle</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>No lamp in the beginning of the drive cycle for 1656 &amp;1654</li><li>Lamp will be continuously ON for 1655</li></ul>	<ul style="list-style-type: none"><li>Open connector.</li><li>Short to battery</li><li>Short to ground</li></ul>

### **P1656: System lamp no load**

This error is registered the pin no 27 does not get any signal

**Effect:** Lamp continuously Off.

**Possible causes:** Open circuit

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**Corrective action:** Check for pin back out at Inter connector or IC or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

P1654  
P1655  
P1656

**P1654: System lamp short circuit to battery**

This error is registered the short circuit to battery is detected

**Effect:** Lamp continuously Off.

**Possible causes:** Check the wire from Instrument cluster to EMS ECU.

Instrument cluster defective  
EMS ECU defective

**Corrective action:** Check for pin back out at metering unit or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

**P1655: System lamp short circuit to ground**

This error is registered the short circuit to ground is detected

**Effect:** Lamp continuously ON.

**Possible causes:** Check the wire from Instrument cluster to EMS ECU.

Instrument cluster defective  
EMS ECU defective

**Corrective action:** Check for pin back out at metering unit or loose connector.  
Check for pin bend or oxidation.  
Wire cut.

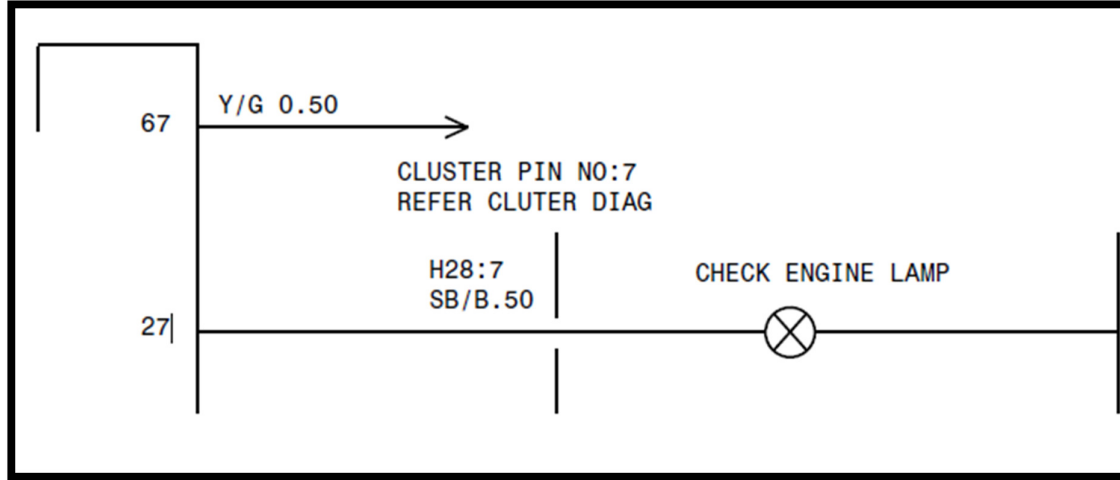
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P1654  
P1655  
P1656



TO CHECK	TO RECTIFY
1 Check continuity	1. Fix Harness
2. If problem persists	2. Replace Cluster

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## Injector

### Description:

P2147  
P2148

The EMS ECU's injector bank are monitored for performance.

DTC	Diagnostic item
P2147	Injector bank short circuit to battery
P2148	Injector bank short circuit to ground

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"><li>No abnormality</li></ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"><li>Correct battery voltage, engine running</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>Short to battery or short to ground</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>Continuously On</li><li>Engine switches off and then cannot be started</li></ul>	<ul style="list-style-type: none"><li>Pin bent.</li><li>Wire cut and getting shorted.</li><li>Injector failure</li><li>EMS ECU failure</li></ul>

### **P2147: Injector bank short circuit to battery**

Either of these pins if they are short to battery will cause the error :

7 or 6 or 44 or 25 or pin 63.

It will also be caused if the following pin/ wires are shorted to each other.

**Effect:** Lamp will be continuously ON.

Engine will switch OFF.

### **Possible causes:**

1. Open circuit in the wire.

Corrective action: Check for the pin bent/ wire cut and shorted.

Defective injector & ECU

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## P2147: Injector bank short circuit to ground

P2147  
P2148

Either of these pins if they are short to ground will cause the error :  
7 or 6 or 44 or 25 or pin 63.

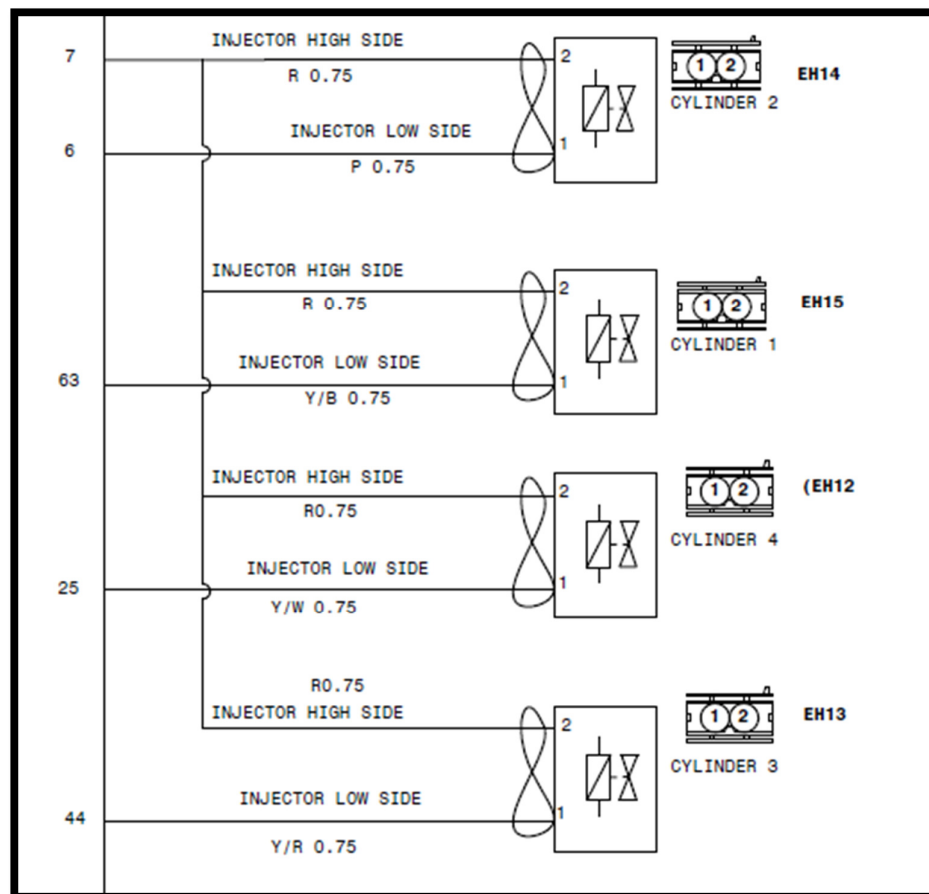
**Effect:** Lamp will be continuously ON.  
Engine will switch OFF.

### Possible causes:

1. Wire short to earth
2. Defective injector or defective EMS ECU

**Corrective action:** Check for the pin bent/ wire cut and shorted.

Defective injector  
EMS ECU



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## Injector

### Description:

The EMS ECU's injector bank are monitored for performance.

P0201  
P0203  
P0204  
P0202

DTC	Diagnostic item
P0201	Cylinder 1 injector open load error
P0203	Cylinder 2 injector open load error
P0204	Cylinder 3 injector open load error
P0202	Cylinder 4 injector open load error

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"><li>No abnormality</li></ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"><li>Correct battery voltage, engine running</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>Open load</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>Check lamp continuously ON.</li><li>Engine hunting.</li><li>Reduced torque.</li><li>Error healing requires ignition OFF</li></ul>	<ul style="list-style-type: none"><li>Wire open.</li><li>Loose connector</li><li>Pin back out</li><li>Pin bent/ oxidized</li><li>Injector failure</li><li>EMS ECU failure</li></ul>

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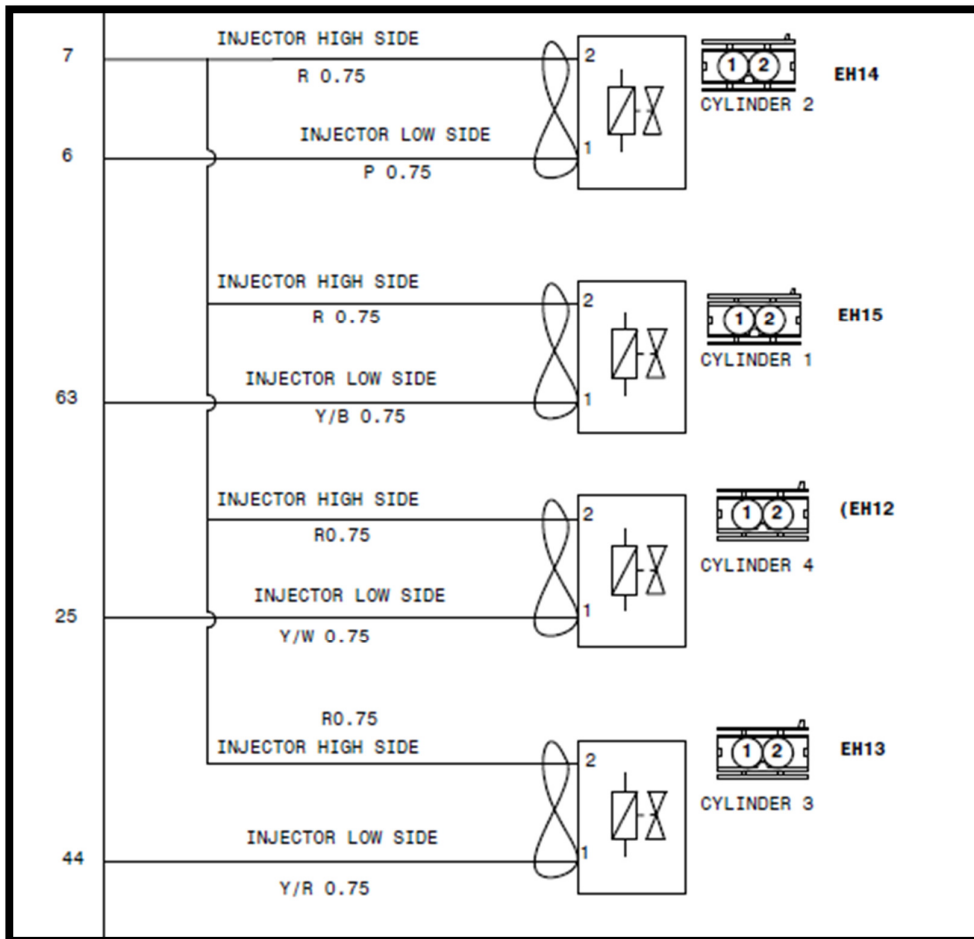
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Code	Reason	Probable Causes
P0201	63 to 2 (injector 1)- open circuit	1. Loose connector 2. Pin back out 3. Pin bent/ oxidized. 4. Wire open 5. Injector failure 6. EMS ECU failure
P0203	44 to 2 (injector # 3)- open circuit	
P0204	25 to 2 (injector # 4)- open circuit	
P0202	6 to 2 (injector # 4)- open circuit	

P0201  
P0203  
P0204  
P0202



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## Injector

### Description:

The EMS ECU's injector bank are monitored for performance.

P0261  
P0267  
P0270  
P0264  
P0263  
P0272  
P0266  
P0269

DTC	Diagnostic item
P0261	High side - Low side short circuit for cylinder1 injector
P0267	High side - Low side short circuit for cylinder2 injector
P0270	High side - Low side short circuit for cylinder3 injector
P0264	High side - Low side short circuit for cylinder4 injector
P0263	Combustion Imbalance in cylinder 1
P0272	Combustion Imbalance in cylinder 2
P0266	Combustion Imbalance in cylinder 3
P0269	Combustion Imbalance in cylinder 4

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"><li>No abnormality</li></ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"><li>Correct battery voltage, engine running</li></ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"><li>Short between high side &amp; low side</li></ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"><li>Check lamp continuously ON.</li><li>Engine hunting.</li><li>Reduced torque.</li><li>Error healing requires ignition OFF</li></ul>	<ul style="list-style-type: none"><li>Pin bent</li><li>Wire cut and touching each other.</li><li>Injector solenoid failure</li><li>EMS ECU failure</li></ul>

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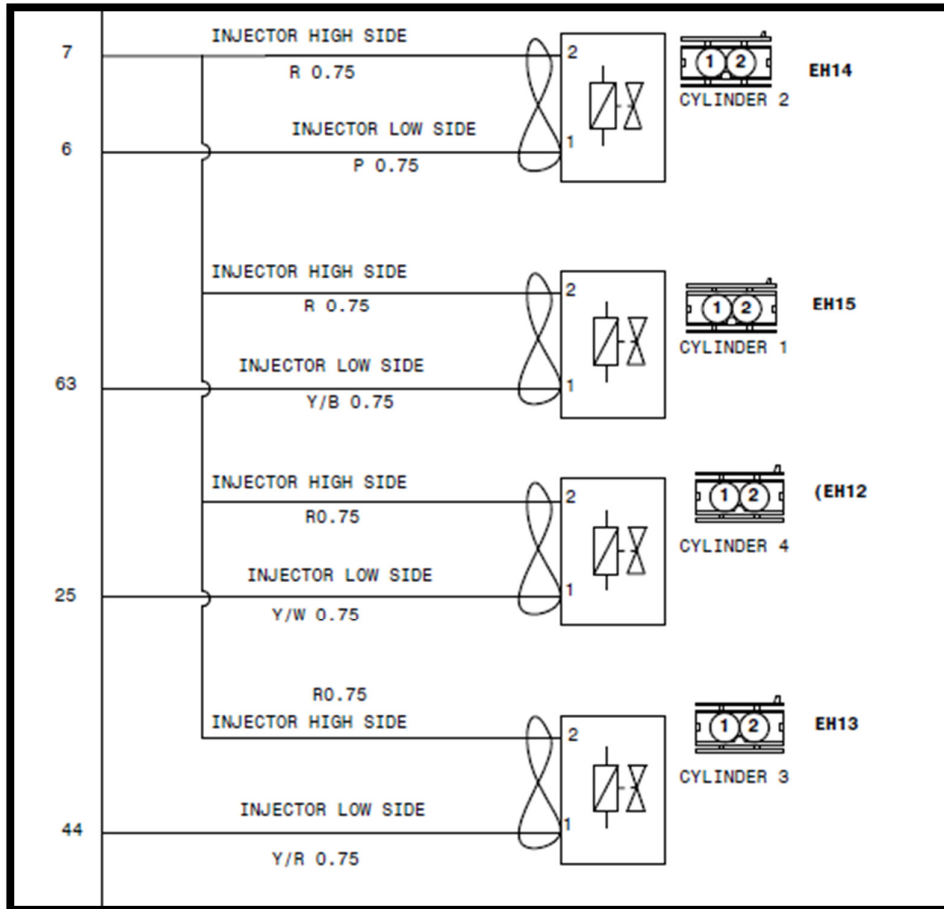
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Code	Reason	Probable Causes
P0261 & P0263	Short between pin 7 & pin 63 ( cylinder # 1)	1. Pin bent 2. Wire cut and touching each other. 3. Injector solenoid failure 4. EMS ECU failure
P0267 & P0272	Short between pin 7 & pin 44 ( cylinder no 3)	
P0270 & P0266	Short between pin 7 & pin 25 ( cylinder no 4)	
P0264 & P0269	Short between pin 7 & pin 6 ( cylinder no 2)	

P0261  
 P0267  
 P0270  
 P0264  
 P0263  
 P0272  
 P0266  
 P0269



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## Injector

### Description:

The EMS ECU's injector bank are monitored for performance.

DTC	Diagnostic item
P1286	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 1
P1287	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 1
P1290	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 3
P1291	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 3
P1292	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 4
P1293	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 4
P1288	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 2
P1289	Measured resistance value equal to or less than the calibrated threshold Value - INJECTOR Cyl 2
P268C	Incorrect or No I2C / I3C written on 1 <sup>st</sup> Cylinder
P268E	Incorrect or No I2C / I3C written on 3 <sup>rd</sup> Cylinder
P268F	Incorrect or No I2C / I3C written on 4 <sup>th</sup> Cylinder
P268D	Incorrect or No I2C / I3C written on 2 <sup>nd</sup> Cylinder

P1286  
P1287  
P1290  
P1291  
P1292  
P1293  
P1288  
P1289  
P268C  
P268E  
P268F  
P268D

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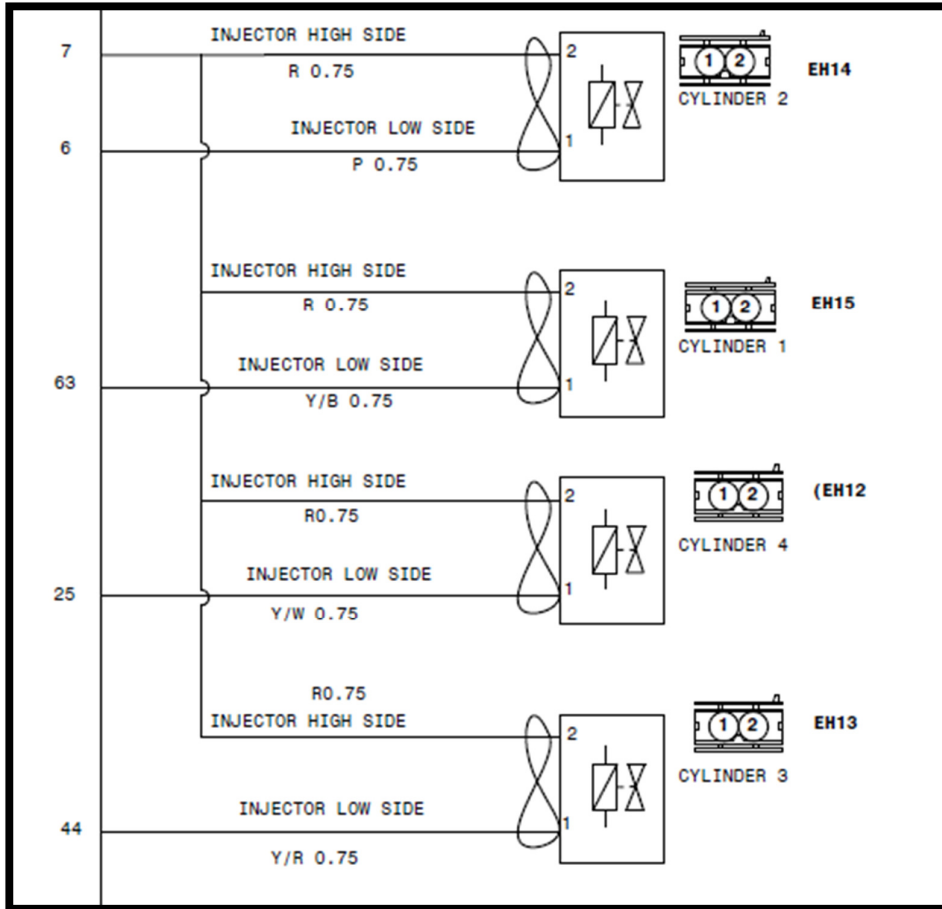
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- P1286
- P1287
- P1290
- P1291
- P1292
- P1293
- P1288
- P1289
- P268C
- P268E
- P268F
- P268D

TO CHECK	TO RECTIFY
1 Disconnect Injector and check connector	1. Rectify terminal back out/ Replace connector
2. Continuity between two injector terminals	2. Replace injector if open circuit
3. ECU connection	3. Remove and refit connector.
4. Electrical continuity in wiring harness	4. Perform necessary repair
5. If problem persists	5. Replace injector
6. ECU	6. Replace ECU
For P268C ,P268E,P268F & P268D : Read I2C/I3C from ECU	Enter correct I2C / I3C values

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## Fuel Pump Drive

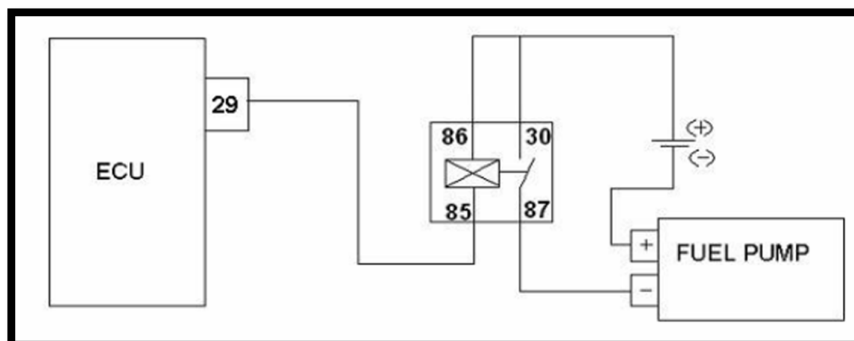
### Description

The fuel pump gets energised once the ignition is turned ON and the main relay gets energized

P0627  
P0629  
P0628

DTC	Diagnostic item
P0627	Feed pump relay - Open circuit
P0629	Feed pump relay - Short circuit to Vbat
P0628	Feed pump relay - Short circuit to Ground

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"> <li>It gets energized after the ignition ON and main relay is energized. If the engine is not started in 30 second then it will be turned OFF , but will restart when the engine is cranked</li> </ul> <p><b>Normal Operating Requirements:</b></p> <ul style="list-style-type: none"> <li>Ignition ON, Main relay ON</li> </ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"> <li>Open Load</li> </ul> <p><b>Reaction:</b></p> <ul style="list-style-type: none"> <li>No lamp</li> <li>No error code</li> </ul>	<ul style="list-style-type: none"> <li>Open connector.</li> <li>Fuse blown.</li> <li>Pin backout</li> <li>Relay defective.</li> </ul>





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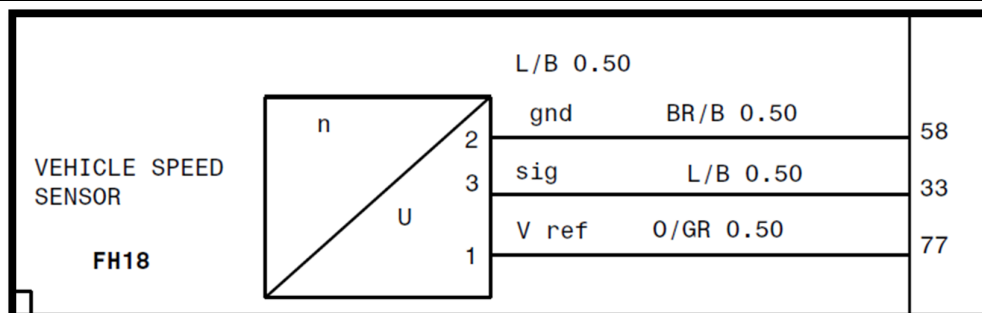
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## Vehicle speed sensor

P0501  
P0503  
P0502  
P0500

DTC	Diagnostic item
P0501	Vehicle speed sensor output not constant (erratic)
P0503	Vehicle speed sensor fault (speed too high)
P0502	Vehicle speed sensor fault (signal lost)
P0500	Vehicle speed fault(global)

DTC detection condition	Probable cause
<p><b>Normal Operation</b></p> <ul style="list-style-type: none"> <li>The vehicle speed sensor outputs a pulse signal while the vehicle is driven.</li> <li>The ECU checks whether the pulse signal is present.</li> </ul> <p><b>Malfunction</b></p> <ul style="list-style-type: none"> <li>Sensor output voltage has not changed (No pulse signal) for 4 sec</li> </ul>	<ul style="list-style-type: none"> <li>Failed vehicle speed sensor.</li> <li>Open shorted vehicle-speed sensor circuit, loose or wrong connection</li> </ul>



TO CHECK	TO RECTIFY
Vehicle speed is displayed on dashboard and check continuity from sensor to dashboard and if continuity is ok	Replace vehicle speed sensor
if problem persists	Replace cluster
Vehicle speed is displayed on dashboard and check continuity from dashboard and EUC	Remove intermediate onnector, check pin connection,oxidation or rust.
if problem persists	Replace ECU

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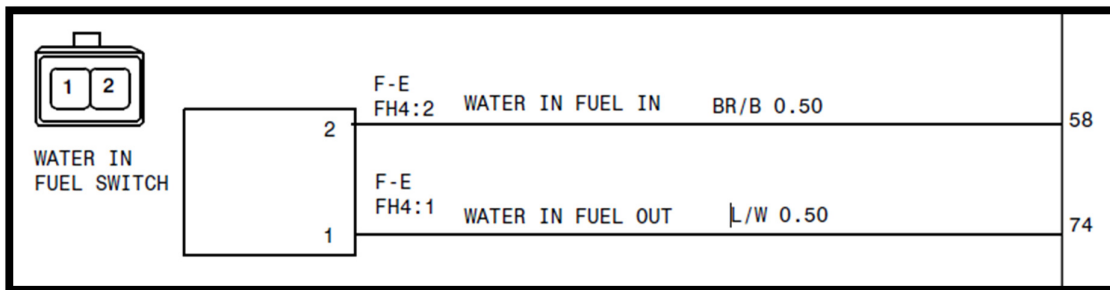
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**Water in fuel sensor:**

P2269  
P2266  
P2264

DTC	Diagnostic item
P2269	Water in fuel detected
P2266	fault due to Short circuit
P2264	fault due to open circuit or VBAT



TO CHECK	TO RECTIFY
Presence of water in filter Drain and check for water in LP circuit	Drain and check for water in LP circuit
Sensor connection	Remove and connect again
Electrical wiring	Terminal back out, wire open circuit & short circuit
Sensor malfunctioning	Change sensor

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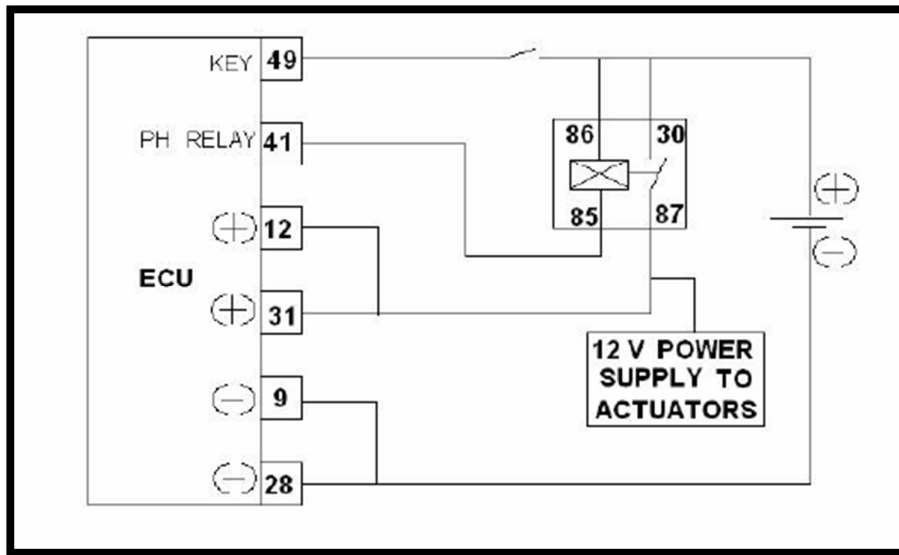
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ECU:

P0685  
P1685  
P1603  
P1604  
P1605

DTC	Diagnostic item
P0685	ECU Relay Struck Time
P1685	ECU -Relay Stuck open.
P1603	ECU memory integrity fault-Code integrity
P1604	ECU memory integrity fault-Calibration integrity
P1605	ECU memory integrity fault-RAM integrity



TO CHECK	TO RECTIFY
1. Relay connection	1. Remove and connect again
2. ECU connection	2. Connect properly
3. Electrical wiring	3. Terminal backout, wire open circuit & short circuit
4. Relay functioning	4. Replace relay

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## Battery voltage signal:

P0562  
P0563  
P1560

DTC	Diagnostic item
P0562	Battery Voltage falls below 6 volts
P0563	Battery Voltage falls below 18 volts.
P1560	A-D Convertor Fault.

TO CHECK	TO RECTIFY
1. Battery and ECU connections	1. Connect properly
2. Resistance between chassis & ECU ground	2. Fix ECU & Battery ground firmly
3. Battery charge circuit (Insulation on battery positive cable)(Alternator circuit)	3. Change battery positive cable
4. Battery voltage at key on (min 9 V) (Min voltage for ECU is 6 volts - considering 2.5 Volts reduction during cranking)	4. Change battery

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## Battery voltage signal: ( Vext 1 & Vext 2)

P0642  
P0643  
P1641  
P0652  
P0653  
P1651

DTC	Diagnostic item
P0642	Sensor Supply voltage falls below the calibrated value.
P0643	Sensor Supply voltage exceeds the calibrated value.
P1641	Analogue to Digital Convertor Fault.
P0652	Sensor Supply voltage falls below the calibrated value.
P0653	Sensor Supply voltage exceeds the calibrated value.
P1651	Analogue to Digital Convertor Fault.

TO CHECK	TO RECTIFY
1.Sensor connection supplied by ECU (Cam & Pedal track2)	1.Check individual correction and connect
2.Apply Diagonastic charts of respective sensors	2. Remove and connect again.
	3.Terminal backout, wire open circuit & short circuit.
	4.Connect properly
	5.Change sensor

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## Atmospheric Pressure Fault:

DTC	Diagnostic item
P1107	Global Atmospheric pressure fault.
P0107	Atmospheric sensor low fault
P0108	Atmospheric sensor high fault
P1105	Atmospheric sensor ADC fault
P0109	Atmospheric sensor gradability fault

P1107  
P0107  
P0108  
P1105  
P0109

TO CHECK	TO RECTIFY
ECU	Replace ECU

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ECU SCHEMATIC

