Circuit Description

The fuel pressure sensor is used by the electronic control module (ECM) to monitor the fuel pressure in the fuel rail. The sensor gets +5-VDC from the ECM and is grounded by a return pin. A third pin is the signal pin. The power and return pins are shared with other devices on the engine.

Component Location

The fuel pressure sensor is installed in the fuel rail.

Refer to Section E for a detailed component location view.

Shop Talk

This fault code will become active if there is an open circuit on any of the three pins (+5 volt supply, signal, or return) that connect the sensor or ECM to the wiring harness. This fault will also be active if the signal wire is shorted to a source of voltage. This fault code will...
become inactive any time the keyswitch is ON and the signal returns to a valid in-range voltage.

Causes for this fault code include:

- Voltage (+5-VDC or higher shorted to the signal wire)
- Open circuit on the signal wire
- Open circuit on the +5-VDC supply wire
- Open circuit on the return wire
- Damaged sensor
- Malfunctioning ECM.

Cautions and Warnings

⚠️ CAUTION ⚠️
To reduce the possibility of damaging a new ECM, all other active fault codes must be investigated prior to replacing the ECM.

⚠️ CAUTION ⚠️
To reduce the possibility of pin and harness damage, use the following test leads when taking a measurement:
Part Number 3164111 - male Bosch™ test lead
Part Number 3164110 - female Bosch™ test lead
Part Number 3822758 - male Deutsch™/AMP™/Metri-Pack™ test lead
Part Number 3822917 - female Deutsch™/AMP™/Metri-Pack™ test lead.

Troubleshooting Steps

<table>
<thead>
<tr>
<th>STEPS</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STEP 1.</strong> Check the fault codes.</td>
<td></td>
</tr>
<tr>
<td><strong>STEP 1A.</strong> Check for sensor supply fault codes.</td>
<td>Fault Code 227 active?</td>
</tr>
<tr>
<td><strong>STEP 1B.</strong> Check for an inactive fault code.</td>
<td>Fault Code 451 inactive?</td>
</tr>
<tr>
<td><strong>STEP 2.</strong> Check the rail fuel pressure sensor and circuit.</td>
<td></td>
</tr>
<tr>
<td><strong>STEP 2A.</strong> Inspect the rail fuel pressure sensor and connector pins.</td>
<td>Dirty or damaged pins?</td>
</tr>
<tr>
<td><strong>STEP 2B.</strong> Check the circuit response.</td>
<td>Fault Code 452 active and Fault Code 451 inactive?</td>
</tr>
</tbody>
</table>
Guided Step 1 -
Check the fault codes.

Guided Step 1A -
Check for sensor supply fault codes.

Conditions
- Turn keyswitch ON.
**Guided Step 1B -**

**Check for an inactive fault code.**

**Conditions**
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

**Action**
- Check for sensor supply fault codes.
  - Use INSITE™ electronic service to read the fault codes.

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Fault Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>227</td>
<td>227</td>
</tr>
<tr>
<td>inactive?</td>
<td>active?</td>
</tr>
</tbody>
</table>

**Fault Code**
- 227 active?
  - YES
  - NO

**No Repair**

**Appropriate troubleshooting tree**

Go to 1B
Guided Step 2 - Check the rail fuel pressure sensor and circuit.

Guided Step 2A - Inspect the rail fuel pressure sensor and connector pins.

**Conditions**
- Turn keyswitch OFF.
- Disconnect the rail fuel pressure sensor from the engine harness.

**Action**
Inspect the engine harness and rail fuel pressure sensor connector pins for the following:
- Loose connector
- Corroded pins
- Bent or broken pins
- Pushed back or expanded pins
- Moisture in or on the connector
- Missing or damaged connector seals
- Dirt or debris on or in the connector pins
- Connector shell broken
- Wire insulation damage
- Damaged connector locking tab.

Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19.
## Guided Step 2B - Check the circuit response.

### Conditions
- Turn keyswitch OFF.
- Disconnect the rail fuel pressure sensor from the engine harness.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

### Action
Place a jumper wire between the rail fuel pressure RETURN pin and the rail fuel pressure SIGNAL pin at the rail fuel pressure sensor connector of the engine harness.

Check for the appropriate circuit response after 30 seconds.

- Use INSITE™ electronic service tool to read the fault codes.

Refer to the wiring diagram for connector pin identification.

<table>
<thead>
<tr>
<th>Dirty or damaged pins?</th>
<th>Dirty or damaged pins?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
</tr>
<tr>
<td>A damaged connection has been detected in the sensor or harness connector. Clean the connector and pins. Repair the damaged harness, connector, or pins if possible. <strong>Refer to Procedure 019-043 in Section 19.</strong></td>
<td><strong>No Repair</strong></td>
</tr>
</tbody>
</table>

Go to 4A

Go to 2B

Fault Code 452 active and Fault Code 451
Guided Step 2C -

Check the sensor supply voltage and return circuit.

<table>
<thead>
<tr>
<th>Code 451 inactive?</th>
<th>inactive?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>No Repair</td>
<td>No Repair</td>
</tr>
</tbody>
</table>

**Conditions**

- Turn keyswitch OFF.
- Disconnect the rail fuel pressure sensor from the engine harness.
- Turn keyswitch ON.

**Action**

Check the supply voltage and return circuit.

- Measure the voltage from the rail fuel pressure +5 volt SUPPLY pin to the
Guided Step 2D - Check the fault codes and verify sensor condition.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Turn keyswitch OFF.</td>
<td>Check for the appropriate circuit response after 30 seconds.</td>
</tr>
<tr>
<td>• Connect the rail fuel pressure sensor to the engine harness.</td>
<td>• Use INSITE™ electronic service tool to read the fault codes.</td>
</tr>
<tr>
<td>• Turn keyswitch ON.</td>
<td></td>
</tr>
<tr>
<td>• Connect INSITE™ electronic service tool.</td>
<td></td>
</tr>
</tbody>
</table>

Refer to the wiring diagram for connector pin identification.

<table>
<thead>
<tr>
<th>4.75 to 5.25 VDC?</th>
<th>4.75 to 5.25 VDC?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>No Repair</strong></td>
<td><strong>No Repair</strong></td>
</tr>
</tbody>
</table>

Go to 3B

Go to 2D
Guided Step 3 - Check the engine control module and engine harness.

Guided Step 3A - Inspect the engine control module and engine harness connector pins.

Fault Code 451 is active?

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>A damaged sensor has been detected. Replace the rail fuel pressure sensor.</td>
<td>None. The removal and installation of the connector corrected the fault.</td>
</tr>
</tbody>
</table>

Refer to Procedure 019-115 in Section 19.

Go to 4A

Go to 4A

Conditions

- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM.

Action

Inspect the engine harness and engine control module engine connector pins for the following:

- Loose connector
- Corroded pins
- Bent or broken pins
- Pushed back or expanded pins
- Moisture in or on the connector
- Missing or damaged connector seals
- Dirt or debris on or in the connector pins
- Connector shell broken
- Wire insulation damage
- Damaged connector locking tab.

Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19.
Guided Step 3A-1 - Check the engine control module response.

<table>
<thead>
<tr>
<th>Dirty or damaged pins?</th>
<th>Dirty or damaged pins?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
</tr>
<tr>
<td>A damaged connection has been detected in the engine control module engine connector or engine harness connector.</td>
<td>No Repair</td>
</tr>
<tr>
<td>Clean the connector and pins.</td>
<td></td>
</tr>
<tr>
<td>Repair the damaged harness, connector or pins if possible.</td>
<td></td>
</tr>
<tr>
<td>Refer to Procedure 019-043 in Section 19.</td>
<td></td>
</tr>
</tbody>
</table>

**Conditions**

- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

**Action**

Place a jumper wire between the rail fuel pressure +5 volt SUPPLY pin and the rail fuel pressure SIGNAL pin at the ECM engine connector.

Check for the appropriate circuit
Guided Step 3A-2 - Check for an inactive fault code.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect all components.</td>
<td>Check for the appropriate circuit response after 30 seconds.</td>
</tr>
<tr>
<td>Turn keyswitch ON.</td>
<td></td>
</tr>
<tr>
<td>Connect INSITE™ electronic</td>
<td></td>
</tr>
<tr>
<td>service tool</td>
<td></td>
</tr>
</tbody>
</table>

Fault Code 452 active and Fault Code 451 inactive?

<table>
<thead>
<tr>
<th>YES</th>
<th>Fault Code 451 inactive?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Go to 4A</td>
</tr>
</tbody>
</table>

Fault Code 452 active and Fault Code 451 inactive?

<table>
<thead>
<tr>
<th>YES</th>
<th>No Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Call for authorization to replace the ECM.</td>
</tr>
<tr>
<td></td>
<td>Upon receipt of authorization, replace the ECM.</td>
</tr>
<tr>
<td></td>
<td>Refer to Procedure 019-031 in Section 19.</td>
</tr>
</tbody>
</table>

Go to 3A-2

Fault Code 451 inactive?

<table>
<thead>
<tr>
<th>YES</th>
<th>Go to 3A-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Go to 4A</td>
</tr>
</tbody>
</table>
Guided Step 3B - Inspect the engine control module and engine harness connector pins.

**Conditions**
- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM.

**Action**
Inspect the engine harness and engine control module engine connector pins for the following:
- Loose connector
- Corroded pins
- Bent or broken pins
- Pushed back or expanded pins
- Moisture in or on the connector
- Missing or damaged connector seals
- Dirt or debris on or in the connector pins
- Connector shell broken
- Wire insulation damage
- Damaged connector locking tab.

Use the following procedure for general inspection techniques. Refer to Procedure 019-361 in Section 19.

<table>
<thead>
<tr>
<th>Dirty or damaged pins?</th>
<th>Dirty or damaged pins?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

A damaged connection has been detected in the engine control module engine connector or engine harness connector.

Clean the connector and pins.

A pin to pin short circuit has been detected on the signal line of the engine harness.
Repair or replace the engine harness.
Refer to Procedure 019-043 in Section 19.
Guided Step 3B-1 - Check the sensor supply voltage and return circuit.

### Conditions
- Turn keyswitch OFF.
- Disconnect the engine harness from the ECM connector.
- Turn keyswitch ON.

### Action
Check the supply voltage and return circuit.
- Measure the voltage from the rail fuel pressure +5 volt SUPPLY pin to the rail fuel pressure RETURN pin at the ECM engine harness connector.

Refer to the wiring diagram for connector pin identification.

<table>
<thead>
<tr>
<th>4.75 to 5.25-VDC?</th>
<th>4.75 to 5.25-VDC?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>
Guided Step 3B-2 - Check for an inactive fault code.

**Conditions**
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

**Action**
Check for the appropriate circuit response after 30 seconds.
- Use INSITE™ electronic service tool to read the fault codes.

<table>
<thead>
<tr>
<th>Fault Code 451 inactive?</th>
<th>Fault Code 451 inactive?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
</tr>
<tr>
<td>None. The removal and installation of the connector corrected the fault.</td>
<td>An open RETURN circuit has been detected in the engine harness. Repair or replace the engine harness. Refer to Procedure 019-043 in Section 19.</td>
</tr>
</tbody>
</table>

Go to 4A

Guided Step 4 -
Clear the fault codes.

Guided Step 4A -
Disable the fault code.

**Conditions**
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.

**Action**
Disable the fault code.
- Start the engine and let it idle for 1 minute.
- Use INSITE™ electronic service tool to verify that the fault code is inactive.

<table>
<thead>
<tr>
<th>Fault Code</th>
<th>Fault Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>451</td>
<td>451</td>
</tr>
<tr>
<td>inactive?</td>
<td>inactive?</td>
</tr>
</tbody>
</table>

- **YES**
- **NO**

No Repair

**Guided Step 4B -**

Clear the inactive fault codes.

**Conditions**
- Connect all components.
- Turn keyswitch ON.
- Connect INSITE™ electronic service tool.
### Action

Clear the inactive fault codes.

- Use INSITE™ electronic service tool to clear the inactive fault codes.

<table>
<thead>
<tr>
<th>All fault codes cleared?</th>
<th>All fault codes cleared?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No Repair</th>
<th>No Repair</th>
<th>Repair complete</th>
<th>Appropriate troubleshooting steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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