

KA: Fuel Pump (FP) Relay

← [KA: Introduction](#)

KA1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0230, P0231, or P0232 present?

Yes	No
For KOEO and KOER DTC P0230, GO to KA2 . For continuous memory DTC P0230, GO to KA32 . For KOEO and KOER DTC P0231, GO to KA24 . For continuous memory DTC P0231, GO to KA31 . For KOEO and KOER DTC P0232, GO to KA12 . For continuous memory DTC P0232, GO to KA29 .	For all others, GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .

KA2 KOEO AND KOER DTC P0230: CHECK FOR THE PRESENCE OF DTC P0685 OR P0690

- Carry out the self-test.

Are DTCs P0685 or P0690 present?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .	GO to KA3 .

KA3 CHECK THE VPWR VOLTAGE TO FUEL PUMP RELAY

- FP Relay connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) FP Relay Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10 V?

Yes	No
GO to KA4 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

KA4 CHECK THE FUEL PUMP RELAY

- Ignition OFF.
- Carry out the FP relay component test. Refer to the Wiring Diagrams Cell 149 Component Testing.

Does the FP relay pass the component test?

Yes	No
GO to KA5 .	INSTALL a new FP relay. CLEAR the DTCs. REPEAT the self-test.

KA5 CHECK THE FP CIRCUIT FOR A SHORT TO VOLTAGE IN THE HARNESS

- PCM connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) FP Relay Connector, Harness Side	(-)
FP	Ground

Is the voltage less than 1 V?

Yes	No
GO to KA6 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

KA6 CHECK THE FUEL PUMP CIRCUIT FOR A SHORT TO GROUND IN THE HARNESS

- Ignition OFF.
- Measure the resistance between:

(+) FP Relay Connector, Harness Side	(-)
FP	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to KA7 .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

KA7 CHECK THE FUEL PUMP CIRCUIT FOR AN OPEN IN THE HARNESS

- Measure the resistance between:

(+) FP Relay Connector, Harness Side	(-) PCM Connector, Harness Side
FP	FP

Is the resistance less than 5 ohms?

Yes	No
GO to KA8 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

KA8 CHECK FOR KOEO DTCS

- Carry out the KOEO self-test.

Are DTCs P0231 or P0232 present?

Yes	No
GO to KA9 .	GO to KA34 .

KA9 CHECK THE FP PRIMARY CIRCUIT INSIDE THE PCM

- PCM connector connected.
- FP Relay connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the FP_F PID.

Is the PID state YES?

Yes	No
GO to KA34 .	GO to KA10 .

KA10 CHECK THE FUEL PUMP PRIMARY CIRCUIT INSIDE THE PCM WHILE CRANKING THE ENGINE

- Access the PCM and monitor the FP_F PID.
- While observing the PID, crank the engine.

Does the PID display indicate a concern during crank?

Yes	No
GO to KA34 .	The fuel pump primary circuit is OK in the harness and PCM. GO to KA11 .

KA11 IS DTC P0231 PRESENT IN THE KOEO SELF-TEST?

- Carry out the KOEO self-test.

Is DTC P0231 present?

Yes	No
GO to KA24 .	GO to KA12 .

KA12 KOEO AND KOER DTC P0232: DOES THE ENGINE START?

Does the engine start?

Yes	No
GO to KA13 .	GO to KA18 .

KA13 VERIFY THE FUEL PUMP IS OFF

- Ignition ON, engine OFF.
- Wait for 5 seconds.
- The fuel pump is located above the fuel tank. Listen for the sound of the fuel pump operating which can be heard from outside the vehicle.

Is fuel pump off with the ignition ON?

Yes	No
GO to KA15 .	GO to KA14 .

KA14 CHECK FOR FUEL PUMP RELAY CONTACTS ALWAYS CLOSED

- FP Relay connector disconnected.
- Ignition ON, engine OFF.

Is fuel pump off with the ignition ON?

Yes	No
INSTALL a new FP relay. CLEAR the DTCs. REPEAT the self-test.	REPAIR the short circuit. The short circuit is between the FPPWR and FPM circuits or in the INJPWRM circuit. CLEAR the DTCs. REPEAT the self-test.

KA15 CHECK THE FPM CIRCUIT FOR AN OPEN IN THE HARNESS

- PCM connector disconnected.
- FP Relay connector disconnected.
- Measure the resistance between:

(+) FP Relay Connector, Harness Side	(-) PCM Connector, Harness Side
FPPWR	FPM

Is the resistance less than 5 ohms?

Yes	No
GO to KA16 .	REPAIR the open circuit. The concern is between the splice and the PCM. CLEAR the DTCs. REPEAT the self-test.

KA16 IS KOEO DTC P0231 PRESENT?

- Carry out the KOEO self-test.

Is DTC P0231 present?

Yes	No
GO to KA34 .	GO to KA17 .

KA17 CHECK THE FPM PRIMARY CIRCUIT INSIDE THE PCM

- PCM connector connected.
- FP Relay connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the FPM PID.

Is the PID state OFF?

Yes	No
The concern is not present at this time. The FPM circuit is OK in the harness and PCM. DISREGARD DTC P0232 at this time. RETURN to Section 3 , Symptom Charts for further direction.	GO to KA34 .

KA18 CHECK IF THE INERTIA FUEL SHUTOFF (IFS) SWITCH IS TRIPPED

Is the IFS switch tripped?

Yes	No
RESET the IFS switch. CLEAR the DTCs. REPEAT the self-test.	GO to KA19 .

KA19 CHECK THE INERTIA FUEL SHUTOFF

- IFS Switch connector disconnected.
- Measure the resistance between:

(+) IFS Switch Connector, Component Side	(-) IFS Switch Connector, Component Side
FPPWR-A - Pin 2	FPPWR-B - Pin 1

Is the resistance less than 5 ohms?

Yes	No
GO to KA20 .	INSTALL a new IFS switch. REFER to the Workshop Manual Section 310-01, Fuel Tank and Lines. CLEAR the DTCs. REPEAT the self-test.

KA20 CHECK THE FP PWR CIRCUIT FOR AN OPEN IN THE HARNESS

- FP Relay connector disconnected.
- Measure the resistance between:

(+) IFS Switch Connector, Harness Side	(-) FP Relay Connector, Harness Side
FPPWR-A - Pin 2	FPPWR

Is the resistance less than 5 ohms?

Yes	No
GO to KA21 .	REPAIR the open circuit. CHECK for an open circuit between the IFS switch and the FPM splice. REFER to the Wiring Diagrams Manual for schematic and connector information. CLEAR the DTCs. REPEAT the self-test.

KA21 CHECK THE FUEL PUMP GROUND CIRCUIT FOR AN OPEN IN THE HARNESS

- FP connector disconnected.
- Measure the resistance between:

(+) FP Connector, Harness Side	(-)
FPGND	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to KA22 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

KA22 CHECK THE FP PWR CIRCUIT FOR AN OPEN IN THE HARNESS

- Measure the resistance between:

(+) FP Connector, Harness Side	(-) IFS Switch Connector, Harness Side
FPPWR	FPPWR-B - Pin 1

Is the resistance less than 5 ohms?

Yes	No
GO to KA23 .	REPAIR the open circuit. CLEAR the DTCs. REPEAT the self-test.

KA23 CHECK THE INTERNAL RESISTANCE OF THE FUEL PUMP

- Measure the resistance between:

(+) FP Connector, Harness Side	(-) FP Connector, Harness Side
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FPPWR	FPGND
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Is the resistance less than 10 ohms?

Yes	No
The fuel pump circuit is OK in the harness and PCM. DISREGARD DTC P0232 at this time. RETURN to Section 3 , Symptom Charts for further direction.	INSTALL a new FP. REFER to the Workshop Manual Section 310-01, Fuel Tank and Lines. CLEAR the DTCs. REPEAT the self-test.

KA24 KOEO AND KOER DTC P0231: IS KOEO DTC P0230 ALSO PRESENT?

- Carry out the KOEO self-test.

Is DTC P0230 present?

Yes	No
GO to KA3 .	GO to KA25 .

KA25 DOES THE ENGINE START?

Does the engine start?

Yes	No
GO to KA15 .	GO to KA26 .

KA26 CHECK IF THE IFS SWITCH IS TRIPPED

Is the IFS switch tripped?

Yes	No
RESET the IFS switch. CLEAR the DTCs. REPEAT the self-test.	GO to KA27 .

KA27 CHECK THE B+ CIRCUIT VOLTAGE TO THE FP RELAY

- FP Relay connector disconnected.
- Measure the voltage between:

(+) FP Relay Connector, Harness Side	(-)
B+	Ground

Is the voltage greater than 10 V?

Yes	No
	A B+ circuit concern is present. CHECK the condition of the related fuse/fuse links. If OK, REPAIR the open circuit. If the fuse/fuse link is

GO to [KA28](#).

damaged, CHECK the circuit for a short to ground before installing a new fuse/fuse link.

CLEAR the DTCs. REPEAT the self-test.

KA28 CHECK THE FP PWR CIRCUIT FOR AN OPEN IN THE HARNESS

- Measure the resistance between:

(+) FP Relay Connector, Harness Side	(-)
FPPWR	Ground

Is the resistance less than 10 ohms?

Yes	No
INSTALL a new FP relay. CLEAR the DTCs. REPEAT the self-test.	REPAIR the open circuit. The open is between the splice and the FP relay. CLEAR the DTCs. REPEAT the self-test.

KA29 CONTINUOUS MEMORY DTC P0232: IS A CONTINUOUS DTC P0230 PRESENT?

- Retrieve the continuous memory DTCs.

Is DTC P0230 present?

Yes	No
GO to KA33 .	GO to KA30 .

KA30 CHECK THE FUEL PUMP SECONDARY CIRCUITS FOR A CONCERN

Note: Be aware that DTC P0232 could be set if the IFS switch is tripped then reset, or if voltage is supplied to the FP PWR circuit when the PCM expects the fuel pump to be off. The fuel pump prime procedure produces this.

Note: The FPM PID turns ON when a concern is present.

- Ignition ON, engine OFF.
- Access the PCM and monitor the FPM PID.
- Observe the FPM PID for an indication of a concern while carrying out the following:
 - Shake, wiggle, and bend the FPPWR circuit between the FP RLY and the FP
 - Shake, wiggle, and bend the FP GND
 - Shake, wiggle, and bend the FPM circuit between the PCM and the splice to the FPPWR circuit
 - Shake, wiggle, and bend the INJPWRM circuit between the PCM and the splice to the FPPWR circuit
 - Lightly tap on the FP, IFS, and FP RLY to simulate road shock

Is a concern present?

Yes	No
ISOLATE the concern and REPAIR as necessary.	Unable to duplicate or identify the concern at this time.

CLEAR the DTCs. REPEAT the self-test.

GO to Pinpoint Test [Z](#).

KA31 CONTINUOUS MEMORY DTC P0231: CHECK THE HARNESS

- PCM connector disconnected.
- Connect a 5 amp fused jumper wire between the following:

Point A PCM Connector, Harness Side	Point B
FP	Ground

- Ignition ON, engine OFF.
- Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
FPM	Ground

- The FP turns on and the voltage will be greater than 10 V.
- Check for an indication of a concern while carrying out the following. The voltage changes suddenly when a concern is present.
 - Shake, wiggle, and bend the B+ supply to the FP relay
 - Shake, wiggle, and bend the FP PWR circuit between the FP relay and the FPM splice
 - Lightly tap on the FP relay to simulate road shock
- Ignition OFF.
- Visually inspect the FP relay and its loom connector for damage and corrosion.

Is a concern present?

Yes	No
ISOLATE the concern and REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z .

KA32 CONTINUOUS MEMORY DTC P0230: CHECK FOR THE PRESENCE OF DTC P0685 OR P0690

- Carry out the self-test.

Are DTCs P0685 or P0690 present?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to Section 4, Diagnostic Trouble Code (DTC) Charts and Descriptions .	GO to KA33 .

KA33 CHECK THE FP PRIMARY CIRCUITS

Note: The PID indicates YES when a concern is present.

- Ignition ON, engine OFF.

- Wait for 5 seconds.
- Access the PCM and monitor the FP_F PID.
- Observe the FP_F PID for an indication of a concern while carrying out the following:
 - Shake, wiggle, and bend the FP circuit between the PCM and the FP relay
 - Shake, wiggle, and bend the VPWR circuit between the electronic engine control power relay and the FP relay
 - Lightly tap on the FP relay to simulate road shock
- Ignition OFF.
- Visually inspect the PCM connector and wires as far back as the main loom for damage.
- Visually inspect the FPR connector and wires as far back as the main loom for damage.

Is a concern present?

Yes	No
ISOLATE the concern and REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	Unable to duplicate or identify the concern at this time. GO to Pinpoint Test Z .

KA34 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test and verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
