

2014 VW Jetta & GLI

Quick Reference Specification Book

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DTC CHART

Engine Code 2.0L CBPA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P0016	Crankshaft Position-Camshaft Position Correlation Bank 1 Sensor A	<ul style="list-style-type: none"> • Permissible deviation < -12° Rev or • Permissible deviation > 12° Rev
P0030	HO2S Heater Control Circuit (Bank 1, Sensor 1)	Heater voltage 4.70 - 5.40 V
P0031	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) Low	Heater voltage 0 to 3.26 V
P0032	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) High	Heater current > 5.50 A
P0036	Sensor Heater Control Circuit (Bank 1 (1) Sensor 2)	Heater voltage 2.34 - 3.59 V
P0037	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) Low	Heater voltage < 2.34 V
P0038	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) High	Heater voltage > 3.59 V
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature < -50 °C
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • Difference in value IAT vs. ECT @ engine start (depending on engine off time) < 25 °K • Difference in value IAT vs AAT @ engine start > 25 °K (depending on engine off time) • Difference in value ECT vs AAT @ engine start > 25 °K (depending on engine off time)
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature > 87 °C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0106	Manifold ABS. Pressure or BARO Pressure Range/ Performance	<ul style="list-style-type: none"> • Difference of actual manifold pressure lower threshold < 0 hPa • Modeled range 45 to 845 hPa or • Difference of actual manifold pressure upper threshold > 0 hPa • Modeled range 640 to 1055 hPa or • Difference between BARO sensor and MAP sensor at engine start > 60 hPa
P0107	Manifold ABS Pressure or BARO Pressure Low Input	Signal voltage < 0.20 V
P0108	Manifold Abs.Pressure or BARO Pressure High Input	Signal voltage > 4.88 V
P0111	Intake Air Temperature (Sensor 1 Bank 1) Circuit Range/Performance	<ul style="list-style-type: none"> • Difference in value IAT vs. ECT @ engine start (depending on engine off time) > 25 °K • Difference in value IAT - AAT @ engine start < 25 °K (depending on engine off time) • Difference in value ECT vs AAT @ engine start > 25 °K (depending on engine off time)
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	Intake air temperature > 130°C
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	Intake air temperature < -46°C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	<ul style="list-style-type: none"> • Difference in value IAT vs. ECT @ engine start (depending on engine off time) > 24.75 °C • Difference in value IAT - AAT @ engine start < 24.75 °C (depending on engine off time)
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature > 140°C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature < -40°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 5.10 6.30% • Actual TPS 1 calculated value > TPS 2 calculated value • TPS 1 calc. value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
P013A	O2 Sensor (Bank 1 Sensor 2) Slow Response - Rich to Lean	<ul style="list-style-type: none"> • EWMA filtered max differential transient time at fuel cutoff \geq 0.5 Sec. • Number of checks \geq 3
P0130	O2 Sensor Circuit (Bank 1 Sensor 1) Malfunction	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass > 1.75 V
		Nernst voltage > 1.50 V
		Adjustment voltage > 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V
P0133	O2 Sensor Circuit (Bank 1 Sensor 1) Slow Response	<p>Signal dynamic slope check</p> <ul style="list-style-type: none"> • O2S signal front vs. modeled O2S signal ratio < 0.35 and > 0.01 • Cycles completed > 40 <p>Oscillation check</p> <ul style="list-style-type: none"> • Lambda amplitude signal > 20% • Cycles > 8 • Time lambda > lambda amplitude 400 m sec. <p>Delay check</p> <ul style="list-style-type: none"> • Delay modeled lambda signal minus measured signal > 460 m sec. • Cycles > 12
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1) Malfunction	<ul style="list-style-type: none"> • Heater duty cycle, > 90% • O2S ceramic temperature, < 715 °C • Time after O2S heater on 36 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0137	O2 Sensor Circuit (Bank 1 Sensor 2) Low Voltage	Cold condition <ul style="list-style-type: none"> • Signal voltage < 0.06 V for time > 3 Sec. and <ul style="list-style-type: none"> • Difference of sensor voltage with load pulse vs. no load pulse < 0.01 V
P0138	O2 Sensor Circuit (Bank 1 Sensor 2) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0140	O2 Sensor Circuit (Bank 1 Sensor 2) No Activity Detected	Signal voltage <ul style="list-style-type: none"> • Signal voltage .40 - .60 mV for > 3 Sec • Internal resistance > 40000 ohm and exhaust temperature > 600 °C
P0141	O2 Sensor Heater Circuit (Bank 1 Sensor 2) Malfunction	Heater resistance 1200 to 32400 Ω
P0169	Incorrect Fuel Composition	<ul style="list-style-type: none"> • Fuel quantity incorrect • Fuel correction factor incorrect • Difference between predicted and real air mass > 3.80%
P0201	Cylinder 1- Injector Circuit	<ul style="list-style-type: none"> • Signal voltage 4.5 to 5.5 V • Internal logic failure
P0202	Cylinder 2- Injector Circuit	<ul style="list-style-type: none"> • Signal voltage 4.5 to 5.5 V • Internal logic failure
P0203	Cylinder 3- Injector Circuit	<ul style="list-style-type: none"> • Signal voltage 4.5 to 5.5 V • Internal logic failure
P0204	Cylinder 4- Injector Circuit	<ul style="list-style-type: none"> • Signal voltage 4.5 to 5.5 V • Internal logic failure
P0221	Throttle/Pedal Position Sensor/Switch B Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 5.10 to 6.30% • Actual TPS 2 calculated value > TPS 1 calculated value • TPS 2 – calc. value > 9.00%
P0222	Throttle/Pedal Position Sensor/Switch B Low Input	Signal voltage < 0.20 V
P0223	Throttle/Pedal Position Sensor/Switch B High Input	Signal voltage > 4.81 V
P0261	Cylinder 1- Injector Circuit Low	Signal voltage < 3.0 V
P0262	Cylinder 1- Injector Circuit High	Signal current > 2.20 to 4.0 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0264	Cylinder 2- Injector Circuit Low	Signal voltage < 3.0 V
P0265	Cylinder 2- Injector Circuit High	Signal current > 2.20 to 4.0 A
P0267	Cylinder 3- Injector Circuit Low	Signal voltage < 3.0 V
P0268	Cylinder 3- Injector Circuit High	Signal current > 2.20 to 4.0 A
P0270	Cylinder 4- Injector Circuit Low	Signal voltage < 3.0 V
P0271	Cylinder 4- Injector Circuit High	Signal current > 2.20 to 4.0 A
P2096	Post Catalyst Fuel Trim System (Bank 1) Too Lean	Deviation lambda control < -0.03
P2097	Post-Catalyst Fuel Trim System Too Rich (Bank 1)	Integral part of lambda control > 0.03%
P3081	Post Catalyst Fuel Trim System (Bank 1) Too Rich	Difference between ECT and modeled ECT > 10.5 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) > 1.6% • Catalyst damage misfire rate (MR) > 1.6% - 24%
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) > 1.6% • Catalyst damage misfire rate (MR) > 1.6% - 24%
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) > 1.6% • Catalyst damage misfire rate (MR) > 1.6% - 24%
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) > 1.6% • Catalyst damage misfire rate (MR) > 1.6% - 24%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) > 1.6% • Catalyst damage misfire rate (MR) > 1.6% - 24%
P0321	Ign./Distributor Eng.Speed Inp.Circ. Range/Performance	<ul style="list-style-type: none"> • Comparison of counted teeth vs reference = incorrect • Monitoring reference gap failure
P0322	Ign./Distributor Eng.Speed Inp.Circ. No Signal	<ul style="list-style-type: none"> • Camshaft signal > 5 • Engine speed no signal
P0324	Knock Control System Error	<ul style="list-style-type: none"> • Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low Input	<ul style="list-style-type: none"> • Lower threshold < 70 V or for signal range check • Lower threshold < 1.05 to 5.49 V
P0328	Knock Sensor 1 Circuit High Input	<ul style="list-style-type: none"> • Upper threshold > 32.99 to 99.99 V
P0341	Camshaft Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal pattern incorrect • Defect counter = 8
P0342	Camshaft Position Sensor Circuit Low Input	<ul style="list-style-type: none"> • Signal voltage permanently low • Crankshaft signals = 8
P0343	Camshaft Pos.Sensor Circuit High Input	<ul style="list-style-type: none"> • Signal voltage permanently high • Crankshaft signals = 8
P0351	Ignition Coil A Primary/Secondary Circuit	<ul style="list-style-type: none"> • Signal current < 0.25 to -2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/Secondary Circuit	<ul style="list-style-type: none"> • Signal current < 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System (Bank 1) Efficiency Below Threshold	<ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 1.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	EVAP pump current during reference measurement > 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	EVAP pump current during reference measurement < 15 mA
P0441	EVAP Emission Contr. Sys. Incorrect Purge Flow	Difference of actual vs. reference EVAP pump current > 1.70 or drop of EVAP pump current < 1 mA within 12 Sec.
P0442	EVAP Emission Contr. Sys. (Small Leak) Leak Detected	Modeled pressure from pump current < 9 hPa
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.7 to 5.4 V
P0448	Evaporative Emission System Vent Control Circuit Shorted	Signal voltage < 2.74 to 3.26 V or signal current > 2.2 to 4.0 A
P0456	EVAP Emission Control System (very small Leak) Leak Detected	EVAP system leakage area calculated from pump current curve > 0.17 mm squared.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.00 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P050A	Cold Start Idle Air Control System Performance	Out of range low: <ul style="list-style-type: none"> • Engine speed deviation > 200 RPM • RPM controller torque value ≥ calculated min. value Out of range high: <ul style="list-style-type: none"> • Engine speed deviation < -100 RPM • RPM controller torque value ≤ calculated min. value

DTC	Error Message	Malfunction Criteria and Threshold Value
P050B	Cold Start Ignition Timing Performance	Difference between commanded and actual spark timing > 20%
P0501	Vehicle Speed Sensor "A" Range/Performance	VSS signal < 4 km/h
P0506	Idle Control System RPM Lower than Expected	<ul style="list-style-type: none"> Idle speed Deviation > 100 RPM and RPM controller torque value \geq calculated max. value
P0507	Idle Control System RPM Higher than Expected	<ul style="list-style-type: none"> Idle speed Deviation < -100 RPM and RPM controller torque value \leq calculated min. value

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM Processor Fault	ECM internal check failure, signal voltage driver out of range or plausibility check failed
P0627	Fuel Pump "A" Control Circuit/ Open	Open circuit <ul style="list-style-type: none"> Signal voltage 4.50 to 5.50 V Short to ground <ul style="list-style-type: none"> Signal voltage < 3.0 V
P0629	Fuel Pump "A" Control Circuit High	Signal current 0.60 to 1.20 A
P0638	Throttle Actuator Control (Bank 1) Range/Performance	<ul style="list-style-type: none"> Time to close to reference point > 0.6 Sec. Reference point 2.88% or <ul style="list-style-type: none"> TPS 1 signal voltage is NOT 0.40 to 0.80 V TPS 2 signal voltage is NOT 4.20 to 4.60 V TPS 1 and TPS 2 signal voltage is NOT 4.82 to 5.18 V
P0641	Sensor Reference Voltage "A" Circuit Open	Signal voltage deviation > \pm 0.3 V
P0651	Sensor Reference Voltage "B" Circuit Open	Signal voltage deviation > \pm 0.3 V
P0697	Sensor Reference Voltage "C" Circuit Open	Signal voltage deviation > \pm 0.3 V

DTC	Error Message	Malfunction Criteria and Threshold Value
U0001	High Speed CAN Communication Bus	Bus Off failure or CAN message = no feedback
U0002	High Speed CAN Communication Bus Performance	Global Time Out failure or receiving no messages
U0101	Lost Communication with TCM	Time Out failure. No message received by ECM
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No CAN communication with ABS.
U0146	Lost Communication With Gateway "A"	CAN communication with gateway no messages received.
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No IPC CAN messages received
U0302	Software Incompatibility with Transmission Control Module	Manual transmission coded ECM software. ECM received AT messages from TCM
U0402	Software Incompatibility with Transmission Control Module	Transmission Data Length Code incorrect or implausible messages received.
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	<ul style="list-style-type: none"> • Speed sensor initialization failed • Speed sensor low voltage error failed • Speed sensor error out of range • Implausible messages sent from ABS
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	<ul style="list-style-type: none"> • Implausible CAN messages received. • Implausible ambient temperature value

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P150A	Engine Off Time Performance	Difference between engine off time and ECM after run time < -12 Sec. or > 12 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2101	Throttle Actuator Control Motor Circuit Range/ Performance	<ul style="list-style-type: none"> • Duty cycle >80% • Deviation throttle value angles vs. calculated value 4 - 50% • ECM power stage no failure
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failed
P2122	Throttle/Pedal Pos. Sens./ Switch D Circuit Low Input	Signal voltage < 0.61 V
P2123	Throttle/Pedal Pos. Sens./ Switch D Circuit High Input	Signal voltage > 4.79 V
P2127	Throttle/Pedal Pos. Sens./ Switch E Circuit Low Input	Signal voltage < 0.27 V
P2128	Throttle/Pedal Pos. Sens./ Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs. sensor 2 is > 0.17 - 0.70 V
P2177	System too lean off idle, (Bank 1)	Adaptive value > 28%
P2178	System too rich off idle, (Bank 1)	Adaptive value < -20%
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient mass air flow integral 65 to 75 °C
P2184	Engine Coolant Temperature (Sensor 2) Circuit Low	ECT outlet > 140 °C
P2185	Engine Coolant Temperature (Sensor 2) Circuit High	ECT outlet < -40 °C
P2187	System too lean at idle, (Bank 1)	Adaptive value > 5.02%
P2188	System too rich at idle, (Bank 1)	Adaptive value < -5.02%
P2195	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop < -0.07
P2237	O2 Sensor Positive Current Control Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S signal front 1.49 - 1.51 V • Delta lambda controller > 0.10

DTC	Error Message	Malfunction Criteria and Threshold Value
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S signal front < 0.20 V and Internal resistance > 950 Ohm • O2S signal front > 4.70 V and Internal resistance > 950 Ohm
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) open	<ul style="list-style-type: none"> • O2S signal front 1.47 to 1.53 V • Internal resistance > 950 Ohm
P2270	O2 Sensor Signal Stuck Lean; (Bank 1 Sensor 2)	<ul style="list-style-type: none"> • O2S signal rear not oscillating at reference < 0.62 to 0.63 V • Enrichment after stuck lean 20%
P2271	O2 Sensor Signal Stuck Rich; (Bank 1 Sensor 2)	<ul style="list-style-type: none"> • O2S signal rear not oscillating at reference > 0.62 to 0.63 V • Enrichment after stuck lean 20% or Fuel Cutoff • Sensor voltage \geq 0.15 V • Mass flow after fuel cutoff > 2000 to 3500 mg • 1 or more checks
P2279	Intake Air System Leak	<ul style="list-style-type: none"> • Offset value throttle mass flow > 13kg/h

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil "A" Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil "A" Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil "C" Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil "C" Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current > 2.2 to 4.0 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.7 - 5.4 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage > 2.74 - 3.26 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal voltage at EVAP pump current measuring resistor > 1.80 to 4.0 V
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	<ul style="list-style-type: none"> • ECT at start < 60 °C and > 60 °C running • AAT < 35 °C and > 4 °C • Time since engine start 600 Sec. • Integrated purge flow since last purge stop > 2 g • Integrated purge flow since last monitoring run > 0 g • Intake manifold vacuum > 100 hPa • Vehicle speed 0 to 120 km/h • Fuel volume flow ≤ 5 ml/Sec. • Engine speed > 30 RPM and not idle. • Front O2S ready • Altitude ≤ 2700 m
P2414	O2 Sensor Exhaust Sample Error, (Bank 1 Sensor 1)	<ul style="list-style-type: none"> • Threshold 1 - Signal voltage 3.10 - 4.77 V • Threshold 2 - Signal voltage 2.5 to 3.06 V
P2431	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Range/Performance	Difference between SAI pressure and ambient pressure ≠ -25.0 - 25.0 hPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	EVAP pump current difference between reference measurement to idle < 3 mA
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.9 V
P2540	Low Pressure Fuel System Sensor Circuit Range/ Performance	Actual pressure deviation < 800 kPa < 80 kPa
P2541	Low Pressure Fuel System Sensor Circuit Low Input	Signal voltage < 0.2 V
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

DTC CHART

Engine Code 2.0L CJAA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000E	HO2 Sensors Adaptive Correction of the Lambda- Pre Control Signal	<ul style="list-style-type: none"> • Number of learning points at adaptation limits ≥ 8 of 64 • Upper limit > 1.2
P0045	Wastegate Bypass Regulator Valve Circuit Open	$> 200 \text{ KOhm}$
P0047	Wastegate Bypass Regulator Valve Circuit Short to Ground	Signal Voltage $< 2.97 \text{ V}$
P0048	Wastegate Bypass Regulator Valve Circuit Short to Battery voltage	Signal Current $> 3.0 \text{ A}$
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	Temperature difference to at least 3 other temperature sensors at startup $> 45 \text{ K}$
P0072	Ambient Air Temperature Sensor Circuit Low	Error message sent from Cluster to ECU
P0073	Ambient Air Temperature Sensor Circuit High	Error message sent from Cluster to ECU
P0087	Fuel Rail Pressure Control Too Low	<ul style="list-style-type: none"> • Control deviation $> 150 - 200 \text{ Bar}$ • Exceeding absolute rail pressure limits $< 120 - 125 \text{ Bar}$
P0088	Fuel Rail Pressure Control Too High	<ul style="list-style-type: none"> • Control deviation < -200 to -300 Bar • Exceeding absolute rail pressure $> 1950 \text{ Bar}$
P0090	Fuel Pressure Regulator Circuit Open	Signal Voltage $< 4.7 \text{ V}$
P0091	Fuel Pressure Regulator Circuit Short to Ground	Signal Voltage $< 2.97 \text{ V}$
P0092	Fuel Pressure Regulator Control Circuit Short to Battery Voltage	Signal Current $> 3.0 \text{ A}$

DTC	Error Message	Malfunction Criteria and Threshold Value
P00AF	Charge Air Pressure Dynamic Response	Characteristic value (amplitude of air mass) < 1 - 1.7%
P00C6	Fuel Rail Pressure Control Monitoring of Fuel Pressure During Engine Start (Cranking)	Fuel rail pressure < 120 to 180 bar
P00D1	HO2 Sensor Heater Control Performance	<ul style="list-style-type: none"> Battery voltage < exhaust gas flow rate, exhaust gas temperature at sensor element Sensor temperature < 720° C
P00D2	O2S Bank 1 Sensor 2 Heater Output Warm Up Time Exceeded	<ul style="list-style-type: none"> Battery voltage < f(exhaust gas flow rate, exhaust gas temperature at sensor element) Sensor temperature < 720° C
P00D5	HO2 Sensor 1 and HO2 Sensor 2 Offset Adaption	Offset air fuel ratio > 0.05
P0101	<p>Mass Air Flow Circuit Plausibility Check</p> <p>Mass Air Flow Circuit Range Check High Temp. Calculated Value</p> <p>Mass Air Flow Circuit Range Check Low Temp. Calculated Value</p>	<p>Plausibility check by model air mass min.</p> <ul style="list-style-type: none"> Ratio of model air mass and actual airflow mass < 0.84 [-] <p>Plausibility check by model air mass max.</p> <ul style="list-style-type: none"> Ratio of model air mass and actual airflow mass > 1.8 [-] PWM signal period time > 60 ms <ul style="list-style-type: none"> PWM signal period time < 40 ms
P0102	Mass Air Flow Circuit Low Input	<p>Range check low calculated value:</p> <ul style="list-style-type: none"> PWM signal period time > 83 μs (854 kg/h) <p>Range check low Raw value:</p> <ul style="list-style-type: none"> PWM signal period time > 71.4 μs (900 kg/h)

DTC	Error Message	Malfunction Criteria and Threshold Value
P0103	Mass Air Flow Circuit High Input	Range check High Calculated value: <ul style="list-style-type: none"> • PWM signal period time > 667.0 μs (-57 kg/h) Range check High Raw value: <ul style="list-style-type: none"> • Raw value PWM signal period time > 833,35 μs (-150 kg/h)
P0111	Intake Air Temperature Sensor Circuit Performance	Temperature difference to at least 3 other temperature sensors at startup > 30 °K
P0112	Intake Air Temperature Sensor Circuit Short to Ground	Signal Voltage < 0.04 V
P0113	Intake Air Temperature Sensor Circuit Open or Short to Battery Voltage	Signal Voltage > 2.88 V
P0116	Engine Coolant Temperature Sensor Circuit Warm Up Time Plausibility	<ul style="list-style-type: none"> • Time for coolant temp to reach 19.96° C or increase by 10° K \geq 300 s for start temp. < 10° C or • > 120 s. for start temp > 10° C
P0117	Engine Coolant Temperature Sensor Circuit Short to Ground	Signal voltage < 0.15 V
P0118	Engine Coolant Temperature Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 3.25 V
P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance	Signal Voltage > 1.00 V and/or < 0.4 V
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low	Signal Voltage > 4.85 V
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High	Signal Voltage < 150 mV
P0130	O2 Sensor Circuit Bank 1 Sensor 1	<ul style="list-style-type: none"> • Virtual ground (VM) > 3 V • Nernst voltage (UN) > 4 V • Adjustment voltage (IP) > 1.5 V
	Short to Ground	<ul style="list-style-type: none"> • Virtual ground (VM) < 2 V • Nernst voltage (UN) < 1.75 V • Adjustment voltage (IP) < 0.3 V
P0132	O2 Sensor Circuit High Voltage Bank 1 Sensor 1	Signal voltage > 3.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	<ul style="list-style-type: none"> • Time to 30% of expected concentration increase > 2.6 s or • Time to 60% minus time to 30% > 1.5 s or • Time to 60% of expected concentration increase > 4.1 s
P0135	O2 Sensor Heater Circuit Bank 1 Sensor 1	<ul style="list-style-type: none"> • HO2S ceramic temp. > 840° C • HO2S ceramic temp. < 720° C
	Short to Battery voltage	• Signal current > 2.2 A
	Short to Ground	• Signal voltage < 2.15 V
	Open	• Signal voltage > 4.4 V
P0136	O2 Sensor Heater Circuit Bank 1 Sensor 2	<ul style="list-style-type: none"> • Virtual ground (VM) > 3 V • Nernst voltage (UN) > 4 V • Adjustment voltage (IP) > 1.5 V
	Short to Ground	<ul style="list-style-type: none"> • Virtual ground (VM) < 2 V • Nernst voltage (UN) < 1.75 V • Adjustment voltage (IP) < 0.3 V
	Dynamic Check Virtual Ground (VM)	<ul style="list-style-type: none"> • Virtual ground (VM) internal resistance > 1104 Ω • Internal signal voltage < 1.4 V and/or > 1.6 V
	Dynamic Check Nernst Voltage (UN)	<ul style="list-style-type: none"> • Nernst voltage (UN) internal resistance > 1104Ω • Internal signal voltage > 3 V
	Dynamic Check Pump Current (IP)	Pump current (IP) < 0.005 [-]
P0138	O2 Sensor Circuit High Voltage Bank 1 Sensor 2	Signal voltage > 3.2 V
P0139	O2 Sensor Circuit Slow Response Bank 1 Sensor 2	<ul style="list-style-type: none"> • Time to 30% of expected concentration increase > 2.6 s or • Time to 60% minus time to 30% > 1.5 s or • Time to 60% of expected concentration increase > 4.1 s

DTC	Error Message	Malfunction Criteria and Threshold Value
P013B	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 2	<ul style="list-style-type: none"> • Time delay between oxygen signals pre and post NOx trap > 1.5 Sec. (1. sensor later than 2. sensor) • Time delay between oxygen signals pre and post NOx trap > 0.45...0.72 Sec. = (exhaust gas mass flow) (2. sensor later than 1. sensor)
P0141	O2 Sensor Heater Circuit Bank 1 Sensor 2	<ul style="list-style-type: none"> • HO2S ceramic temp. > 840° C • HO2S ceramic temp. < 720° C
	Short to Battery voltage	Signal current > 2.2 A
	Short to Ground	Signal voltage < 2.15 V
	Open	Signal voltage > 4.4 V
P014D	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 1	<ul style="list-style-type: none"> • Time delay between oxygen signals pre and post NOx trap > 1.5 Sec. (1. sensor later than 2. sensor) • Time delay between oxygen signals pre and post NOx trap > 0.45...0.72 Sec. = (exhaust gas mass flow) (2. sensor later than 1. sensor)
P0181	Fuel Temperature Sensor Circuit Range / Performance	Temperature difference to at least 3 other temperature sensors at startup > 30 °K
P0182	Fuel Temperature Sensor Circuit Short to Ground	Signal voltage < 0.05 V
P0183	Fuel Temperature Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 4.7 V
P0191	Fuel Pressure Sensor Circuit Offset Detection During Keep Alive Time	Signal voltage < 0.409 V or > 0.620 V
	Fuel Pressure Sensor Circuit Adaptation of Pressure Control Valve (PCV)	Adaptation value out of limit > 130 % or < 83 %
P0192	Fuel Pressure Sensor Circuit Short to Ground	Signal voltage < 200 mV
P0193	Fuel Pressure Sensor Circuit Short to Battery Voltage	Signal voltage > 4.8 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0201	Cylinder 1 Injector Circuit Open	Signal voltage > 60 V
P0202	Cylinder 2 Injector Circuit Open	Signal voltage > 60 V
P0203	Cylinder 3 Injector Circuit Open	Signal voltage > 60 V
P0204	Cylinder 4 Injector Circuit Open	Signal voltage > 60 V
P020A	Cylinder 1 Injection Timing	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -8° CA to -4° CA or • Control error < limit from MAP f (engine speed and desired torque) +8° CA to +4° CA
P020B	Cylinder 2 Injection Timing	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -8° CA to -4° CA or • Control error < limit from MAP f (engine speed and desired torque) +8° CA to +4° CA
P020C	Cylinder 3 Injection Timing	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -8° CA to -4° CA or • Control error < limit from MAP f (engine speed and desired torque) +8° CA to +4° CA
P020D	Cylinder 4 Injection Timing	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -8° CA to -4° CA or • Control error < limit from MAP f (engine speed and desired torque) +8° CA to +4° CA
P0234	Charge Air Boost Pressure Rationality Check Low	Absolute value of control deviation > -300 - 800 hPa
P0236	Charge Air Pressure Sensor Circuit Plausibility Check	Difference between barometric and boost pressure signal > 150 hPa
P0237	Charge Air Pressure Sensor Circuit Short to Ground	Signal voltage < 0.68 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0238	Charge Air Pressure Sensor Circuit Open or Short to Battery Voltage	Signal Voltage > 4.88 V
P0263	Cylinder 1 Zero fuel calibration (monitoring of fuel calibration values)	Calibration value of injector energizing time > 217 μ s or < 117 μ s (at 1400 bar rail pressure).
P0266	Cylinder 2 Zero fuel calibration (monitoring of zero fuel calibration values)	Calibration value of injector energizing time > 217 μ s or < 117 μ s (at 1400 bar rail pressure).
P0269	Cylinder 3 Zero fuel calibration (monitoring of zero fuel calibration values)	Calibration value of injector energizing time > 217 μ s or < 117 μ s (at 1400 bar rail pressure).
P026A	Charge Air Cooler Efficiency Below Threshold	Charge air intercooler efficiency < 0.4
P026A	Charge Air Cooler Efficiency Below Threshold	Efficiency < 0.40
P0272	Cylinder 4 Zero fuel calibration (monitoring of zero fuel calibration values)	Calibration value of injector energizing time > 217 μ s or < 117 μ s (at 1400 bar rail pressure).
P0299	Charge Air Boost Pressure Rationality Check High	Absolute value of control deviation > 400 - 800 hPa
P2000	NOx Adsorber Efficiency Below Threshold	<ul style="list-style-type: none"> • Oxygen signals post NOx trap < 0.95 • Oxygen signals pre NOx trap < 0.045 • Mass of reductant consumption < 0.9 g
P2002	Particulate Trap Efficiency Below Threshold	<ul style="list-style-type: none"> • Differential pressure Signal < (exhaust gas volume flow) or • Accumulated loading increment from differential pressure < 1 g • Differential pressure signal < f (exhaust gas volume flow) • Ratio of filtered temperature dynamic upstream and downstream of the PM trap < 1.2 [-]

DTC	Error Message	Malfunction Criteria and Threshold Value
P2004	Intake Manifold Runner Flap Stuck Open	Intake Manifold Runner Stuck (open) > 12%
P2006	Intake Manifold Runner Flap Stuck Closed	Intake Manifold Runner Stuck (closed) < 12%
P2008	Intake Manifold Runner Motor Circuit Open	Signal voltage > 0.8 or < 2.0 V
P2009	Intake Manifold Runner Motor Circuit Short to Ground	Signal current > 8 - 18 A
P2010	Intake Manifold Runner Motor Circuit Short to Battery Voltage	Signal current > 8 - 18 A
P2015	Intake Manifold Runner Position Sensor Circuit Physical Signal Range Check High	Signal Voltage > 4.61 V
	Intake Manifold Runner Position Sensor Circuit Physical Signal Range Check Low	Signal Voltage < 0.39 V
P2016	Intake Manifold Runner Position Sensor Circuit Short to Ground	Signal Voltage < 0.25 V
P2017	Intake Manifold Runner Position Sensor Circuit Short to Battery Voltage	Signal Voltage > 4.75 V
P2031	Exhaust Gas Temperature Sensor 3 Circuit Open or Short to Battery Voltage	Signal voltage > 1.72 V
P2032	Exhaust Gas Temperature Sensor 3 Circuit Short to Ground	Sensor 2 voltage < 0.45 V
P2080	Exhaust Gas Temperature Sensor 1 Circuit Plausibility Check	Sensor temperature < 85° C
P2084	Exhaust Gas Temperature Sensor 2 Circuit Plausibility Check	Sensor temperature < 85° C
P20D8	Exhaust After Treatment Fuel Supply Control Performance	Control deviation < limit from Map f or > limit from Map f (engine speed, torque)
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 10° K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Misfire Detected Multiple Cylinder	<ul style="list-style-type: none"> • Rise in engine speed after fuel injection: Calculated based on values from last two engine revolutions • Error threshold: 180 counts over 440 crankshaft revolutions
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Misfire rate within 1000 engine revolutions > 10% • Misfire event detection if actual inner torque < 2,5Nm
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Misfire rate within 1000 engine revolutions > 10% • Misfire event detection if actual inner torque < 2,5Nm
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Misfire rate within 1000 engine revolutions > 10% • Misfire event detection if actual inner torque < 2,5Nm
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Misfire rate within 1000 engine revolutions > 10% • Misfire event detection if actual inner torque < 2,5Nm
P0321	Engine Speed Input Circuit Rationality Check	<ul style="list-style-type: none"> • Consecutive not plausible signals > 15 • Cam phase signals without plausible signal > 4 cam rotations • Monitoring reference gap = failure
P0322	Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • Camshaft signals > 3.00 [-] • Crankshaft signals = No signal
P0381	Glow Plug Control Indicator Lamp Circuit (Wait to Start)	Not equal with lamp request bit. (via CAN)
P0383	Glow Plug Time Control Module Control Circuit Short to Ground	Signal voltage < 200 mV

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0401	EGR System Rationality Check Low Flow Detected	Control deviation: EGR < -45 - -200 g/rev
P0402	EGR System Rationality Check Excessive Flow Detected	Mass air flow ratio calculated from: mass air flow measured vs. mass air flow modeled > 1.16 [-]
P0403	HP EGR Actuator Circuit Open	Signal voltage > 0.8 V or < 2.0 V
	HP EGR Actuator Circuit Short to Ground or Malfunction Error	Signal Current > 8.0 A - 18 A
	HP EGR Actuator Circuit Short to Battery Voltage	
	HP EGR Actuator Circuit Functional check: Stuck Close	Stuck Valve > 20.00 %
	HP EGR Actuator Circuit Functional check: Stuck Open	Signal Voltage < 150 mV
P0405	HP EGR Position Sensor Circuit Short to Ground	Signal Voltage < 150 mV
P0406	HP EGR Position Sensor Circuit Short to Battery Voltage	Signal Voltage > 4.80 V
P040B	Exhaust Gas Recirculation Temperature Sensor Circuit Plausibility check	<ul style="list-style-type: none"> • Sensor temperature < 55 °C or • Temperature difference to other temp sensors during cold start < 45 °K
P040C	Exhaust Gas Recirculation Temperature Sensor Circuit Short to Ground	Signal sensor voltage < 0.06 V
P040D	Exhaust Gas Recirculation Temperature Sensor Circuit Open or Short to Battery Voltage	Signal sensor voltage > 3.24 V
P0420	NMHC Oxidation Catalyst System Functional Check: Conversion Efficiency	Ratio of measured and modeled heat quantity < 0.3 [-]
P045A	LP EGR Actuator Circuit Open or Malfunction Error	<ul style="list-style-type: none"> • Signal voltage > 0.8 V or < 2.0 V • Signal Current > 8.0 A - 18 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P045B	LP EGR Actuator Circuit position sensor signal in desired range (closed)	Signal Voltage > 1.0 V or < 0.4 V
P045C	LP EGR Actuator Circuits Short to Ground	Signal Current > 8.0 A - 18 A
P045D	LP EGR Actuator Circuits Short to Battery Voltage	Signal Current > 8.0 A - 18 A
P045E	LP EGR Position Sensor Circuit EGR Stuck Open	Comparison of actual and desired position signal: • EGR valve Stuck (open) > 12%
P045F	LP EGR Position Sensor Circuit EGR Stuck Closed	Comparison of actual and desired position signal: • EGR valve Stuck (Closed) < 12%
P046C	HP EGR Actuator Circuit Position Sensor Signal in Desired Range (closed)	Signal Voltage > 1.0 V or < 0.4 V
P0470	Differential Pressure Sensor Circuit Open or Short to Battery Voltage	Sensor voltage > 4.9
P0471	Differential Pressure Sensor Circuit Dynamic Check	Detection of false connected hose lines: • Differential of pressure signal < -30 hPa Offset detection during after-run: • Differential of pressure signal < -27 and/or > 47 hPa
P0472	Differential Pressure Sensor Circuit Short to Ground	Sensor voltage < 0.2 V
P0473	Differential Pressure Sensor Circuit Open or Short to Battery	Sensor voltage > 4.9 V
P0474	Exhaust Pressure Sensors Circuit Detection of a Disconnected	Difference between modeled and actual pressure differential across low pressure EGR > 40 hPa
P0475	Exhaust Door Control Unit Circuit Open	Signal voltage > 0.8 V or < 2.0 V
	Exhaust Door Control Unit Circuit Malfunction Error	Signal Current > 8.0 A - 18 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0477	Exhaust Door Control Unit Circuit Short to Ground	Signal Current > 8.0 A - 18 A
P0478	Exhaust Door Control Unit Circuit Short to Battery Voltage	Signal Current > 8.0 A - 18 A.
P047F	Exhaust Door Control Unit Circuit Stuck Open	Exhaust Door Flap stuck Open < 10%
P0486	LP EGR Position Sensor Circuit Open	Signal Voltage > 4.7 V
	LP EGR Position Sensor Circuit Short to Ground	Signal Voltage < 0.21 V
P048A	Exhaust Door Control Unit Circuit Stuck Closed	Exhaust Door Flap stuck closed > 10%
P048B	Exhaust Flap Position Sensor Circuit Short to Ground	Signal Voltage < 0.25 V
P048C	Exhaust Door Control Unit Circuit Position Sensor Signal in Desired Range (closed)	Position sensor signal in desired range during closed position learning > 1.1 V or < 0.5 V
P048E	Exhaust Flap Position Sensor Circuit Short to Battery Voltage	Signal Voltage > 4.85 V

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor Performance	Brake control unit error message sent
P0502	Vehicle Speed Sensor Circuit Low Input	Brake control unit error message sent
P0503	Vehicle Speed Sensor Intermittent High Signal	Vehicle speed > 320 km/h
P0506	Idle Control System RPM Lower than Expected	Vehicle speed > 320 km/h
P0507	Idle Control System RPM Higher than Expected	Control deviation > 10%
P050E	Cold Start Engine Exhaust Temperature Too Low	<ul style="list-style-type: none"> • Sensor temperature < 170° C • Control deviation > limit from map (engine speed, torque)
P0534	Vehicle Speed Sensor Intermittent / Erratic / High	-

DTC	Error Message	Malfunction Criteria and Threshold Value
P0544	Exhaust Gas Temperature Sensor Circuit (Upstream Turbocharger) Open or Short to Battery Voltage	Signal voltage > 1.72 V
P0545	Exhaust Gas Temperature Sensor Circuit (Upstream Turbocharger) Short to Ground	Signal voltage < 0.45 V
P054E	Idle Control System Fuel Quantity Higher Than Expected	Fuel quantity < 0.004 g/rev
P054F	Idle Control System Fuel Quantity Lower Than Expected	Fuel quantity > 0.0182 - 0.0325 g/rev
P0562	System Voltage Low Voltage	Internal check failure of voltage supply for ECM off timer

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P06A3	Sensor Reference Voltage "D" Circuit/Open	Sensor supply voltage < 2.97 V or > 3.63 Vr
P0604	EEPROM Memory Error	<ul style="list-style-type: none"> • EEPROM could not be erased - data still available • Write EEPROM not possible • Checksum error in 3 or more locations
P0605	ECM Internal Test Error	ECM internal self test failed
P0606	Internal Control Module Memory Check Sum Error	ECM internal self test failed
P0607	Control Module Performance	ECM internal self test failed
P0627	Fuel Pump Circuit Open	Signal current < 0.8 mA
P0628	Fuel Pump Circuit Short to Ground	Signal voltage < 2.0 V
P0629	Fuel Pump Circuit Short to Battery Voltage	Signal current > 1.0 A
P0634	ECM Internal Temperature Too High	Output driver temperature too high >150° C
P0638	Throttle Valve Actuator Control Motor Circuit Internal Error	Diagnostic signal from actuator module = defective state

DTC	Error Message	Malfunction Criteria and Threshold Value
P0641	Sensor Reference Voltage "A" Circuit Open	Sensor supply voltage < 4.8 V or > 5.2 V
P064C	Glow Plug Time Control Module Circuit Wrong Calibration	<ul style="list-style-type: none"> • Number of cylinders is unequal to ECU application or • Glow plug type is unequal to ECU application
P0651	Sensor Reference Voltage "B" Circuit Open	Sensor supply voltage < 4.8 V or > 5.2 V
P066A	Glow Plug Cylinder 1 Circuit Short to Battery Voltage	Signal current > 70 A
P066C	Glow Plug Cylinder 2 Circuit Short to Battery Voltage	Signal current > 70 A
P066E	Glow Plug Cylinder 3 Circuit Short to Battery Voltage	Signal current > 70 A
P0670	Glow Plug Time Module Control Circuit Open or Short to Battery Voltage	Signal Voltage > 3.44 V
P0671	Glow Plug Cylinder 1 Circuit Open or Short to Ground	Signal current < 2.2 A
P0672	Glow Plug Cylinder 2 Circuit Open or Short to Ground	Signal current < 2.2 A
P0673	Glow Plug Cylinder 3 Circuit Open or Short to Ground	Signal current < 2.2 A
P0674	Glow Plug Cylinder 4 Circuit Open or Short to Ground	Signal current < 2.2 A
P067A	Cylinder 4 Glow Plug Control Circuit Low	Message from glow control unit = 3.44 V
P0684	Glow Plug Time Control Module Circuit No PCM Communication	<ul style="list-style-type: none"> • Missing communication from the Glow Control Unit • Automatic Glow Time Control Module = Error Message
P068A	ECM Power Relay Performance - Open to Early	Internal test
P068B	ECM Power Relay Performance - Stuck	Internal test
P0697	Sensor Reference Voltage "C" Circuit Open	Sensor supply voltage < 3.168 V or > 3.432 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P06BA	Glow Plug Cylinder 2 Resistance Check	Glow plug resistance time interval after glow start: <ul style="list-style-type: none"> • 4 - 9 s (< 0,3 O), • 9 - 14 s (< 0.4 O) • After 14 s (< 0.5 O) • Anytime (> 1.2 O)
P06BB	Glow Plug Cylinder 3 Resistance Check	Glow plug resistance time interval after glow start: <ul style="list-style-type: none"> • 4 - 9 s (< 0,3 O), • 9 - 14 s (< 0.4 O) • After 14 s (< 0.5 O) • Anytime (> 1.2 O)
P06BC	Glow Plug Cylinder 4 Resistance Check	Glow plug resistance time interval after glow start: <ul style="list-style-type: none"> • 4 - 9 s (< 0,3 O), • 9 - 14 s (< 0.4 O) • After 14 s (< 0.5 O) • Anytime (> 1.2 O)
P06C5	Glow Plug Cylinder 1 Incorrect Type	Wrong current slope
P06C6	Glow Plug Cylinder 1 Incorrect Type	Wrong current slope
P06C7	Glow Plug Cylinder 1 Incorrect Type	Wrong current slope
P06C8	Glow Plug Cylinder 1 Incorrect Type	Wrong current slope
P06FE	Cold Start Diesel Intake Air Flow Control Performance	Valve stuck open > 12%
U0001	High Speed CAN Communication Bus	CAN driver A status Bus Off.
U0002	High Speed CAN Communication Bus Performance	CAN driver A status no communication
U0029	Vehicle Communication Bus A Performance	CAN driver B status no communication
U0101	Lost Communication with TCM	Value from TCM = error state
U012C	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No TCM messages received.

DTC	Error Message	Malfunction Criteria and Threshold Value
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	Message from ABS module = missing
U0146	Lost Communication With Gateway "A"	Fault message from gateway module = true
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	Fault messages received from Instrument cluster
U0302	Software Incompatibility with Transmission Control Module	Fault message from automatic transmission module.
U0402	Invalid Data Received From Transmission Control Module	Wrong TCM messages received.
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	Implausible ABS messages sent. Veh speed > 320 km/h or missing vehicle speed data.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Error message sent from instrument cluster to ECU = invalid data.
U1024	Instrument cluster control module Read out DTC	Error message sent from instrument cluster to ECU

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1004	Torque Difference Cylinder 1 Limiting Value Exceeded	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P1005	Torque Difference Cylinder 2 Limiting Value Exceeded	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P1006	Torque Difference Cylinder 3 Limiting Value Exceeded	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm

DTC	Error Message	Malfunction Criteria and Threshold Value
P1007	Torque Difference Cylinder 4 Limiting Value Exceeded	<ul style="list-style-type: none"> • Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P13CE	Cylinder 1 Pressure Sensor Circuit Short to Battery Voltage	Signal voltage > 3.17 V
P13CF	Sensor for internal pressure of cylinder 1 Short circuit to ground	Cylinder pressure sensor voltage < 0.13 V
P13D0	Cylinder 1 Pressure Sensor Circuit Out of Range	Signal voltage < 0.33 V and/or > 3.09 V
	Cylinder 1 Constant Pressure	Deviation between maximum and minimum cylinder pressure sensor 1 < 20 bar
	Cylinder 1 Pressure Sensor Offset	Offset out of range < -7 bar and/or > 7 bar
	Cylinder 1 Plausibility With Calculated Pressure	Difference between calculated cylinder pressure, based on intake air pressure and compression ratio, and measured cylinder pressure sensor #1 out of range < -10 bar
P13D1	Cylinder 2 Pressure Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 3.17 V
P13D2	Cylinder 2 Pressure Sensor Circuit Short to Ground	Signal voltage < 0.13 V
P13D3	Cylinder 2 Pressure Sensor Circuit Out of Range	Signal voltage < 0.33 V and/or > 3.09 V
	Cylinder 2 Constant Pressure	Deviation between maximum and minimum cylinder pressure sensor 1 < 20 bar
	Cylinder 2 Pressure Sensor Offset	Offset out of range < -7 bar and/or > 7 bar
	Cylinder 2 Plausibility With Calculated Pressure	Difference between calculated cylinder pressure, based on intake air pressure and compression ratio, and measured cylinder pressure sensor #1 out of range < -10 bar and/or > 10 bar

DTC	Error Message	Malfunction Criteria and Threshold Value
P13D4	Cylinder 3 Pressure Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 3.17 V
P13D5	Cylinder 3 Pressure Sensor Circuit Short to Ground	Signal voltage < 0.13 V
P13D6	Cylinder 3 Pressure Sensor Circuit Out Of Range	Signal voltage < 0.33 V and/or > 3.09 V
	Cylinder 3 Constant Pressure	Deviation between maximum and minimum cylinder pressure sensor 1 < 20 bar
	Cylinder 3 Pressure Sensor Offset	Offset out of range < -7 bar and/or > 7 bar
	Cylinder 3 Plausibility With Calculated Pressure	Difference between calculated cylinder pressure, based on intake air pressure and compression ratio, and measured cylinder pressure sensor #1 out of range < -10 bar and/or > 10 bar
P13D7	Cylinder 4 Pressure Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 3.17 V
P13D8	Cylinder 4 Pressure Sensor Circuit Short to Ground	Signal voltage < 0.13 V
P13D9	Cylinder 4 Pressure Sensor Circuit Out Of Range	Signal voltage < 0.33 V and/or > 3.09 V
	Cylinder 3 Constant Pressure	Deviation between maximum and minimum cylinder pressure sensor 1 < 20 bar
	Cylinder 4 Pressure Sensor Offset	Offset out of range < -7 bar and/or > 7 bar
	Cylinder 4 Plausibility With Calculated Pressure	Difference between calculated cylinder pressure, based on intake air pressure and compression ratio, and measured cylinder pressure sensor #1 out of range < -10 bar and/or > 10 bar
P13E0	Cylinder 1 Pressure Sensor Circuit Plausibility Check	Pressure based measured TDC position sensor #1 out of range < -1.8 CA and/or > 1.8 CA

DTC	Error Message	Malfunction Criteria and Threshold Value
P13E1	Cylinder 2 Pressure Sensor Circuit Plausibility Check	Pressure based measured TDC position sensor #1 out of range < -1.8 CA and/or > 1.8 CA
P13E2	Cylinder 3 Pressure Sensor Circuit Plausibility check	Pressure based measured TDC position sensor #1 out of range < -1.8 CA and/or > 1.8 CA
P13E3	Cylinder 4 Pressure Sensor Circuit Plausibility check	Pressure based measured TDC position sensor #1 out of range < -1.8 CA and/or > 1.8 CA
P140C	Low Pressure Egr Sensor Position Circuit High	Position sensor signal > 4850 mV
P140E	Low Pressure Egr Sensor Position Circuit Low	Position sensor signal < 150 mV
P169A	Transport Mode Active	Transport mode active
P2100	Throttle Valve Actuator Control Motor Circuit Open	Signal Voltage < 4.7 V
P2101	Throttle Valve Actuator Control Motor Circuit Internal Electrical Error	Signal Current > 3.0 A
P2102	Throttle Valve Actuator Control Motor Circuit Short to Ground	Signal Voltage < 2.97 V
P2103	Throttle Valve Actuator Control Motor Circuit Short to Battery Voltage	Signal Current > 3.0 A
P2111	Throttle Actuator Control System Stuck Open	Valve stuck open > 12%
P2112	Throttle Actuator Control System Stuck closed	Valve stuck closed < 12%
P2122	Throttle/Pedal Position Sensor/Switch "D" Circuit Low	Signal voltage < 0.61 V
P2123	Throttle/Pedal Position Sensor/Switch "D" Circuit High	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low	Sensor 2 voltage < 0.27 V
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch "D"/"E" Voltage Correlation	Difference between app sensor 1 voltage and app sensor 2 voltage) V (tolerance 13% - 20%)

DTC	Error Message	Malfunction Criteria and Threshold Value
P2146	Fuel Injector Group "A" Supply Voltage Circuit Shorted Internally	Diagnostic signal in power stage = Failed
P2149	Fuel Injector Group "B" Supply Voltage Circuit Shorted Internally	Diagnostic signal in power stage = Failed
P2183	Engine Coolant Temperature Sensor On Radiator Circuit Range / Performance	Temperature difference to at least 3 other temperature sensors at startup > 30° K
P2184	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Short to Ground	Signal Voltage < 0.15 V
P2185	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Open or Short to Battery Voltage	Deviation to oxygen concentration > 0.046
P2195	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1	Deviation to oxygen concentration (while fuel cutoff) > 4,6 % vol/vol
P2196	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 1	Deviation to oxygen concentration (while fuel cutoff) < -6,3 % vol/vol
P2237	O2 Sensor Positive Current Control Circuit/Open Bank 1 Sensor 1	Pump current (IP) < 0.005 [-]
P2243	O2 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1	<ul style="list-style-type: none"> Nernst voltage (UN) internal resistance > 1104Ω Internal signal voltage > 3 V
P2251	2 Sensor Negative Current Control Circuit/Open Bank 1 Sensor 1	<ul style="list-style-type: none"> Virtual ground (VM) internal resistance > 1104 Ω Internal signal voltage < 1.4 V and/or > 1.6 V
P2270	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 2	Deviation to oxygen concentration during fuel cutoff > 4.6 % vol/vol
P2271	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 2	Deviation to oxygen concentration during fuel cutoff < -6.3%
P2279	Intake Air System Leak	Deviation between actual airflow and modeled mass air flow < 0.7
P2294	Fuel Pressure Metering Valve Circuit Open	Signal Current < 0.8 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2295	Fuel Pressure Metering Valve Circuit Shorted to Ground	Signal Voltage < 2.0 V
P2296	Fuel Pressure Metering Valve Circuit Shorted to Battery Voltage	Signal Current > 3.0 A
P334A	Turbocharger Boost Pressure Va,ve	> 9.3 - 15.0 A

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240F	EGR System Dynamic Check	<ul style="list-style-type: none"> • Calculated characteristics value: Positive gradient of target air mass flow > 20 [-] • Calculated characteristics value: Negative gradient of target air mass flow > 20 [-]
P2413	EGR System / Fuel Mean Value Adaption	<ul style="list-style-type: none"> • Number of learning points at fuel mass adaptation limit >= 4 • At upper limit = 6 mg/stroke • At lower limit = -6 mg/stroke
P242A	Exhaust Gas Temperature Sensor 3 Circuit Open or Short to Battery Voltage	Signal voltage > 1.72 V
P242B	Exhaust Gas Temperature Sensor 3 Circuit Plausibility Check	Comparison of upstream turbine exhaust gas temp vs modeled temperature < 45K
P242C	Exhaust Gas Temperature Sensor 3 Circuit Short to Ground	Signal voltage < 0.45 V
P244C	Exhaust Gas Temperature Sensors Circuit Feedback Check	Time to activate control loop EGT Upstream turbine > 45 s
P2452	Exhaust Pressure Sensor Circuit Short to Battery Voltage	Sensor voltage > 4.9 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2453	Exhaust Pressure Sensor Circuit Offset Detection During Afterrun	<ul style="list-style-type: none"> Differential pressure signal > 200 hPa and/or < -150 hPa or Differential pressure signal > 80 hPa and/or < -80 hPa Offset corrected differential pressure signal > 10 hPa and < -10 hPa
P2454	Exhaust Pressure Sensor Circuit Short to Ground	Signal voltage < 0.2 V
P2456	Exhaust Pressure Sensor Circuit Plausibility Check	<ul style="list-style-type: none"> Inverse change of differential pressure per time > 10 hPa/s Inverse change of differential pressure per time > -10 hPa/s
P2457	Exhaust Gas Recirculation Cooling System Performance	Sensor temperature above threshold = 40° K
P2458	Diesel Particulate Filter Regeneration Duration	Regeneration time > 90 mins.
P2459	Diesel Particulate Filter Regeneration Frequency	PM trap loading > dynamically rising threshold f (simulated engine emissions)
P2463	Diesel Particulate Filter Soot Accumulation	Calculated particulate matter trap loading > 40 g
P246E	Exhaust Gas Temperature Sensor 4 Circuit Open or Short to Battery Voltage	Signal voltage > 1.72 V
P246F	Exhaust Gas Temperature Sensor 4 Circuit Plausibility Check	<ul style="list-style-type: none"> Sensor temperature < 230° C or Temperature difference to other temp sensors during cold start < 45° K
P2470	Exhaust Gas Temperature Sensor 4 Circuit Short to Ground	Signal voltage < 0.45 V
P2478	Exhaust Gas Temperature Sensor 1 Circuit Out of Range	Control deviation > 40 K
P247A	Exhaust Gas Temperature Sensor 3 Circuit Out of Range	<ul style="list-style-type: none"> Control deviation > limit from Map or < limit from Map f (engine speed, torque)

DTC	Error Message	Malfunction Criteria and Threshold Value
P2563	Charge Pressure Actuator Position Sensor Circuit Range / Performance	Signal voltage > 4.5 V and/or < 0.3 V
	Charge Pressure Actuator Position Sensor Circuit Desired Range (Closed)	Signal voltage > 1.72 V and/or < 0.3 V
P2564	Charge Pressure Actuator Position Sensor Circuit Short to Ground	Position sensor signal voltage < 0.05 V
P2565	Charge Pressure Actuator Position Sensor Circuit	Sensor signal voltage > 4.90 V
P2610	ECM/PCM Internal Engine Off Timer Performance	Quantity count over time threshold < 7.52 or > 8.48 Sec
P2632	Auxiliary In-line Fuel Pump Circuit Open	Signal current < 0.8 mA
P2633	Auxiliary In-line Fuel Pump Circuit Short to Ground	Signal voltage < 2.0 V
P2634	Auxiliary In-line Fuel Pump Circuit Short to Battery Voltage	Signal current > 1.0 A
P268A	Fuel Injectors Calibration Not Learned / Programmed	Accumulated global release time of zero fuel calibration but disabled by rail pressure deviation > 35 s

DTC CHART

Engine Codes 2.5L CBTA, CBUA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake Camshaft Position Slow Response Bank 1	<ul style="list-style-type: none"> • Difference between target and actual > 8° CRK for > 1.8 to 2.5 Sec. • Adjustment angle < 3° CRK rotation
P0010	Intake Camshaft Position Actuator Circuit Open Bank 1	Signal voltage > 4.70 - 5.40 V
P0011	Intake Camshaft Position Timing - Over-Advanced Bank 1	<ul style="list-style-type: none"> • Difference between target and actual > 8° CRK rotation • Adjustment angle < 3° CRK rotation
P0016	Camshaft Position Sensor Angular Offset Check	Permissible deviation < -13.49 or >13.49 CRK deg.
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	• Heater voltage 4.70 to 5.40 V
P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	• Heater voltage 0 to 3.26 V
P0032	HO2S Heater Control Circuit High Bank 1 Sensor 1	Heater current > 5.50 A
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2	Heater voltage 2.34 to 3.59 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2)	Heater voltage < 2.34 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2)	Heater voltage > 3.59 A
P0042	O2 Sensor Heater Control Circuit Bank 1 Sensor 3 (CBUA ONLY)	Heater voltage 2.34 to 3.59 V
P0043	O2 Sensor Heater Control Circuit Bank 1 Sensor 3 Low (CBUA ONLY)	Heater voltage < 2.34 V
P0044	O2 Sensor Heater Control Circuit Bank 1 Sensor 3 High (CBUA ONLY)	Heater voltage > 3.59 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0070	Ambient Air Temperature	Ambient air temp < -50° C
P0071	Ambient Air Temperature Sensor Range/Performance	Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K (kelvin)
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temp > 87° C
P0106	Manifold Absolute Pressure/ BARO Pressure Range/ Performance	<ul style="list-style-type: none"> • Difference manifold pressure - lower threshold model < 0. Model range 45 to 845 hPa • Difference manifold pressure - upper threshold model > 0. Model range 640 - 1055 • Difference altitude sensor signal vs. manifold pressure signal at engine start > 60 hPa
P0107	Manifold Absolute Pressure Circuit Low Input	Signal voltage < 0.20 V
P0108	Manifold Absolute Pressure Circuit High Input	Signal voltage > 4.86 V
P0111	Intake Air Temperature Circuit Range/Performance	• Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K (kelvin)
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	IAT > 130.0° C
P0113	Intake Air Temperature Sensor 1 Circuit High Input	IAT < -46° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • No change on signal 2° K • ECT signal stuck in range 75 - 105° C and no change in signal 2° K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 140° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High Input	Engine coolant temperature < -40° C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 5.10 to 6.30% • TPS 1 calc. value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P013A	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	EWMA filtered max differential transient time at fuel cutoff ≥ 0.8 Sec. and number of checks ≥ 1
P0130	O2 Sensor Circuit Bank 1 Sensor 1	O2S ceramic temperature $< 640^{\circ} \text{C}$
P0131	O2 Sensor Circuit, Bank 1 Sensor 1 Low Voltage	Virtual mass $< 1.75\text{V}$
		UN, $< 1.50 \text{ V}$
		IA, 0.3 V
P0132	O2 Sensor Circuit, Bank 1 Sensor 1 High Voltage	Virtual mass $> 3.25 \text{ V}$
		UN, $> 4.40 \text{ V}$
		IA, $> 7.0 \text{ V}$
P0133	O2 Circuit Slow Response Bank 1, Sensor 1	<ul style="list-style-type: none"> • Difference between R2L and L2R area ratio -0.40 to 0.40 • Counter cycles completed ≥ 4 times • Gradient ratio ≥ 0.25 or ≤ 0.40 and lower value of both ratios < 0.25
P0135	O2 Heater Circuit Bank 1, Sensor 1	<ul style="list-style-type: none"> • Heater duty cycle $> 90\%$ • O2S ceramic temperature, $< 720^{\circ} \text{C}$ or <ul style="list-style-type: none"> • O2S ceramic temp $< 715^{\circ} \text{C}$ • Time after O2 heater on, 35 Sec.
P0136	O2 Circuit Bank 1, Sensor 2	<ul style="list-style-type: none"> • Delta O2S rear signal $> 2.00 \text{ V}$ • Number of checks = 6
P0137	O2 Circuit Low Voltage Bank 1, Sensor 2	<ul style="list-style-type: none"> • Cold condition: Signal voltage $< 0.06 \text{ V}$ for $> 3 \text{ Sec}$ • Difference of sensor voltage with and without load pulse $< 0.01 \text{ V}$
P0138	O2 Circuit High Voltage Bank 1, Sensor 2	Signal voltage $> 1.08 \text{ V}$ for $> 5 \text{ Sec.}$
P0139	O2 Circuit Slow Response Bank 1, Sensor 2	<ul style="list-style-type: none"> • EWMA filtered transient time at fuel cut off $> 0.6 \text{ Sec.}$ • O2 voltage between $201 - 401 \text{ mV}$ • O2S rear signal $> 0.16 \text{ V}$ during fuel cut off active

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit No Activity Detected Bank 1, Sensor 2	<ul style="list-style-type: none"> • Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse ≥ 2.80 V • Internal resistance > 40 k and exhaust temp > 670° C
P0141	O2 Heater Circuit Bank 1, Sensor 2	<ul style="list-style-type: none"> • Difference of sensor voltage with and without load pulse < 0.01 V • Internal heater resistance 1200 - 32400 Ω
P0142	O2 Sensor Circuit Bank 1 Sensor 3	<ul style="list-style-type: none"> • Delta voltage 1 step at heater switching > 2.00 V • Heater coupling ≥ 6 times
P0143	O2 Sensor Circuit Low Voltage Bank 1 Sensor 3	<ul style="list-style-type: none"> • Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse ≥ 2.80 V • Internal resistance > 40 kΩ and exhaust temp > 670° C
P0144	O2 Sensor Circuit High Voltage Bank 1 Sensor 3	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit Slow Response Bank 1 Sensor 3	<ul style="list-style-type: none"> • EWMA filtered transient time at fuel cut off > 1.5 Sec. • O2 voltage between 201 - 401 mV
P0146	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 3	<ul style="list-style-type: none"> • Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse ≥ 2.80 V • Internal resistance > 40 kΩ and exhaust temp > 670° C
P0147	O2 Sensor Heater Circuit Bank 1 Sensor 3	Internal heater resistance 1200 - 32400 Ω
P0169	Incorrect Fuel Composition	Fuel quantity out of limit or incorrect
P0201	Injector Circuit Open Cylinder 1	Low side signal voltage 4.50 - 5.50 V
P0202	Injector Circuit Open Cylinder 2	Low side signal voltage 4.50 - 5.50 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0203	Injector Circuit Open Cylinder 3	Low side signal voltage 4.50 - 5.50 V
P0204	Injector Circuit Open Cylinder 4	Low side signal voltage 4.50 - 5.50 V
P0205	Injector Circuit Open Cylinder 5	Low side signal voltage 4.50 - 5.50 V
P0221	Accelerator Pedal Position Sensor B Circuit Range/ Performance	<ul style="list-style-type: none"> • TPS 1 to TPS 2, > 5.10 to 6.3% • TPS 2 – calc position > 9 %
P0222	Accelerator Pedal Position Sensor B Circuit Low Input	Signal voltage < 0.20 V
P0223	Accelerator Pedal Position Sensor B Circuit High Input	Signal voltage > 4.81 V
P0261	Cylinder 1 Injector Circuit Low	Signal voltage < 3.00 V
P0262	Cylinder 1 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0264	Cylinder 2 Injector Circuit Low	Signal voltage < 3.00 V
P0265	Cylinder 2 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0267	Cylinder 3 Injector Circuit Low	Signal voltage < 3.00 V
P0268	Cylinder 3 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0270	Cylinder 4 Injector Circuit Low	Signal voltage < 3.00 V
P0271	Cylinder 4 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0273	Cylinder 5 Injector Circuit Low	Signal voltage < 3.00 V
P0274	Cylinder 5 Injector Circuit High	Signal current < 2.20 - 4.00 A
P2088	Camshaft Position Actuator Control Circuit Low Bank 1	Signal voltage 0.0 to 3.25 V
P2089	Camshaft Position Actuator Control Circuit High Bank 1	Signal current, > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1	Deviation lambda control < -0.03%
P2097	Post Catalyst Fuel Trim System Too Rich Bank 1	Deviation lambda control > 0.03%
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 11 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0305	Cylinder 5 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0321	Engine Speed Input Circuit Range/Performance	<ul style="list-style-type: none"> • Comparison of counted teeth and number of teeth +/- 1 tooth • Loss of reference gap during normal operation • No reference gap during engine start

DTC	Error Message	Malfunction Criteria and Threshold Value
P0322	Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • No engine speed signal but CMP signals > 5 cam shaft revs • Engine speed = no signal
P0324	Knock Control System Error	<ul style="list-style-type: none"> • Signal fault counter (combustion) > 30 or Signal fault counter measuring window > 2
P0327	Knock Sensor 1 Circuit Low Input	<ul style="list-style-type: none"> • Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0328	Knock Sensor 1 Circuit High Input	<ul style="list-style-type: none"> • Upper threshold > 1.00 V • Signal range check > 16.50 to 92 V
P0332	Knock Sensor 2 Circuit Low Input	<ul style="list-style-type: none"> • Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0333	Knock Sensor 2 Circuit High Input	<ul style="list-style-type: none"> • Upper threshold > 1 V • Signal range check > 16.50 to 92 V
P0341	Camshaft Position Sensor A Circuit Range/Performance	<ul style="list-style-type: none"> • Signal pattern incorrect • Defect counter = 8
P0342	Camshaft Position Sensor A Circuit Low Input	<ul style="list-style-type: none"> • Signal voltage permanently low • Crankshaft signals = 8
DTC	Error Message	Malfunction Criteria and Threshold Value
P0343	Camshaft Position Sensor A Circuit High Input	<ul style="list-style-type: none"> • Signal voltage permanently high • Crankshaft signals = 8
P0351	Ignition Coil A Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0355	Ignition Coil E Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Secondary Air Injection System	Deviation SAI pressure > 50 hPa
P0413	Secondary Air Injection System Switching Valve A Circuit Open	Signal voltage 9.25 to 11.25 V
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted	<ul style="list-style-type: none"> • Signal voltage > 6.0 V or • Signal current > 2.20 A
P0418	Secondary Air Injection System Control Circuit	Signal voltage 4.70 to 5.40 V
P0420	Catalyst System Efficiency Below Threshold	Oxygen storage capacity (OSC) vs OSC value of borderline catalyst < 1.00
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	EVAP pump current during reference measurement > 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	EVAP pump current during reference measurement < 15 mA
P0441	Evaporative Emission System Incorrect Purge Flow - Stuck Closed	Drop of pump current > 1.0 mA
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.9 Sec
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.70 - 5.40 V
P0448	Evaporative Emission System Vent Control Circuit Shorted	<ul style="list-style-type: none"> • Signal current > 2.2 to 4 A or • Signal voltage < 2.74 to 3.26 V
P0455	Evaporative Emission System Leak Detected (gross leak)	Time for pressure drop < 1 Sec.
P0456	Evaporative Emission System Leak Detected (very small leak)	Time for pressure drop < 5.8 Sec
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0 to 3.26 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current, > 2.2 A
P0491	Secondary Air Injection System Insufficient Flow	<ul style="list-style-type: none"> • SAI pressure vs. modeled SAI < 50 - 72% or • Absolute deviation of raw pressure signal from filtered signal mean value < 8.98 hPa
P0496	Evaporative Emission System Incorrect Purge Flow - Stuck Open	Actual EVAP pump current vs. difference from last reading > 1.00

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor Range/Performance	Vehicle speed < 4 km/h
P0503	Vehicle Speed Sensor Intermittent/Erratic/High	Vehicle speed > 325 km/h
P0506	Idle Air Control System RPM Lower Than Expected	<ul style="list-style-type: none"> • Engine speed deviation > 100 RPM • RPM controller torque value ≥ calculated max value.
P0507	Idle Control System RPM Higher than Expected	<ul style="list-style-type: none"> • Engine speed deviation < -100 RPM • RPM controller torque value ≤ calculated min. value.
P050A	Idle Air Control System Out of Range	<ul style="list-style-type: none"> • Engine speed deviation > 100 RPM • RPM controller torque value ≥ calculated max. value or • Engine speed deviation < -100 RPM • RPM controller torque value ≤ calculated min. value.
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P052A	Cold Start Camshaft Position Timing Over-Advanced	Difference between actual and target position > 10° CRK rev.

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	<ul style="list-style-type: none"> • Internal hardware/voltage check - failed • Communication CPU - Sensor IC - failed • EEPROM Check failed
P0627	Fuel Pump Control Circuit Open/Shorted to Ground	<ul style="list-style-type: none"> • Signal voltage 4.50 to 5.50 V (open circuit) • Signal voltage < 3.00 V (grounded circuit)
P0629	Fuel Pump Control Circuit High	Signal current 0.60 to 1.20 A
P0638	Throttle Actuator Control Range/Performance	<ul style="list-style-type: none"> • Time to close to reference point > 0.6 Sec. and reference point = 2.88% or • TPS 1 signal voltage, not 0.40 - 0.80 V • TPS 2 signal voltage, not (4.20 - 4.60) V
P0641	Sensor Reference Voltage "A" Circuit Open	Signal voltage deviation > +/- 0.3 V
P0651	Sensor Reference Voltage "B" Circuit Open	Signal voltage deviation > ± 0.3 V
P0697	Sensor Reference Voltage "C" Circuit Open	Signal voltage deviation > +/- 0.3 V
U0001	High Speed CAN Communication Bus	CAN message = no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out, no messages received
U0101	Lost Communication with TCM	Time out, no message received
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No CAN messages received
U0146	Lost Communication With Gateway "A"	No CAN messages received
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received

DTC	Error Message	Malfunction Criteria and Threshold Value
U0302	Software Incompatibility with Transmission Control Module	Manual transmission coded ECM but automatic transmission messages received from TCM
U0402	Invalid Data Received From Transmission Control Module	Implausible data message received
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	<ul style="list-style-type: none"> • Sensor signal failure • None, or implausible information • CAN 1 VSS signal incorrect > 327.08 km/h
U0422	Invalid Data Received From Body Control Module	Ambient temperature value initialization = 00h
U0423	Invalid Data Received From Instrument Panel Control (IPC) Module	AAT sensor reading from cluster to ECM implausible or no message
U0447	Invalid Data Received From Gateway Module	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Fuel System Out of Range	I - portion of 3rd lambda control loop > 0.03
P150A	Engine Off Timer Performance	Comparison of engine off time from Instrument Cluster control unit with ECM engine after run timer < -12 or > 12 Sec.
P1609	Crash shut-off was triggered	Airbags activated
P169A	Vehicle In Transport Mode	Transport mode active
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	<ul style="list-style-type: none"> • Duty cycle >80% • Deviation throttle value angles vs calculated value 4 to 50% • ECM driver = no fault
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failure
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.61 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.79 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.27 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs. 2 > 0.17 to 0.70 V
P2177	System Too Lean Off Idle	• Adaptive value > 28%
P2178	System Too Rich Off Idle	• Adaptive value < 20%
P2181	Cooling System Performance	ECT too low after sufficient mass air flow interval < 70-73° C
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	ECT outlet > 140° C
P2185	Engine Coolant Temperature Sensor 2 Circuit High	ECT outlet < -40° C
P2187	System Too Lean at Idle Bank 1	• Adaptive value > 5.02%
P2188	System Too Rich at Idle Bank 1	• Adaptive value < -5.02%
P2195	O2 Sensor Signal Biased/ Stuck Lean - Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor Signal Biased/ Stuck Rich - Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop < -0.07
P219C	Cylinder 1 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase
P219D	Cylinder 2 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase
P219E	Cylinder 3 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase
P219F	Cylinder 4 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase

DTC	Error Message	Malfunction Criteria and Threshold Value
P21A0	Cylinder 5 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enrichment for dedicated engine roughness increase
P2237	O2 Sensor Positive Current Control Circuit Open Bank 1, Sensor 1	<ul style="list-style-type: none"> • O2S signal front 1.49 to 1.51 V • Fuel cutoff > 3 Sec. • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S signal front > 4.70 V and Internal resistance > 950 Ω • O2S signal front < 0.20 V And Internal resistance > 950 Ω
P2251	O2 Sensor Negative Current Control Circuit Open	O2S signal front 1.47 to 1.53 V and > 950 Ω
P2257	Secondary Air Injection System Control Circuit Low	Signal voltage 0 to 3.26 V
P2258	Secondary Air Injection System Control Circuit High	Signal current .60 to 2.40 A
P2270	O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20%
P2271	O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	O2S signal rear not oscillating at reference > 598 mV and enrichment after stuck rich 15%
P2274	O2 Sensor Signal Stuck Lean Bank 1 Sensor 3	O2S rear not oscillating at reference < 0.64 to 0.65 V and enrichment after stuck lean 20%
P2275	O2 Sensor Signal Stuck Rich Bank 1 Sensor 3	<ul style="list-style-type: none"> • O2S rear not oscillating at reference > 0.64 to 0.65 V and enrichment after stuck rich 15% or • Sensor voltage of ≥ 0.15 V after oxygen mass flow (after fuel cutoff) > 3500 mg with ≥ 1 check
P2279	Intake Air System Leak	Offset value throttle mass flow > 13 kg/h

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2312	Ignition Coil E Primary Control Circuit Low	Signal current > 24.0 mA
P2313	Ignition Coil E Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current > 2.2 to 4 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.70 to 5.40 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.74 to 3.26 V

P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal voltage > 4.00 or >1.80 V
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > .5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	<ul style="list-style-type: none"> • High signal voltage > 12 Sec. • Number of checks = 30 • Cumulative time of high signal voltage during pumping > 10 Sec.
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	<ul style="list-style-type: none"> • Fluctuation of EVAP pump current during reference measurement > 1 mA • Drop of EVAP pump current during pump phase > 6 mA for \geq 3 Sec.
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	<ul style="list-style-type: none"> • Threshold 1 - Signal voltage 3.1 - 4.77 V • Threshold 2 - Signal voltage 2.5 to 3.06 V
P2431	Secondary Air Injection System Air Flow Pressure Sensor Circuit Range/Performance	Difference between SAI pressure and ambient pressure NOT -60 to 60 hPa
P2432	Secondary Air Injection System Air Flow/Pressure Sensor Circuit Low	Signal voltage < 0.5 V
P2433	Secondary Air Injection System Air Flow/Pressure Sensor Circuit High	Signal voltage > 4.5 V
P2440	Secondary Air Injection System Switching Valve Stuck Open	SAI pressure sensor measured with SAI pressure vs. modeled while SAI valve closed < 64.8%
P2450	Evaporative Emission System Switching Valve Performance/Stuck Open	EVAP pump current difference between reference measurement to idle < 3 mA
P2626	O2 Sensor Pumping Current Trim Circuit Open Bank 1 Sensor 1	O2S signal front > 4.81 V (lean)

DTC CHART

Engine Code 2.0L CBFA, CCTA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	"A" Camshaft Position Slow Response (Bank 1)	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle >= 2.50 CRK rev.
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage, > 4.7 - 5.4 V
P0011	A Camshaft Position (Bank 1) Timing over-advanced or System Performance	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle < 2.50 CRK rev.
P0016	Crankshaft Position-Camshaft Position Correlation (Bank 1, Sensor A)	<ul style="list-style-type: none"> • Permissible deviation < -11 CRK ° or • Permissible deviation > 11 rev
P0030	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1)	Heater voltage 4.70 - 5.40 V
P0031	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) Low	Heater voltage < 0 to 3.26 V
P0032	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1)	Signal current > 5.50 A
P0036	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2)	Heater voltage, 4.50 - 5.50 V
P0037	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) Low	Heater voltage < 3.00 V
P0038	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) High	Heater current 2.70 - 5.50 A
P0042	O2 Sensor Heater Control Circuit (Bank1 (1) Sensor 3)	Heater voltage 2.34 to 3.59 V
P0043	O2 Sensor Heater Control Circuit(Bank1(1)Sensor 3) Low	Heater voltage < 2.34 V
P0044	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 3) High	Heater voltage > 3.59 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0068	MAP/MAF - Throttle Position Correlation	Plausibility with fuel system <ul style="list-style-type: none"> • Load calculation < -22% Plausibility with fuel system <ul style="list-style-type: none"> • Load calculation > 22%
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature < -50 °C
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • Difference in value between ECT and AAT at engine start (depending on engine off time) > 25 K and <ul style="list-style-type: none"> • Difference in value between AAT and IAT at engine start (depending on engine off time) > 25 K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature > 77 °C
P0087	Fuel Rail/System Pressure - Too Low	<ul style="list-style-type: none"> • Fuel trim activity 0.90 - 1.15 • Pressure controller activity > 2 MPa • Difference between target and actual pressure > -16.4
P0100	Mass or Volume Air Flow A Circuit	MAF sensor signal 0 µs
P0101	Mass or Volume Air Flow A Circuit Range/Performance	Mass air flow vs. <ul style="list-style-type: none"> • upper threshold model > 60 to 800 kg/h • lower threshold model < 0 to 400 kg/h • Load calculation > 18% • Fuel system < -18%
P0102	Mass or Volume Air Flow Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow Circuit High Input	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure or BARO Sensor Range/ Performance	<ul style="list-style-type: none"> • Difference of boost pressure signal vs altitude sensor signal > 230 hPa or <ul style="list-style-type: none"> • Difference of boost pressure signal vs altitude sensor signal < -130 hPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0111	Intake Air Temperature (Sensor 1 Bank 1) Circuit	<ul style="list-style-type: none"> • Difference in value IAT - ECT @ engine start (depending on engine off time) > 25 °C and • Difference in value IAT - AAT @ engine start > 25 °C (depending on engine off time)
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	Intake air temperature > 141°C
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	Intake air temperature < -46°C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • No change on signal < 2 K or • Signal in range > 89 °C with no change on signal 1.5 °K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature > 140°C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature < -40°C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% • Actual TPS 1 calculated value > TPS 2 calculated value • TPS 1 calc. value > 9.00%
P0122	Throttle/Pedal Pos.Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1) Malfunction	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass > 1.75 V
		Nernst voltage > 1.50 V
		Adjustment voltage > 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Sensor Circuit (Bank 1, Sensor 1) Slow Response	<p>Signal dynamic slope check</p> <ul style="list-style-type: none"> • O2S signal front vs. modeled O2S signal ratio < 0.35 and > 0.01 • Lower value of both counters for area ratios L to R and R to L > = 5 times <p>Oscillation check</p> <ul style="list-style-type: none"> • Lambda amplitude signal > 20% • Cycles > 8 • Time lambda > lambda amplitude 400 m sec. <p>Delay check</p> <ul style="list-style-type: none"> • Delay modeled lambda signal minus measured signal > 460 m sec. • Cycles > 12
P0135	O2 Sensor Heater Circuit (Bank 1, Sensor 1) Malfunction	<ul style="list-style-type: none"> • Heater duty cycle, >100% • O2S ceramic temperature, < 715 °C • Time after O2S heater on 40 Sec.
P0136	O2 Sensor Circuit (Bank 1, Sensor 2) Malfunction	<ul style="list-style-type: none"> • Delta voltage one step at heater switching > 2.00 V • Number of checks ≥ 4
P0137	O2 Circuit (Bank 1, Sensor 2) Low Voltage	<p>Cold condition</p> <ul style="list-style-type: none"> • Signal voltage, < 0.06 V for 3 Sec. <p>Warm condition</p> <ul style="list-style-type: none"> • Signal voltage < 0.01 V • Reaction at closed loop enrichment - no reaction
P0138	O2 Circuit (Bank 1, Sensor 2) High Voltage	<p>Signal voltage > 1.08 V for > 5 Sec.</p>
P0139	O2 Circuit (Bank 1 Sensor 2) Slow Response	<ul style="list-style-type: none"> • EWMA filtered transient time at fuel cutoff > 0.0 Sec. • In voltage range of 201 - 401 mV • Number of checks, ≥ 3
P013A	O2 Sensor (Bank 1 Sensor 2) Slow Response - Rich to Lean	<ul style="list-style-type: none"> • EWMA filtered max differential transient time at fuel cutoff ≥ 0.5 Sec. • Number of checks ≥ 3

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit (Bank 1, Sensor 2) No Activity Detected	Signal voltage • Signal voltage, 0.40 - 0.60 V for > 3 Sec Internal resistance • > 40000 ohm
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Malfunction	Heater resistance, 702 - 5250 Ohm
P0142	O2 Sensor Circuit (Bank 1 Sensor 3)	• Delta voltage one step at heater > 2.0 V • Number of checks, 4
P0143	O2 Sensor Circuit (Bank 1 Sensor 3) Low Voltage	Cold/Warm condition • Signal voltage < 0.06 V for > 3 Sec.
P0144	O2 Sensor Circuit (Bank 1 Sensor 3) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit (Bank 1, Sensor 3) Slow Response	• EWMA filtered transient time at fuel cutoff > 1.2 Sec. • In voltage range 401.4 - 201.2 mV • Number of checks > 3
P0146	O2 Sensor Circuit (Bank 1, Sensor 3) No Activity Detected	• Signal voltage 0.40 - 0.60 V for > 3 Sec. • Internal resistance > 40000 Ohm
P0147	O2 Sensor Heater Circuit (Bank 1, Sensor 3)	Heater (ECM internal) resistance 792 - 4560 ohm
P0169	Incorrect Fuel Composition	Comparison with fuel quantity incorrect
P0171	Fuel Trim, (Bank1) System too Lean	At idle • Adaptive value > 5.02% At part-load • Adaptive value > 21%
P0172	Fuel Trim, (Bank 1) System too Rich	At idle • Adaptive value < -5.02% At part-load • Adaptive value < -21%
P0190	Fuel Rail Pressure Sensor "A" Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	Actual pressure > 20.6 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0192	Fuel Rail Pressure Sensor "A" Circuit Low Input	Signal voltage < 0.2 V
P0201	Cylinder 1 - Injector Circuit	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0202	Cylinder 2 - Injector Circuit	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0203	Cylinder 3 - Injector Circuit	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0204	Cylinder 4 - Injector Circuit	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% • Actual TPS 2 calculated value > TPS 1 calculated value • TPS 2 – calc. value > 9.00%
P0222	Throttle/Pedal Position Sensor/Switch B Low Input	Signal voltage < 0.20 V
P0223	Throttle/Pedal Position Sensor/Switch B High Input	Signal voltage > 4.81 V
P0234	Turbocharger/Supercharger Overboost Condition	Difference of set value boost pressure vs altitude sensor signal > 260 - 1275 hPa
P0236	Turbocharger Boost Sensor (A) Circuit Range/Performance	Difference of boost pressure signal vs. altitude sensor signal > 230 hPa or < -130 hPa
P0237	Turbocharger Boost Sensor (A) Circuit Low Input	Signal voltage < 0.2 V
P0238	Turbocharger Boost Sensor (A) Circuit High Input	Signal voltage > 4.88 V
P0243	Turbo/Super Charger Wastegate Solenoid A	Signal voltage > 4.4 - 5.6 V
P0245	Turbo/Super Charger Wastegate Solenoid A Low	Signal voltage < 3.25 - 2.15 V
P0246	Turbo/Sup.Charger Wastegate Solenoid A High	Signal current > 2.2 to 4 A
P025A	Fuel Pump Module Control Circuit/Open	Signal voltage 4.40 - 5.60 V
P025C	Fuel Pump Module Control Circuit Low	Signal voltage 2.15 - 3.25 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 1.10 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbo/Super Charger Underboost	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P2008	Intake Manifold Runner (Bank 1) Control Circuit/Open	Signal voltage 4.70 - 5.40 V
P2009	Intake Manifold Runner (Bank 1) Control Circuit Low	Signal voltage 0 to 3.26 V
P2010	Intake Manifold Runner (Bank 1) Control Circuit High	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit (Bank 1)	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance	<ul style="list-style-type: none"> • Deviation runner flap target position vs actual position > 25% • Actual position 0 to 100%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low	Signal voltage < 0.25 V
P2088	"A" Camshaft Position Actuator Control Circuit Low (Bank 1)	Signal voltage 0 - 3.25 V
P2089	"A" Camshaft Position Actuator Control Circuit High (Bank 1)	Signal current > 2.2 A
P2096	Post-Catalyst Fuel Trim System (Bank 1) Too Lean	Deviation lambda control < -0.03
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	Integral part of lambda control > 0.03%
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 10 °K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0321	Ign./Distributor Eng.Speed Inp.Circ. Range/Performance	<ul style="list-style-type: none"> • Comparison of counted teeth vs. reference = incorrect • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • Camshaft signal > 3 • Engine speed, no signal
P0324	Knock Control System Error	<ul style="list-style-type: none"> • Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low Input	<ul style="list-style-type: none"> • Lower threshold < -0.70 V for signal range check • Lower threshold < 0 - 1.60 V
P0328	Knock Sensor 1 Circuit High Input	<ul style="list-style-type: none"> • Upper threshold > 1.00 V or for signal range check • > 15 - 115.87 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0340	Camshaft Position Sensor Circuit	Cam adaption values out of range <ul style="list-style-type: none"> • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal pattern incorrect • Defect counter 12
P0342	Camshaft Position Sensor Circuit Low Input	<ul style="list-style-type: none"> • Signal voltage low • Crankshaft signals = 8
P0343	Camshaft Position Sensor Circuit High	<ul style="list-style-type: none"> • Signal voltage high • Crankshaft signals = 8
P0351	Ignition Coil A Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Secondary Air Injection System Malfunction	Deviation SAI pressure > 50.0 hPa
P0413	Secondary Air Injection System Switching Valve A Circuit Open	Signal voltage 4.70 - 5.40 V
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted	<ul style="list-style-type: none"> • Signal voltage 0 to 3.25 V or • Signal current > 2.20 A
P0418	Secondary Air Injection System Relay A Circuit	Signal voltage 4.70 - 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System, (Bank 1) Efficiency Below Threshold	Front: <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 1.00 • Front catalyst < 1.50 • Main catalyst < 1.00 Main: <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 0.40 • Front catalyst < .90 • While value for front catalyst < 2.00
P0441	Evaporative Emission Control System Incorrect Purge Flow	Deviation < 8% lambda controller and 35% idle controller
P0442	EVAP Emission Control System (Small Leak) Leak Detected	Time for pressure drop < 1.6 - 1.8 Sec.
P0444	EVAP Emission Control System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0455	EVAP Emission Control System (Gross Leak) Leak Detected	Time for pressure drop < 1 Sec.
P0456	EVAP Emission Control System (very small Leak) Leak Detected	Time for pressure drop, < 4.5 - 6.0 Sec.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air System Insufficient Flow. Flow Check During Catalyst Heating. (PZEV)	SAI pressure sensor vs modeled pressure < 60 to 75%

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P050A	Cold Start Idle Air Control System Performance	Out of range low: <ul style="list-style-type: none"> • Engine speed deviation < -80 RPM • Engine speed deviation > 80 RPM
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P0501	Vehicle Speed Sensor "A" Range/Performance	VSS signal < 6 km/h
P0503	Vehicle Speed Sensor "A" Intermittent/Erratic/High	Vehicle speed > 290 km/h
P0506	Idle Control System RPM Lower than Expected	Integrated engine speed deviation > 2000 RPM or engine speed deviation > 80 RPM
P0507	Idle Control System RPM Higher than Expected	Idle speed Deviation < -80 RPM
P052A	Cold Start "A" Camshaft Position Timing Over-Advanced	Difference between target and actual position > 6 CRK °
P053F	Cold Start Fuel Pressure Performance	<ul style="list-style-type: none"> • Difference between target pressure vs actual pressure: > 1.50 MPa or • < -1.50 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	ECM internal check failure or BARO failure (located in the ECM).
P062B	Internal Control Module Fuel Injector Control Performance	Internal logic failure
P0634	PCM/ECM/TCM Internal Temperature Too High	Power stage temperature > 150 °C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control (Bank1) Range/Performance	<ul style="list-style-type: none"> • Time to close to reference point > 0.6 Sec and • Reference point 2.88% • TPS 1 signal 0.40 - 0.60 V • TPS 2 signal 4.20 - 4.60 V • TPS 1 and TPS 2 4.82 - 5.18 V
P0641	Sensor Reference Voltage "A" Circuit Open	Signal voltage deviation > ± 0.3 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.1 A
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global Time Out failure
U0101	Lost Communication with TCM	Time Out failure. No message received by ECM
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	CAN communication with ABS Time Out - no message
U0146	Lost Communication With Gateway "A"	CAN communication with gateway Time Out - no message
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0402	Invalid Data Received From Transmission Control Module	Transmission Data implausible message
U0415	CAN Link to Speed Sensor	Vehicle speed > 325 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	<ul style="list-style-type: none"> • Speed sensor initialization failed • Speed sensor low voltage error failed • Implausible message received
U0422	Invalid Data Received From Body Control Module	Ambient temperature value initialization failure.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Implausible CAN message received OR ambient temperature value = 00
U0447	Invalid Data Received From Gateway "A"	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	(Bank 1), oxygen sensor correction center sensor Control limit reached	1 portion of 3rd lambda control loop > 0.030
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	<ul style="list-style-type: none"> • Pressure control activity > 0.20 MPa • Fuel trim activity < 0.80 • Difference between actual pressure vs target pressure -16.38 to 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	<ul style="list-style-type: none"> • Pressure control activity < -0.05 MPa • Fuel trim activity > 1.65 • Difference between target pressure and actual pressure -16.38 to 16.38 MPa
P12A4	Fuel Rail Pump Control Valve Stuck Closed	<ul style="list-style-type: none"> • Fuel trim activity .90 to 1.15 • Pressure control activity < -6 MPa • System Deviation < 16.38 MPa
P13EA	Cold Start Ignition Timing Performance Off Idle	Difference between commanded spark timing vs. actual value > 40%
P150A	Engine Off Time Performance	Difference between engine off time and ECM after run time < -12 Sec. or > 12 Sec.
P1609	Crash shut-off was triggered	Airbag was activated

DTC	Error Message	Malfunction Criteria and Threshold Value
P2101	Throttle Actuator Control Motor Circuit Range/performance	<ul style="list-style-type: none"> • Duty cycle >80% • Deviation throttle value angles vs. calculated value 4 - 50% • ECM power stage no failure
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failed
P2122	Throttle/Pedal Pos. Sens./ Switch D Circuit Low Input	Signal voltage < 0.61 V
P2123	Throttle/Pedal Pos. Sens./ Switch D Circuit High Input	Signal voltage > 4.79 V
P2127	Throttle/Pedal Pos. Sens./ Switch E Circuit Low Input	Signal voltage < 0.27 V
P2128	Throttle/Pedal Pos. Sens./ Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage: Difference between signal APP1 and APP2 > 0.17 - 0.70 V
P2146	Fuel Injector Group "A" Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current, < 2.6 A or • Signal current > 14.90 A
P2149	Fuel Injector Group "B" Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current, < 2.6 A or • Signal current > 14.90 A
P2177	System too lean off idle, (Bank 1)	• Adaptive value > 28%
P2178	System too rich off idle, (Bank 1)	• Adaptive value < -21%
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient mass air flow integral 74 - 84 °C
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	ECT outlet > 141 °C
P2185	Engine Coolant Temperature Sensor 2 Circuit High	ECT outlet < -43 °C
P2187	System too lean at idle, (Bank 1)	• Adaptive value > 5.02%
P2188	System too rich at idle, (Bank 1)	• Adaptive value < -5.02%
P2195	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop > 0.07

DTC	Error Message	Malfunction Criteria and Threshold Value
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop < -0.07
P2231	O2 Sensor (Bank 1 Sensor 1) Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S signal front 1.49 - 1.51 V • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S signal front > 3.25 V and Internal resistance > 1000 Ohm • O2S signal front < 0.30 V and Internal resistance > 1000 Ohm
P2251	O2 Sensor Negative Current Control Circuit Bank 1 Sensor 1 open	O2S signal front 1.47 to 1.53 V and internal resistance > 1000 Ohm
P2257	Secondary Air Injection System Control "A" Circuit Low	Signal voltage 0 to 3.26 V
P2258	Secondary air injection System Control "A" Circuit High	Signal current .60 - 2.40 A
P2270	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)	<ul style="list-style-type: none"> • O2S signal rear < -2.00 mV • Enrichment after stuck lean 27.9%
P2271	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 2)	<ul style="list-style-type: none"> • Sensor voltage of ≥ 0.15 V • After oxygen mass flow > 3000 mg • Number of checks ≥ 1
P2274	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 3)	<ul style="list-style-type: none"> • O2S rear signal not oscillating at reference < 0.62 to 0.65 V • Enrichment after stuck lean 27.9%
P2275	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 3)	<ul style="list-style-type: none"> • O2S sensor voltage ≥ 0.15 V • After oxygen mass flow (fuel cutoff) > 4500 mg • Number of checks ≥ 1
P2279	Intake Air System Leak	Threshold to detect a defective system > 1.33 - 1.60

DTC	Error Message	Malfunction Criteria and Threshold Value
P2293	Fuel Pressure Regulator 2 Performance	<ul style="list-style-type: none"> • Difference between target pressure vs. actual pressure: > 1.50 mPa or • < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	<ul style="list-style-type: none"> • Signal voltage 1.40 - 3.20 V or • Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3.0 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	<ul style="list-style-type: none"> • High signal voltage > 12 Sec. • Number of checks = 30
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	<ul style="list-style-type: none"> • Threshold 1 - Signal voltage 3.1 - 4.81 V • Threshold 2 - Signal voltage 2.5 to 3.10 V
P2431	Secondary Air Injection System Air Flow/Pressure (Bank 1) Sensor Circuit Range/Perfor	Difference between SAI pressure sensor and ambient pressure NOT -60.0 to 60.0 hPa
P2432	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Low	Signal voltage < 0.40 V
P2433	Secondary Air Injection System Air Flow/Pressure (Bank 1) Sensor Circuit High	Signal voltage > 4.65 V
P2440	Secondary Air Injection System Switching Valve Stuck Open (Bank1)	SAI pressure sensor vs modeled while SAI valve is closed < 71.1%
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

DTC CHART

Engine Code 1.8L CPKA, 2.0L CPLA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake Camshaft Position Slow Response Bank 1	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle \geq 2.50 CRK rev.
P0010	Intake Camshaft Position Actuator Circuit Open Bank 1	Signal voltage > 4.70 - 5.40 V
P0011	Intake Camshaft Position Timing - Over-Advanced Bank 1	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle < 2.50 CRK rev.
P0016	Crankshaft Position – Camshaft Position Correlation	<ul style="list-style-type: none"> • Permissible deviation < -11 CRK ° or • Permissible deviation > 11 CRK °
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	Heater voltage 4.70 to 5.40 V
P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Heater voltage 0 to 3.26 V
P0032	HO2S Heater Control Circuit High Bank 1 Sensor 1	Signal current > 5.50 A
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2	Heater voltage, 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low Bank 1 Sensor 2	Heater voltage < 3.00 V
P0038	HO2S Heater Control Circuit High Bank 1 Sensor 2	Heater current, > 2.70 - 5.50 A
P0068	MAP/MAF – Throttle Position Correlation	Plausibility with fuel system <ul style="list-style-type: none"> • Load calculation < -22% Plausibility with fuel system • Load calculation > 22%
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature < -50 °C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • Difference in value between ECT and AAT at engine start (depending on engine off time) > 25 K and • Difference in value between AAT and IAT at engine start (depending on engine off time) > 25 K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature > 77 °C
P0087	Fuel Rail/System Pressure - Too Low	<ul style="list-style-type: none"> • Fuel trim activity 0.90 - 1.15 • Output value rail pressure controller > 2 MPa • Difference between target and actual pressure > -16.4
P0100	Mass Air Flow Circuit Fault	MAF sensor signal 0 µs
P0101	Mass Air Flow Circuit Range/ Performance	<ul style="list-style-type: none"> • Mass air flow vs. • Upper upper threshold model > 60 to 800 kg/h • Lower threshold model < 0 to 400 kg/h • Load calculation > 18% and • Fuel system < -18%
P0102	Mass or Volume Air Flow Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow Circuit High Input	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure/ Barometric Pressure Circuit Range/Performance	<ul style="list-style-type: none"> • Difference of boost pressure signal vs altitude sensor signal > 230 hPa or • Difference of boost pressure signal vs altitude sensor signal < -130 hPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • Difference in value IAT - ECT @ engine start (depending on engine off time) > 25° C • Difference in value IAT - AAT @ engine start > 25° C (depending on engine off time)
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	Intake air temperature > 141° C
P0113	Intake Air Temperature Sensor 1 Circuit High Input	Intake air temperature < -46° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • No change on signal < 2 K and • Signal in range ≥ 89° C with no change and signal ≤ 110° C
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 140° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High Input	Engine coolant temperature < -40° C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or <ul style="list-style-type: none"> • TPS 1 calculated value > 9.00%
P0122	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Low Input	Signal voltage < 0.20 V
P0123	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit High Input	Signal voltage > 4.81 V
P0130	O2 Sensor Circuit Bank 1 Sensor 1	O2S ceramic temperature < 640° C
P0131	O2 Sensor Circuit, Bank 1 Sensor 1 Low Voltage	Virtual mass < 1.75 V
		Nernst voltage < 1.50 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit, Bank 1 Sensor 1 High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit Slow Response Bank 1 Sensor 1	Signal dynamic slope check <ul style="list-style-type: none"> • O2S signal front vs. modeled O2S signal ratio < 0.35 and > 0.01 • Lower value of both counters for area ratios L to R and R to L ≥ 5 times Oscillation check <ul style="list-style-type: none"> • Lambda amplitude signal > 20% • Cycles > 8 • Time lambda > lambda amplitude 400 m sec. Delay check <ul style="list-style-type: none"> • Delay modeled lambda signal minus measured signal > 460 m sec. • Cycles > 12
P0135	O2 Heater Circuit Bank 1 Sensor 1	<ul style="list-style-type: none"> • Heater duty cycle, >100% • O2S ceramic temperature < 715 °C and • Time after O2S heater on 40 Sec.
P0136	O2 Sensor Circuit Bank 1 Sensor 2 Malfunction	<ul style="list-style-type: none"> • Delta voltage one step at heater switching > 2.00 V and • Number of checks ≥ 4
P0137	O2 Circuit Low Voltage Bank 1 Sensor 2	Cold condition <ul style="list-style-type: none"> • Signal voltage, < 0.06 V for 3 Sec. Warm condition <ul style="list-style-type: none"> • Reaction at closed loop enrichment - no reaction
P0138	O2 Circuit High Voltage Bank 1 Sensor 2	Signal voltage 1.08 V for > 5 Sec.
P0139	O2 Circuit Slow Response Bank 1 Sensor 2	<ul style="list-style-type: none"> • EWMA filtered transient time at fuel cutoff > 0.0 Sec. • In voltage range of 201 - 401 mV • Number of checks ≥ 3
P013A	O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	<ul style="list-style-type: none"> • EWMA filtered max differential transient time at fuel cutoff ≥ 0.65 Sec. • Number of checks ≥ 1

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit No Activity Detected Bank 1 Sensor 2	Signal voltage • Signal voltage 0.40 - 0.60 V for > 3 Sec. Internal resistance • > 40000 ohm
P0141	O2 Heater Circuit Bank 1 Sensor 2	Heater resistance, 702 - 5250 Ohm
P0142	O2 Sensor Circuit Bank 1 Sensor 3	• Delta voltage one step at heater > 2.0 V • Number of checks, 4
P0143	O2 Sensor Circuit Low Voltage Bank 1 Sensor 3	Cold/Warm condition • Signal voltage < 0.06 V for > 3 Sec.
P0144	O2 Sensor Circuit High Voltage Bank 1 Sensor 3	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit Slow Response Bank 1 Sensor 3	• EWMA filtered transient time at fuel cutoff > 1.2 Sec. • In voltage range of 201.2 - 401.4 mV • Number of checks, 3
P0146	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 3	• Signal voltage 0.40 - 0.60 V for > 3 Sec. • Internal resistance > 40000 Ohm
P0147	O2 Sensor Heater Circuit Bank 1 Sensor 3	Heater (ECM internal) resistance 792 - 4560 ohm
P0169	Incorrect Fuel Composition	• Fuel quantity incorrect • Fuel correction factor incorrect • Internal check failed
P0171	System Too Lean Bank 1	At idle • Adaptive value > 5.02% At part-load • Adaptive value > 21%
P0172	System Too Rich Bank 1	At idle • Adaptive value < -5.02% At part-load • Adaptive value < 21%
P0190	Fuel Rail Pressure Sensor Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Pressure Sensor Circuit Range/Performance	Actual pressure > 20.6 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0192	Fuel Rail Pressure Sensor Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit Open Cylinder 1	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0202	Injector Circuit Open Cylinder 2	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0203	Injector Circuit Open Cylinder 3	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0204	Injector Circuit Open Cylinder 4	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0221	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% • Actual TPS 2 calculated value > TPS 1 calculated value • TPS 2 – calc. value > 9.00%
P0222	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Low Input	Signal voltage < 0.20 V
P0223	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit High Input	Signal voltage > 4.81 V
P0234	Turbo/Super Charger Overboost Condition	Difference of set value boost pressure vs altitude sensor signal > 260 - 1275 hPa
P0236	Turbocharger Boost Sensor Circuit Range/Performance	Difference of boost pressure signal vs altitude sensor signal > 230 or < -130 hPa
P0237	Turbocharger Boost Sensor Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger Boost Sensor Circuit High	Signal voltage > 4.88 V
P025A	Fuel Pump Module Control Circuit/Open	Signal voltage 4.40 - 5.60 V
P025C	Fuel Pump Module Control Circuit Low	Signal voltage 2.15 - 3.25 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 1.10 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger Underboost	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P2008	Intake Manifold Runner Bank 1 Control Circuit/Open	Signal voltage 4.70 - 5.40 V
P2009	Intake Manifold Runner Bank 1 Control Circuit Low	Signal voltage 0.0 to 3.26 V
P2010	Intake Manifold Runner Bank 1 Control Circuit High	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance	Deviation runner flap target position vs actual position > 25% and actual position within 0 to 100%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low	Signal voltage < 0.25 V
P2008	Intake Manifold Runner Control Circuit Open	Signal voltage 4.70 - 5.40 V
P2009	Intake Manifold Runner Control Circuit Low	Signal voltage 0 to 3.26 V
P2010	Intake Manifold Runner Control Circuit High	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor Circuit	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Deviation runner flap target position vs actual position > 25% • Actual position 0 to 100%
P2016	Intake Manifold Runner Position Sensor Circuit Low	Signal voltage < 0.25 V
P2088	A Camshaft Position Actuator Control Circuit Low	Signal voltage 0 - 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2089	A Camshaft Position Actuator Control Circuit High	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Bank1 Too Lean	Deviation lambda control < -0.03
P2097	Post Catalyst Fuel Trim System Too Rich	Integral part of lambda control > 0.03%
P3081	Engine Temperature Too Low	Cooling system temperature < 74°C - 84° C after AAT check

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0321	Engine Speed Input Circuit Performance	<ul style="list-style-type: none"> • Comparison of counted teeth vs. reference = incorrect • Monitoring reference gap failure
P0322	Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • Camshaft signal > 3 • Engine speed no signal

DTC	Error Message	Malfunction Criteria and Threshold Value
P0324	Knock Control System Error	<ul style="list-style-type: none"> • Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low	<ul style="list-style-type: none"> • Lower threshold < -70 V or for signal range check • Lower threshold < 0 - 1.60 V
P0328	Knock Sensor 1 Circuit High	<ul style="list-style-type: none"> • Upper threshold > 1.00 V or for signal range check • > 21.75 - 115.87 V
P0340	Camshaft Position Sensor Circuit	<ul style="list-style-type: none"> • Cam adaption values out of range • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal pattern incorrect • Defect counter 12
P0342	Camshaft Position Sensor Circuit Low	<ul style="list-style-type: none"> • Signal voltage low • Crankshaft signals = 8
P0343	Camshaft Position Sensor Circuit High	<ul style="list-style-type: none"> • Signal voltage high • Crankshaft signals = 8
P0351	Ignition Coil A Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0352	Ignition Coil B Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0353	Ignition Coil C Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0354	Ignition Coil D Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Secondary Air Injection System	Deviation SAI pressure sensor > 5.0 kPa
P0413	Secondary Air Injection System Switching Valve Circuit Open	Signal voltage 4.70 - 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0414	Secondary Air Injection System Switching Valve Circuit Low	<ul style="list-style-type: none"> • Signal voltage 0 to 3.25 V or • Signal current > 2.20 A
P0418	Secondary Air Injection System Control Circuit	Signal voltage 4.70 - 5.40 V
P0420	Catalyst System Efficiency Below Threshold	<p>Front:</p> <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 1.00 • Front catalyst < 1.50 • Main catalyst < 1.00 <p>Main:</p> <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 0.40 • Front catalyst < .90 • While value for front catalyst < 2.00
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	<ul style="list-style-type: none"> • EVAP pump current during reference measurement engine off > 40 mA • EVAP pump current during reference measurement engine on < 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	<ul style="list-style-type: none"> • EVAP pump current during reference measurement engine off > 15mA • EVAP pump current during reference measurement engine on > 15mA
P0441	Evaporative Emission Control System Incorrect Purge Flow	Deviation < 8% lambda controller and 35% idle controller
P0442	Evaporative Emission System Leak Detected Small Leak	Time for pressure drop < 1.6 - 1.8 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.70 to 5.40 V
P0448	Evaporative Emission System Vent Control Circuit Shorted to B+ or Ground	<ul style="list-style-type: none"> • Short to B+ - Signal current > 2.2 - 4.0 A • Short to Ground - Signal voltage < 2.74 - 3.26 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0455	Evaporative Emission System Leak Detected Gross Leak/ No Flow	Time for pressure drop < 1 Sec.
P0456	Evaporative Emission System Leak Detected Very Small Leak	Time for pressure drop, < 4.5 - 6.0 Sec
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.00 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air System Insufficient Flow	SAI pressure sensor vs modeled pressure < 60 to 75%

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P050A	Cold Start Idle Air Control System Performance	Out of range low: • Engine speed deviation < -80 RPM Out of range high: • Engine speed deviation > 80 RPM
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P0501	Vehicle Speed Sensor Range/ Performance	VSS signal < 6 km/h
P0503	Vehicle Speed Sensor Intermittend/Erratic/High	Vehicle speed > 290 km/h
P0506	Idle Control System RPM Lower than Expected	Integrated engine speed deviation > 2000 RPM or engine speed deviation > 80 RPM
P0507	Idle Control System RPM Higher than Expected	Idle speed Deviation < -80 RPM
P052A	Cold Start Camshaft Position Timing Over-Advanced	Difference between target position vs actual position: > 6° CRK

DTC	Error Message	Malfunction Criteria and Threshold Value
P053F	Cold Start Fuel Pressure Performance	Difference between target pressure vs actual pressure: > 1.50 MPa or < -1.50 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	ECM internal check failure or BARO failure (located in the ECM).
P062B	Internal Control Module Fuel Injector Control Performance	Internal logic failure
P0634	ECM Internal Temperature Too High	Power stage temperature > 150° C
P0638	Throttle Actuator Control Range/Performance	<ul style="list-style-type: none"> • Time to close to reference point > 0.6 Sec. and • Reference point 2.88% • TPS 1 signal 0.40 - 0.60 V • TPS 2 signal 4.20 - 4.60 V • TPS 1 and TPS 2 4.82 - 5.18 V
P0641	Sensor Reference Voltage A Circuit Open	Signal voltage deviation > ± 0.3 V
P0651	Sensor Reference Voltage B Circuit Open	Signal voltage deviation > ± 0.3 V
P0657	Actuator Supply Voltage Circuit Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage Circuit High	Signal current > 1.1 A
P0697	Sensor Reference Voltage Circuit Open	Signal voltage deviation > ± 0.3 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out failure
U0101	Lost Communication with TCM	Time Out failure. No message received by ECM

DTC	Error Message	Malfunction Criteria and Threshold Value
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	CAN communication with ABS Time Out - no message
U0146	Lost Communication With Gateway A	CAN communication with gateway, time out
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received
U0302	Software Incompatibility with Transmission Control Module	AT vehicle. ECM coded as MT vehicle
U0402	Invalid Data Received From Gear Shift Control Module A	Transmission Data implausible message
U0415	CAN Communication With ABS Error	<ul style="list-style-type: none"> • Speed sensor initialization failed • Speed sensor low voltage error failed • Implausible message received
U0422	Invalid Data Received From Body Control Module (IPC)	Ambient temperature value initialization failure.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Implausible CAN message received OR ambient temperature value = 00
U0447	Invalid Data Received From Gateway "A"	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Bank 1 Sensor 2 Control Limit Reached	1 portion of 3rd lambda control loop > 0.030
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	<ul style="list-style-type: none"> • Pressure control activity > 0.20 MPa • Fuel trim activity < 0.80 • Difference between actual pressure vs target pressure -16.38 to 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	<ul style="list-style-type: none"> • Pressure control activity < -0.05 MPa • Fuel trim activity > 1.65 • Difference between target pressure and actual pressure -16.38 to 16.38 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A4	Fuel Rail Pump Control Valve Stuck Closed	<ul style="list-style-type: none"> • Fuel trim activity .90 to 1.15 • Pressure control activity < -6 MPa • System Deviation < 16.38 MPa
P13EA	Cold Start Ignition Timing Performance Off Idle	Difference between commanded spark timing vs. actual value > 40%
P150A	Engine Off Timer Performance	Difference between engine off time and ECM after run time < -12 Sec. or > 12 Sec.
P1609	Crash Shut Down Was Deployed	Airbag activated
P169A	Vehicle in Transport Mode	Transport mode active
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	<ul style="list-style-type: none"> • Duty cycle >80% • Deviation throttle value angles vs. calculated value 4 - 50% • ECM power stage no failure
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failed
P2122	APP Sensor 1/APP Sensor 2 Circuit D Low Input	Signal voltage < 0.61 V
P2123	APP Sensor 1/APP Sensor 2 Circuit D High Input	Signal voltage > 4.79 V
P2127	APP Sensor 1/APP Sensor 2 Circuit E Low Input	Signal voltage < 0.27 V
P2128	APP Sensor 1/APP Sensor 2 Circuit E High Input	Signal voltage > 2.43 V
P2138	APP Sensor 1/APP Sensor 2 Circuit D/E Voltage Correlation	Signal voltage: Difference between signal APP1 and APP2 > 0.17 - 0.70 V
P2146	Fuel Injector Group "A" Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current > 2.6 A or • Signal current < 14.90 A
P2149	Fuel Injector Group "B" Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current > 2.6 A or • Signal current < 14.70 A
P2177	System Too Lean Off Idle)	• Adaptive value > 28%
P2178	System Too Rich Off Idle	Adaptive value < -21%
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient mass air flow integral 74 - 84° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	ECT outlet > 141° C
P2185	Engine Coolant Temperature Sensor 2 Circuit High	ECT outlet < -43° C
P2187	System Too Lean At Idle	• Adaptive value > 5.02%
P2188	System Too Rich At Idle	• Adaptive value < -5.02%
P2195	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1	Delta lambda of 2nd lambda control loop > 0.08
P2196	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 1	Delta lambda of 2nd lambda control loop < -0.08
P2231	O2 Sensor Bank 1 Sensor 1 Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1	• O2S signal front 1.49 - 1.51 V • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1	• O2S signal front > 3.25 V and Internal resistance > 1000 Ohm • O2S signal front < 0.30 V and Internal resistance > 1000 Ohm
P2251	O2 Sensor Negative Current Control Circuit Open Bank 1 Sensor 1	O2S signal front 1.47 to 1.53 V and internal resistance > 1000 Ohm
P2257	Secondary Air Injection System Control Circuit Low	Signal voltage 0 to 3.26 V
P2258	Secondary Air Injection System Control Circuit High	Signal current .60 - 2.40 A
P2270	O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	• Sensor voltage of ≤ 0.75 V • O2S signal rear < -2.00 mV • Enrichment after stuck lean 27.9%
P2271	O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	• Sensor voltage of ≥ 0.15 V • After oxygen mass flow > 3000 mg • Number of checks ≥ 1
P2274	O2 Sensor Signal Stuck Lean Bank 1 Sensor 3	• Sensor voltage of ≤ 0.70 V • O2S rear signal not oscillating at reference < 0.62 to 0.65 V • Enrichment after stuck lean 27.9%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2275	O2 Sensor Signal Stuck Rich Bank 1 Sensor 3	<ul style="list-style-type: none"> • O2S sensor voltage ≥ 0.15 V • After oxygen mass flow (fuel cutoff) > 4500 mg • Number of checks ≥ 1
P2279	Intake Air System Leak	Threshold to detect a defective system $> 1.33 - 1.60$
P2293	Fuel Pressure Regulator 2 Performance	<ul style="list-style-type: none"> • Difference between target pressure vs. actual pressure: > 1.50 mPa or • < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	<ul style="list-style-type: none"> • Signal voltage $1.40 - 3.20$ V or • Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Signal voltage $< 1.40 - 3.20$ V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current $> 5.1 - 7.0$ mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current $> 5.1 - 7.0$ mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage $> 5.1 - 7.0$ mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage $> 5.1 - 7.0$ mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current 2.2 to 4 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.7 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage > 2.15 - 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	<ul style="list-style-type: none"> • High signal voltage > 12 Sec. • Number of checks = 30
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	<ul style="list-style-type: none"> • Fluctuation of EVAP pump current during reference measurement engine off > 2mA • Or drop of EVAP pump current during pump phase of 3 sec > 6mA • Fluctuation of EVAP pump current during reference measurement engine on > 2mA • Or drop of EVAP pump current during pump phase of 3 sec > 6mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	Threshold 1 • Signal voltage 3.1 - 4.81 V • O2S signal 2.5 - 3.2 V Threshold 2 • O2S signal 2.5 - 3.2 V
P2431	Secondary Air Injection Sensor Performance	Difference between SAI pressure sensor and ambient pressure NOT -60.0 to 60.0 hPa
P2432	Secondary Air Injection Sensor Circuit Low	Signal voltage < 0.40 V
P2433	Secondary Air Injection Sensor Circuit High	Signal voltage > 4.65 V
P2440	Secondary Air Injection System Switching Valve Stuck Open	SAI pressure sensor vs modeled while SAI valve is closed < 71.1%
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	• Engine off EVAP pump current difference between reference measurement to idle < 3mA • Engine on EVAP pump current difference between reference measurement to idle >3mA
P2626	O2 Sensor Pumping Current Trim Circuit/Open Bank 1 Sensor 1	O2S signal front > 4.81 V

DTC CHART

Engine Code 1.8L CPRA, 2.0L CPPA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake Camshaft Position Slow Response Bank 1	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle \geq 2.50 CRK rev.
P0010	Intake Camshaft Position Actuator Circuit Open Bank 1	Signal voltage > 4.70 - 5.40 V
P0011	Intake Camshaft Position Timing - Over-Advanced Bank 1	Signal change > 8 CRK ° for > 2.9 Sec. and adjustment angle < 2.50 CRK rev.
P0016	Crankshaft Position – Camshaft Position Correlation	<ul style="list-style-type: none"> • Permissible deviation < 11° Rev or • Permissible deviation > 11° Rev
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	Heater voltage 4.70 - 5.40 V
P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Heater voltage < 0 to 3.26 V
P0032	HO2S Heater Control Circuit High Bank 1 Sensor 1	Heater current > 5.50 A
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2	Heater voltage, 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low Bank 1 Sensor 2	Heater voltage < 3.00 V
P0038	HO2S Heater Control Circuit High Bank 1 Sensor 2	Heater current, > 2.70 - 5.50 A
P0068	MAF vs Throttle Position Correlation	Plausibility with fuel system <ul style="list-style-type: none"> • Load calculation < -22% Plausibility with fuel system • Load calculation > 22%
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature < -50° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • Difference in value between ECT and AAT at engine start (depending on engine off time) > 25 K and • Difference in value between AAT and IAT at engine start (depending on engine off time) > 25 K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature > 77° C
P0087	Fuel Rail/System Pressure - Too Low	<ul style="list-style-type: none"> • Fuel trim activity 0.90 - 1.15 • Pressure controller activity > 2 MPa • Difference between target and actual pressure > -16.4
P0100	Mass Air Flow Circuit Fault	MAF sensor signal 0 µs
P0101	Mass Air Flow Circuit Range/ Performance	<ul style="list-style-type: none"> • Mass air flow vs. • Upper threshold model > 60 to 800 kg/h • Lower threshold model < 0 to 400 kg/h • Load calculation > 18% • Fuel system < -18%
P0102	Mass Air Flow Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow Circuit High Input	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure/ Barometric Pressure Circuit Range/Performance	<ul style="list-style-type: none"> • Difference of boost pressure signal vs altitude sensor signal > 230 hPa or • Difference of boost pressure signal vs altitude sensor signal < -130 hPa
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • Difference in value IAT - ECT @ engine start (depending on engine off time) > 25° C • Difference in value IAT - AAT @ engine start > 25° C (depending on engine off time)
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	Intake air temperature > 141° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0113	Intake Air Temperature Sensor 1 Circuit High Input	Intake air temperature < -46° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> • No change on signal < 2 K and • Signal in range $\geq 89^{\circ}$ C with no change and signal $\leq 110^{\circ}$ C
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 140° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High Input	Engine coolant temperature < -40° C
P0121	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value • TPS 1 calculated value > 9.00%
P0122	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Low Input	Signal voltage < 0.20 V
P0123	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit High Input	Signal voltage > 4.81 V
P0130	O2 Sensor Circuit Bank 1 Sensor 1	O2S ceramic temperature < 640° C
P0131	O2 Sensor Circuit, Bank 1 Sensor 1 Low Voltage	Virtual mass < 1.75 V
		UN > 1.50 V
		IA or IP > 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		UN > 4.40 V
		IA or IP > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit Slow Response Bank 1 Sensor 1	Signal dynamic slope check <ul style="list-style-type: none"> • O2S signal front vs. modeled O2S signal ratio < 0.35 and > 0.01 • Lower value of both counters for area ratios L to R and R to L ≥ 5 times Oscillation check <ul style="list-style-type: none"> • Lambda amplitude signal > 20% • Cycles > 8 • Time lambda > lambda amplitude 400 m sec. Delay check <ul style="list-style-type: none"> • Delay modeled lambda signal minus measured signal > 460 m sec. • Cycles > 12
P0135	O2 Heater Circuit Bank 1 Sensor 1	<ul style="list-style-type: none"> • Heater duty cycle 100% • O2S ceramic temperature < 715° C • Time after O2S heater on 40 Sec.
P0136	O2 Circuit Bank 1 Sensor 2 Malfunction	<ul style="list-style-type: none"> • Delta voltage one step at heater switching > 2.00 V and • Number of checks ≥ 4
P0137	O2 Circuit Low Voltage Bank 1 Sensor 2	Cold condition <ul style="list-style-type: none"> • Signal voltage < 0.06 V for 3 Sec. Warm condition <ul style="list-style-type: none"> • Signal voltage < 0.01 V • Reaction at closed loop enrichment - no reaction
P0138	O2 Circuit High Voltage Bank 1 Sensor 2	Signal voltage 1.08 V for > 5 Sec.
P0139	O2 Circuit Slow Response Bank 1 Sensor 2	<ul style="list-style-type: none"> • EWMA filtered transient time at fuel cutoff > 0.0 Sec. • In voltage range of 201.2 - 401.4 mV • Number of checks ≥ 3
P013A	O2 Sensor Slow Response Rich to Lean Bank 1 Sensor 2	<ul style="list-style-type: none"> • EWMA filtered max differential transient time at fuel cutoff ≥ 0.65 Sec. • Number of checks ≥ 1

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit No Activity Detected Bank 1 Sensor 2	Signal voltage • Signal voltage 0.40 - 0.60 V for > 3 Sec. Internal resistance • > 40000 ohm
P0141	O2 Heater Circuit Bank 1 Sensor 2	Heater resistance, 702 - 5250 Ohm
P0142	O2 Sensor Circuit Bank 1 Sensor 3	• Delta voltage one step at heater > 2.0 V • Number of checks, 4
P0143	O2 Sensor Circuit Low Voltage Bank 1 Sensor 3	Cold/Warm condition • Signal voltage < 0.06 V for > 3 Sec.
P0144	O2 Sensor Circuit High Voltage Bank 1 Sensor 3	Signal voltage > 1.08 V for > 5 Sec
P0145	O2 Sensor Circuit Slow Response Bank 1 Sensor 3	• EWMA filtered transient time at fuel cutoff > 1.2 Sec. • In voltage range of 201.2 - 401.4 mV • Number of checks, 3
P0146	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 3	• Signal voltage 0.40 - 0.60 V for > 3 Sec. • Internal resistance > 40000 Ohm
P0147	O2 Sensor Heater Circuit Bank 1 Sensor 3	Heater (ECM internal) resistance 792 - 4560 ohm
P0169	Incorrect Fuel Composition	• Fuel quantity incorrect • Fuel correction factor incorrect • Internal check failed
P0171	System Too Lean Bank 1	At idle • Adaptive value > 5.02% At part-load • Adaptive value > 21%
P0172	System Too Rich Bank 1	At idle • Adaptive value < -5.02% At part-load • Adaptive value < 21%
P0190	Fuel Rail Pressure Sensor Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Pressure Sensor Circuit Range/Performance	Actual pressure > 20.6 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0192	Fuel Rail Pressure Sensor Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit Open Cylinder 1	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0202	Injector Circuit Open Cylinder 2	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0203	Injector Circuit Open Cylinder 3	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0204	Injector Circuit Open Cylinder 4	<ul style="list-style-type: none"> • Low side signal current < 2.1 A • Internal logic failure
P0221	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Range/Performance	<ul style="list-style-type: none"> • TPS 1 - TPS 2 > 6.30% • Actual TPS 2 calculated value > actual TPS 1 calculated value • TPS 2 calculated value > 9.00%
P0222	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit Low Input	Signal voltage < 0.20 V
P0223	Accelerator Pedal Position Sensor 1/Accelerator Pedal Position Sensor 2 Circuit High Input	Signal voltage > 4.81 V
P0234	Turbocharger Overboost Condition	Difference of set value boost pressure vs altitude sensor signal > 260 - 1275 hPa
P0236	Turbocharger Boost Sensor Circuit Range/Performance	Difference of boost pressure signal vs altitude sensor signal > 230 or < -130 hPa
P0237	Turbocharger Boost Sensor Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger Boost Sensor Circuit High	Signal voltage > 4.88 V
P025A	Fuel Pump Module Control Circuit Open	Signal voltage > 4.4 - 5.60 V
P025C	Fuel Pump Module Control Circuit Low	Signal voltage < 2.15 - 3.25 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 1.10 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger Underboost	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P2008	Intake Manifold Runner Control Circuit Open	Signal voltage 4.70 - 5.40 V
P2009	Intake Manifold Runner Control Circuit Low	Signal voltage 0.0 to 3.26 V
P2010	Intake Manifold Runner Control Circuit High	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor Circuit	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Deviation runner flap target position vs actual position > 25% • Actual position 0 to 100%
P2016	Intake Manifold Runner Position Sensor Circuit Low	Signal voltage < 0.25 V
P2088	A Camshaft Position Actuator Control Circuit Low	Signal voltage 0 - 3.25 V
P2089	A Camshaft Position Actuator Control Circuit High	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Bank1 Too Lean	Deviation lambda control < -0.03
P2097	Post Catalyst Fuel Trim System Bank 1 Too Rich	Integral part of lambda control > 0.03
P3081	Engine Temperature Too Low	Cooling system temperature < 74°C - 84° C after AAT check

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold 1st interval Misfire Rate (MR), > 2.65% • Catalyst damage misfire rate (MR), > 3% - 20%
P0321	Engine Speed Input Circuit Performance	<ul style="list-style-type: none"> • Comparison of counted teeth vs. reference = incorrect • Monitoring reference gap failure
P0322	Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • Camshaft signal > 3 • Engine speed no signal
P0324	Knock Control System Error	<ul style="list-style-type: none"> • Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low	<ul style="list-style-type: none"> • Lower threshold < -70 V or for signal range check • Lower threshold < 0.60 - 1.60 V
P0328	Knock Sensor 1 Circuit High	<ul style="list-style-type: none"> • Upper threshold > 1.00 V or for signal range check • > 21.75 - 115.87 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0340	Camshaft Position Sensor Circuit	Cam adaption values out of range <ul style="list-style-type: none"> • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal pattern incorrect • Defect counter 12
P0342	Camshaft Position Sensor A Circuit Low	<ul style="list-style-type: none"> • Signal voltage low • Crankshaft signals = 8
P0343	Camshaft Position Sensor Circuit High	<ul style="list-style-type: none"> • Signal voltage high • Crankshaft signals = 8
P0351	Ignition Coil A Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0352	Ignition Coil B Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
DTC	Error Message	Malfunction Criteria and Threshold Value
P0353	Ignition Coil C Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed
P0354	Ignition Coil D Primary Circuit	<ul style="list-style-type: none"> • Signal current 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	AIR System	Deviation SAI pressure sensor > 5.0 kPa
P0413	AIR System Switching Valve "A" Circuit Open	Signal voltage 4.70 - 5.40 V
P0414	AIR System Switching Valve "A" Circuit Shorted	<ul style="list-style-type: none"> • Signal voltage 0 to 3.25 V or • Signal current > 2.20 A
P0418	AIR System Control "A" Circuit	Signal voltage 4.70 - 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System Efficiency Below Threshold	Front: <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 1.00 • Front catalyst < 1.50 • Main catalyst < 1.00 Main: <ul style="list-style-type: none"> • Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 0.40 • Front catalyst < .90 • While value for front catalyst < 2.00
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	<ul style="list-style-type: none"> • EVAP pump current during reference measurement engine off > 40 mA • EVAP pump current during reference measurement engine on < 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	<ul style="list-style-type: none"> • EVAP pump current during reference measurement engine off > 15mA • EVAP pump current during reference measurement engine on > 15mA
P0441	Evaporative Emission System Incorrect Purge Flow	Deviation < 8% lambda controller and 35% idle controller
P0442	Evaporative Emission System Leak Detected Small Leak	Time for pressure drop < 1.6 - 1.8 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.70 to 5.40 V
P0448	Evaporative Emission System Vent Control Circuit Shorted to B+ or Ground	<ul style="list-style-type: none"> • Short to B+ - Signal current > 2.2 - 4.0 A • Short to Ground - Signal voltage < 2.74 - 3.26 V
P0455	Evaporative Emission System Leak Detected Gross Leak/ No Flow	Time for pressure drop < 1 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0456	Evaporative Emission System Leak Detected Very Small Leak	Time for pressure drop, < 4.5 - 6.0 Sec.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.00 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air System Insufficient Flow	SAI pressure sensor vs modeled pressure < 60 to 75%

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P050A	Cold Start Idle Air Control System Performance	Out of range low: • Engine speed deviation < -80 RPM Out of range high: • Engine speed deviation > 80 RPM
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P0501	Vehicle Speed Sensor Range/Performance	VSS signal < 6 km/h
P0503	Vehicle Speed Sensor Intermittend/Erratic/High	Vehicle speed > 290 km/h
P0506	Idle Control System RPM Lower than Expected	Integrated engine speed deviation > 2000 RPM or engine speed deviation > 80 RPM
P0507	Idle Air Control System RPM Higher Than Expected	Idle speed Deviation < -80 RPM
P052A	Cold Start Camshaft Position Timing Over-Advanced	Difference between target position vs actual position: > 6° CRK
P053F	Cold Start Fuel Pressure Performance	• Difference between target pressure vs actual pressure: > 1.50 MPa or • < -1.50 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	ECM internal check failure or BARO failure (located in the ECM).
P062B	Internal Control Module Fuel Injector Control Performance	Internal logic failure
P0634	ECM Internal Temperature Too High	Power stage temperature > 150° C
P0638	Throttle Actuator Control Range/Performance	<ul style="list-style-type: none"> • Time to close to reference point > 0.6 Sec. and • Reference point 2.88% • TPS 1 signal 0.40 - 0.60 V • TPS 2 signal 4.20 - 4.60 V • TPS 1 and TPS 2 4.82 - 5.18 V
P0641	Sensor Reference Voltage A Circuit Open	Signal voltage deviation > ± 0.3 V
P0651	Sensor Reference Voltage B Circuit Open	Signal voltage deviation > ± 0.3 V
P0657	Actuator Supply Voltage Circuit Open	Signal voltage > 4.4 - 5.7 V
P0658	Actuator Supply Voltage Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage Circuit High	Signal current > 1.1 A
P0697	Sensor Reference Voltage Circuit Open	Signal voltage deviation > ± 0.3 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out failure
U0101	Lost Communication with TCM	Time Out failure. No message received by ECM
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	CAN communication with ABS Time Out - no message
U0146	Lost Communication With Gateway A	CAN communication with gateway Time Out - no message

DTC	Error Message	Malfunction Criteria and Threshold Value
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0402	Invalid Data Received From Gear Shift Control Module A	Transmission Data implausible message
U0415	CAN Communication With ABS Error	<ul style="list-style-type: none"> • Speed sensor initialization failed • Speed sensor low voltage error failed • Implausible message received
U0422	Invalid Data Received From Body Control Module (IPC)	Ambient temperature value initialization failure.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Implausible CAN message received OR ambient temperature value = 00
U0447	Lost Communication With Gateway	CAN message implausible

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Bank 1 Sensor 2 Control Limit Reached	1 portion of 3rd lambda control loop > 0.030
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	<ul style="list-style-type: none"> • Pressure control activity > 0.20 MPa • Fuel trim activity < 0.80 • Difference between actual pressure vs target pressure -16.38 to 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	<ul style="list-style-type: none"> • Fuel trim activity .90 to 1.15 • Pressure control activity < -6 MPa • System Deviation < 16.38 MPa
P12A4	Fuel Rail Pump Control Valve Stuck Closed	<ul style="list-style-type: none"> • Fuel trim activity .90 to 1.15 • Pressure control activity < -6 MPa • System Deviation < 16.38 MPa
P13EA	Cold Start Ignition Timing Performance Off Idle	Difference between commanded spark timing vs. actual value > 40%

DTC	Error Message	Malfunction Criteria and Threshold Value
P150A	Engine Off Timer Performance	Difference between engine off time and ECM after run time < -12 Sec. or > 12 Sec.
P1609	Crash Shut Down Was Deployed	Airbag was activated
P169A	Vehicle in Transport Mode	Transport mode active
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	<ul style="list-style-type: none"> • Duty cycle >80% • Deviation throttle value angles vs. calculated value 4 - 50% • ECM power stage no failure
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failed
P2122	APP Sensor 1/APP Sensor 2 Circuit D Low Input	Signal voltage < 0.61 V
P2123	APP Sensor 1/APP Sensor 2 Circuit D High Input	Signal voltage > 4.79 V
P2127	APP Sensor 1/APP Sensor 2 Circuit E Low Input	Signal voltage < 0.27 V
P2128	APP Sensor 1/APP Sensor 2 Circuit E High Input	Signal voltage > 2.43 V
P2138	APP Sensor 1/APP Sensor 2 Circuit D/E Voltage Correlation	Signal voltage: Difference between signal APP1 and APP2 > 0.17 - 0.70 V
P2146	Fuel Injector Group A Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current > 2.6 A or • Signal current < 14.90 A
P2149	Fuel Injector Group B Supply Voltage Circuit Open	<ul style="list-style-type: none"> • Signal current > 2.6 A or • Signal current < 14.70 A
P2177	System Too Lean Off Idle	Adaptive value > 28%
P2178	System Too Rich Off Idle	Adaptive value < -21%
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient mass air flow integral 74 - 84° C
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	ECT outlet > 141° C
P2185	Engine Coolant Temperature Sensor 2 Circuit High	ECT outlet < -43° C
P2187	System Too Lean At Idle	• Adaptive value > 5.02%
P2188	System Too Rich At Idle	• Adaptive value < -5.02%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2195	O2 Sensor Signal Stuck Lean Bank 1 Sensor 1	Delta lambda of 2nd lambda control loop > 0.08
P2196	O2 Sensor Signal Stuck Rich Bank 1 Sensor 1	Delta lambda of 2nd lambda control loop < -0.08
P2231	O2 Sensor Bank 1 Sensor 1 Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1	<ul style="list-style-type: none"> • O2S signal front 1.49 - 1.51 V • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1	<ul style="list-style-type: none"> • O2S signal front > 3.25 V and Internal resistance > 1000 Ohm • O2S signal front < 0.30 V and Internal resistance > 1000 Ohm
P2251	O2 Sensor Negative Current Control Circuit Open Bank 1 Sensor 1	O2S signal front 1.47 to 1.53 V and internal resistance > 1000 Ohm
P2257	AIR System Control "A" Circuit Low	Signal voltage 0 to 3.26 V
P2258	AIR System Control "A" Circuit High	Signal current .60 - 2.40 A
P2270	O2 Sensor Signal Stuck Lean Bank 1 Sensor 2	<ul style="list-style-type: none"> • Sensor voltage of ≤ 0.75 V • 2S signal rear < -2.00 mV • Enrichment after stuck lean 27.9%
P2271	O2 Sensor Signal Stuck Rich Bank 1 Sensor 2	<ul style="list-style-type: none"> • Sensor voltage of ≥ 0.15 V • After oxygen mass flow > 3000 mg • Number of checks ≥ 1
P2274	O2 Sensor Signal Stuck Lean Bank 1 Sensor 3	<ul style="list-style-type: none"> • Sensor voltage of ≤ 0.70 V • O2S rear signal not oscillating at reference < 0.62 to 0.65 V • Enrichment after stuck lean 27.9%
P2275	O2 Sensor Signal Stuck Rich Bank 1 Sensor 3	<ul style="list-style-type: none"> • Sensor voltage of ≥ 0.15 V • After oxygen mass flow (fuel cutoff) > 4500 mg • Number of checks ≥ 1
P2279	Intake Air System Leak	Threshold to detect a defective system > 1.33 - 1.60

DTC	Error Message	Malfunction Criteria and Threshold Value
P2293	Fuel Pressure Regulator 2 Performance	<ul style="list-style-type: none"> • Signal voltage 1.40 - 3.20 V or • Signal pattern incorrect
P2294	Fuel Pressure Regulator 2 Control Circuit	<ul style="list-style-type: none"> • Signal voltage 1.40 - 3.20 V or • Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current 2.2 to 4.0 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage > 2.15 - 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Range/Performance	<ul style="list-style-type: none"> • High signal voltage > 12 Sec. • Number of checks = 30
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	<ul style="list-style-type: none"> • Fluctuation of EVAP pump current during reference measurement engine off > 2mA • Or drop of EVAP pump current during pump phase of 3 sec > 6mA
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	Threshold 1 <ul style="list-style-type: none"> • Signal voltage 3.1 - 4.81 V Threshold 2 <ul style="list-style-type: none"> • Signal voltage 2.5 V • O2S signal 2.5 - 3.2 V
P2431	Secondary Air Injection Sensor Performance	Difference between SAI pressure sensor and ambient pressure NOT -60.0 to 60.0 hPa
P2432	Secondary Air Injection Sensor Circuit Low	Signal voltage < 0.40 V
P2433	Secondary Air Injection Sensor Circuit High	Signal voltage > 4.65 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2440	AIR System Switching Valve Stuck Open Bank 1	SAI pressure sensor vs modeled while SAI valve is closed < 71.1%
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	EVAP pump current difference between reference measurement to idle ≤ 3 mA
P2626	O2 Sensor Pumping Current Trim Circuit/Open Bank 1 Sensor 1	O2S signal front > 4.81 V

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