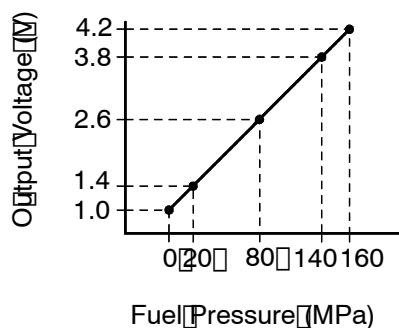


DTC	P0087	FUEL RAIL/SYSTEM PRESSURE - TOO LOW
------------	--------------	--

DTC	P0190	FUEL RAIL PRESSURE SENSOR CIRCUIT
------------	--------------	--

HINT:

- For more information on the fuel pressure sensor and the common rail system, see page 05-432.
- If P0087 and/or P0190 is present, refer to the diagnostic trouble codes (DTCs) table for the fuel system on page 05-432.

CIRCUIT DESCRIPTION**Property of Output Voltage:**

A84827

The ECM monitors internal fuel pressure of the common rail using the fuel pressure sensor, and controls the suction control valve to regulate the internal pressure to the target pressure (approximately 20 to 135 MPa [204 to 1,377 kgf/cm², 2,901 to 19,580 psi]).

The pressure sensor is a semiconductor pressure sensor that varies electric resistance when applying the pressure to its silicon. This sensor outputs the voltage in proportion to the internal fuel pressure.

DTC No.	DTC Detection Condition	Trouble Area
P0087	Fuel pressure sensor output stays at fixed value (2 trip detection logic)	<ul style="list-style-type: none"> Open or short in fuel pressure sensor circuit Fuel pressure sensor ECM
P0190	Fuel pressure sensor output voltage is 0.6 V or less, or 4.6 V or more for 0.5 seconds (1 trip detection logic)	

HINT:

When DTC P0087 and/or P0190 is detected, check the internal fuel pressure of the common rail by selecting Powertrain / Engine and ECT / Data List / Common Rail Pressure on the intelligent tester II.

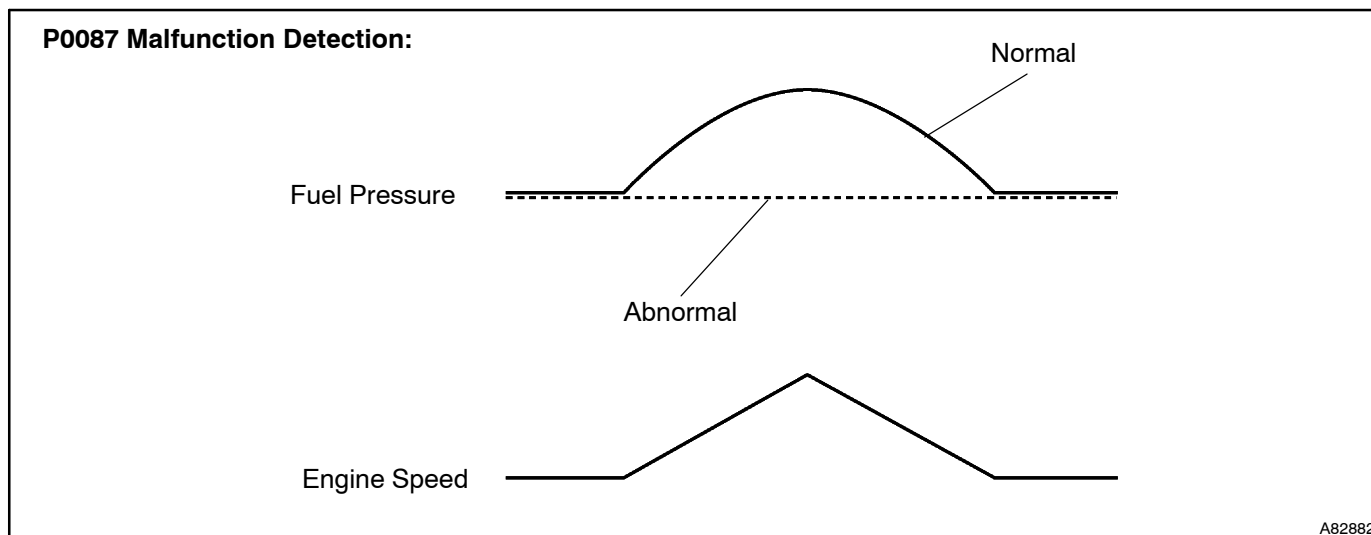
Reference:

Engine Speed	Fuel Pressure (MPa)
Idling	Approximately 20 to 40
2,500 rpm (No engine load)	Approximately 40 to 80

MONITOR DESCRIPTION

P0087 (Fuel pressure sensor output stays at fixed value):

Under normal condition, the internal fuel pressure of the common rail usually fluctuates 1 to 2 MPa (10 to 20 kgf/cm², 145 to 290 psi) even if the driving condition is constant. The internal fuel pressure is approximately 20 to 40 MPa (204 to 408 kgf/cm², 2,901 to 5,801 psi) at idling, and it increases to approximately 40 to 80 MPa (408 to 816 kgf/cm², 5,801 to 11,603 psi) when running the engine at 2,500 rpm. This DTC is set if there is no fluctuation in the internal fuel pressure.



P0190 (Open or short in fuel pressure sensor circuit):

This DTC is set if the fuel pressure sensor output voltage is out of the standard range. The DTC stands for open or short malfunction of the sensor circuit.

If this DTC is present, the ECM enters fail-safe mode and limits the engine power. The fail-safe mode continues until the ignition switch is turned to OFF.

MONITOR STRATEGY

P0087:

Required sensors	Fuel pressure sensor
Frequency of operation	Continuous
Duration	1 second
MIL operation	2 driving cycles

P0190:

Required sensors	Fuel pressure sensor
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	1 driving cycle

TYPICAL ENABLING CONDITIONS

P0087:

Item	Specification	
	Minimum	Maximum
Engine speed	600 rpm	–
Battery voltage	8 V	–
Fuel quantity	5 mm ³ /st	–
The monitor will not run if the fuel pressure sensor circuit (P0190) is malfunctioning		

TYPICAL MALFUNCTION THRESHOLDS

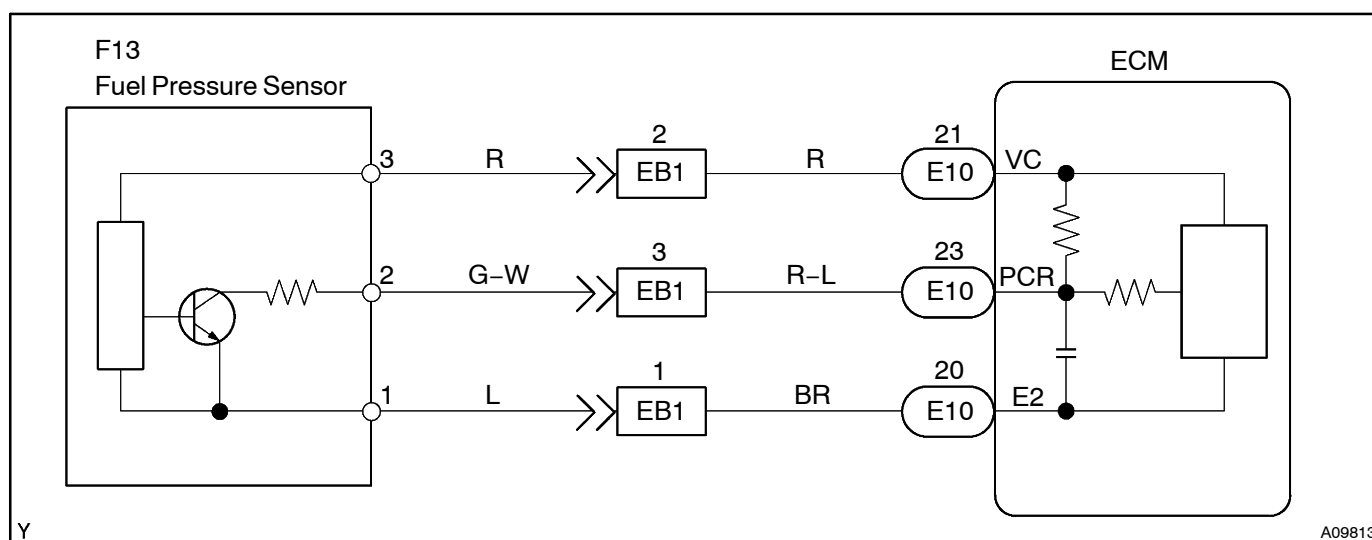
P0087:

Detection Criteria	Threshold
Changing value of fuel pressure	Virtually no fluctuation

P0190:

Detection Criteria	Threshold
Fuel pressure sensor output voltage	Less than 0.6 V or more than 4.6 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- After completing repairs, check that P0087 and/or P0190 is not set again.
- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, and other data from the time the malfunction occurred.

1 READ VALUE OF INTELLIGENT TESTER II(FUEL PRESSURE)

- Connect the intelligent tester II to the DLC3.
- Start the engine and turn the intelligent tester II ON.
- On the intelligent tester II, select the following menu items: Powertrain / Engine and ECT / Data List / Common Rail Pressure.
- Check that the internal fuel pressure of the common rail is within the specification below.

Standard:

Engine Speed	Fuel Pressure (MPa)
Idling	Approximately 20 to 40
2,500 rpm (No engine load)	Approximately 40 to 80

NG

Go to step 3

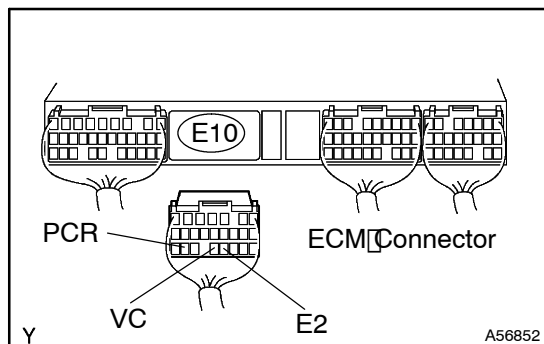
OK

2 CHECK IF DTC OUTPUT RECURS (FUEL PRESSURE SENSOR DTCs)

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester ON.
- Select the following menu items: Powertrain / Engine and ECT / DTC / Clear.
- Clear the DTC(s).
- Let the engine idle for 60 seconds, and repeat quick engine RPM accelerations (to 2,500 rpm) for 30 seconds.
- Select the following menu items: Powertrain / Engine and ECT / DTC.
- Read DTCs.

Result:

Display (DTC Output)	Proceed To
P0087 and/or P0190	A
No output	B

B
CHECK FOR INTERMITTENT PROBLEMS
 (See page 05-440)
A
REPLACE ECM (See page 10-30)
3 CHECK HARNESS AND CONNECTOR (FUEL PRESSURE SENSOR - ECM)

- Disconnect the F13 fuel pressure sensor connector.
- Disconnect the E10 ECM connector.
- Check the resistance.

Standard (Check for open):

Tester Connection	Specified Condition
PCR (E10-23) - VOUT (F13-2)	Below 1 Ω
VC (E10-21) - VCC (F13-3)	
E2 (E10-20) - GND (F13-1)	

Standard (Check for short):

Tester Connection	Specified Condition
PCR (E10-23) or VOUT (F13-2) - Body ground	10 k Ω or higher
VC (E10-21) or VCC (F13-3) - Body ground	
E2 (E10-20) or E2 (F13-1) - Body ground	

- Reconnect the ECM connector.
- Reconnect the fuel pressure sensor connector.

NG
REPAIR OR REPLACE HARNESS OR CONNECTOR
OK
REPLACE COMMON RAIL ASSY (FUEL PRESSURE SENSOR)
 (See page 14-91 of Pub. No. RM864E AVENSIS VERSO/ PICNIC REPAIR MANUAL)