2014 Volkswagen Golf, GTI, & Golf R Quick Reference Specification Book

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DTC CHART

Engine Codes CBFA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Slow Response (Bank 1)	Signal change < 1.9 - 4.2° CRK/s
P0010	Intake (A) Camshaft Position Actuator Circuit / Open (Bank 1)	Signal voltage, > 4.40 - 5.60 V
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	Target error (Stuck position) > 6.8 - 8° CRK
P0016	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Permissible deviation < -11 CRK ° or Permissible deviation > 11 rev
P025A	Fuel Pump Open Circuit	Signal voltage 4.40 - 5.60 V
P025C	Fuel Pump Short to Ground	Signal voltage 2.15 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 1.10 A
P0030	HO2S Heater Control Circuit, Bank 1, Sensor 1, Open Circuit	Heater voltage 2.34 - 3.59 V
P0031	HO2S Heater Control Circuit Low, Bank 1, Sensor 1, Short to Ground	Heater voltage < 2.34 V
P0032	HO2S Heater Control Circuit High, Bank 1, Sensor 1, Short to B+	Heater voltage > 3.59 V
P0036	HO2S Heater Control Circuit, Bank 1, Sensor 2, Open Circuit	SULEV Heater voltage, 4.50 - 5.50 V
P0036	HO2S Heater Circuit, Bank 1, Sensor 3, Open Circuit SULEV	Heater voltage 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low, Bank 1, Sensor 2, Short to Ground	SULEV Heater voltage < 3 V ULEV Heater voltage < 3 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0038	HO2S Heater Control Circuit High, Bank 1, Sensor 2, Short to B+	Heater current, > 2.70 - 5.50 A
P0042	HO2S Heater Circuit, Bank 1, Sensor 3, Open circuit (SULEV)	Heater voltage 4.505.50 V
P0043	HO2S Heater Control Circuit Low Bank 1, Sensor 2, Short to Ground	• SULEV Heater voltage < 3 V • ULEV Heater voltage < 3 V
P0044	HO2S Heater Control Circuit High Bank 1, Sensor 2, Short to B+	Heater current, > 2.70 - 5.50 A
P050A	Idle Air Control System RPM Lower Or Higher Than Expected	Out of range-low Engine speed deviation < 80 RPM Out of range-high Engine speed deviation > 80 RPM
P0068	MAP/MAF – Throttle Position Correlation	Plausibility with fuel system load calculation < 50% Plausibility with fuel system load calculation > 50%
P0070	Ambient Air Temperature Sensor Short to B+	Ambient air temp < 45.0° C
P0071	Rationality Check	Difference value AAT - ECT @ engine start (depending on engine-off time) > 25K - 40K and Difference value AAT - IAT engine start (depending on engine-off time) > 25K - 40K
P0072	Ambient Air Temperature Sensor Circuit to Ground	Ambient air temperature > 87° C
P0087	Fuel Rail/System Pressure - Too Low	 Pressure controller activity 4 MPa Fuel trim activity 1.30 - 16.00 Difference difference between target pressure vs. actual pressure, > -16.38 mPa
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0089	Fuel Pressure Regulator 1 Performance	Actual pressure Deviation • < 100 kPa • > 100 kPa
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 lower threshold model < 12% Mass air flow vs upper threshold < 12% Load calculation >21%. 23 for ULEV only and Fuel system (mult) <-19%23 ULEV only Load calculation <21%23 for ULEV only and Fuel system (mult) >19%. 23 ULEV only and Fuel system (mult) >19%. 23 ULEV only
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 μs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4500 μs
P0106	Manifold Absolute Pressure/ Barometric Sensor Range/ Performance	Boost pressure signal • < Altitude sensor -210 hPa • > Altitude sensor +230 hPa
P0111	Intake Air Temperature Sensor 1 Rationality check ULEV only	Difference value: IAT - ECT @ engine start (depending on engine-off time, > 25 - 40 K and Difference value: IAT - AAT @ engine start (depending on engine-off time), > 25 - 40 K
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	IAT, < 45.80° C
P0113	Intake Air Temperature Sensor 1 Circuit High Input	IAT, < 45.80° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck high (140° C): • No change of signal, < 1.5K
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck low (-40° C): • No change of signal, < 1.5K

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck in range • 88.5 - 109.5° C and • No hange on signal, 1.5 K
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Difference value: ECT - AAT @ engine start (depending on engine off time) > 2540 K and Difference value: ECT - IAT @ engine start (depending on engine off time) > 2540 K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 140.30° C
P0118	Engine Coolant Temperature Sensor 1 Circuit Open	Engine coolant temperature < 39.80° C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	TPS 1 - TPS 2 > 6.30% and Actual TPS 1 calculated value > actual TPS 2 calculated value or TPS 1 calculated 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
P0130	O2 Sensor Circuit (Bank 1, Sensor 1)	O2S ceramic temperature < 640 °C
P0131	O2S Circuit, Bank 1, Sensor	VM < 2 V
	1, Low Voltage	UN < 1.75 V
		IA > 0.30 V
		IP > 0.30 V
P0132	O2 Sensor Circuit Bank 1,	VM > 3 V
	Sensor 1 High Voltage	UN > 4 V
		IA > 1.5 V
		IP > 1.5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2S Circuit Bank 1, Sensor 1, Slow Response	O2S signal front vs. modeled O2S signal ratio ≤ 0.35 and > 0.01 Cycles completed, > 12 B8 ULEV II cycles completed > 40
P0135	O2 Heater Circuit Bank 1, Sensor 1	Out of range-high O2S ceramic temperature, <715° C and Heater duty cycle, 100% Rationality check: O2S ceramic temperature, <715° C and Time after O2S heater on 40 s Out of range low: Difference between measured calibration resistance in ECM and set value, > 45 O
P0136	O2 Circuit Bank 1 Sensor 2	Delta voltage one step at heater switching > 2.0020 V Number of checks 10
P0137	O2 Circuit Low Voltage (Bank 1, Sensor 2)	Cold condition, Signal voltage, < 59.6 mV Warm condition, signal voltage < 59.6 mV Reaction at closed loop enrichment, no reaction
P0138	O2S Circuit Bank 1, Sensor 2, High Voltage	Signal voltage > 1.26 V
P0139	O2S Circuit Bank 1, Sensor 2, Slow Response	EWMA filtered transient time at fuel cutoff, > 0.4 s In voltage range, 401.4201.2 mV Number of checks (initial phase), > 3 Number of checks (step function), > 3

DTC	Error Message	Malfunction Criteria and Threshold Value
P013A	O2S Circuit Bank 1, Sensor 2, (ULEV Bank 1, Sensor 3), Slow Response, Rich to Lean	 EWMA filtered transient time at fuel cut-off, >0.4s In voltage range, 401.4201.2 mV Number of checks (initial phase), > 3 Number of checks (step function), > 3
P0140	O2S Circuit Bank 1, Sensor 2, No Activity Detected	Signal voltage, 401499 mV O2S rear internal resistance > 40 KO
P0141	O2S Heater Circuit Bank 1, Sensor 2, out of range (ULEV)	Heater resistance, 8104560 O
P0142	O2S Circuit Bank 1, Sensor 3, Heater Check	Delta voltage one step at heater > 2.0 V Number of checks 10
P0143	O2S Circuit Bank 1, Sensor 3, Short to Ground	 Cold condition, Signal voltage, 59.6 mV Warm condition, signal voltage 59.6 mV Short to B+, voltage > 1.26 V
P0144	O2S Circuit Bank 1, Sensor 3, Short to B +	Signal voltage > 1.26 V
P0145	O2S Circuit Bank 1, Sensor 2, Slow Response	 EWMA filtered transient time at fuel cutoff, >0.4 s In voltage range, 401.4201.2 mV Number of checks (initial phase), > 3 Number of checks (step function), > 3
P0146	O2S Circuit Bank 1, Sensor 3, Open Circuit	• Signal voltage, 401.4499 mV • Internal resistance, 40 KO
P0147	O2S Circuit Bank 1, Sensor 3 Heater check (SULEV)	Heater resistance 1056 11656 O
P0171	System (Bank 1) Too Lean	Lean @ idle Adaptive value > 21% Lean @ part-load Adaptive value 26 (only B8 ULEVVII)

DTC	Error Message	Malfunction Criteria and Threshold Value
P0172	System (Bank 1) Too Rich	Too rich at idle Adaptive value < 5.02% (< 6.0 only B8 ULEV) Too rich at part-load Adaptive value < 21% (-26 (only B8 ULEVVII)
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 20.6 MPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit/Open - Cylinder 1	Low side signal current < 2.1 A
P0202	Injector Circuit/Open - Cylinder 2	Low side signal current < 2.1 A
P0203	Injector Circuit/Open - Cylinder 3	Low side signal current < 2.1 A
P0204	Injector Circuit/Open - Cylinder 4	Low side signal current < 2.1 A
P0221	Throttle / Pedal Position Sensor / Switch B Circuit Range / Performance	TPS 1 - TPS 2 > 6.30% and Actual TPS 2 calculated value TPS 1 calculated value or TPS 2 calculated value or 9.00%
P0222	Throttle / Pedal Position Sensor / Switch B Circuit Low Input	Signal voltage < 0.20 V
P0223	Throttle / Pedal Position Sensor / Switch B Circuit High Input	Signal voltage > 4.81 V
P0234	Turbocharger / Supercharger Overboost Condition Rationality Check High	Difference of set value boost pressure vs altitude sensor signal > 260 - 1275 hPa
P0236	Turbocharger / Supercharger Boost Sensor A Plausibility check (ULEV)	Difference boost pressure signal vs altitude sensor signal, > 230 hPa Difference boost pressure signal vs altitude sensor signal, < 130 hPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0237	Turbocharger / Supercharger Boost Sensor A Circuit Low	Signal voltage, < 0.20 V
P0238	Turbocharger / Supercharger Boost Sensor A Circuit High	Signal voltage, > 4.88 V
P0243	Turbocharger / Supercharger Wastegate Solenoid A	Signal voltage, > 4.405.60 V
P0245	Turbocharger / Supercharger Wastegate Solenoid A Low	Signal voltage, < 2.153.25 V
P0246	Turbocharger / Supercharger Wastegate Solenoid A High	Signal current > 2.20 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
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	Signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger / Supercharger Underboost Rationality Check Low	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P2004	Intake Manifold Runner Control Stuck Open Bank 1	Normal closed position, unable to reach Signal voltage, < 2.62 or > 4.65 V or Normal open position, unable to reach Signal voltage, < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit / Open Bank 1	Signal voltage 4.40 - 5.60 V
P2009	Intake Manifold Runner Control Circuit / Shorted Bank 1	Signal voltage 2.153.25 V
P2010	Intake Manifold Runner Control Circuit / Shorted to B+ Bank 1	Signal current > 2.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
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 Bank 1	Deviation runner flap position vs actual position > 25%
P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)	Signal voltage < 0.25 V
P2088	A Camshaft Position Actuator Control Circuit Low Bank 1 Short to Ground	Signal voltage, < 2.153.25 V
P2089	A Camshaft Position Actuator Control Circuit High Bank 1 Short to B+	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1	I-portion of 2nd lambda control loop <0.03
P2097	Post-Catalyst Fuel Trim System Too Rich Bank 1	I-portion of 2nd lambda control loop >0.03

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	"> 2.1 (PZEV) > 1.9 (Bin 5 / B8 ULEV II)"
P0301	Cylinder 1 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0302	Cylinder 2 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0303	Cylinder 3 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0304	Cylinder 4 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5

DTC	Error Message	Malfunction Criteria and Threshold Value
P0321	Engine Speed Input Circuit Performance	Counted teeth versus reference, incorrect or Monitoring reference gap failure
P0322	Ignition / Distributor Engine Speed Input Circuit No Signal	Camshaft signal > 3 Engine speed, no signal
P0324	Knock Control System Error	 Signal fault counter (combustion) > 24 or Signal fault counter (measuring window) > 2.00 Communication errors SPI communication > 25
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground, Port B	Lower threshold, < 0.70 V
P0327	Knock Sensor 1 Circuit Short to ground, Port A	Lower threshold, < 0.70 V
P0327	Knock Sensor 1 Circuit Signal Range Check	Lower threshold, < 0.0 - 2.1582 V
P0328	Knock Sensor 1 Circuit (Bank 1) Signal Range Check	Upper threshold 29.0674 - 114.9023 V
P0328	Knock Sensor 1 (Bank 1) Circuit short to B+ Port B	Upper threshold > 1.00 V
P0328	Knock Sensor 1 (Bank 1) Circuit short to B+ Port A	Upper threshold > 1.00 V
P0340	Camshaft Position Sensor A Circuit (Bank 1 or Single Sensor)	Cam adaption values out of range • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor A Circuit Range / Performance (Bank 1 or Single Sensor)	Signal pattern incorrect
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	Signal voltage low and crankshaft signals, 8.0
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	Signal voltage low and crankshaft signals, 8.0

DTC	Error Message	Malfunction Criteria and Threshold Value
P0351	Ignition Coil A Primary / Secondary Circuit	Signal current 0.25 to -2.0 mA or Internal check failed
P0352	Ignition Coil B Primary / Secondary Circuit	Signal current 0.25 to -2.0 mA or Internal check failed
P0353	Ignition Coil C Primary / Secondary Circuit	Signal current 0.25 to -2.0 mA or Internal check failed
P0354	Ignition Coil D Primary / Secondary Circuit	Signal current 0.25 to -2.0 mA or Internal check failed
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal voltage > 5.1 - 7.0 V
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal voltage > 5.1 - 7.0 V
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 V
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 V

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	System Check after SAI PZEV Only	Deviation SAI pressure > 50.0 hPa
P0413	Open Circuit PZEV Only	Signal voltage, 9.2511.25 V
P0414	Short to Ground PZEV Only	Signal voltage < 6.00 V
P0415	Short to B+ PZEV Only	Signal current 2.204.20 A
P0418	Air Pump Relay. Open Circuit. PZEV Only	• Signal voltage 4.50 - 5.50 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	Measured OSC / OSC of borderline catalyst value for front catalyst, < 0.40 or Value for front catalyst, < 1.30 and Value for main catalyst, < 1.20
P0420	Catalyst System (main) Efficiency Below Threshold (Bank 1) PZEV Only	Measured OSC / OSC of borderline catalyst value for main catalyst, < 0.90 while Value for front catalyst, < 2.00
P0420	Catalyst System (only Bin 5, ULEV) Efficiency Below Threshold (Bank 1)	Measured OSC / OSC of borderline catalyst. EWMA filter value for catalyst, < .20
P0441	Evaporative Emission System Incorrect Purge Flow	Reaction of idle controller or lambda controller Deviation less than 7% lambda controller AND 35% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.551.75s.
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	Engine off • EVAP pump current during reference measurement < 15.0 mA Engine on • EVAP pump current during reference measurement > 15.0 mA
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 > 4.40 - 5.40 V
P0455	Evaporative Emission System Leak Detected (Gross Leak/ No Flow)	Time for pressure drop < 0.95 Sec.
P0456	Evaporative Emission System Leak Detected (Very Small Leak)	< 4.5 - 6.0 Sec

DTC	Error Message	Malfunction Criteria and Threshold Value
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 2.15 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air Injection System Insufficient Flow. Flow Check during Cat. Heating. SULEV Only	SAI pressure measured with SAI pressure sensor vs modeled < 0.6 (0.62) %

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor A Range / Performance	VSS signal < 4 km/h
P0501	Vehicle Speed Sensor A Range / Performance Only (ULEV)	VSS signal < 4 km/h
P0503	Vehicle Speed Sensor A Out of range high	Vehicle speed > 200 km/h
P0506	Idle Air Control System RPM Lower Than Expected	Engine speed deviation < -80 RPM
P0507	Idle Air Control System RPM Higher Than Expected	Engine speed deviation > -80 RPM

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Checksum Incorrect
P0606	ECM Processor	Powerup calibration • EEPROM check, failed A/D channel conversion • Check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0627	Fuel Pump "A" Control Circuit /Open	Internal error fuel pump control unit Feedback from fuel pump control unit Pump blocked short circuit to battery +, ground or open circuit
P0638	Throttle Actuator Control Range / Performance - Bank 1	Rationality check: • Time to close to reference point > 0.56s. and • Reference point 2.88% Signal range check: • Duty cycle > 80% and • ECM power stage, no failure
P0641	Sensor Reference Voltage A Circuit Open	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage, < 4.6-5 V
P0643	Sensor Reference Voltage A Circuit High	5 V supply voltage > 4.99-5.41 V
P0651	Sensor Reference Voltage B Circuit Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage, < 4.6-5 V
P0653	Sensor Reference Voltage B Circuit High	5 V supply voltage >4.99-5.41 V
P0657	Actuator Supply Voltage A Circuit Open	Signal voltage > 4.40 - 5.60 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.10 A
P0685	ECM / PCM Power Relay Control Circuit/Open	Signal voltage, 2.6-3.7 V Sense circuit voltage, > 6 V
P0686	ECM / PCM Power Relay Control Circuit Low	Signal voltage, 2.6-3.7 V Sense circuit voltage, > 6 V
P0687	ECM / PCM Power Relay Control Circuit High	• Signal current, >1.4-0.7 A • Sense circuit voltage, < 6 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0688	ECM / PCM Power Relay Sense Circuit	Sense voltage, < 3.0 V Difference sense circuit voltage with camshaft actuator commanded off and on > 2.5 V Battery voltage > 3 V
P0697	Sensor Reference Voltage C Circuit / Open	Signal voltage, deviation +/- 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage, < 4.6 - 5 V
P0699	Sensor Reference Voltage C Circuit High	5 V supply voltage > 4.99 - 5.41 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global Time Out
U0100	Lost Communication with ECM / PCM A	Failure of all CAN engine messages, Time out more than 490 mSec Failure of all CAN engine messages but not all CAN messages, Time out more than 1010 mSec
U0101	Lost Communication with TCM	Checksum check Failed Message counter check failed Time out check No message received by ECM
U0121	CAN ABS brake unit	CAN communication with brake unit, time-out
U0146	CAN gateway A	CAN communication with gateway Time Out - no message
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0323	CAN: Instrument Cluster Audi Only	Ambient temp value module not encoded for ambient temp sensor, 00h
U0402	CAN Communication with TCM	Data length code transmitted, incorrect

DTC	Error Message	Malfunction Criteria and Threshold Value
U0404	Invalid Data Received From Gear Shift Control Module	If the value of message counter is permanent, constant, or change exceeds a threshold, increment an event counter Maximum change of message counter > 5
U0415	CAN link to speed sensor	Speed sensor initialization failed
U0422	CAN: Instrument Cluster	Ambient temp. value (initialization), Audi, 01h
U0447	CAN Gateway	CAN message incorrect
U102E	LIN Communication	LIN message incorrect
U102F	LIN Communication	Time out
U1030	LIN Communication	Not active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k O (dep. on mod. exhaust temp. and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	Pressure control activity 2.50 MPa and Fuel trim activity < 0.80 and Difference between actual pressure vs target pressure -16.38 to 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	Pressure control activity < -0.05 MPa Fuel trim activity > 1.30 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	Pressure control activity < 6.00 MPa Fuel trim activity .90 to 1.15 Difference between target pressure vs. actual pressure, - < 16.38 mPa
P2101	Throttle Actuator Control Motor Circuit Range Performance	Duty cycle >80% ECM power stage no failure Deviation throttle value angles vs. calculated value 4 - 50%
P2106	Throttle Actuator Control System - Short to B+ or Ground	Internal check
P2106	Throttle Actuator Control System Open Circuit	Internal check
P2106	Throttle Actuator Control System Temp. Current Monitoring	Internal check failed
P2106	Throttle Actuator Control System Functional Check	Internal check failed
P2110	Throttle Actuator Control System - Forced Limited RPM	Engine load out of range
P2122	Throttle / Pedal Position Sensor / Switch D Circuit Low Input	Signal voltage < 0.606 V
P2123	Throttle / Pedal Position Sensor / Switch D Circuit High Input	Signal voltage > 4.794 V
P2127	Throttle / Pedal Position Sensor / Switch E Circuit Low Input	Signal voltage < 0.268 V
P2128	Throttle / Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.431 V
P2138	Throttle / Pedal Position Sensor / Switch D / E Voltage Correlation	Signal voltage sensor 1 vs 2, 0.1670.703 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Signal current, >14.90 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to Ground	Signal current > 14.90 A
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow interval, < 7484° C (SULEV) < 6084° C (ULEV)
P2195	O2S 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
P2231	O2S 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 1.493 1.507 V O2S signal front < 1.70020 V and Fuel cutoff >3.00 s O2S signal front 1.501.51 V Delta lambda controller, > 0.10
P2243	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1	O2S signal front >4.70 V and Internal resistance > 1000 O O2S signal front < 0.30 V And Internal resistance > 1000 O
P2257	Air Pump Relay. Short to Grnd. PZEV Only	Signal voltage < 3.00 V
P2258	Air Pump Relay. Short to B+. PZEV Only	Signal current 0.601.20 A
P2270	O2S Circuit Slow Response Bank 1, Sensor 3 (ULEV)	Rationality check, O2S signal rear, < 0.620 - 0.654 mV
P2270	O2S Circuit Slow Response Bank 1, Sensor 2 (SULEV)	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2271	O2S Circuit Bank 1 - Sensor 3 (ULEV)	Measurement range from fuel cutoff to voltage threshold, ≤ 152.3 mV Number of checks (initial phase), ≥ 1
P2271	O2S Circuit Bank 1 - Sensor 2 (SULEV)	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2274	O2S Circuit Slow Response Bank 1, Sensor 3 (SULEV)	Rationality check, O2S signal rear, < 0.620 - 0.654 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P2275	O2S Circuit Slow Response Bank 1, Sensor 3 (SULEV)	Measurement range from fuel cutoff to voltage threshold, ≤ 152.3 mV number of checks (initial phase), ≥ 1 ULEV O2S signal rear,>0.620 - 0.654 mV
P2279	Intake Air System Leak	Threshold to detect a defective system >1.331.6 and Ratio of the tie system defective during the measurement window to the whole duration of the measurement window > 0.60000
P2293	Fuel Pressure Regulator 2 Performance	Difference between target pressure vs. actual pressure, > 1.50mPa Difference between target pressure vs. actual pressure, < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit open circuit	Signal voltage 2.30 - 2.70 V
P2294	Fuel Pressure Regulator 2 Control Circuit Rationality Check	Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	< 1.802.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage >3.9 V

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.40 - 5.60 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
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 Range/Performance	High signal voltage > 30.4 V and Number of checks 30.0
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	Signal voltage 3.104.81 V O2S signal, 2.53.2 Signal Voltage 2.5 V O2S signal 2.53.1 V
P2431	Rationality Check	Difference between SAI pressure and ambient pressure, NOT -25.025.00 hPa
P2432	Signal range check	Signal voltage < 0.40 V
P2433	Signal range check	Signal voltage > 4.65 V
P2440	System check after SAI PZEV only	SAI pressure measured with SAI pressure sensor vs modeled while SAI valve closed. < 0.55%
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	Signal voltage < 0.2 V
P2568	RIS Sensor Wrong Signal PZEV Only	Signal of sensor mismatched with radiator or Signal of sensor mismatched with radiator
P2569	RIS Sensor Signal Low PZEV Only	Signal voltage < 0.2 V
P2570	RIS Sensor Signal always High PZEV Only	Signal voltage > 5.0 V
P2626	O2S Pumping Current Trim Circuit/Open Bank 1 Sensor 1	O2S signal front > 4.81 V
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 9.80° K

DTC CHART

Engine Codes CCTA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Slow Response (Bank 1)	Signal change < 1.9 - 4.2° CRK/s
P0010	Intake (A) Camshaft Position Actuator Circuit / Open (Bank 1)	Signal voltage, >4.40 - 5.60 V
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	Target error (Stuck position) > 6.8 - 8° CRK
P0016	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Permissible deviation < -11° Rev or Permissible deviation > 11° Rev
P0030	HO2S Heater Control Circuit, Bank 1, Sensor 1, Open Circuit	Heater voltage 2.34 - 3.59 V
P0031	HO2S Heater Control Circuit Low, Bank 1, Sensor 1, Short to Ground	Heater voltage < 2.34 V
P0032	HO2S Heater Control Circuit High, Bank 1, Sensor 1, Short to B+	Heater voltage > 3.59 V
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2 Open Circuit	SULEV Heater voltage, 4.50 - 5.50 V
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2 Open Circuit SULEV	Heater voltage, 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low, Bank 1, Sensor 2, Short to ground	SULEV Heater voltage < 3 V ULEV Heater voltage < 3 V
P0038	HO2S Heater Control Circuit High, Bank 1, Sensor 2, Short to B+	Heater current, > 2.70 - 5.50 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0042	HO2S Heater Circuit, Bank 1, Sensor 3, Open Circuit (SULEV)	Heater voltage 4.505.50 V
P0043	HO2S Heater Control Circuit Low Bank 1, Sensor 2, Short to Ground	SULEV Heater voltage < 3 V ULEV Heater voltage < 3 V
P0044	HO2S Heater Control Circuit High Bank 1, Sensor 2, Short to B+	Heater current, > 2.70 - 5.50 A
P050A	Idle Air Control System RPM Lower Or Higher Than Expected	Out of range-low • Engine speed deviation < 80 RPM Out of range-high • Engine speed deviation > 80 RPM
P0068	MAP/MAF – Throttle Position Correlation	 Plausibility with fuel system, load calculation < 50% Plausibility with fuel system, load calculation > 50%
P0070	Ambient air temp sensor short to B+	Ambient air temperature < 45.0° C
P0071	Rationality Check	Difference value AAT - ECT @ engine start (depending on engine-off time) > 25K - 40K and Difference value AAT - IAT engine start (depending on engine-off time) > 25K - 40K
P0072	Ambient Air Temp Sensor Short to Ground	Ambient air temperature > 87.0° C
P0087	Fuel Rail/System Pressure - Too Low	Pressure controller activity > 4.00 MPa Fuel trim activity, 1.30 - 16.00 and Difference between target pressure vs. actual pressure, > -16.38 mPa
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa
P0089	Fuel Pressure Regulator 1 Performance	Actual pressure Deviation • < 100 kPa • > 100 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0100	Mass or Volume Air Flow A Circuit	MAF sensor signal 0 μs
P0101	Mass Air Flow Ciruit Range/ Performance	Mass air flow vs lower threshold model < 12% Mass air flow vs upper threshold < 12% Load calculation > 21%. 23 for ULEV only and Fuel system (mult) < -19%23 ULEV only Load calculation < 21%23 for ULEV only and Fuel system (mult) > 19%. 23 ULEV only
P0102	Mass or Volume Air Flow Circuit Low Input	MAF sensor signal < 66 μs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4500 μs
P0106	Manifold Absolute Pressure/ Barometric Sensor Range/ Performance	Boost pressure signal < Altitude sensor signal 210 hPa or Altitude sensor + 230 hPa
P0111	Intake Air Temperature Sensor 1 Rationality Check ULEV Only	Difference value: IAT - ECT @ engine start (depending on engine-off time, > 25 - 40 K and Difference value: IAT - AAT @ engine start (depending on engine-off time), > 25 - 40 K
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 < 45.80° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck high (140° C): • No change of signal < 1.5 K
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck low (-40° C): • No change of signal < 1.5 K

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Stuck in range • 88.5 - 109.5° C and • No change on signal, 1.5 K
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance. Only SULEV	Difference value: ECT - AAT @ engine start (depending on engine off time) > 2540 K and Difference value: ECT - AAT @ engine start (depending on engine off time) > 2540 K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 140.30° C
P0118	Engine Coolant Temperature Sensor 1 Circuit Open	Engine coolant temperature < 39.80° C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	TPS 1 - TPS 2, > 6.30% Actual TPS 1 - calc. value, > actual TPS 2 calc. value or TPS 1 calculated 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
P0130	O2S Circuit Bank 1 Sensor 1	O2S ceramic temperature < 640° C
P0131	O2S Circuit, Bank 1 Sensor 1	VM > 2 V
	Low Voltage	UN > 1.75 V
		IA or IP > 0.30 V
P0132	O2S Circuit, Bank 1 Sensor 1	VM > 3 V
	High Voltage	UN > 4 V
		IA or IP > 7 V
P0133	O2S Circuit Bank 1, Sensor 1, Slow Response	O2S signal front vs. modeled O2S signal ratio ≤ 0.35 and > 0.01 Cycles completed, > 12 B8 ULEV II cycles completed > 40

DTC	Error Message	Malfunction Criteria and Threshold Value
P0135	O2S Heater Circuit Bank 1 Sensor 1	Out of range-high O2S ceramic temperature, < 715° C and Heater duty cycle, 100% Rationality check: O2S ceramic temperature, < 715° C and Time after O2S heater on 40 s Out of range low: Difference between measured calibration resistance in ECM and set value, > 45 O
P0136	O2S Circuit Bank 1 Sensor 2 Malfunction	Delta voltage one step at heater switching > 2.0020 V Number of checks 10
P0137	O2S Circuit Low Voltage Bank 1 Sensor 2	 Cold condition, signal voltage, 59.6 mV Warm condition, signal voltage 59.6 mV Reaction at closed loop enrichment, no reaction
P0138	O2S Circuit Bank 1, Sensor 2, High Voltage	Signal voltage > 1.26 V.
P0139	O2S Circuit Bank 1, Sensor 2, Slow Response	EWMA filtered transient time at fuel cutoff > 0.4 s In voltage range, 401.4201.2 mV Number of checks, > 3 Number of checks (step function), > 3
P013A	O2S Circuit Bank 1, Sensor 2, (ULEV Bank 1, Sensor 3), Slow Response, Rich to Lean	 EWMA filtered transient time at fuel cutoff > 0.4 s In voltage range, 401.4201.2 mV Number of checks, > 3 Number of checks (step function), > 3
P0140	O2S Circuit Bank 1, Sensor 2, No Activity Detected	Signal voltage, 401499 mV Internal resistance > 40 KO
P0141	O2S Heater Circuit Bank 1, Sensor 2, out of range (ULEV)	Heater resistance, 8104560 O

DTC	Error Message	Malfunction Criteria and Threshold Value
P0142	O2S Circuit Bank 1, Sensor 3, Heater check	Delta voltage one step at heater switching, >2.0 V Number of checks, 10
P0143	O2S Circuit Bank 1, Sensor 3, Short to Ground	 Cold condition, Signal voltage, 59.6 mV Warm condition, signal voltage 59.6 mV Short to B+, voltage > 1.26 V
P0144	O2S Circuit Bank 1, Sensor 3, Short to B +	Signal voltage > 1.26 V
P0145	O2S Circuit Bank 1, Sensor 2, Slow Response	EWMA filtered transient time at fuel cutoff, >0.4 s In voltage range, 401.4 201.2 mV Number of checks (initial phase), > 3 Number of checks (step function), > 3
P0146	O2S Circuit Bank 1, Sensor 3, Open Circuit	• Signal voltage, 401.4499 mV • Internal resistance > 40 KO
P0147	O2S Circuit Bank 1, Sensor 3 Heater check (SULEV)	Heater resistance 1056 11656 O
P0171	System Too Lean Bank 1	Lean @ idle Adaptive value >21% Lean @ part-load Adaptive value 26 (only B8 ULEVVII)
P0172	System Too Rich Bank 1	Too rich at idle Adaptive value < 5.02% (< 6.0 only B8 ULEV) Too rich at part-load Adaptive value < 21% (-26 (only B8 ULEVVII)
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 20.6 MPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 2.0 V
P0201	Injector Circuit Open - Cylinder 1	Low side signal current < 2.1 A
P0202	Injector Circuit Open - Cylinder 2	Low side signal current < 2.1 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0203	Injector Circuit Open - Cylinder 3	Low side signal current < 2.1 A
P0204	Injector Circuit Open - Cylinder 4	Low side signal current < 2.1 A
P0221	Throttle / Pedal Position Sensor / Switch B Circuit Range / Performance	TPS 1 - TPS 2 > 6.30% and Actual TPS 2 calculated value > actual TPS 1 calculated value or TPS 2 calculated value > 9.00%
P0222	Throttle / Pedal Position Sensor / Switch B Circuit Low Input	Signal voltage < 0.20 V
P0223	Throttle / Pedal Position Sensor / Switch B Circuit High Input	Signal voltage > 4.81 V
P0234	Turbocharger / Supercharger Overboost Condition Rationality Check High	Difference set value boost pressure vs actual boost pressure value, > 200 1275 hPa
P0236	Turbocharger / Supercharger Boost Sensor A Plausibility check (ULEV)	 Diff. boost pressure signal vs altitude sensor signal, >230 hPa Diff. boost pressure signal vs altitude sensor signal, <130 hPa
P0237	Turbocharger / Supercharger Boost Sensor A Circuit Low	Signal voltage < 0.20 V
P0238	Turbocharger / Supercharger Boost Sensor A Circuit High	Signal voltage > 4.88 V
P0243	Turbocharger / Supercharger Wastegate Solenoid A	Signal voltage, > 4.405.60 V
P0245	Turbocharger / Supercharger Wastegate Solenoid A Low	Signal voltage, < 2.153.25 V
P0246	Turbocharger / Supercharger Wastegate Solenoid A High	Signal current > 2.20 A
P025A	Fuel Pump Open Circuit	Signal voltage > 4.40 - 5.60 V
P025C	Fuel Pump Short to Ground	Signal voltage 2.15 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 1.10 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.10 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 < 2.10 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.10 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Signal current < 2.10 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger / Supercharger Underboost Rationality Check Low	Difference of set boost pressure vs actual boost pressure value > 150 hPa
P2004	Intake Manifold Runner Control Stuck Open Bank 1	 Normal closed position, unable to reach Signal voltage, < 2.62 or > 4.65 V and Normal open position, unable to reach Signal voltage, < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit / Open Bank 1	Signal voltage 4.40 - 5.60 V
P2009	Intake Manifold Runner Control Circuit / Shorted Bank 1	Signal voltage 2.15 - 3.25 V
P2010	Intake Manifold Runner Control Circuit / Shorted to B+ Bank 1	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 Bank 1	Deviation runner flap target position vs actual position > 25%
P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)	Signal voltage < 0.25 V
P2088	A Camshaft Position Actuator Control Circuit Low Bank 1 Short to Ground	Signal voltage, < 2.153.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2089	A Camshaft Position Actuator Control Circuit High Bank 1 Short to B+	Signal current > 2.20 A
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1	I-portion of 2nd lambda control loop < 0.03
P2097	Post Catalyst Fuel Trim System Too Rich Bank 1	I-portion of 2nd lambda control loop > 0.03
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 9.80 K

Ignition System

DTC	Error Message	Malfunction Criteria and
		Threshold Value
P0300	Random Misfire Detected	"> 2.1 (PZEV) > 1.9 (Bin 5 / B8 ULEV II)"
P0301	Cylinder 1 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0302	Cylinder 2 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0303	Cylinder 3 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0304	Cylinder 4 Misfire Detected	• Catalyst damage misfire rate (MR) > 2.9 - 20.0% PZEV • > 3.2 - 20.0 Bin 5
P0321	Ignition / Distributor Engine Speed Input Circuit Range/ Performance	Counted teeth versus reference incorrect Monitoring reference gap failure
P0322	Ignition / Distributor Engine Speed Input Circuit No Signal	Camshaft signal > 3 Engine speed, no signal
P0324	Knock Control System Error	Signal fault counter (combustion) > 24.00 or Signal fault counter (measuring window) > 2.00 Communication errors SPI communication > 25

DTC	Error Message	Malfunction Criteria and Threshold Value
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground, Port B	Lower threshold < 0.70 V
P0327	Knock Sensor 1 Circuit Short to Ground, Port A	Lower threshold < 0.70 V
P0327	Knock Sensor 1 Circuit Signal Range Check	Lower threshold, < 0.0 2.1582 V
P0328	Knock Sensor 1 Circuit (Bank 1) signal range check	Upper threshold 29.0674 114.9023 V
P0328	Knock Sensor 1 (Bank 1) Circuit short to B+ Port B	Upper threshold > 1.00 V
P0328	Knock Sensor 1 (Bank 1) Circuit short to B+ Port A	Upper threshold > 1.00 V
P0340	Camshaft Position Sensor Circuit	Cam adaption values out of range • > 20 °KW • < -20 °KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor A Circuit Range / Performance (Bank 1 or Single Sensor)	Signal pattern incorrect
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	Signal voltage low and crankshaft signals, 8.0
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	Signal voltage low and crankshaft signals, 8.0
P0351	Ignition Coil A Primary / Secondary Circuit	Signal current < -0.25 to 2.00 mA or Internal check failed
P0352	Ignition Coil B Primary / Secondary Circuit	Signal current < -0.25 to 2.00 mA or Internal check failed
P0353	Ignition Coil C Primary / Secondary Circuit	Signal current < -0.25 to 2.00 mA or Internal check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0354	Ignition Coil D Primary / Secondary Circuit	• Signal current < -0.25 to 2.00 mA
		or • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	Measured OSC / OSC of borderline catalyst value for front catalyst , < 0.40
		Value for front catalyst, < 1.30 and Value for main catalyst, < 1.20
P0420	Catalyst System (main) Efficiency Below Threshold (Bank 1) PZEV Only	Measured OSC / OSC of borderline catalyst value for main catalyst, < 0.90 While Value for front catalyst, < 2.00
P0420	Catalyst System (only bin 5, ULEV) Efficiency Below Threshold (Bank 1)	Measured OSC / OSC of borderline catalyst. EWMA filter value for catalyst, < .20
P0441	Evaporative Emission System Incorrect Purge Flow	Reaction of idle controller or lambda controller Deviation less than 7% lambda controller AND 35% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.551.75s.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage> 4.40 5.40 V
P0455	Evaporative Emission System Leak Detected Gross Leak/ No Flow	Time for pressure drop < 0.95 Sec.
P0456	Evaporative Emission System Leak Detected Very Small Leak	< 4.5 - 6.0 s.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 2.15 - 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.20 A

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor A Range / Performance	VSS signal, < 4 km/h
P0501	Vehicle Speed Sensor A Range / Performance Only (ULEV)	VSS signal, < 4 km/h
P0503	Vehicle Speed Sensor A Out of range high	Vehicle speed > 200 km/h
P0506	Idle Air Control System - RPM Lower Than Expected	Engine speed deviation <-80 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	Engine speed deviation > -80 RPM

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Checksum incorrect
P0606	ECM Processor	Powerup calibration • EEPROM check, failed A/D channel conversion • Check failed
P0627	Fuel Pump "A" Control Circuit /Open	Internal error fuel pump control unit Feedback from fuel pump control unit Pump blocked short circuit to battery +, ground or open circuit

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control Range / Performance - Bank 1	Rationality check: • Time to close to reference point > 0.56s. and • Reference point 2.88% Signal range check: • Duty cycle > 80% and • ECM power stage, no failure
P0641	Sensor Reference Voltage A Circuit Open	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage, < 4.6-5 V
P0643	Sensor Reference Voltage A Circuit High	5 V supply voltage > 4.99- 5.41 V
P0651	Sensor Reference Voltage B Circuit Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage, < 4.6-5 V
P0653	Sensor Reference Voltage B Circuit High	5 V supply voltage > 4.99- 5.41 V
P0657	Actuator Supply Voltage A Circuit / Open	Signal voltage > 4.40 - 5.60 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage "A" Circuit High	Signal current > 1.10 A
P0685	ECM / PCM Power Relay Control Circuit/Open	Signal voltage, 2.6-3.7 VSense circuit voltage, > 6 V
P0686	ECM / PCM Power Relay Control Circuit Low	Signal voltage, 2.6-3.7 V Sense circuit voltage, > 6 V
P0687	ECM / PCM Power Relay Control Circuit High	• Signal current, > 1.4-0.7 A • Sense circuit voltage, < 6 V
P0688	ECM / PCM Power Relay Sense Circuit	Sense voltage, < 3.0 V Difference sense circuit voltage with camshaft actuator commanded off and on >2.5 V Battery voltage > 3 V
P0697	Sensor Reference Voltage C Circuit / Open	Signal voltage deviation > ± 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage, < 4.6 - 5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0699	Sensor Reference Voltage C Circuit High	5 V supply voltage > 4.99 - 5.41 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out
U0100	Lost Communication with ECM / PCM A	Failure of all CAN engine messages, Time out more than 490 mSec Failure of all CAN engine messages but not all CAN messages, Time out more than 1010 mSec
U0101	Lost Communication with TCM	Checksum check Failed Message counter check failed Time out check No message received by ECM
U0121	CAN ABS Brake Unit	CAN communication with brake unit, time-out
U0146	CAN gateway A	CAN communication with gateway, time-out
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0323	CAN: Instrument Cluster Audi Only	Ambient temp value module not encoded for ambient temp sensor, 00h
U0402	CAN communication with TCM	Data length code transmitted, incorrect
U0404	Invalid Data Received From Gear Shift Control Module	If the value of message counter is permanent, constant, or change exceeds a threshold, increment an event counter Maximum change of message counter > 5
U0415	CAN Link to Speed Sensor	Speed sensor initialization failure
U0422	CAN: Instrument Cluster	Ambient temp. value (initialization), Audi, 01h
U0447	CAN Gateway	CAN message implausible
U102E	LIN Communication	LIN message incorrect

DTC	Error Message	Malfunction Criteria and Threshold Value
U102F	LIN Communication	Time out
U1030	LIN Communication	Not active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	Internal resistance too large (Bank 1, sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k O (dep. on mod. exhaust temp. and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	 Pressure control activity, 2.50 mPa Fuel trim activity < 0.80 Difference between target pressure vs. actual pressure -16.38 to 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	 Pressure control activity, 0.05 mPa Fuel trim activity > 1.30 Difference between target pressure vs. actual pressure -16.38 to 16.38 mPa
P12A4	Fuel Rail Pump Control Valve Stuck Closed	 Pressure control activity 6.0 mPa Fuel trim activity > .90 to 1.15 Difference between target pressure vs. actual pressure, 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 s or > 12 s.
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	Duty cycle > 80% and ECM power stage, no failure Deviation throttle valve angles vs. calculated value > 4.00 - 50.0%
P2106	Throttle Actuator Control System - Short to B+ or Ground	Internal check

DTC	Error Message	Malfunction Criteria and Threshold Value
P2106	Throttle Actuator Control System Open Circuit	Internal check
P2106	Throttle Actuator Control System Temp. Current Monitoring	Internal check failed
P2106	Throttle Actuator Control System Functional Check	Internal check failed
P2110	Throttle Actuator Control System - Forced Limited RPM	Engine load out of range
P2122	Throttle / Pedal Position Sensor / Switch D Circuit Low Input	Signal voltage < 0.606 V
P2123	Throttle / Pedal Position Sensor / Switch D Circuit High Input	Signal voltage > 4.794 V
P2127	Throttle / Pedal Position Sensor / Switch E Circuit Low Input	Signal voltage < 0.268 V
P2128	Throttle / Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.431 V
P2138	Throttle / Pedal Position Sensor / Switch D / E Voltage Correlation	Signal voltage sensor 1 vs 2, 0.1670.703 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Signal current > 14.90 A
P2149	Fuel Injector Group B Supply Voltage Circuit Open	Signal current < 2.60 A or Signal current > 14.90 A
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow interval, < 7484° C (SULEV) < 6084° C (ULEV)
P2195	O2S Signal Biased/Stuck Lean - Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2S Signal Biased / Stuck Rich - Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop < 0.07
P2231	O2S Signal Circuit Shorted to Heater Circuit	Delta O2S signal front, > 190 uA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2237	O2S Positive Current Control Circuit / Open - Bank 1, Sensor 1	O2S signal front 1.493 1.507 V O2S signal front < 1.70020 V and Fuel cutoff > 3.00 s O2S signal front 1.501.51 V Delta lambda controller, > 0.10
P2243	O2S Reference Voltage Circuit / Open Bank 1 - Sensor 1	O2S signal front >4.70 V and Internal resistance > 1000 O O2S signal front < 0.30 V and Internal resistance > 1000 O
P2270	O2S Circuit Slow Response Bank 1, Sensor 3 (ULEV)	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2271	O2S Circuit Bank 1 - Sensor 3 (ULEV)	Measurement range from fuel cutoff to voltage threshold, ≤ 152.3 mV Number of checks (initial phase), ≥ 1
P2271	O2S Circuit Bank 1 - Sensor 2 (SULEV)	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2274	O2S Circuit Slow Response Bank 1, Sensor 3 (SULEV)	Rationality check, O2S signal rear, < 0.620 - 0.654 mV
P2275	O2S Circuit Slow Response Bank 1, Sensor 3 (SULEV)	Measurement range from fuel cutoff to voltage threshold, ≤ 152.3 mV Number of checks (initial phase), ≥ 1 ULEV O2S signal rear,> 0.620 - 0.654 mV
P2279	Intake Air System Leak	Threshold to detect a defective system > 1.331.6 and Ratio of the tie system defective during the measurement window to the whole duration of the measurement window > 0.60000

DTC	Error Message	Malfunction Criteria and Threshold Value
P2293	Fuel Pressure Regulator 2 Performance	 Difference between target pressure vs. actual pressure, > 1.50mPa Difference between target pressure vs. actual pressure, < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit Open Circuit	Signal voltage 2.30 - 2.70 V
P2294	Fuel Pressure Regulator 2 Control Circuit Rationality Check	Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	< 1.802.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.9 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
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 s
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	High signal voltage > 30.4 V and Number of checks = 30
P2414	O2S Exhaust Sample Error Bank 1, Sensor 1	Signal voltage 3.104.81 V O2S signal, 2.53.2 Signal Voltage 2.5 V O2S signal 2.53.1 V
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	Signal voltage < 0.2 V
P2626	O2S Pumping Current Trim Circuit/Open Bank 1 Sensor 1	O2S signal front > 4.81 V

DTC CHART

Engine Codes 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	 Number of learning points at adaptation limits ≥ 8 of 64 Upper limit > 1.2
P0045	Wastegate Bypass Regulator Valve Circuit Open	Signal Voltage < 4.7 V
P0047	Wastegate Bypass Regulator Valve Circuit Short to Ground	Signal Voltage < 2.97 V
P0048	Wastegate Bypass Regulator Valve Circuit Short to Battery Voltage	Signal current > 3.0 A
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	Temperature difference to at least 3 other temperature sensors at startup > 45° 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/System Pressure - Too Low	Control deviation > 150 - 200 Bar Exceeding absolute rail pressure limits < 120 - 125 Bar
P0088	Fuel Rail Pressure Control Too High	Control deviation < -200 to -300 Bar Exceeding absolute rail pressure limits > 1950 Bar
P0090	Fuel Pressure Regulator Circuit Open	Signal Voltage < 4.7 V
P0091	Fuel Pressure Regulator Circuit Short to Ground	Signal Voltage < 2.97 V
P0092	Fuel Pressure Regulator Control Circuit Short to Battery Voltage	Signal Current > 3.0 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 is < 120 to 180 bar
P00D1	HO2 Sensor Heater Control Performance	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	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	Mass Air Flow Circuit Plausibility check	Plausibility check by model air mass min. Ratio of model air mass and actual airflow mass < 0.84 [-] Plausibility check by model air mass max Ratio of model air mass and actual airflow mass > 1.8 [-]
	Mass Air Flow Circuit Range Check High Temp. Calculated Value	PWM signal period time > 60 ms
	Mass Air Flow Circuit Range Check Low Temp. Calculated Value	PWM signal period time < 40 ms
P0102	Mass Air Flow Circuit Low Input	Range check low calculated value: • PWM signal period time > 83 µs (854 kg/h) Range check low Raw value • 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: • PWM signal period time > 667.0 µs (-57 kg/h) Range check High Raw value: • 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	• Time for coolant temp to reach 19.96° C or increase by 10° K ≥ 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
P0128	Thermostat Temperature Below Control Range	Measured temperature 70° C Modeled temperature > 80° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0130	O2 Sensor Circuit Bank 1 Sensor 1	Virtual ground (VM) > 3 V Nernst voltage (UN) > 4 V Adjustment voltage (IP) > 1.5 V
	Short to Ground	Virtual ground (VM) < 2 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
P0133	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	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	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 Circuit Bank 1 Sensor 2	Virtual ground (VM) > 3 V Nernst voltage (UN) > 4 V Adjustment voltage (IP) > 1.5 V
	Short to Ground	Virtual ground (VM) < 2 V Nernst voltage (UN) < 1.75 V adjustment voltage (IP) < 0.3 V
	Dynamic Check virtual ground (VM)	Virtual ground (VM) internal resistance > 1104 O Internal signal voltage < 1.4 V and/or > 1.6 V
	Dynamic Check Nernst voltage (UN)	Nernst voltage (UN) internal resistance > 1104O Internal signal voltage > 3 V
	Dynamic Check pump current (IP)	• Pump current (IP) < 0.005 [-]

DTC	Error Message	Malfunction Criteria and Threshold Value
P0138	2 Sensor Circuit High Voltage Bank 1 Sensor 2	Signal voltage > 3.2 V
P0139	O2 Sensor Circuit Slow Response Bank 1 Sensor 2	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
P013B	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 2	 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 > 0.450.72 Sec. = (exhaust gas mass flow) (2. sensor later than 1. sensor)
P0141	O2 Sensor Heater Circuit Bank 1 Sensor 2	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	 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 > 0.450.72 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
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	Control error < limit from MAP (engine speed and desired torque) -8° CA to -4° CA or Control error < limit from MAP (engine speed and desired torque) +8° CA to +4° CA
P020B	Cylinder 2 Injection Timing	Control error < limit from MAP (engine speed and desired torque) -8° CA to -4° CA or Control error < limit from MAP (engine speed and desired torque) +8° CA to +4° CA
P020C	Cylinder 3 Injection Timing	Control error < limit from MAP (engine speed and desired torque) -8° CA to -4° CA or Control error < limit from MAP (engine speed and desired torque) +8° CA to +4° CA

DTC	Error Message	Malfunction Criteria and Threshold Value
P020D	Cylinder 4 Injection Timing	Control error < limit from MAP (engine speed and desired torque) -8° CA to -4° CA or Control error < limit from MAP (engine speed and desired torque) +8° CA to +4° CA
P0234	Charge Air Boost Pressure Rationality Check Low	Absolute value of control deviation > -300800 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
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 µs or < 117µs (at 1400 bar rail pressure).
P0266	Cylinder 2 Zero Fuel Calibration (monitoring of fuel calibration values)	Calibration value of injector energizing time > 217 µs or < 117µs (at 1400 bar rail pressure).
P0269	Cylinder 3 Zero Fuel Calibration (monitoring of fuel calibration values)	Calibration value of injector energizing time > 217 µs or < 117µs (at 1400 bar rail pressure).
P026A	Charge Air Cooler Efficiency Below Threshold	Charge air intercooler efficiency < 0.4
P0272	Cylinder 4 Zero Fuel Calibration (monitoring of fuel calibration values)	Calibration value of injector energizing time > 217 µs or < 117µs (at 1400 bar rail pressure).
P0299	Charge Air Boost Pressure Rationality Check High	Absolute value of control deviation > 400 - 800 hPa
P1004	Torque Difference Cylinder 1 Limiting Value Exceeded	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
P1005	Torque Difference Cylinder 2 Limiting Value Exceeded	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	Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or +50 to +30 Nm
P1007	Torque Difference Cylinder 4 Limiting Value Exceeded	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	Cylinder 1 Pressure Sensor Circuit Short 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 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 and/or > 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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 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
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 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P13D9	Cylinder 4 Pressure Sensor Circuit Out of Range	Signal voltage < 0.33 V and/or > 3.09 V
	Cylinder 4 Constant Pressure	Deviation between maximum and minimum cylinder pressure sensor 1 < 20 bar
	Cylinder 4 Pressure Sensor Offset	Offset out of range < -7 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
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
P2000	NOx Adsorber Efficiency Bank 1 Below Threshold	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	Differential pressure Signal < (exhaust gas volume flow) or Accumulated loading increment from differential pressure < 1 g

DTC	Error Message	Malfunction Criteria and Threshold Value
P2002*	Particulate Trap Efficiency Below Threshold	Differential pressure signal < f (exhaust gas volume flow) or Ratio of filtered temperature dynamic upstream and downstream of the PM trap < 1.2 [-]
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	Signal voltage < 0.45 V
P2080	Exhaust Gas Temperature Sensor 1 Circuit Plausibility Check	Sensor temperature < 85° C

DTC	Error Message	Malfunction Criteria and Threshold Value
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)
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	hrottle/Pedal Position Sensor/ Switch "D" Circuit High	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch "E" Circuit Low	Sensor voltage < 0.27 V
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High	Sensor voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor D/E Circuit Voltage Correlation	Difference between app sensor 1 voltage and app sensor 2 voltage) V (tolerance 13% - 20%
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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	Signal voltage > 3.25 V
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	Nernst voltage (UN) internal resistance > 1104O Internal signal voltage > 3 V
P2251	O2 Sensor Negative Current Control Circuit/Open Bank 1 Sensor 1	Virtual ground (VM) internal resistance > 1104 O Internal signal voltage < 1.4 V and/or > 1.6 V
P2270	O2 Sensor Signal 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 Regulator 2 Control Circuit	Signal Current < 0.8 mA
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

DTC	Error Message	Malfunction Criteria and Threshold Value
P240F	EGR System Dynamic Check	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	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 Time to activate control loop EGT Upstream particulate matter trap > 60 s
P2452	Exhaust Pressure Sensor Circuit Short to Battery voltage	Signal voltage > 4.9 V
P2453	Exhaust Pressure Sensor Circuit Offset detection During Afterrun	 Differential pressure signal 200 hPa and/or < -150 hPa 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	 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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	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	Control deviation > limit from Map or < limit from Map f (engine and torsus)
P2563	Charge Pressure Actuator Position Sensor Circuit Range / Performance	speed, torque 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	Signal voltage < 0.15 V
P2565	Charge Pressure Actuator Position Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 4.85 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Misfire Detected Multiple Cylinder	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	 Misfire rate within 1000 engine revolutions > 10% Misfire event detection if actual inner torque < 2.5 Nm
P0302	Cylinder 2 Misfire Detected	Misfire rate within 1000 engine revolutions > 10% Misfire event detection if actual inner torque < 2.5 Nm
P0303	Cylinder 3 Misfire Detected	Misfire rate within 1000 engine revolutions > 10% Misfire event detection if actual inner torque < 2.5 Nm
P0304	Cylinder 4 Misfire Detected	Misfire rate within 1000 engine revolutions > 10% Misfire event detection if actual inner torque < 2.5 Nm
P0321	Engine Speed Input Circuit Rationality Check	 Consecutive not plausible signals > 15 Cam phase signals without plausible signal > 4 cam rotations. Monitoring reference gap = failure

DTC	Error Message	Malfunction Criteria and Threshold Value
P0322	Engine Speed Input Circuit No Signal	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 < -45200 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 HP EGR Actuator Circuit Short to Battery Voltage	• Signal Current > 8.0 A - 18 A
	HP EGR Actuator Circuit Functional check: Stuck Close	• Stuck Valve > 20.00%
	HP EGR Actuator Circuit Functional check: Stuck Open	• Stuck Valve > 20.00%
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	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 voltage < 0.06 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P040D	Exhaust Gas Recirculation Temperature Sensor Circuit Open or Short to Battery Voltage	Signal 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	Signal voltage > 0.8 V or < 2.0 VSignal Current > 8.0 A - 18 A
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 afterrun: Differential of pressure signal < -27 and/or > 47 hPa
P0472	Differential Pressure Sensor Circuit Short to Ground	Signal voltage < 0.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0473	Differential Pressure Sensor Circuit Open or Short to Battery	Signal 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
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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	Control deviation < 10%
P0507	Idle Control System RPM Higher than Expected	Control deviation > 10%
P050E	Cold Start Engine Exhaust Temperature Too Low	Sensor temperature < 170° C Control deviation > limit from map (engine speed, torque)
P0534	Vehicle Speed Sensor "A" Intermittent/Erratic/High	-
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
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	Signal voltage < 0.15 V
P2565	Charge Pressure Actuator Position Sensor Circuit Open or Short to Battery Voltage	Signal voltage > 4.85 V

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 V
P0604	EEPROM Memory Error	 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	Current Over-Temperature diagnostic signal from output driver > 150 °C
P0638	Throttle Valve Actuator Control Motor Circuit Internal Error	Diagnostic signal from actuator module = defective state
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	 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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	Glow Plug Cylinder 4 Circuit Short to Battery Voltage	Signal current > 70 A
P0684	low Plug Time Control Module Circuit No PCM Communication	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
P06B9	Glow Plug Cylinder 1 Resistance Check	Glow plug resistance time interval after glow start: • 4 - 9 s (< 0,3 O), • 9 - 14 s (< 0.4 O) • after 14 s (< 0.5 O) • anytime (> 1.2 O)
P06BA	Glow Plug Cylinder 2 Resistance Check	Glow plug resistance time interval after glow start: • 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: • 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: • 4 - 9 s (< 0,3 O), • 9 - 14 s (< 0.4 O) • after 14 s (< 0.5 O) • anytime (> 1.2 O)

DTC	Error Message	Malfunction Criteria and Threshold Value
P06C5	Glow Plug Cylinder 1 Incorrect Type	Wrong current slope
P06C6	Glow Plug Cylinder 2 Incorrect Type	Wrong current slope
P06C7	Glow Plug Cylinder 3 Incorrect Type	Wrong current slope
P06C8	Glow Plug Cylinder 4 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
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 = 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 Gear Shift Control Module A	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.
U102C	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No TCM messages received.
U1024	Instrument Cluster Control Module Read Out DTC	Error message sent from instrument cluster to ECU

DTC CHART

Engine Codes CRZA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Camshaft Position Slow Response	Difference between target and actual position > 8° CRK for > 1.3 to 2.9 Sec. and adjustment angle ≥ 2.50° CRK
P0010	Camshaft Position Actuator Circuit Open	Signal voltage, > 4.70 - 5.40 V
P0011	Camshaft Position Timing - Over-Advanced	Difference between target and actual position > 8° CRK Adjustment angle < 2.50° CRK
P0016	Crankshaft Position vs. Camshaft Position Correlation	Permissible deviation < 11° Rev or Permissible deviation > 11° Rev
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 V
P008A	Low Pressure Fuel System Pressure Too Low	Actual pressure < 0.08 MPa
P008B	Low Pressure Fuel System Pressure Too High	Actual pressure > 0.8 MPa
P0087	Fuel Rail/System Pressure - Too Low	Fuel trim activity 0.90 - 1.15 Output value rail pressure controller > 2 MPa Difference between target and actual pressure > -16.38
P0089	Fuel Pressure Regulator Performance	Difference between target and actual pressure > 0.15 and < -0.2 MPa Total pressure controller response < -0.25 and > 0.35 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0100	Mass Air Flow Circuit Fault	MAF sensor signal 0 μs
P0101	Mass Air Flow Circuit Performance	Mass air flow vs. • Upper threshold model < 12% • Lower threshold model < 0.400 kg/h • Load calculation > 21% • Fuel system < -19%
P0102	Mass Air Flow Circuit Low Input	MAF sensor signal < 66 μs
P0103	Mass Air Flow Circuit High Input	MAF sensor signal > 4500 μs
P0106	Manifold Absolute Pressure/ Barometric Pressure Circuit Performance	Difference of boost pressure signal vs altitude sensor signal > 230 hPa or Difference of boost pressure.
		Difference of boost pressure signal vs altitude sensor signal < -130 hPa
P0111	Intake Air Temperature Sensor Circuit Performance	Difference in value IAT - ECT @ engine start (depending on engine off time) > 24.8° K Difference in value IAT - AAT @ engine start < 24.8° K (depending on engine off time)
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	Intake air temperature > 141.0° C
P0113	Intake Air Temperature Sensor Circuit High Input	Intake air temperature < -46° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Performance	No change on signal < 1.5° K or Signal in range 88.5 - 109.5 °C with no change on signal < 1.5° 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	Pedal Position Sensor A Circuit Performance	TPS 1 - TPS 2 > 6.30% Actual TPS 1 calculated value TPS 2 calculated value TPS 1 calc. value > 9.00%
P0122	Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0123	Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
P013A	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	EWMA filtered max differential transient time at fuel cutoff ≥ 0.5 Sec. for 3 function checks
P0130	O2 Sensor Circuit Bank 1, Sensor 1	O2S ceramic temperature < 640° C
P0131	O2 Sensor Circuit Bank 1, Sensor 1 Low Voltage	• VM < 1.75 V • UN < 1.50 V • IA or IP > 0.30 V
P0132	O2 Sensor Circuit, Bank 1 - Sensor 1 High Voltage	• VM > 3.25 V • UN > 4.40 V • IA or IP > 7.0 V
P0133	O2 Circuit Slow Response Bank 1, Sensor 1	Signal dynamic slope check O2S signal front vs. modeled O2S signal ratio < 0.40 and > 0.01 Cycles completed > 400 Oscillation check Lambda amplitude signal > 20% Cycles > 8 Time lambda > lambda amplitude 400 m sec. Delay check Delay modeled lambda signal minus measured signal > 460 m sec. Cycles > 12
P0135	O2 Heater Circuit Bank 1, Sensor 1	Heater duty cycle > 90% O2S ceramic temperature < 720° C Time after O2S heater on 40 Sec.
P0136	O2 Circuit Bank 1, Sensor 2	Delta voltage one step at heater switching > 2.0020 V Number of checks 10
P0137	O2 Circuit Low Voltage Bank 1, Sensor 2	Signal voltage < 0.06 V for > 3 Sec. Difference with/without load pulse < 0.01 V
P0138	O2 Circuit High Voltage Bank 1, Sensor 2	Signal voltage 1.08 V for > 5 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0139	O2 Circuit Slow Response Bank 1 Sensor 2	EWMA filtered transient time at fuel cutoff > 0.4 Sec. In voltage range of 201.2 - 401.4 mV Number of checks, 3
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 • Exhaust temperature > 600° C
P0141	O2 Heater Circuit Bank 1, Sensor 2	Heater resistance > 792 to 4560 Ohm
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 Performance	Actual pressure > 20.6 MPa
P0192	Fuel Rail Pressure Sensor Circuit Low	Signal voltage < 0.2 V
P0201	Injector Circuit Open - Cylinder 1	Low side signal current < 2.1 A Internal logic failure
P0202	Injector Circuit Open - Cylinder 2	Low side signal current < 2.1 A Internal logic failure
P0203	Injector Circuit Open - Cylinder 3	Low side signal current < 2.1 A Internal logic failure
P0204	Injector Circuit Open - Cylinder 4	Low side signal current < 2.1 A Internal logic failure
P0221	Pedal Position Sensor Circuit Performance	TPS 1 - TPS 2 > 6.30% Actual TPS 2 calculated value TPS 1 calculated value TPS 2 - calc. value > 9.00%
P0222	Pedal Position Sensor Circuit Low Input	Signal voltage < 0.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0223	Pedal Position Sensor 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
P0237	Turbocharger Boost Sensor Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger Boost Sensor Circuit High	Signal voltage > 4.88 V
P0243	Turbocharger Wastegate Solenoid Circuit Performance	Signal voltage > 5.6 - 4.4 V
P0245	Turbocharger Wastegate Solenoid Low	Signal voltage < 3.25 - 2.15 V
P0246	Turbocharger Wastegate Solenoid High	Signal current > 2.2 to 4 A
P025A	Fuel Pump Module Control Circuit Open	Signal voltage 4.80 - 5.30 V
P025C	Fuel Pump Module Control Circuit Low	Signal voltage 2.70 - 3.25 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 0.6 mA
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	Turbocharger Underboost	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	Pressure control activity > 0.20 MPa Fuel trim activity < 0.80 Difference between actual pressure vs target pressure -16.38 to 16.38 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A2	Fuel Rail Pressure Sensor Inappropriately High	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	 Fuel trim activity .90 to 1.15 Pressure control activity < -6 MPa System Deviation < 16.38 MPa
P2004	Intake Manifold Runner Control Stuck Open	Signal voltage < 2.62 or > 4.65 V Unable to reach normal closed position
P2008	Intake Manifold Runner Control Circuit Open	Signal duty cycle > 80% ECM power stage failure
P2014	Intake Manifold Runner Position Sensor Circuit	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor Circuit Performance	Deviation runner flap target position vs actual position > 25% and actual position within 0 to 100%
P2088	A Camshaft Position Actuator Control Circuit Low	Signal voltage, < 0.0 - 3.25 V
P2089	A Camshaft Position Actuator Control Circuit High	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean	Deviation lambda control < -0.04
P2097	Post Catalyst Fuel Trim System Too Rich	Integral part of lambda control > 0.04

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	Emission threshold 1st interval Misfire Rate (MR), > 3% Catalyst damage misfire rate (MR), > 2% - 15%
P0301	Cylinder 1 Misfire Detected	 Emission threshold 1st interval Misfire Rate (MR), > 3% Catalyst damage misfire rate (MR), > 2% - 15%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0302	Cylinder 2 Misfire Detected	Emission threshold 1st interval Misfire Rate (MR), > 3% Catalyst damage misfire rate (MR), > 2% - 15%
P0303	Cylinder 3 Misfire Detected	 Emission threshold 1st interval Misfire Rate (MR), > 3% Catalyst damage misfire rate (MR), > 2% - 15%
P0304	Cylinder 4 Misfire Detected	 Emission threshold 1st interval Misfire Rate (MR), > 3% Catalyst damage misfire rate (MR), > 2% - 15%
P0321	Engine Speed Input Circuit Performance	Comparison of counted teeth vs reference = incorrect Monitoring reference gap failure
P0322	Engine Speed Input Circuit No Signal	Camshaft signal > 3 Engine speed, no signal
P0324	Knock Control System Error	Signal fault counter (combustion) > 24 or Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low Input	Lower threshold < -70 V or for signal range check Lower threshold < 0.60 - 1.60 V
P0328	Knock Sensor 1 Circuit High Input	Upper threshold > 1.00 V or for signal range check > 21.75 - 115.87 V
P0332	Knock Sensor 2 Circuit Low Input	Signal range check lower threshold 0.5 to 0.8
P0333	Knock Sensor 2 Circuit High Input	Signal range check upper threshold 4.5 to 30
P0341	Camshaft Position Sensor Circuit Performance	Signal pattern incorrect Defect counter 12
P0342	Camshaft Position Sensor Circuit Low Input	Signal voltage low Crankshaft signals = 8
P0343	Camshaft Position Sensor Circuit High Input	Signal voltage high Crankshaft signals = 8

DTC	Error Message	Malfunction Criteria and Threshold Value
P0351	Ignition Coil A Primary/ Secondary Circuit	Signal current < -0.25 to 2.0 mA Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	Signal current < -0.25 to 2.0 mA Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	Signal current < -0.25 to 2.0 mA Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
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 Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System Efficiency Below Threshold	Front: Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 0.40 Front catalyst < 1.30 Main: Oxygen storage capacity (OSC) vs OSC of borderline catalyst < 0.40 Front catalyst < .90 While value for front catalyst < 2.00
P0441	Evaporative Emission System Incorrect Purge Flow	Actual EVAP pump current difference between reference measurement to idle divided by pump current difference from the last leak detection phase during engine off > 1.40 mA
P0442	Evaporative Emission System Leak Detected (Small Leak)	Modeled pressure from pump current < 9 hPa
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0456	Evaporative Emission System Leak Detected (Very Small Leak)	EVAP leakage area calculated from pump current curve > 0.17 mm 2
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.00 - 3.25 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.20 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: • Engine speed deviation < -80 RPM Out of range high: • Engine speed deviation > 80 RPM
P0501	Vehicle Speed Sensor Range/ Performance	VSS signal < 4 km/h
P0506	Idle Air Control System RPM Lower Than Expected	Idle 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

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module ROM Test Error	ROM check failed
P0606	ECM Processor Fault	ECM internal check failure
P0638	Throttle Actuator Control Performance	 Time to close to reference point > 0.6 Sec. and Reference point 2.88% Time to close below reference point, + 2.49%, > 0.56 Sec. Duty cycle > 80% ECM power stage no failure
P0641	Sensor Reference Voltage A Circuit	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 to 5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0643	Sensor Reference Voltage A Circuit High	Signal voltage > 5 to 5.4 V
P0651	Sensor Reference Voltage B Circuit	Signal voltage deviation > +/- 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.6 - 5.0 V
P0653	Sensor Reference Voltage B Circuit High	Signal voltage > 5 to 5.4 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
P0685	ECM Power Relay Control Circuit Open	Control voltage 2.6 to 3.7 V and Sense circuit voltage < 6 V
P0686	ECM Power Relay Control Circuit Low	Control voltage 2.6 to 3.7 V and Sense circuit voltage > 6 V
P0687	ECM Power Relay Control Circuit High	Signal current > 1.4 to 0.7 A and Sense circuit voltage < 6 V
P0688	ECM Power Relay Sense Circuit Open	 Sense voltage > 3 V with main relay commanded on Sense voltage < 3 V with main relay commanded off
P0697	Sensor Reference Voltage C Circuit Open	Signal voltage deviation > ± 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.6 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	Signal voltage > 5 to 5.4 V
U0001	High Speed CAN Communication Bus	Bus Off failure
U0002	High Speed CAN Communication Bus Performance	Global Time Out failure
U0121	Lost Communication with Anti- Lock Brake System (ABS) Control Module	CAN communication with ABS, time out
U0146	Lost Communication With Gateway A	CAN communication with gateway, time out

DTC	Error Message	Malfunction Criteria and Threshold Value
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	CAN messages not received
U0415	CAN Communication with ABS Error	 Speed sensor initialization failed Speed sensor low voltage error failed Speed > 326 km/h
U0422	Invalid Data Received From Body Control Module (Cluster)	Ambient temperature value initialization failure.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Implausible Ambient Air Temperature Sensor value message received from IPC

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	Pressure control activity 0.25 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	 Pressure control activity 0.25 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	 Fuel trim activity 0.90 to 1.15 Pressure control activity -6 MPa System Deviation < 16.38 MPa
P2004	Intake Manifold Runner Control Stuck Open	Signal voltage < 2.62 or > 4.65 V Unable to reach normal closed position
P2008	Intake Manifold Runner Control Circuit Open	Signal duty cycle > 80% ECM power stage failure
P2014	Intake Manifold Runner Position Sensor Circuit	• Signal voltage > 4.75 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2015	Intake Manifold Runner Position Sensor Circuit Performance	Deviation runner flap target position vs actual position > 25% and actual position within 0 to 100%
P2088	A Camshaft Position Actuator Control Circuit Low	Signal voltage, < 0.0 - 3.25 V
P2089	A Camshaft Position Actuator Control Circuit High	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean	Deviation lambda control < -0.04
P2097	Post Catalyst Fuel Trim System Too Rich	Integral part of lambda control > 0.04
P2101	Throttle Actuator Control Motor Circuit Performance	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	Pedal Position Sensor D Circuit High Input	Signal voltage < 0.61 V
P2123	Pedal Position Sensor D Circuit High Input	Signal voltage > 4.79 V
P2127	Pedal Position Sensor E Circuit Low Input	Signal voltage < 0.27 V
P2128	Pedal Position Sensor E Circuit High Input	Signal voltage > 2.43 V
P2138	Pedal Position Sensor D / E Voltage Correlation	Signal voltage: Difference between signal APP1 and APP2 > 0.17 - 0.70 V
P2146	Fuel Injector A Supply Voltage Circuit Open	Signal current, < 2.6 A or Signal current > 14.90 A
P2149	Fuel Injector B Supply Voltage Circuit Open	Signal current, < 2.6 A or Signal current > 14.70 A
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient mass air flow integral 74 - 84° C
P2195	O2 Sensor Signal Biased/ Stuck Lean Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop > 0.06

DTC	Error Message	Malfunction Criteria and Threshold Value
P2196	O2 Sensor Signal Biased/ Stuck Rich Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop < 0.06
P2231	O2 Sensor 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 1.493 - 1.507 V and delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit Open Bank 1, Sensor 1	O2S signal front < 0.30 V and Internal resistance > 1000 Ohms O2S signal front > 3.25 V and Internal resistance > 1000 Ohms
P2270	O2 Sensor Signal Stuck Lean Bank 1, Sensor 2	O2S signal rear < 0.63 - 0.64 V Enrichment after stuck lean 27.90%
P2271	O2 Sensor Signal Stuck Rich Bank 1, Sensor 2	O2S signal rear > 0.63 - 0.64 V Enrichment after stuck rich 14.99%
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.33 - 1.60
P2293	Fuel Pressure Regulator 2 Performance	Difference between target pressure vs. actual pressure: > 1.50 mPa or < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	Signal voltage 1.40 - 3.20 V or Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit Open	Signal voltage > 4.7 - 5.4 V

DTC	Error Message	Malfunction Criteria and Threshold Value
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 LDP current measuring resistor > 4.00 to 1.80 V
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	High signal voltage > 30.4 Sec.
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 • Signal voltage 2.5 V • O2S signal 2.5 - 3.1 V
P2539	Low Pressure Fuel System Circuit	Signal voltage > 4.9 V
P2541	Low Pressure Fuel 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
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 9.80° K

DTC CHART

Engine Codes CBTA and CBUA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake Camshaft Position Slow Response Bank 1	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	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
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temp > 87° C
P0106	Manifold Absolute Pressure to Barometric Pressure Circuit Range/Performance	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 High 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
P0112	Intake Air Temperature Circuit Low Input	• IAT > 130.0° C
P0113	Intake Air Temperature Sensor Circuit High Input	• IAT < -46° C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	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	• ECT > 140° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High Input	ECT < -40° C
P0121	Accelerator Pedal Position Sensor A Circuit Range/ Performance	• TPS 1 - TPS 2 > 5.10 to 6.30% • TPS 1 calc. value > 9.00%
P0122	Accelerator Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0123	Accelerator Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
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 temp. < 640° C
P0131	O2 Sensor Circuit, Bank 1 Sensor 1 Low Voltage	• Virtual mass < 1.75 V • UN, < 1.50 V • IA, 0.3 V
P0132	O2 Sensor Circuit, Bank 1 Sensor 1 High Voltage	• Virtual mass, > 3.25 V • UN, > 4.40 V • IA, > 7.0 V
P0133	O2 Circuit Slow Response Bank 1, Sensor 1	 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 Sensor Heater Circuit Bank 1 Sensor 1	Heater duty cycle > 90% O2S ceramic temperature, < 720° C or O2S ceramic temp < 715° C Time after O2 heater on, 35 Sec
P0136	O2 Sensor Circuit Bank 1 Sensor 2	Delta O2S rear signal > 2.00 V Number of checks = 6
P0137	O2 Circuit Low Voltage Bank 1, Sensor 2	Cold condition: Signal voltage < 0.06 V for > 3 Sec. Difference of sensor voltage with and without load pulse < 0.01 V
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	EWMA filtered transient time at fuel cut off > 0.6 Sec. O2 voltage between 201 - 401 mV. O2S rear signal > 0.16 V during fuel cut off active

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit No Activity Detected Bank 1, Sensor 2	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 Sensor Heater Circuit Bank 1 Sensor 2	Difference of sensor voltage with and without load pulse < 0.01 V Internal heater resistance 1200 - 20400 O
P0142	O2 Sensor Circuit Bank 1 Sensor 3	Delta voltage 1 step at heater switching > 2.00 V Heater coupling ≥ 6 times
P0143	O2 Sensor Circuit Low Voltage Bank 1 Sensor 3	• 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
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 cut off > 1.5 Sec O2 voltage between 201 - 401 mV
P0146	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 3	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
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	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%
P2101	Throttle Actuator Control Motor Circuit Range/ Performance	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

DTC	Error Message	Malfunction Criteria and Threshold Value
P2122	Accelerator Pedal Position Sensor D Circuit Low Input	• Signal voltage < 0.61 V
P2123	Accelerator Pedal Position Sensor D Circuit High Input	• Signal voltage > 4.79 V
P2127	Accelerator Pedal Position Sensor E Circuit Low Input	• Signal voltage < 0.27 V
P2128	Accelerator Pedal Position Sensor E Circuit High Input	• Signal voltage > 2.43 V
P2138	Accelerator Pedal Position Sensor 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	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

DTC	Error Message	Malfunction Criteria and Threshold Value
P219F	Cylinder 4 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase
P21A0	Cylinder 5 Air-Fuel Ratio Imbalance	Individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase
P2237	O2 Sensor Positive Current Control Circuit Open Bank 1, Sensor 1	Our Substitution of the control of
P2243	O2 Sensor Reference Voltage Circuit Open Bank 1, Sensor 1	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	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

DTC	Error Message	Malfunction Criteria and Threshold Value
P2279	Intake Air System Leak	Offset value throttle mass flow > 13 kg/h
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24 mA
P2301	Ignition Coil A Primary Control Circuit High	• Signal voltage > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24 mA
P2304	Ignition Coil B Primary Control Circuit High	• Signal voltage > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24 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 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 mA
P2313	Ignition Coil "E" Primary Control Circuit High	• Signal voltage > 5.1 - 7.0 mA
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

DTC	Error Message	Malfunction Criteria and Threshold Value
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > .5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Range/Performance	 High signal voltage > 12 Sec. and 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	 Fluctuation of EVAP pump current during reference measurement > 1 mA Drop of EVAP pump current during pump phase > 6 mA for ≥ 3 Sec.
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	• Threshold 1 • Signal voltage 3.1 to 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)
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	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0301	Cylinder 1 Misfire Detected	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0302	Cylinder 2 Misfire Detected	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0303	Cylinder 3 Misfire Detected	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0304	Cylinder 4 Misfire Detected	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0305	Cylinder 5 Misfire Detected	 Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.0% Emission threshold misfire rate (1000 rev Misfire Rate), > 2.0 to 19%
P0321	Engine Speed Input Circuit Range/Performance	 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	No engine speed signal but CMP signals > 5 cam shaft revs Engine speed = no signal
P0324	Knock Control System Error	Signal fault counter (combustion) > 30 OR Signal fault counter measuring window > 2
P0327	Knock Sensor 1 Circuit Low Input	Lower threshold < - 0.70 V Signal range check < 0.55 to 5.60 V
P0328	Knock Sensor 1 Circuit High Input	Upper threshold > 1 V Signal range check > 16.50 to 92 V
P0332	Knock Sensor 2 Circuit Low Input	• Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0333	Knock Sensor 2 Circuit High Input	Upper threshold > 1 V Signal range check > 16.50 to 92 V
P0341	Camshaft Position Sensor A Circuit Range/Performance	Signal pattern incorrect Defect counter = 8
P0342	Camshaft Position Sensor A Circuit Low Input	Signal voltage permanently low Crankshaft signal = 8
P0343	Camshaft Position Sensor A Circuit High Input	Signal voltage permanently high Crankshaft signal = 8
P0351	Ignition Coil A Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
P0355	Ignition Coil E Primary/ Secondary Circuit	Signal current 0.25 to -2.0 mA Internal check failed
P0381	Engine Temperature Too Low	Difference between ECT and modeled ECT > 11 K

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 Circuit Open	Signal voltage 9.25 to 11.25 V
P0414	Secondary Air Injection System Switching Valve Circuit Shorted	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	Actual EVAP pump current vs. difference from last reading > 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	• 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	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 High Signal	Vehicle speed > 325 km/h
P0506	Idle Air Control System RPM Lower Than Expected	 Engine speed deviation > 100 RPM RPM controller torque value ≥ calculated max value.
P0507	Idle Control System RPM Higher than Expected	 Engine speed deviation < -100 RPM RPM controller torque value ≤ calculated min. value.
P050A	Idle Air Control System Out of Range	 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	Internal hardware/voltage check - failed Communication CPU - Sensor IC - failed EEPROM Check failed
P0627	Fuel Pump Control Circuit Open/Shorted to Ground	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 - Bank 1	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
P117A	Fuel System Out of Range	I - portion of 3rd lambda control loop > 0.03
P150A	Engine Off Timer Comparison	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 Deployed	Airbags activated
P169A	Vehicle In Transport Mode	Transport mode active
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
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	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

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