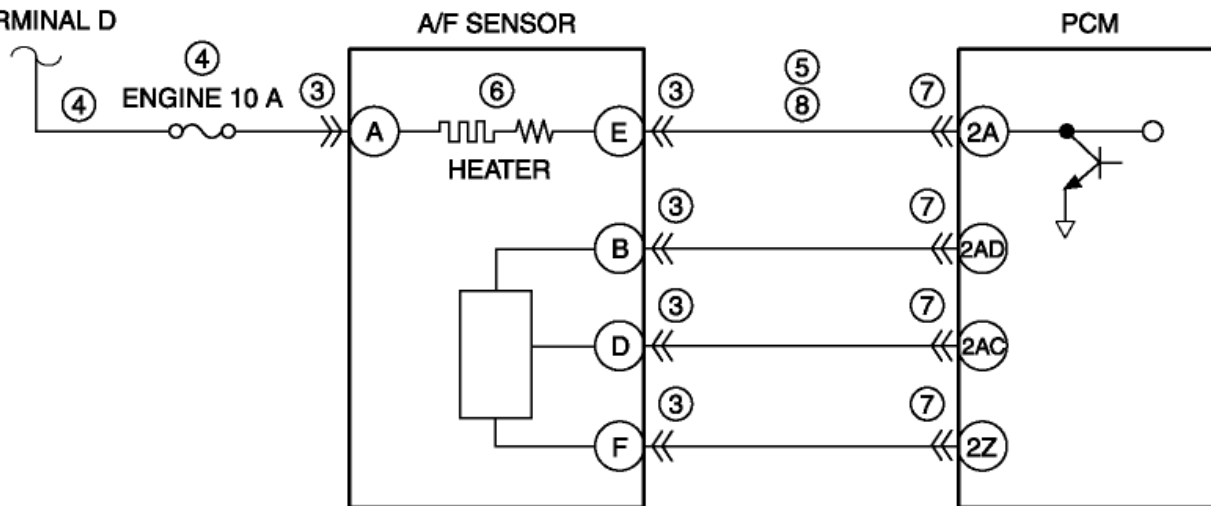


2012 - Mazda6 - Engine

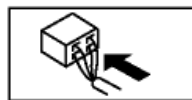
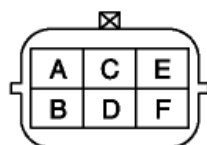
DTC P0031:00 [MZR 2.5]

DTC P0031:00	A/F sensor heater control circuit low input
DETECTION CONDITION	- The PCM monitors the A/F sensor heater output voltage. If the PCM turns the A/F sensor heater off but the A/F sensor heater circuit remains low voltage, the PCM determines that the A/F sensor heater circuit has a malfunction. Diagnostic support note - This is a continuous monitor (A/F sensor heater, HO2S heater). - The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. - PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. - FREEZE FRAME DATA (Mode 2)/Snapshot data is available. - The DTC is stored in the PCM memory.
POSSIBLE CAUSE	- A/F sensor connector or terminal malfunction - Short to ground or open circuit in A/F sensor heater power supply circuit - Short to ground in wiring harness between main relay terminal D and A/F sensor terminal A - ENGINE 10 A fuse malfunction - Open circuit in wiring harness between main relay terminal D and A/F sensor terminal A - Short to ground in wiring harness between A/F sensor terminal E and PCM terminal 2A - A/F sensor heater malfunction - PCM connector or terminal malfunction - Open circuit in wiring harness between A/F sensor terminal E and PCM terminal 2A - PCM malfunction

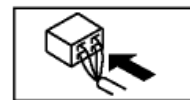
MAIN RELAY
TERMINAL D



A/F SENSOR
WIRING HARNESS-SIDE
CONNECTOR



PCM WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

STEP	INSPECTION	ACTION
1	VERIFY FREEZE FRAME DATA (MODE 2)/ SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS HAVE BEEN RECORDED Have the FREEZE FRAME DATA (Mode 2)/snapshot data and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor heater, HO2S heater related) been recorded?	Yes Go to the next step. No Record the FREEZE FRAME DATA (Mode 2)/snapshot data and DIAGNOSTIC MONITORING TEST RESULTS on the repair order, then go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY - Verify related Service Bulletins and/or on-line repair information availability. - Is any related repair information available?	Yes Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step. No Go to the next step.
3	INSPECT A/ F SENSOR CONNECTOR CONDITION - Switch the ignition to off. - Disconnect the A/F sensor connector. - Inspect for poor connection (such as damaged/pulled-out pins, corrosion). - Is there any malfunction?	Yes Repair or replace the terminal and/or connector, then go to Step 9. No Go to the next step.
4	INSPECT A/ F SENSOR HEATER POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT	Yes Go to the next step.

	• A/F sensor connector is disconnected. • Switch the ignition to ON (engine off). • Measure the voltage between A/F sensor terminal A (wiring harness-side) and body ground. • Is the voltage B+ ?	No Inspect the ENGINE 10 A fuse. • If the fuse is melt: ▪ Repair or replace the wiring harness for a possible short to ground. ▪ Replace the fuse. • If the fuse is deterioration: ▪ Replace the fuse. • If the fuse is normal: ▪ Repair or replace the wiring harness for a possible open circuit. Go to Step 9.
5	INSPECT A/ F SENSOR HEATER CONTROL CIRCUIT FOR SHORT TO GROUND • A/F sensor connector is disconnected. • Switch the ignition to off. • Inspect for continuity between A/F sensor terminal E (wiring harness-side) and body ground. • Is there continuity?	Yes If the short to ground circuit could be detected: • Repair or replace the wiring harness for a possible short to ground. If the short to ground circuit could not be detected: • Replace the PCM (short to ground in PCM internal circuit). (See PCM REMOVAL/ INSTALLATION [MZR 2.5].) Go to Step 9. No Go to the next step.
6	INSPECT A/ F SENSOR HEATER • Inspect the A/F sensor heater. (See AIR FUEL RATIO (A/ F) SENSOR INSPECTION [MZR 2.5].) • Is there any malfunction?	Yes Replace the A/F sensor, then go to Step 9. (See AIR FUEL RATIO (A/ F) SENSOR REMOVAL/ INSTALLATION [MZR 2.5].) No Go to the next step.
7	INSPECT PCM CONNECTOR CONDITION • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes Repair or replace the terminal and/or connector, then go to Step 9. No Go to the next step.
8	INSPECT A/ F SENSOR HEATER CONTROL CIRCUIT FOR OPEN CIRCUIT • A/F sensor and PCM connectors are disconnected. • Inspect for continuity between A/F sensor terminal E (wiring harness-side) and PCM terminal 2A (wiring harness-side). • Is there continuity?	Yes Go to the next step. No Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	VERIFY DTC TROUBLESHOOTING COMPLETED • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [MZR 2.5].)	Yes Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/ INSTALLATION [MZR 2.5].)

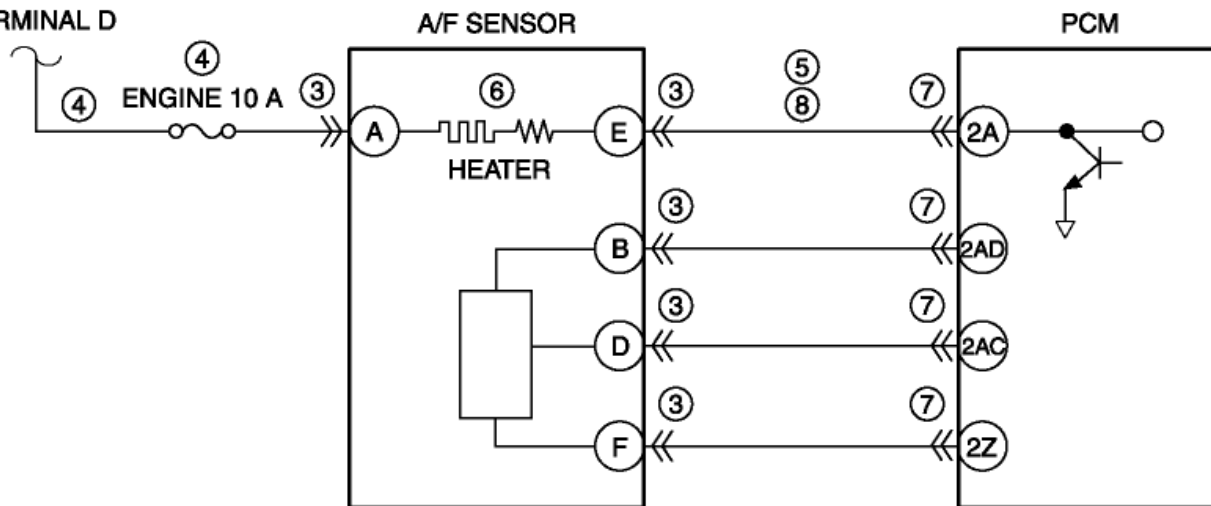
	• Perform the KOEO or KOER self test. (See KOEO/ KOER SELF TEST [MZR 2.5].) • Is the PENDING CODE for this DTC present?	Go to the next step.
		No Go to the next step.
10	VERIFY AFTER REPAIR PROCEDURE • Perform the “AFTER REPAIR PROCEDURE”. (See AFTER REPAIR PROCEDURE [MZR 2.5].) • Are any DTCs present?	YesGo to the applicable DTC inspection. (See DTC TABLE [MZR 2.5] .)
		No DTC troubleshooting completed.

2012 - Mazda6 - Engine

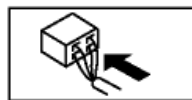
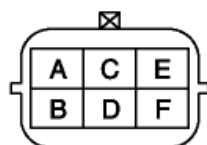
DTC P0031:00 [MZR 2.5]

DTC P0031:00	A/F sensor heater control circuit low input
DETECTION CONDITION	- The PCM monitors the A/F sensor heater output voltage. If the PCM turns the A/F sensor heater off but the A/F sensor heater circuit remains low voltage, the PCM determines that the A/F sensor heater circuit has a malfunction. Diagnostic support note - This is a continuous monitor (A/F sensor heater, HO2S heater). - The MIL illuminates if the PCM detects the above malfunction condition in two consecutive drive cycles or in one drive cycle while the DTC for the same malfunction has been stored in the PCM. - PENDING CODE is available if the PCM detects the above malfunction condition during the first drive cycle. - FREEZE FRAME DATA (Mode 2)/Snapshot data is available. - The DTC is stored in the PCM memory.
POSSIBLE CAUSE	- A/F sensor connector or terminal malfunction - Short to ground or open circuit in A/F sensor heater power supply circuit - Short to ground in wiring harness between main relay terminal D and A/F sensor terminal A - ENGINE 10 A fuse malfunction - Open circuit in wiring harness between main relay terminal D and A/F sensor terminal A - Short to ground in wiring harness between A/F sensor terminal E and PCM terminal 2A - A/F sensor heater malfunction - PCM connector or terminal malfunction - Open circuit in wiring harness between A/F sensor terminal E and PCM terminal 2A - PCM malfunction

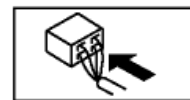
MAIN RELAY
TERMINAL D



A/F SENSOR
WIRING HARNESS-SIDE
CONNECTOR



PCM WIRING HARNESS-SIDE CONNECTOR



Diagnostic procedure

STEP	INSPECTION	ACTION
1	VERIFY FREEZE FRAME DATA (MODE 2)/ SNAPSHOT DATA AND DIAGNOSTIC MONITORING TEST RESULTS HAVE BEEN RECORDED Have the FREEZE FRAME DATA (Mode 2)/snapshot data and DIAGNOSTIC MONITORING TEST RESULTS (A/F sensor heater, HO2S heater related) been recorded?	Yes Go to the next step. No Record the FREEZE FRAME DATA (Mode 2)/snapshot data and DIAGNOSTIC MONITORING TEST RESULTS on the repair order, then go to the next step.
2	VERIFY RELATED REPAIR INFORMATION AVAILABILITY - Verify related Service Bulletins and/or on-line repair information availability. - Is any related repair information available?	Yes Perform repair or diagnosis according to the available repair information. If the vehicle is not repaired, go to the next step. No Go to the next step.
3	INSPECT A/ F SENSOR CONNECTOR CONDITION - Switch the ignition to off. - Disconnect the A/F sensor connector. - Inspect for poor connection (such as damaged/pulled-out pins, corrosion). - Is there any malfunction?	Yes Repair or replace the terminal and/or connector, then go to Step 9. No Go to the next step.
4	INSPECT A/ F SENSOR HEATER POWER SUPPLY CIRCUIT FOR SHORT TO GROUND OR OPEN CIRCUIT	Yes Go to the next step.

	• A/F sensor connector is disconnected. • Switch the ignition to ON (engine off). • Measure the voltage between A/F sensor terminal A (wiring harness-side) and body ground. • Is the voltage B+ ?	No Inspect the ENGINE 10 A fuse. • If the fuse is melt: ▪ Repair or replace the wiring harness for a possible short to ground. ▪ Replace the fuse. • If the fuse is deterioration: ▪ Replace the fuse. • If the fuse is normal: ▪ Repair or replace the wiring harness for a possible open circuit. Go to Step 9.
5	INSPECT A/ F SENSOR HEATER CONTROL CIRCUIT FOR SHORT TO GROUND • A/F sensor connector is disconnected. • Switch the ignition to off. • Inspect for continuity between A/F sensor terminal E (wiring harness-side) and body ground. • Is there continuity?	Yes If the short to ground circuit could be detected: • Repair or replace the wiring harness for a possible short to ground. If the short to ground circuit could not be detected: • Replace the PCM (short to ground in PCM internal circuit). (See PCM REMOVAL/ INSTALLATION [MZR 2.5].) Go to Step 9. No Go to the next step.
6	INSPECT A/ F SENSOR HEATER • Inspect the A/F sensor heater. (See AIR FUEL RATIO (A/ F) SENSOR INSPECTION [MZR 2.5].) • Is there any malfunction?	Yes Replace the A/F sensor, then go to Step 9. (See AIR FUEL RATIO (A/ F) SENSOR REMOVAL/ INSTALLATION [MZR 2.5].) No Go to the next step.
7	INSPECT PCM CONNECTOR CONDITION • Disconnect the PCM connector. • Inspect for poor connection (such as damaged/pulled-out pins, corrosion). • Is there any malfunction?	Yes Repair or replace the terminal and/or connector, then go to Step 9. No Go to the next step.
8	INSPECT A/ F SENSOR HEATER CONTROL CIRCUIT FOR OPEN CIRCUIT • A/F sensor and PCM connectors are disconnected. • Inspect for continuity between A/F sensor terminal E (wiring harness-side) and PCM terminal 2A (wiring harness-side). • Is there continuity?	Yes Go to the next step. No Repair or replace the wiring harness for a possible open circuit, then go to the next step.
9	VERIFY DTC TROUBLESHOOTING COMPLETED • Make sure to reconnect all disconnected connectors. • Clear the DTC from the PCM memory using the M-MDS. (See AFTER REPAIR PROCEDURE [MZR 2.5].)	Yes Repeat the inspection from Step 1. • If the malfunction recurs, replace the PCM. (See PCM REMOVAL/ INSTALLATION [MZR 2.5].)

	• Perform the KOEO or KOER self test. (See KOEO/ KOER SELF TEST [MZR 2.5].) • Is the PENDING CODE for this DTC present?	Go to the next step.
		No Go to the next step.
10	VERIFY AFTER REPAIR PROCEDURE • Perform the "AFTER REPAIR PROCEDURE". (See AFTER REPAIR PROCEDURE [MZR 2.5].) • Are any DTCs present?	YesGo to the applicable DTC inspection. (See DTC TABLE [MZR 2.5] .)
		No DTC troubleshooting completed.