Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Mass Air Flow Sensor	**P0102** **P0103** **P0101**	range check low range check high rationality check	value difference between measured and calculated airmassflow and gradient of above signal	see table KFMLDMN (0...156,4 kg/h) see table KFMLDMX (60...1181 kg/h) see table > GRDSDMSS + DGRDSDMSS and > GRDSGDMSS	• battery voltage • time after start • Errorflag throttle position sensor • difference between both throttle signals • (throttle1/ throttle2) - 1 • pressure intake manifold/ in front of throttle • wot • integrator stop	> 11 V (UBHFM) > 0,3 s (TDMLST) not set < 0,6% < 0,5 < 0,95 not set not set	continuous	Two driving cycles
Intake Manifold Pressure Sensor	**P0107** **P0108**	range check low range check high	sensor signal voltage	< 0,14V (UADPSMN) > 4,88V (UADPSMX)	• time • engine	> 0.2 s (TDDSS) running	continuous	Two Driving Cycles
Intake Air Temperature Sensor	**P0113** **P0112**	range check low range check high	temperature	<-42,75°C (TADMN) > 139,50°C (TADMX)	• time after start • time in idle • time	>180s (TDNSTA) >10 s (TDTAL) > 2s (TDTA)	continuous	Two driving cycles
Coolant Temperature Sensor	**P0115** **P0116** **P0118** **P0117**	signal check plausibility check range check low range check high	temperature for closed loop control not reached after time temperature	timer depending on airflow < model temp. -12°K (DTMDMA) < -42,75°C (TMDMN) > 139,50 °C (TMDMX)	• time after engine start (timer depending on airflow) • engine speed • no • no	2 min - 5 min > 20 rpm	continuous	Two Driving cycles
Engine Coolant Thermostat Monitoring	**P0128**	Coolant temperature below thermostat regulating temperature (plausibility check)	(calculated reference coolant temperature - coolant temperature) > threshold DTHMD	DTHMD = 5°C	▪ debounce time ▪ fuel cut off ▪ error flag engine coolant sensor ▪ error flag vehicle speed sensor ▪ ambient temperature ▪ ambient temperature ▪ coolant temp. at start	TDTHM > 1s B_sa not set E_tm not set E_vfz not set TDTHMU > -30°C TDTHMO < 45°C TMSDTHMU < 50°C	continous during warm up	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					▪ vehicle speed ▪ engine speed ▪ integrated air mass flow	VDTHMU > 15 km/h NDTHMU > 960/min ITDTHMU > 3 kg		
Throttle Position Sensor	**P0121**	plaus. check poti1	TPS1 compared to TPS2 and a TPS3 value calculated from MAF	> 6,3% (DWDK120) > 9% (DWDK130)	• battery voltage • time •	> 7 V > 140 ms	continuous	5 s
	P0122	range check low poti 1	voltage	< 0,195 V (UDKP1U)				
	P0123	range check high poti 1		> 4,609 V (UDKP1O)				
	P0221	plaus. check poti 2	TPS2 compared to TPS1 and a TPS3 value calculated from MAF	> 6,3% (DWDK120) > 9% (DWDK130)				
	P0222	range check low poti 2		< 0,1563V (UDKP2U)				
	P0223	range check high poti 2	voltage	> 4,8047V (UDKP2O)				
O2 Sensors								
Front Bank 1 **Front Bank 2**	**P0130** **P0150**	circuit continuity	sensor signal voltage for time **or** sensor signal value for time **or** sensor signal value for time **or** sensor signal value for time	> 4,7V (SULSUMX) > 2s (TVCJLSU) 0,995 (LSUNAMN) <. .<1,005 (LSUNAMX) >2...16 s (TVPLMSA) > 1,2 (LAMMX) >2...16 s (TVPLMSA) < 0,8 (LAMMN) >2...16 s (TVPLMSA)	• none • either one errorflag: front sensorheater, rear sensor, rear sensor aging • indicator self adjust • rear sensor voltage • rear sensor voltage • errorflags: rear sensor, rear sensor aging • rear sensor voltage • erroflags: rear sensor, rear sensor aging	 not present not present > 0,85 V (USHKFT) or < 0,103 V (USHKMR) > 0,85 V not present < 0,103 V not present	continuous	Two driving cycles
Front Bank 1 **Front Bank 2**	**P0131** **P0151**	range check low	standardized dynamic value from sensor	< 0,60 (DYNLSUMX)	• load • engine speed	23,25 <.... < 45 % (RLDYNU <..< RLDYNO) 1400<.... <2520 rpm (NMOTDYNU < ...< NMOTDYNO)	continuous	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
					• lambdavalue • either one errorflag: misfire, evapsystem, purge valve, fueltrim • evapsystem • close loop control maximum • close loop control minimun	0,96 <... <1,04 (LAMDYNU<.....< LAMDYNO) not present no high loading indicated not reached or exceeded not reached or exceeded		
Front Bank 1 **Front Bank 2**	**P0132** **P0152**	range check high	lambda offset	> 0,03 (SDLAOF)	• time • engine • either one errorflag: rear sensor, rear sensor aging • rear sensor aging diagnosis	> 2 s (TVLSUOF) running not present Q finished	continuous	Two driving cycles
Front Bank 1 **Front Bank 2**	**P0134** **P0154**	no activity detected	lambda value	> 0,1 (SDLAMX)	• eventcounter • timer • exhaust model temperatur • time after start • flag lambda amplitude • flag low loadchange • flag O2-sensor maxi-mum value exceeded	> 30 (ZEHK) > 0,5 s (TVHKLSU) >460 °C (TALAMX) >25 s (TVLSUHK) present present not present	continuous	Two driving cycles
Rear Bank 1 **Rear Bank 2**	**P0136** **P0156**	circuit continuity	sensor signal voltage	< 0,04 V (USMIN)	• rear close loop either one errorflag: evap system, purge valve• • timer • flag tank empty • engine • catalytic converter temperature • battery voltage • lambda target • time after dewpoint	established not present > 60 s (TUSDUH) not present running < 940 °C (TABGMCSD) >11,03 V (UBDLS) =1 > 90 s (TTBMH)	continuous	Two driving cycles
Rear Bank 1 **Rear Bank 2**	**P0138** **P0158**	range check high	sensor signal voltage for time	> 1,5 V (USMAX) 5,1 s (TUSKS + TUSMAX)	• engine • catalytic converter temperature • battery voltage • lambda target value • time after dewpoint	running < 940 °C (TABGMCSD) > 11,03 V (UBDLS) =1 > 90 s (TTBMH)	continuous	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Rear Bank 1 **Rear Bank 2**	**P0139** **P0159**	sensor signal stuck rich or lean	sensor voltage for time	below or above reference value 0.35V for 110s (TTLASH + TUSLASH) or >0,200 V(USSCHUB) for 5s (TSALASH)	• rear closed loop fuel cut off test with additional enrichment /enleanment • fuel cut off	active not active completed active	continuous	Two driving cycles
Rear Bank 1 **Rear Bank 2**	**P0140** **P0160**	no activity detected	sensor signal voltage for time	0,421 <... < 0,479 V (USREMH<.....<USREFH) 1150 s (TRSAH)	• engine • catalytic converter temperature • battery voltage • lambda target value • time after dewpoint	running < 940 °C (TABGMCSD) > 11,03 V (UBDLS) =1 > 90 s (TTBMH)	continuous	Two driving cycles
Heater Rear B. 1 **Heater Rear B. 2**	**P0141** **P0161**	heater resistance	actuall heater resistance	> Map KFRINH * 5...12	• catalytic converter temperture • battery voltage • error flag heater output stage • dewpoint behind catalytic converter • timer	400 <... < 580°C (TADHMN<..<TADHMX) 11,03 <... < 14,98 V (UBDLS<..<UBDLSMX) not present reached > 15 s	continuous	Two driving cycles
Heater Rear **Power Stage Check** **Bank 1** **Bank 2** **Bank 1** **Bank 2** **Bank 1** **Bank 2**	 **P0036** **P0056** **P0037** **P0057** **P0038** **P0058**	 open circuit range check low range check high	 Voltage	 IC internal	 • engine speed • battery voltage • battery voltage • time • stage had to be	 > 40 rpm > 7,5V < 15 V 300ms .. 500 ms active	 continuos	 Two driving cycles
Heater Front B1 **Heater Front B2** **Heater Front B.1**	**P0030** **P0050** **P0031**	signal check range check low	heater voltage heater voltage	>2,34V (UHEMN) and < 3,6V (UHEMX) < 2,43V (UHEMN)	• delaytime • battery voltage • heater outputstage • engine • delaytime • battery voltage	>0,04 s (TDFHS) 11,03 <... < 14,98 V (UBDLS <..< UBDLSMX) not active running >0,04 s (TDFHS) 11,03 <... < 14,98 V	continuous	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Heater Front B.2	**P0051**					(UBDLS<..<UBDLSMX)		
		range check high	heater votage	> 3,6V (UHEMX)	• heater outputstage • engine	active running		
Heater Front B.1	**P0032**							
Heater Front B.2	**P0052**	plausibility check	time after heater on	>20 s (TVLSUBM) and Sensor not active	• batterie voltage • heater outputstage • engine	11,03 <... < 14,98 V (UBDLS <..< UBDLSMX) active running		
Heater Front B.1	**P0135**							
Heater Front B.2	**P0155**							
Fuel System								Two driving cycles
Bank 1	**P0171**	fuel trim limits exceeded	additional or multiplicational	>7,7 % or > 21 % (>RKATDX or >FRAODX,FRAUDX)	• fuel system status • fuel trim adaption	closed loop activ	continuous	
Bank 1	**P0172**			< -7,7 % or < -24% (>RKATDN or >FRAODN,FRAUDN)				
Bank 2	**P0174**			>7,7 % or > 21 % (>RKATDX or >FRAODX,FRAUDX)				
Bank 2	**P0175**			< -7,7 % or < -24 % (>RKATDN or >FRAODN,FRAUDN)				
Injection Valves 1..6 (Power Stage Check)	**P0201** **P0202** **P0203** **P0204** **P0205** **P0206**	open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	Two driving cycles
	P0261 **P0264** **P0267** **P0270** **P0273** **P0276**	range check low						
	P0262 **P0265** **P0268** **P0271** **P0274**	range check high						

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
	P0277							
Fuel Pump Primary Circuit	**P0230** **P0231** **P0232**	open circuit range check low range check high	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	No
Misfire	**P0301 to P0306** **P0300**	crankshaft speed fluctuation cylinder 1 to cylinder 6 Multiple misfire	FTP emission threshold or catalyst damage	> 1,0 % Misfire counts weighted with map (rpm/load) KFKSWF > 3200 in 200 rev (AHEKSB1 /2)	• engine speed • load • engine speed change • load change • intake air temp • engine run time • rough road • traction control • either one errorflag: throttle position, crankshaft sensor, reference mark sensor	NMIALU > 500 rpm NMXALU < 6520 rpm RLSALUNG > 13,5...33 % NGALU <2500..5500rpm/s DRLSOLA<120..750%/seg TAMIALU > -30°C > 0 sec not detected off not set	continuous first 1000 rev then 4 x 1000 rev 200 rev	Two driving cycles Immediate flashing latches on 2. driving cycle
Misfire With Low Fuel	**P0313**	Fuel Level	Liter	< 11 l (FSTTAL)	• time or • Misfire detected or • fuel trim limits exceeded	30 s yes	continuous	No
Knock Sensor 1	**P0327**	range check low	Voltage	table UDKSNU	• coolant temp.	> 39,75°C	Continuous	No

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
	P0328	range check high		table UDKSNO	• engine speed	> 2000 rpm		
Knock Sensor 2	**P0332** **P0333**	range check low range check high	voltage	table UDKSNU table UDKSNO	• coolant temp. • engine speed	> 39,75°C > 2000 rpm	continuous	No
Crankshaft Position Sensor	**P0335**	malfunction	counter schedule of phase signal and no signal from crankshaft position sensor	> 8	• camshaft signal	Active	continuous	Two driving cycles
Camshaft Position Sensor	**P0342** **P0343** **P0341**	check low check high rationality	bit pattern at crankshaft marker high or low marker not plausible	>= 5 times	• engine speed	> 20 rpm	continuous	Two driving cycles
EGR		flow-check: comparison betw. Modelled and measured intake pressure after charging EGR-rate			• engine speed • engine load • engine load gradient	1600<...>2200 rpm (NDAGRFMN<...> NDAGRFMX) 35<...>60 % (RLDAGRFN<...> RLDAGRFX) < 0,35% (DRLDAGMX)	<= 15s once per driving cycle	Two driving cycles
	P0401	flow-check low	Insufficient EGR-flow	< -0,70 (RFEAGRMN)	• EGR partial pressure	>= 25 hPa (PSAGRMN) >0,5 kg (IMLATDAG)		
	P0402	flow-check high	Excessive EGR-flow	>0,70 (RFEAGRMX)	• air mass since start • altitude	< 2750m		
EGR Power Stage	**P0403** **P1403** **P1405**	open circuit range check low range check high	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	Continuous	Two driving cycles
EGR Position Sensor	**P0406**	Open valve pintle error	Position sensor voltage	> 4,8242 V (UAGRPMX) for time > =1s (TWUAGERR)	• errorflag: battery voltage • engine	not present running	Continuous	Two Driving Cycles
	P0405	Closed valve pintle error		< 0,1367 V (UAGRPMN) for time >= 1s (TWUAGERR)				
	P1406	sticking valve	difference between set and actual position of EGR-valve	>20% (AGRDMX) for time >= 10s (TWAGRDI)	• EGR-System	Active		
Catalyst, Bank 1 **Catalyst, Bank 2**	**P0421** **P0431**	determining the oxygen storage capability by	catalyst qualtity factor	> 0,65 (AHKATMX)	• engine speed • load	>1000rpm; < 2000rpm > 20 .. 24 %; < 30 .. 45 %	50 s, once per driving cycle, in case	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
		comparing the amlitude obtained from the downstream O2-sensor to a modelled sensor-signal amplitude			• fuel system status • modelled catalyst temp. • modelled signal amplitude • catalyst load value • canister purge value • either one errorflag: O2-sensor upstream and downstream, misfire, air flow sensor, throttle pos. sensor, purge system, fuel system	closed loop > 350 °C > 0.36 < 10 .. 30 /s < 6 not present	of a fault detection one repeated test possible	
					•			
Evaporative Emission Control System	**P0440**	pressure control or or or	tank pressure while compesation gradient measurement tank pressure after large leak detection tank pressure while opening purge solenoid tank pressure for time period	< - 1,61 hPa (DDPTEKU) < - 14,99 hPa (DDPTETV) < - 6 hPa (DDPTEAV) - 14,95 hPa (DPTEDUD) 15 s (TTEDWU)	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start • intake air temperature • tank pressure while compensation gradient measurement • battery voltage • time after start • altitude • tank pressure while driving cycle • fuel level • • either one errorflag: load-, electr. Throttle potentiometer-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire, egr output stage, egr flow	= 0 mph idle closed loop < 7 (SFTEDA) -15<...< 15 hPa (DPTEBU, DPTEBO) < 35 % (RLTEDMX) > 400 hPa (DPUSTED) 3.75 °C < ... < 75 °C 3.75 °C<...< 50,25 °C < 0,40 hPa (DDPTEKO) > 11,05 V (UBTEDU) > 1005 s or fuel mixture adaption OK (b_gae =1) < 3000 m < 15 hPa 9 l < ... < 51 l (FSTDMN, FSTDMX) not present	max. 40 s to complete test in case of a fault detection one repeat test possible max. 10 test attempts per trip	Two driving cycles

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Evaporative Emission Control System Leak Detected (small leak)	**P0442**	pressure control	leak air flow volume	table VLTEDFH (...0,072) and time for vacuum decay <12,5 s (TTEDF)	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start • intake air temperature • tank pressure while compensation gradient measurement • battery voltage • time after start • altitude • tank pressure while driving cycle • fuel level • either one errorflag: load-, electr. Throttle potentiometer-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire, egr output stage, egr flow	= 0 mph idle closed loop < 7 (SFTEDA) -15<...< 15 hPa (DPTEBU, DPTEBO) < 35 % (RLTEDMX) > 400 hPa (DPUSTED) 3.75 °C < ... < 75 °C 3.75 °C < ... < 50,25 °C < 0,40 hPa (DDPTEKO) > 11,05 V (UBTEDU) > 1005s or fuel mixture adaption OK (b_gae =1) < 3000 m < 15 hPa 9 l < ... < 51 l (FSTDMN, FSTDMX) • not present	max. 40 s to complete test in case of a fault detection one repeat test possible max. 10 test attempts per trip	Two driving cycles
Evaporative Emission Control System Purge Control Valve Circuit	**P0445** **P0444** **P0443**	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms • active	Continuous	Two driving cycles
Evaporative	**P0448**	range check high	voltage	IC Internal	• engine speed	> 40 rpm	continuous	Two

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
Emission Control System Vent Control Malfunction	**P0447** **P0449**	range check low open circuit			• battery voltage • battery voltage • time • stage had to be	> 7,5 V < 15 V 300 ms ... 500 ms active		driving cycles
Evaporative Emission Control System Pressure Sensor	**P0452** **P0453** **P0451**	range check low range check high rationality	sensor signal value sensor signal value or sensor signal value	< - 28,125 hPa (DPTEMN) > 29,375 hPa (DPTEMX) >= 25 hPa (DPDSTO)	• time • time • time • engine status • engine temperature at start time after start	> 3 s (TDDSTO) > 3 s (TDDSTO) > 3 s (TDDST) idle <= 33 °C (TMDDST) 1 s < ... < 10 s (TTDSTP, TTDSST)	max. 10 s	Two driving cycles
Evaporative Control System Leak Detected (large leak)	**P0455**	pressure control or	evacuation time for large leak during evacuation no pressure change detected for a time	> 15 s (TDTEGR) > 4 s (TTEDST)	• vehicle speed • engine status • fuel system status • canister load factor • tank pressure • engine load • intake low pressure • engine temperature at start • intake air temperature • tank pressure while compen-sation gradient measurement • battery voltage • time after start • altitude • tank pressure while driving cycle • fuel level • either one errorflag: load-, electr. Throttle potentiometer-, coolanttemp.-, vehicle speed-, tank pressure-, oxygensensor, idle control, purge valve -, vent control output stage, battery voltage, misfire, egr output stage, egr flow	= 0 mph idle closed loop < 7 (SFTEDA) -15<...< 15 hPa (DPTEBU, DPTEBO) < 35 % (RLTEDMX) > 400 hPa (DPUSTED) 3.75 °C < ... < 75 °C 3.75 °C < ... < 50,25 °C < 0,40 hPa (DDPTEKO) > 11,05 V (UBTEDU) > 1005 s or fuel mixture adaption OK (b_gae =1) < 3000 m < 15 hPa 9 l < ... < 51 l (FSTDMN, FSTDMX) • not present	max. 40 s to complete test in case of a fault detection one repeat test possible max. 10 test attempts per trip	Two driving cycles

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Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Fuel Level Sensor Circuit	**P0463** **P0462** **P0461**	range check high range check low rationality	Voltage Liter Voltage	> 4,49 V (UFSTMX) < 0,35 V (UFSTMN) more than +/- 15l (DFSKVO/DFSKVU) difference between calculated and measured Fuel Level after calculating a fuel consume of 20l	• time	1 s	continuous	No
Cooling Fan Control Circuit	**P0480 (Fan A)** **P0481 (Fan B)**	range check high range check low open circuit range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	No
Vehicle Speed Sensor	**P0500**	rationality	speed	< 20 km/h (VDMN)	• engaged gear • CAN:VALID_ACTUAL_ GEAR_TCM • engine coolant temperatur • engine speed • time	= 4 = 0 > 64,5 °C (TMDV) (NDV) (NDVO) 1800 <...< 10200 rpm > 1 s (TDV)	continuous	Two driving cycles
Idle Control	**P0506** **P0507**	functional check	actual desired rpm or fuel cuts off during this idle	> 100 rpm (DNDLLRO) < -200 rpm (DNDLLRU) > 3 (DASA) only for: < -200 rpm	• coolant temp. • intake air temp • vehicle speed • evap (high canister load) • evap diagnostic • secondary air diagnostic • either one errorflag: throttle position, vehicle speed, coolant temp. sensor, intake air sen., evap system, evap valve • load	> 80,25°C (TMDLLR) > 34,5°C (TADLLR) = 0 km/h off off off not set < 50,25 % (RLDLLR)	continuous	Two driving cycles
A/C Refrigerant Pressure Sensor	**P0532** **P0533**	range check low range check high	sensor signal voltage	< 0,1953 V (UADPACMN) > 4,8828 V (UADPACMX)	• engine	Running	continuous	No
System Voltage	**P0563** **P0562** **P0560**	range check high range check low rationality	voltage	> 16 V (UBDMX) < 9 V (UBDMN1) < 2,5 V (UBDMN2)	• time • vehicle speed • time after start	200ms (TDUB) > 0 km/h 180 s (TDNSUB)	continuous	No
Brake Switches	**P0571**	plausibility of brake	several times BLS and	> 1 s (TVERBR)	• no	-	continuous	No

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
		light switch (BLS) and brake test switch (BTS)	BTS unplausible for a certain period	> 10 times (ZERBR)				
Calculator Monitoring	**P0601**	ROM Check	check sum ROM error		• no		continuous	5 s
ECM	**P0602**	Programming Error	Security Access not armed		• no		at enginestart	No
Calculator Monitoring	**P0603**	Calculator check	Calculator Check		• no		continuous	5 s
Calculator Monitoring	**P0604**	RAM check	Read- and write-Test		• no		continuous	5 s
Function Monitoring	**P0606**	monitoring torque safety fuel cut off	torque out of range calculator error in function		• engine speed	> 1120 rpm (NMN_DUF)	continuous	5s
Generator L Terminal Control Circuit	**P0621** **P1637**	open circuit range check low	voltage	Generator Terminal Status	• engine speed • engine • ignition	> 40 rpm running active	continuous	No
Intake Plenum Switchover Valve	**P1245**	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage • time • stage had to be	> 40 rpm > 7,5 V < 15 V 300 ms ... 500 ms active	continuous	No
Accelerator Pedal Position Sensor 1 **(Pedal Moving Detection)**	**P1278** **P1277** **P1271**	range check high range check low plausibility to poti 2 or comparison of poti 1 and poti 2 when leavung idle range	voltage volt. Part. throttle range volt. Full throttle range	> 4,8242 V (UPWG1O) < 0,2930 V (UPWG1U) > 0,2734 V (DUPW12TG) > 0,9961 V (DUPW12VG) > 0,5273 V (UPW1LLMX) <0,6836 V (UPWGU)	• battery voltage • no substitute operation of accelerator pedal position sensor	> 7 V	continuous	5 s
Accelerator Pedal Position Sensor 2	**P1283** **P1282**	range check high range check low	voltage	> 4,8242 V (UPWG2O) < 0,0977 V (UPWG2U)	• battery voltage	> 7 V	continuous	5 s
DV-E Limp-Home	**P1511**	check of limp-	throttle position	< 1.7 %	• vehicle speed	= 0 km/h	continuous	5 s

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
Air Position		home air position		(WDKNLPMI) > 9,8405 % (WDKNLPMA)	• engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	< 250 rpm (UANNMAX) 5°C <... < 100°C (UAN_U_MT, UAN_O_MT) > 5°C (UANUATS) > 10 V (UB_UANL) < 15 % (UANPEDMAX)		
DV-E Position Throttle Blade	**P1516**	difference between set and actual position of throttle blade	difference value	> DWDKSBAMX for time > 0,5 s extended threshold for low ambient start: DWDKSBAMX + 6.2%	• status DVE-E adaption for extended threshold: engine coolant temp. engine speed	not set < 5°C < 400 rpm	continuous	5 s
DV-E Spring Check	**P1523**	check of DV-E return spring	active opening throttle blade, switch off power stage and monitoring the throttle blade return	> (angle limp-home + 3%) for time > 0,56 s (FPRTIM2_T)	• vehicle speed • engine speed • coolant temp. • intake air temp.	= 0 km/h < 250 rpm (FPRNMAX) 5°C <...< 100°C (FPRMT) > 5°C (FPRAT)	once per DV-E adap.	5 s
DV-E Lower Mechanical Stop Throttle Blade	**P1526**	range check lower mechanical stop throttle blade	range check high range check low	< 0,24 V (UDKP1AMIN) > 0,820 V (UDKP1AMAX) < 4,20V (UDKP2AMIN) > 4,77V (UDKP2AMAX)	• vehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	= 0 km/h < 250 rpm (UANNMAX) 5°C <...< 100°C (UAN_U_MT UAN_O_MT) > 5°C (UANUATS) > 10 V (UB_UANL) < 15 % (UANPEDMAX)	once per DV-E adap.	5 s
DV-E Power Stage Switch Off	**P1519**	output	state	not set for time > 5 s (DLRPID2T)	• status DVE-E adaption • duty cycle range check	not set > 80 % PWM	continuous	5 s
DV-E Amplifier Adjustment	**P1530**	range check of amlified actual throttle blade position signal	amplification value offset value	< 4,00 V (UDKP1VVMI) > 4,32 V (UDKP1VVMA) < -0,1503 V (UDKP1VOMI) > 0,1503 V (UDKP1VOMA)	• vehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal positionvehicle speed • engine speed • coolant temp. • intake air temp. • battery voltage • pedal position	= 0 km/h < 250 rpm (UANNMAX) 5°C <...< 100°C (UAN_U_MT UAN_O_MT) > 5°C (UANUATS) > 10 V (UB_UANL) < 15 % (UANPEDMAX)= 0 km/h < 250 rpm 5°C <...< 100°C > 5°C > 10 V < 15 %	once per DV-E adap.	No
A/C Clutch Relay Circuit	**P0647** **P0646**	range check high range check low open circuit	voltage	IC Internal	• engine speed • battery voltage • battery voltage	> 40 rpm > 7,5 V < 15 V	continuous	No

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation
	P0645				• time • stage had to be	300 ms ... 500 ms active		
Knock Control Module	**P0324**	rationality	IC output voltage	>44,983 V/s (DKRISNT) > 0,2148 V (UDKRGOFS) < 3,6914 V (UDKRTP)	• coolant temp. (knock control active)	> 39,75°C (TMKR)	Continuous	No
Immobilizer	**P1630** **P1631** **P1632**	rationality	not or wrong initialized wrong frequencycode received no frequencycode received		• at cranking			No
PWM Vehicles incooperating an ABS unit	**P1669**	rationality	Monitoring of PWM signal from MMR period duration or pulse duty factor	not within f = 100Hz +/- 5Hz < 8% (PCMDMN) for time > 0,1s (TPWMF)	• engine speed • delay time • variant coding	> 160 rpm 2 s car incooperates an ABS unit (eeprom byte FZVAR, bit 6)	Continuous	No
DV-E Control Range	**P1510**	range check high range check low	PWM /- PWM / time	> 80 % PWM (DLRPIDMAX) > 80 % PWM (DLRPIDMIN) for time > 0,6 s first threshold (DLRPID1T) or > 5 s (second threshold (DLRPID2T)	• battery voltage • status DVE-E adaption first threshold is disabled during low ambient start: engine coolant temp engine speed	> 7 V not set < 5°C < 400 rpm	Continuous	5 s
Transmission MIL Request	**P1780**	TCM	OBD2 failure				continuous	Two Driving Cycles
Torque Limiter	**P1845**	range check high	indexed torque	> maximum autorized idexed torque	• engine speed	> 40 rpm	continuous	Two driving cycles
CAN-BUS Communication Malfunction	**U2100**	CAN-BUS circuit	Common not identified bus error		• engine speed • time	> 25 U/min (B_nmot=t rue) > 25 sec	continuous	No
CAN-BUS Fewer Controller On Bus Than Controlled	**U2103**	CAN-BUS circuit	Fewer systems on bus than programmed in the maximum configuration list	< 3	• engine speed • time	>25 U/min (B_nmot= true) > 25 sec	continuous	No
CAN-BUS Reset	**U2104**	CAN-BUS circuit	Reset Counter	> 40	• engine speed	>25 U/min	continuous	No

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Counter Overrun					• time	(B_nmot= true) > 25 sec		
CAN-BUS Lost Communication With TCM	**U2106**	CAN-BUS circuit	No communication with TCM		• engine speed • time	> 25 U/min (B_nmot=t rue) > 25 sec	continuous	5 s
CAN-BUS Lost Communication With BCM ABS	**U2107**	CAN-BUS circuit	No communication with BCMABS		• engine speed • time	> 25 U/min (B_nmot= true) > 25 sec	continuous	No

P0101:

GRDSDMSS

```
X: grdwdkba_w  [-]          gradient of throttle angle
W: GRDSDMSS    [-]          gradient of air flow
StNr.                  0        1        2        3        4        5        6        7
grdwdkba_w      0.000000 0.010300 0.011978 1.999969 2.500000 3.000031 4.000015 4.990005

GRDSDMSS        0.391998 0.399994 0.399994 0.399994 0.399994 0.399994 0.399994 0.399994
```

GRDSGDMSS

```
X: grdwdkba_w  [-]          gradient of throttle angle
W: GRDSGDMSS   [-]          gradient of air flow
StNr.                  0        1        2        3        4        5        6        7
grdwdkba_w      0.000000 0.010986 0.015030 0.999985 2.500000 3.000031 3.499985 4.000015

GRDSGDMSS       1.999969 1.999969 4.000015 4.000015 4.000015 4.000015 4.000015 4.000015
```

P0102:

KFMLDMN

```
X: wdkbad_w    [% DK]       throttle angle

Y: nmot_w      [U/min]      engine speed
W: KFMLDMN     [kg/h]       air flow

StNr.                 0       1       2       3       4       5       6       7
wdkbad_w        0.0000 14.0625 28.1250 42.1875 56.2500 70.3125 84.3750 99.6094
nmot_w
H:  6000.000      3.000  39.900 103.300 144.200 151.500 153.400 154.400 156.400
G:  5000.000      3.000  36.300  95.400 132.300 146.500 148.000 146.200 146.500
F:  4000.000      2.300  35.300  95.000 111.900 114.800 115.200 112.900 113.200
E:  3000.000      2.700  37.600  87.500  98.300  98.300  97.000  98.300  99.000
D:  2000.000      2.600  33.000  50.500  51.800  51.800  51.500  51.100  50.800
C:  1000.000      2.700  23.100  26.000  26.300  26.300  26.200  26.200  26.200
B:   500.000      2.600  11.200  11.200  11.400  11.500  11.500  11.500  11.600
A:     0.000      0.000   0.000   0.000   0.000   0.000   0.000   0.000   0.000
```

KFMLDMX

```
X: wdkbad_w    [% DK]       throttle angle
Y: nmot_w      [U/min]      engine speed
```

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination

```
W: KFMLDMX      [kg/h]        air flow

StNr.                 0       1       2       3       4       5       6       7
wdkbad_w          0.0000 14.0625 28.1250 42.1875 56.2500 70.3125 84.3750 99.6094
nmot_w
H:  6000.000     199.800 199.800 515.000 741.500 840.600 840.600 859.900 867.300
G:  5000.000     189.400 189.400 463.200 695.600 750.400 775.500 780.000 787.400
F:  4000.000     186.500 186.500 473.600 575.700 608.300 621.600 624.600 621.600
E:  3000.000     387.800 387.800 893.900 1044.900 1104.100 1133.700 1163.300 1181.000
D:  2000.000     168.700 168.700 269.400 279.700 288.600 288.600 290.100 290.100
C:  1000.000     103.700 103.700 116.600 117.800 117.800 117.700 117.500 117.500
B:   500.000      61.300  61.300  65.700  63.500  63.500  63.500  63.500  63.500
A:     0.000      60.000  60.000  64.000  62.000  62.000  62.000  62.000  62.000
```

P0130, P150:

TVPLMSA

```
X: msabg        [kg/h]        air flow
W: TVPLMSA      [s]           debounce time
StNr.                 0       1       2       3
msabg             12.00   24.00   48.00   96.00

TVPLMSA           16.000   7.000   3.000   2.000
```

P0161:

KFRINH

```
X: tkatmf       [Grad C]      modelled catalyst temperature
Y: phlsnhf      [-]           normalized heater output
W: KFRINH       [Ohm]         internal resistance
StNr.                 0       1       2       3       4
tkatmf            200.00  300.00  400.00  500.00  700.00
phlsnhf
C:    1.0000      288.00  256.00  224.00  192.00  160.00
B:    0.8000      448.00  384.00  352.00  320.00  224.00
A:    0.7000      704.00  608.00  544.00  384.00  320.00
```

P0300, P301 up to P306:

KFKSWF

```
X: nmot         [Upm]         engine speed
Y: rl           [%]           engine load
W: KFKSWF       []            weighting factor
StNr.                 0       1       2       3       4       5
nmot              1000.0  2000.0  3000.0  4000.0  5000.0  6000.0
rl
F:    69.750        61.00   77.00   92.00  117.00  114.00  183.00
E:    60.000        51.00   61.00   87.00  117.00  113.00  173.00
D:    50.250        46.00   56.00   77.00  117.00  112.00  168.00
C:    39.750        46.00   51.00   66.00  112.00  112.00  158.00
B:    30.000        28.00   46.00   61.00   92.00  107.00  153.00
A:    15.000        28.00   46.00   56.00   82.00  102.00  132.00
```

RLSALUNG

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination

X: gangi [] transmission gear
Y: nmot [Upm] engine speed
W: RLSALUNG [%] engine load

StNr.	0	1	2	3	4	5	6	7
gangi	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00
nmot								
H: 6320.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
G: 5720.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
F: 4800.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
E: 3920.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
D: 2920.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
C: 2000.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
B: 1000.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750
A: 520.0	14.250	13.500	13.500	13.500	22.500	27.000	31.500	33.750

DRLSOLA

X: rl [%] engine load
W: DRLSOLA [%/NWU] load change

StNr.	0	1	2	3	4	5	6	7
rl	10.500	20.250	30.000	40.500	50.250	60.000	80.250	99.750
DRLSOLA	120.0000	120.0000	120.0000	300.0000	400.0078	700.0078	700.0078	750.0000

NGALU

X: nmot [Upm] engine speed
W: NGALU [U/min/s] engine speed change

StNr.	0	1	2	3	4	5	6	7
nmot	520.0	1000.0	2000.0	2920.0	3920.0	4800.0	5720.0	6320.0
NGALU	2500.032	2500.032	3500.045	4000.051	4000.051	5000.064	5000.064	5500.070

P327, P328, P332, P333:

UDKSNO

X: nmot [Upm] engine speed
W: UDKSNO [V] knock sensor signal

StNr.	0	1	2	3	4	5	6	7	8	9
nmot	400.0	800.0	1200.0	1600.0	2000.0	2400.0	2800.0	3200.0	3600.0	4000.0
UDKSNO	29.6095	29.6095	29.6095	29.6095	29.6095	29.6095	29.6095	38.1056	46.6993	52.5978

StNr.	10	11	12	13	14	15
nmot	4400.0	4800.0	5200.0	5600.0	6000.0	6400.0
UDKSNO	57.7931	65.0002	72.5002	80.2932	87.5002	95.0002

UDKSNU

X: nmot [Upm] engine speed
W: UDKSNU [V] knock sensor signal

StNr.	0	1	2	3	4	5	6	7	8	9
nmot	400.0	800.0	1200.0	1600.0	2000.0	2400.0	2800.0	3200.0	3600.0	4000.0
UDKSNU	0.0000	0.0000	0.0000	0.0000	0.5078	0.7031	0.7031	0.8008	0.8984	1.3086

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination

StNr.	10	11	12	13	14	15
nmot	4400.0	4800.0	5200.0	5600.0	6000.0	6400.0
UDKSNU	1.4063	1.8945	2.3047	2.6953	3.0078	5.0000

P0442:

VLTEDFH

X: fho_w [-] altitude compensation factor
W: VLTEDFH [] leak flow rate

StNr.	0	1	2	3	4	5
fho_w	0.700012	0.719971	0.750000	0.799988	0.900024	1.000000
VLTEDFH	0.11000000	0.11000000	0.09000000	0.07200000	0.07200000	0.07200000

Component / System	Fault	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumi-nation

P1516:

DWDKSBAMX

X: dwdks_kge [% DK] change of commanded throttle angle
W: DWDKSBAMX [% DK] deviation of commanded and real throttle angle

StNr.	0	1	2	3	4
dwdks_kge	0.0000	0.3006	0.9995	5.0004	14.9996
DWDKSBAMX	4.0009	6.0014	11.0002	20.0000	30.0008