

OBD I & II, Error Codes & Root Cause Analysis

The components involved in the strategy of fault detection and MI activation
(fixed number of cycles of driving or statistical method)

(List and interaction of all components monitored by the OBD system)

Table (Nummer einfügen)

DEVICE CIRCUITS	SHORT CIRCUIT TO BATTERY	SHORT CIRCUIT TO GROUND	OPEN CIRCUIT	RATIONALITY CHECK	RANGE CHECK
INTERNAL ERROR MODULE CONTROL (ECU/PCU)	X	X	X	✓	X
CRANKSHAFT POSITION SENSOR	X	X	✓	✓	X
ENGINE COOLANT TEMPERATURE SENSOR	✓	✓	✓	✓	X
INTAKE AIR TEMPERATURE SENSOR	✓	✓	✓	✓	X
MAINFOLD ABSOLUTE PRESSURE SENSOR	✓	✓	✓	✓	X
OXYGEN SENSOR	✓	✓	✓	✓	X
THROTTLE POSITION SENSOR	✓	✓	✓	X	X
EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE	✓	✓	✓	X	X
FUEL INJECTOR	✓	✓	✓	X	X
IDLE AIR CONTROL SYSTEM (*)	✓	✓	✓	✓	X
IGNITION COIL "A" PRIMARY CONTROL	✓	✓	✓	X	X
OXYGEN SENSOR HEATER	✓	✓	✓	✓	X

(Macro principles of operation for all OBD II and PCU/ECU diagnostics)



COMPONENT	FAULT CODE	MONITORING STRATEGY	FAULT DETECTION CRITERIA	“MI” ACTIVATION CRITERIA	PRE-CONDITIONING	DEMONSTRATION TEST
Throttle Position Sensor	P0123	Signal range check high for throttle Position Sensor	Voltage of throttle position sensor is >4.75V	1st Cycle	/	1 Test Type I
	P0122	Circuit Open or Signal range check low for throttle Position Sensor	Voltage of throttle position sensor <0.25V	1st Cycle	/	1 Test Type I
Manifold absolute pressure sensor	P0108	Signal range check high for Manifold absolute pressure sensor	Voltage of Manifold absolute pressure sensor is higher than 4.9V	1st Cycle	/	1 Test Type I
	P0107	Circuit Open or Signal range check low for Manifold absolute pressure sensor	Voltage of Manifold absolute pressure sensor is lower than 0.1V	1st Cycle	/	1 Test Type I
	P0105	Manifold Absolute Pressure sensor stuck	Running MAP Signal change <10kpa during Crank to Run and Running situation	2nd Cycle	Yes	
	P3106	Manifold Absolute Pressure sensor Power low TPS Rationality	MAP Signal value is lower than some threshold during stable Running situation	2nd Cycle	Yes	
	P0113	Signal range check high for Intake Air temperature sensor	Voltage of Air temperature sensor is higher than 4.9V	1st cycle	/	1 Test Type I
	P0112	Signal range check low for Intake Air temperature sensor	Voltage of Air temperature sensor is lower than 0.1V	1st Cycle	/	1 Test Type I

Intake Air temperature sensor	P0111	Intake Air Temperature Sensor signal Stuck	Intake Air Temperature value change is ≤ 2 degrees centigrade when engine is fully warmed up compared to the startup temperature	2nd Cycle	Yes	
	P0114	Intake Air Temperature Sensor signal not regular	Intake Air temperature Sensor signal not regular change rate is > 3.2 degrees centigrade	2nd Cycle	Yes	
Engine coolant temperature sensor	P0118	Signal range check high for Engine coolant temperature sensor	Voltage of Engine coolant temperature sensor is $> 4.9V$	1st Cycle	/	1 Test Type I
	P0117	Signal range check low for Engine coolant temperature sensor	Voltage of Engine coolant temperature sensor is $< 0.1V$	1st Cycle	/	1 Test Type I
	P0116	Engine coolant	Signal value change is no larger than 20 degrees centigrade when engine is fully warmed up compared to the startup temperature	2nd Cycle	Yes	
	P1116	Engine coolant temperature sensor signal High At Startup	Startup coolant temperature is higher than 60 degrees centigrade compared to the ambient temperature	2nd Cycle	Yes	
Oxygen Sensor (Lambda)	P0132	Signal range check high for Oxygen sensor		1st Cycle	/	1 Test Type I
	P0131	Signal range check low for Oxygen sensor	Voltage of Oxygen sensor is lower than 0.3V and duration is > 15 seconds	1st Cycle	/	1 Test Type I
	P2A00	Signal range check no activity detected for Oxygen sensor	Voltage of Oxygen sensor is constantly higher than 0.95V for a period of time	2nd Cycle	Yes	1 Test Type I
	P014D	O2 Sensor Lean to Rich rate Slow Response	O2 signal switching from lean state to rich state response rate time is longer than calibrated value	2nd Cycle	Yes	

	P014C	O2 Sensor Rich to Lean rate Slow Response	O2 signal switching from rich state to lean state response rate time is longer than some calibrated value	2nd Cycle	Yes	
	P 2195	O2 Sensor Lean PE	O2 signal is constantly lower than 400mv when PE mode is enabled	2nd Cycle	Yes	
	P 2196	O2 Sensor Rich DFCO	O2 signal is constantly Higher than 300mv	2nd Cycle	Yes	
Crankshaft Position sensor	P0336	Crankshaft Position Sensor noisy signal	Performance of the crankshaft position sensor Signal is poor	2nd Cycle	Yes	
	P0335	Crankshaft Position Sensor no signal	Signal voltage of the crankshaft position sensor is no input during cranking	1st Cycle	/	1 Test Type I
Injector	P0262	Short circuit to battery for Injector	The corresponding feedback is different from the command	1st Cycle	/	1 Test Type I
	P0261	Short circuit open/ to ground for Injector		1st Cycle	/	1 Test Type I
Idle Air Control System	P0505	Errore controllo al minimo Idle control error	Idle speed is >500 rpm compared to the normal warmed up Idle speed	2nd Cycle	Yes	2nd Cycle
HO2S Heater Control	P0032	Short circuit to battery for Oxygen sensor heater circuit	The corresponding feedback is different from the command	1st Cycle	/	1 Test Type I
	P0031	Open/Short circuit to ground for Oxygen sensor heater circuit		1st Cycle	/	1 Test Type I
	P00D1	Oxygen sensor heater Under heat	The current of heater output <0.2A	2nd Cycle	Yes	1 Test Type I
Ignition Coil "A" Primary Control	P2301	Short circuit to battery for Ignition coil	The corresponding feedback is	1st Cycle	/	1 Test Type I
	P2300	Open/Short circuit to ground for Ignition coil		1st Cycle	/	1 Test Type I
Fuel Pump Control	P0232	Short circuit to battery for Fuel pump		1st Cycle	/	1 Test Type I

Fuel Pump Control	P0231	Open/Short circuit to ground for Fuel pump	different from the command	1st Cycle	/	1 Test Type I
Evaporative Emission System Purge Control Valve	P0459	Short circuit to battery for EPC Valve		1st Cycle	/	1 Test Type I
	P0458	Open/Short circuit to ground for EPC Valve		1st Cycle	/	1 Test Type I
Internal Control Module Memory Check Sum Error	P0601	Check sum error	The calculated check sum is not equal to the check sum in the flash memory	1st Cycle	/	1 Test Type I