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Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Mass Air Flow Sensor	P0100	range check low	airmass	< 4 kg/h	engine speed	> 400 rpm	continuous	two driving cycles
		range check high	airmass	see table MLDMXN (304...904 kg/h)	or while cranking: engine speed for time	> 120 rpm > 0,1 s		
	P0101	rationality	load signal	< -3,3 or > 2,0 ms	engine speed coolanttemp for time time after start	> 520 rpm > 80,25°C > 2,0 s > 5 s		
		(load-, throttleposistionsensor, idlecontroller)			Errorflags (look left)	not present		
Intake Air Temp. Sensor	P0110	range check high	temperature	> 139,75°C			continuous	two driving cycles
		range check low		< -42,75°C	only for low: time after start time in idle	>180 s > 10 s		cycles
Coolant Temp. Sensor	P0115	range check low	temperature	< -42,75°C	Errorflag	not present	continuous	two driving cycles
		range check high		> 139,75°C	(intake air temp.)			
	P0116	rationality	temperature or temperature for closed loop control not reached after time	< model temp.-20°K timer depending on airflow				
Throttle Position Sensor	P0120	range check low	TPS value	< 3,906 %	engine speed	> 400 rpm	continuous	two driving cycles
		range check high	TPS value	> 96,09%	time time while cranking	> 0,15 s > 2,0 s		
O2 Sensor Circuit		circuit continuity	sensor signal voltage	0,062<... < 0,399	sensor heater	on	continuous	two driving cycles
Front bank 1	P0130		for time	> 20 s	for time	> 200 s		
Front bank 2	P0150	(Secondary air-, evapvalve, secondary air -,evapsystem)			Errorflags (look left) secondary air	not present off		

					diagnostic secondary air	off		
Front bank 1 Front bank 2	P0131 P0151	range check low	sensor signal voltage for time	< -0,148 V >0,2 s	sensor heater for time	on > 200 s	continuous	two driving cycles
Front bank 1 Front bank 2	P0132 P0152	range check high	sensor signal voltage for time	> 1,083 V >0,2 s	sensor heater for time	on > 200 s	continuous	two driving cycles
Front bank 1 Front bank 2	P0133 P0153	response rate	sensor signal period (average over 25 periods)	> 3,3 s	engine speed load catalyst temp. model time after purge starts fuel system status Errorflags (look left)	1000...2000 rpm 1,3...3,0 ms > 352 °C > 6s closed loop not present	25 periods continuous	two driving cycles
		(load-, throttlepos.-, camshaftsensor,batteryvoltage,evapvalve, fueltrim,secondary air-, evapsystem)						
Front bank 1 Front bank 2	P0134 P0154	no activity detected	sensor signal voltage for time	0,35<...<0,555 V > 3,5 s	sensor heater for time	on > 200 s	continuous	two driving cycles
Heater front b. 1 Heater front b. 2	P0135 P0155	Heater current	calculated resistance	<2,45 or >9,56	sensor heater time after dewpoint (from exhaust temp. model)	on 180 s	continuous	two driving cycles
Rear bank 1 Rear bank 2	P0136 P0156	circuit continuity	sensor signal voltage for time	-0,0398<...<0,0383 > 225 s	sensor heater for time Errorflags (look left) secondary air secondary air diagnosis	on > 200 s not present off off	continuous	two driving cycles
		(Secondary air-, evapvalve, secondary air -,evapsystem)						
Rear bank 1 Rear bank 2	P0137 P0157	range check low	sensor signal voltage for time	<-0,148 V > 0,2 s	sensor heater for time	on > 200 s	continuous	two driving cycles

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Rear bank 1 Rear bank 2	P0138 P0158	range check high	sensor signal voltage for time	> 1,083 > 0,2 s	sensor heater for time	on > 200 s	continuous	two driving cycles
Rear bank 1 Rear bank 2	P0140 P0160	no activity detected	sensor signal voltage for time	-0,0398<...<0,0383 > 225 s	sensor heater for time	on > 200 s	continuous	two driving cycles
Heater rear b. 1 Heater rear b. 2	P0141 P0161	Heater current	calculated resistance	<2,45 or >9,56	sensor heater time after dewpoint (from catalyst temp. model)	on 180 s	continuous	two driving cycles
Fuel system B. 1 Bank 1 Bank 2 Bank 2	P0171 P0172 P0174 P0175	fuel trim limits exceeded	additional or multiplicational fueltrimvalue	>0,550 ms or >23 % <-0,550 ms or<-21% >0,550 ms or >23 % <-0,550 ms or<-21%	fuel system status fuel trim learning	closed loop active	continuous	two driving cycles
Injection Valve	P0201 to P0206	circuit continuity	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	two driving cycles
Fuel Pump primary circut	P0230	range check low range check high	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	two driving cycles
Misfire	P0301 to P0306	Crankshaft speed fluctuation	FTP Emission Threshold I/M Emission Threshold	> 1,6% > 1,6%	engine speed engine speed change load change intake air temp time from engine	520...6400rpm < 4000 rpm/s < 1,5 ms/s > -8,25°C	1000 revs continuous	two driving cycles
	P0300	Multiple misfire			start up rough road traction control evap-system check	> 5 s < 1,011 m/s² off off		
		(coolanttemp-, loadsignal-, throttleposition-, chrankshaftsensor)			Errorflags (look left)	not present		

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			Catalyst Damage	map rpm/load (KFKSWF 1,04...12,5%)			200 revs	immediately
	P1460	misfire with low fuel		fuellevel > 6,82V	misfire	yes		no MIL
Knock Sensor 1	P0325	range check low	voltage	table UDKSNU	coolant temp.	> 45 °C	continuous	no
Knock Sensor 2	P0330	range check high	voltage	table UDKSNO	engine speed	> 2000 rpm		
Crankshaft Position Sensor	P0335	malfunction	while cranking compare with camshaft		engine speed	> 2000 rpm	200 revs continuous	two driving cycles
Position Sensor	P0336	range	marker not in window one tooth to much		no			
Camshaft Position Sensor	P0340	rationality	bit pattern at chrankshaft marker	not plausible	revs time	> 100 > 0,5 s	continuous	two driving cycles
Secondary Air System	P0411	functional check	no flow	Fr<FRSLA+0.281 for time > 6s	secondary air (normally on when starting coolant temp.) fuel system status vehicle speed altitude evap purge valve intake air coolant temp. engine status Errorflags (look left)	on at start 0°C<...< 36°C closed loop = 0 mph <2750 m closed > 5,25°C > 18,75 °C idle not present	20 s in idle once per trip	two driving cycles
		(load-, throttlepos.-, intake airtemp.-, coolanttemp.-, oxygensensor, evapvalve, batteryvoltage,misfire)						
Secondary Air Valve	P0412	circuit continuity	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	two driving cycles
Catalyst Bank 1 Catalyst Bank 2	P0422 P0432	comparison of the amplitude ration (AR)	AR in 3 areas of matrix	AR > 0,35 - 0,60	engine speed load	1200...2200 rpm 1,6...3,2 ms	200 sec in active	two driving

		of upstream			fuel system status	closed loop	map area	cycles
					catalyst temp. model	> 352 °C	ones per	
		Malfunction criteria:			intake air temp.	> -8°C	driving	
		1.5 x standard			canister purge value	< 5	cycle	
					time after start	>100 s		
		(load-, throttle pos.-, intake airtemp.-, coolanttemp.-, oxygen sensor, evap system, evap valve, battery voltage, mifire, fuel trim)			Errorflags (look left)	not present		
Evaporative Emission Control System	P0440	pressure control	tank pressure while compensation gradient messurement	< -1,61 hPa	vehicle speed	= 0 mph	40 s if okay	two
					engine status	idle	once per	driving
			ortank pressure after large leak detection	< -14,95 hPa	fuel system status	closed loop	driving	cycles
					canister load factor	< 5	cycle, max.	
			ortank pressure while opening purge solenoid	< -5,06 hPa	tank pressure	< 7,82 hPa	3 times per	
					engine load	< 2,7ms	driving	
			ortank pressure for time period	< -14,03 hPa	intake airflow	< 33 kg/h	cycle	
				> 20 s	eng. temperature at start	-8,25°C<...< 75°C		
					intake air temperature	-8,25°C<...<50,25°C		
					tank pressure compensation gradient	< 1,15 hPa		
					battery voltage	> 11,03 V		
					time after start	> 1005 s		
					altitude	< 2750 m		
					secondary air	inactive		
					secondary air diagnose	inactive		
		(load-, throttle pos.-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle controller, purge valve-, vent control valve outputstage battery voltage, misfire)			Errorflags (look left)	not present		
Evaporative Emission Control System Leak detected (small leak)	P0442	pressure control	tank pressure loss gradient	table GFSTED	vehicle speed	= 0 mph	40 s if okay	two
					engine status	idle	once per	driving
					fuel system status	closed loop	driving	cycles
					canister load factor	< 5	cycle, max.	
					tank pressure	< 7,82 hPa	3 times per	
					engine load	< 2,7ms	driving	

					intake airflow	< 33 kg/h	cycle	
					eng. temperature at start	-8,25°C<...< 75°C		
					intake air temperature	-8,25°C<...<50,25°C		
					tank pressure compen-sation gradient	< 1,15 hPa		
					battery voltage	> 11,03 V		
					time after start	> 1005 s		
					altitude	< 2750 m		
					secondary air	inactive		
					secondary air diagnose	inactive		
		(load-, throttle pos.-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle controller, purge valve-, vent control valve outputstage battery voltage, misfire)			Errorflags (look left)	not present		
Evaporative Emission Control System Purge Control Valve Circuit	P0443	circuit continuity	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	two driving cycles
Evaporative Emission Control System	P0446	pressure control	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	two driving cycles
Evaporative Emission Control System Pressure Sensor	P0450	range check low range check high	sensor signal value sensor signal value or sensor signal value	< -28,29 hPa > 27,6 hPa >= 14,95 hPa	time or time engine status eng. temperature at start time after start	> 5s > 3 s idle <= 33°C 2s<...< 10s	continuous	two driving cycles
Evaporative Emission	P0455	pressure control	tank pressure gradient ortime for large leak detection	< 0,15 hPa/s > 15,56 s	vehicle speed engine status	= 0 mph idle	40 s if okay once per	two driving

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Control System Leak detected (large leak)			orno pressure change for	> 4 s	fuel system status	closed loop	driving	cycles
					canister load factor	< 5	cycle, max.	
					tank pressure	< 7,82 hPa	3 times per	
					engine load	< 2,7ms	driving	
					intake airflow	< 33 kg/h	cycle	
					eng. temperature at start	-8,25°C<...< 75°C		
					intake air temperature	-8,25°C<...<50,25°C		
					tank pressure compen-sation gradient	< 1,15 hPa		
					battery voltage	> 11,03 V		
					time after start	> 1005 s		
					altitude	< 2750 m		
					secondary air	inactive		
					secondary air diagnose	inactive		
		(load-, throttle pos.-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle controller, purge valve-, vent control valve outputstage battery voltage, misfire)			Errorflags (look left)	not present		
Vehicle Speed Sensor	P0501	rationality	speed	< 5 km/h	engine speed	> 1960 rpm	continuous	two driving cycles
					load	3,2<...<4,2 ms		
					time	> 5 s		
Idle Control	P0505	range check low	voltage	IC internal	stage had to be	aktiv	continuous	two driving cycles
		range check high			battery voltage	> 9 V		
	P0506	functional check	actual - desired rpm	< -100 rpm	coolant temp.	> 80,25 °C	22 s	
	P0507			> 200 rpm	vehicle speed	= 0 mph	once	
			orfuel cut offs during this idle	>3			per trip	
		(vehicle speed-, throttle position-, coolanttempsensor, idle control, evap system, evapvalve)			Errorflags (look left)	not present		
					evap	off		
					evap diagnotic	off		
					altitude	< 2750 m		
					intake air temp.	> -8,25°C		
				only for: >200 rpm	load	< 2 ms		

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System Voltage	P0560	range check high	voltage	> 16,03 V	none		continuous	no
			and not (jumpstart)	> 19,05V	vehicle speed	= 0 mph		
		range check low	voltage	< 9,05 V	time after start	> 60 s		
		rationality	voltage	< 2,55 V	none			
ECM	P0601	Check Sum Error	check sum		at engine turn off		< 4 s	two driving cycles
	P0602	Seed and key	not armed		at starting			
	P0604	RAM Error	bit pattern not correct		at starting			
Intake Air Throttle Charge Over 1 Charge Over 2	P1112 P1113	range check low range check high	voltage	IC internal	stage had to be battery voltage	aktiv > 9 V	continuous	no
Immobilizer	P1501	rationality	not or wrong initialized		at cranking		2 s	no
	P1502	rationality	no frequencecode received		at cranking			
	P1503	rationality	wrong frequencecode received		at cranking			
Battery Voltage	P1564	rationality	if ECU was unplugged (voltage loss)		at cranking		2 s	no
ECU Temperature	P1601	range check high	temperature	> 105°C			continuous	no
		rationality	temperature	<-50,25 or >139,9 °C				
Knock Control Module	P1602	rationality		IC internal	coolant temp.	> 45 °C	continuous	no
Transmission MIL Request	P1700	TCM	OBDII failure				continuous	immediately
Transmission MIL Request Circuit	P1701	circuit continuity			engine speed (cranking)	< 100 rpm	< 2,5 s	two driving cycles

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Torque Control	P1740	circuit continuity	signal always low for time or signal 3 times for time out of window	> 2 s > 2,54 s		continuous	no

Codes skipped from old listing	P0410	did not work as discribed, if pump is running always **and** valve stays open then code P0171 and P0174 will be shown.
	P0441	no function at all, discribtion was put to the wrong code discribtion from old listing fits to code P0440.
	P1640	there is no reserve output stage so there will be no code at all.