# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Catalyst Bank 1 | P0420 | oxygen storage of catalyst | normalized oxygen storage | < | 1 | factor | <1factor | exhaust gas mass flow | > | 8.33 | g/sec | >8.33g/sec | approx. | 0.01 sec | 0.4 sec | two driving |
| | | | less than normalized oxygen storage | | | | | exhaust gas mass flow | < | 27.78 | g/sec | <27.78g/sec | 1000 sec | | continuous | cycles each |
| | | | of a limit catalyst | | | | | catalyst temp. model | < | 700 | ° C | <700° C | during | one | or 4 sec | with: 0.4 sec |
| | | | | | | | | catalyst temp. model | > | 390 | ° C | >390° C | active | completed | cumulative | continuous |
| | | | | | | | | engine speed | > | 1000 | rpm | >1040rpm | driving | test per | | or 4 sec |
| | | | | | | | | engine speed | < | 3520 | rpm | <3520rpm | | driving | | cumulative |
| | | | | | | | | engine load | > | 14 …. 17 | % | >14 …. 17% | one test | cycle | | |
| | | | | | | | | engine load | < | 42….55 | % | <42….55% | | | | |
| | | | | | | | | modeled catalyst temp. gradient | < | 2.5 | ° C / sec | <2.5° C / sec | ( average | | | |
| | | | | | | | | exhaust gas mass flow gradient | < | 8.33 | g/sec² | <8.33g/sec² | of 4 | | | |
| | | | | | | | | fuel system closed loop | active | - | - | active-- | checks ) | | | |
| | | | | | | | | time after engine start | > | 235 | sec | >235sec | per driving | | | |
| | | | | | | | | ambient temperature | > | -48 | ° C | >-48° C | cycle | | | |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | secondary O2 sensor | ready | | | ready | | | | |
| | | | | | | | | fuel adaptation fault | FALSE | | | FALSE | | | | |
| | | | | | | | | short term fuel trim ( < max ) | < | 1.25 | factor | <1.25factor | | | | |
| | | | | | | | | short term fuel trim ( > min ) | > | 0.75 | factor | >0.75factor | | | | |
| | | | | | | | | transient fuel control | FALSE | | | FALSE | | | | |
| | | | | | | | | critical misfire rate detected | FALSE | | | FALSE | | | | |
| | | | | | | | | cat. damaging misfire rate exceeded | FALSE | | | FALSE | | | | |
| | | | | | | | | cat oxygen storage neutralization | FALSE | | | FALSE | | | | |
| Misfire | | crankshaft speed | emissions relevant misfire rate | > | 1.4 | % | >1.4% (emission relevant misfire rate = 1.5%) | engine speed | > | 450 | rpm | >450rpm | 1000 revs | cylinder | immediate | Fault during |
| Emission Level | | fluctuation cylinder 1 to | | | | | | engine speed | < | 6500 | rpm | <6500rpm | | firing | | 1st interval: |
| Multiple Cylinder | P0300 | cylinder 6 | | | | | | indicated torque (idle, no drive) | > | 3.91 | % | >3.91% | | frequency | | 2 faults in |
| Cylinder #1 | P0301 | | | | | | | indicated torque (drive) (MISALUN) | > | 3.91 . . . 17.19 | % | >3.91 . . . 17.19% | | | After | 2 different |
| Cylinder #2 | P0302 | | | | | | | engine speed gradient | < | 12800 | rpm/sec | <12800rpm/sec (not active) | | continuous | detection, | drive cycles. |
| Cylinder #3 | P0303 | | | | | | | volumetric efficiency gradient | < | 768 | %/rev | <768%/rev (not active) | | | the | |
| Cylinder #4 | P0304 | | | | | | | cylinder events after engine start | > | 6 | ignitions | >6ignitions | | | diagnostic | Fault during |
| Cylinder #5 | P0305 | | | | | | | Enabling delay when Coolant temp is below –7 °C at start Delayed until Coolant temp > 21 °C | > | -7 | ° C | >-7° C | | | can only | remaining |
| Cylinder #6 | P0306 | | | | | | | rough road | not detected | - | - | not detected-- | | | pass if | intervals: |
| | | | | | | | | traction control | off | - | - | off-- | | | similar | 8 faults in 2 |
| | | | | | | | | clutch switch press / release | off | - | - | transitionFALSE- | | | conditions | different |
| | | | | | | | | leak detection | off | - | - | off-- | | | are | drive cycles |
| | | | | | | | | active handling | not active | | | not active | | | encountered | with at least |
| | | | | | | | | ABS | not active | - | - | not active-- | | | | 4 faults in |
| | | | | | | | | engine drag control | not active | - | - | not active-- | | | | each. |
| | | | | | | | | fuel cut off | not active | - | - | not active-- | | | | |
| | | | | | | | | fuel level | > | 5.9 | % | > 5.93 % | | | | |
| | | | | | | | | OR fuel level | < | 5.9 | % | > 5.93 % | | | | |
| | | | | | | | | AND solid misfire MIL | on | - | - | on-- | | | | |
| | | | | | | | | OR fuel level error | set | - | - | set-- | | | | |
| | | | | | | | | error: throttle position | not set | - | - | not set-- | | | | |
| | | | | | | | | error: crankshaft sensor | not set | - | - | not set-- | | | | |
| | | | | | | | | error: ref.mark of crank sensor | not set | - | - | not set-- | | | | |
| | | | | | | | | | | - | - | -- | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | - | - | -- | | | | |
| | | | | | | | | | | - | - | -- | | | | |
| | | | | | | | | | | - | - | -- | | | | |
| | | | OR | | | | | | | | | | | | | |
| Catalyst Damaging Level | | | Catalyst damaging misfire rate | > | 16.2 . . . 6.8 | % | >16.2 . . . 6.8% | Includes all the above with the | | | | | 1000 revs | | | First |
| Multiple Cylinder | P0300 | | | | see Misfire | | see Misfire | following exceptions: | | | | | First interval | | | occurance: |
| Cylinder #1 | P0301 | | | | supplemental | | supplemental | First interval extention | | | | | 200 revs | | | immediate |
| Cylinder #2 | P0302 | | | | data | | data | engine coolant temperature | < | -48 | °C | <-48°C | all remaining | | | flashing |
| Cylinder #3 | P0303 | | | | (h) (2.5.1) | | (h) (2.5.1) | fuel level | >= | 6.19 | % | > 6.19 % | intervals | | | while error |
| Cylinder #4 | P0304 | | | | | | | OR fuel level | < | 6.19 | % | > 6.19 % | | | | present, then |
| Cylinder #5 | P0305 | | | | | | | AND blinking MIL | blinking | - | - | blinking-- | | | | no MIL |
| Cylinder #6 | P0306 | | | | | | | AND NOT first blink event | - | - | - | --- | | | | with no error. |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | Second |
| | | | | | | | | | | | | | | | | occurance: |
| | | | | | | | | | | | | | | | | immediate |
| | | | | | | | | | | | | | | | | flashing |
| | | | | | | | | | | | | | | | | while error |
| | | | | | | | | | | | | | | | | present, then |
| | | | | | | | | | | | | | | | | solid MIL |
| | | | | | | | | | | | | | | | | with no error. |
| evaporative system | | | | | | | | | | | | | | | | |
| canister ventilation valve (AAV) | P0446 | monitoring of tank pressure while | tank pressure too low because | < | -10.50049 | hPa | < -10.50049 hPa | ambient temperature | >= | -9.8 | °C | >= -9.8 °C | < 20 sec | once per dcy | 2,6 secs | 2 dcy |
| | | AAV is open and CPV is closed | canister vent. defective & closed | | | | | ambient temperature | <= | 45 | °C | <= 45 °C | | | | |
| | | | | | | | | ambient pressure | >= | 680.00 | hPa | >= 680.00 hPa | | | | |
| | | | | | | | | vehicle speed | <= | 1,86 | mph | <= 1,86 mph | | | | |
| | | | | | | | | engine is in idle mode | true | | | true | | | | |
| | | | | | | | | unfiltered tank pressure | >= | -18.00 | hPa | >= -18.00 hPa | | | | |
| | | | | | | | | and unfiltered tank pressure | <= | 10.00 | hPa | <= 10.00 hPa | | | | |
| canister purge valve (CPV) | P0496 | monitoring of tank pressure while | final pressure too low because | < | -1.00098 | hPa | < -1.00098 hPa | battery voltage | >= | 10.45 | V | >= 10.45 V | ca. 10 sec | once per dcy | | |
| | | CPV and AAV are closed | CPV defective and open | | | | | and battery voltage | <= | 18.00 | V | <= 18.00 V | | | | |
| | | | | | | | | lambda control is active | true | | | true | | | | |
| | | | | | | | | secondary air pump inactive | true | | | true | | | | |
| | | | | | | | | secondary air diagnosis inactive | true | | | true | | | | |
| | | | | | | | | air bag hasn't been triggered | true | | | true | | | | |
| | | | | | | | | no torque reduction (e.g. resulting from switched-off cylinder) | true | | | true | | | | |
| | P0497 | monitoring of tank pressure while | purge control stuck closed | | | | | critical misfire rate | false | | | false | | | | |
| | | CPV and AAV are closed | | | | | | ratio intake manifold pressure /ambient pressure | < | 0.602 | | < 0.602 | | | | |
| | | | | | | | | fault of canister purge valve in actual driving cycle | false | | | false | | | | |
| tank leak large | P0455 | AAV is closed and CPV is open | vacuum pressure built up gradient too low | < | 0.450039 ...0.750065 | hPa/s | < 0.450039 ...0.750065 hPa/s | fault of canister ventilation valve in actual driving cycle | false | | | false | ca. 18 sec | once per dcy | | |
| | | | because of large tank leakage | | | | | tank fuel level | >= | 3.900 | l | >= 3.900 l | | | | |
| | | | (for example: open gas filler cap) | | | | | and tank fuel level | <= | 55.100 | l | <= 55.100 l | | | | |
| | | | | | | | | enabled by diagnostic scheduler | true | | | true | | | | |
| | | | | | | | | fuel system adaptation has completed | true | | | true | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | or time since engine start exceeds threshold | > | 600 | sec | > 600 sec | | | | |
| Fuel Evaporative System | P0456 | Monitor fuel tank's pressure after engine shutdown | | | | | | Engine off natural vacuum diagnosis has not been performed in this driving cyle. | true | | | | 100ms in | once per dcy | 2.6 secs | 2dcy |
| | | | | | | | | Fuel evaporative system monitor (at engine on) didn't run nor detect large leak nor a tight system. | true | | | | afterrun | | | |
| | | | | | | | | Engine coolant temperature at start. | <= | 42.0 | °C | true | | | | |
| | | | | | | | | engine coolant temp. At start - intake air temp. | <= | 6.8 | °C | true | | | | |
| | | | | | | | | intake air temperature | <= | 35.3 | °C | true | | | | |
| | | | | | | | | intake air temperature | >= | 3.8 | °C | true | | | | |
| | | | | | | | | ambient air temperature | < | 36.8 | °C | true | | | | |
| | | | | | | | | ambient air temperature | > | 2.3 | °C | true | | | | |
| | | | | | | | | engine has been running for a cal. min. time | > | 600.00 | s | true | | | | |
| | | | | | | | | engine coolant temp. at engine stop | > | 59.3 | °C | true | | | | |
| | | | | | | | | driving distance (in current dcy) covered | >= | 8100.0 | m | true | | | | |
| | | | | | | | | charcoal canister load factor | < | 10.00 | - | true | | | | |
| | | | | | | | | ambient pressure | >= | 680.0 | hPa | true | | | | |
| | | | | | | | | driving distance (for vehicle lifetime) covered | > | 20 | Km | true | | | | |
| | | | | | | | | the fuel tank's level isn't at its minimum | true | | | | | | | |
| | | | | | | | | the fuel tank's level isn't at ist maximum | true | | | | | | | |
| | | | | | | | | battery's voltage | > | 11.00 | V | true | | | | |
| | | | | | | | | no refueling activity | true | | | | | | | |
| | | | | | | | | the fuel tank pressure is within cal. range | true | | | | | | | |
| | | | | | | | | no intake air temperature faults | true | | | | | | | |
| | | | | | | | | no the purge control system faults | true | | | | | | | |
| | | | | | | | | no faults of the purge control valve's power stage | true | | | | | | | |
| | | | | | | | | no vehicle speed sensor faults | true | | | | | | | |
| | | | | | | | | no engine coolant temperature sensor faults | true | | | | | | | |
| | | | | | | | | no tank pressure sensor rationality faults | true | | | | | | | |
| | | | | | | | | no tank pressure sensor range faults | true | | | | | | | |
| | | | | | | | | no power supply voltage faults | true | | | | | | | |
| | | | | | | | | no main load sensor faults | true | | | | | | | |
| | | | | | | | | no canister vent valve faults | true | | | | | | | |
| | | | | | | | | no canister ventilation valve's power stage faults | true | | | | | | | |
| | | | | | | | | no ambient pressure sensor faults | true | | | | | | | |
| | | Close canister ventilation | | | | | | | | | | | | | | |
| | | valve. | | | | | | | | | | | | | | |
| | | Look for maximum pressure. | | | | | | | | | | | | | | |
| | | Abort if: | | | | | | | | | | | | | | |
| | | - max. pressure >= | | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | threshold. | max. pressure | >= | volume & ambient temperature dependent | hPa | | | | | | | | | | |
| | | - max. pressure - current | | | | | | | | | | | | | | |
| | | pressure >= threshold. | max. pressure - current pressure | >= | 0.30029 | hPa | >= 0.30029 hPa | | | | | | | | | |
| | | - pressure stays in range | pressure | >= | -0.69946 | hPa | >= -0.69946 hPa | | | | | | | | | |
| | | near zero for | pressure | <= | 0.69946 | hPa | <= 0.69946 hPa | | | | | | | | | |
| | | a specific time. | | | 500 | s | 500 s | | | | | | | | | |
| | | - pressure <= | | | | | | | | | | | | | | |
| | | threshold | pressure | <= | -0.74951 | hPa | <= -0.74951 hPa | | | | | | | | | |
| | | for a specific time | | | 30.00 | s | 30.00 s | | | | | | | | | |
| | | (vacuum build-up instead | | | | | | | | | | | | | | |
| | | of pressure build-up) | | | | | | | | | | | | | | |
| | | - pressure-phase-time | | | | | | | | | | | | | | |
| | | >= threshold. | pressure phase time | >= | 2400.00 | s | >= 2400.00 s | | | | | | | | | |
| | | - diagnostic-time >= | | | | | | | | | | | | | | |
| | | threshold | diagnostic time | >= | 2900.00 | s | >= 2900.00 s | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | correct max. pressure. | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | open canister ventilation | | | | | | | | | | | | | | |
| | | valve for a calibrated time. | | | 400.00 | s | 400.00 s | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Look for minimum pressure | | | | | | | | | | | | | | |
| | | Abort if: | | | | | | | | | | | | | | |
| | | - min pressure <= | | | | | | | | | | | | | | |
| | | threshold | min. pressure | <= | | | <= | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | - diagnostic time >= | | | | | | | | | | | | | | |
| | | threshold | diagnostic time | >= | 2900.00 | s | >= 2900.00 s | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | current pressure - min. | | | | | | | | | | | | | | |
| | | - pressure >= threshold | current pressure - min. pressure | >= | 0.30029 | hPa | >= 0.30029 hPa | | | | | | | | | |
| | | AND | | | | | | | | | | | | | | |
| | | min. pressure <= | | | | | | | | | | | | | | |
| | | threshold | min. pressure | <= | -0.69946 | hPa | <= -0.69946 hPa | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | - pressure stays in | pressure | >= | -0.69946 | hPa | >= -0.69946 hPa | | | | | | | | | |
| | | ambient range for a | pressure | <= | 0.69946 | hPa | <= 0.69946 hPa | | | | | | | | | |
| | | specific time | | | 500.00 | s | 500.00 s | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | - canister vent valve re- | | | | | | | | | | | | | | |
| | | opened for a more than N times | no. canister vent valve openings | > | 2 | | > 2 | | | | | | | | | |
| | | because the pressure | | | | | | | | | | | | | | |
| | | exceeds a threshold | pressure | | 0.74951 | hPa | 0.74951 hPa | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Calculate difference | | | | | | | | | | | | | | |
| | | between corrected max. | | | | | | | | | | | | | | |
| | | pressure and min. | | | | | | | | | | | | | | |
| | | pressure. | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Calculate normalized | | | | | | | | | | | | | | |
| | | result. First divide the | | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | pressure difference by a | | | | | | | | | | | | | | |
| | | parameter. Then subtract | | | volume & ambient temperature dependent | | | | | | | | | | | |
| | | this result from 1. | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Filter the normalized | | | | | | | | | | | | | | |
| | | result with an EWMA | | | | | | | | | | | | | | |
| | | filter. | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | Compare filtered result | Filtered result | > | 0.399994 | | > 0.399994 | | | | | | | | | |
| | | with threshold. | | | | | | | | | | | | | | |
| | | N results will be taken | | | 4 | | 4 | | | | | | | | | |
| | | into account in order to | | | | | | | | | | | | | | |
| | | determine a pass. | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | A fault will be indicated | | | | | | | | | | | | | | |
| | | immediately. | | | | | | | | | | | | | | |
| Secondary air system | P0411 | passive functional check | relative secondary air mass flow. Ratio from | < | 0.844 | | < 0.844 | start with catalyst heating | active | | | | < 5s | one | 2.6 sec | 2 dcy |
| | | | calculated secondary air mass by pressure | > | 1.156 | | > 1.156 | secondary air system | active | | | | | | | |
| | | | sensor signal and secondary air mass model | | | | | | | | | | | | | |
| | | | | | | | | intake air temperature | > | 0 | °C | > 0 °C | | test per dcy | | |
| | | | | | | | | intake air temperature | < | 80.3 | °C | < 80.3 °C | | (only, if | | |
| | | | | | | | | engine coolant temperature | > | 5.3 | °C | > 5.3 °C | | secondary- | | |
| | | | | | | | | engine coolant temperature | < | 120 | °C | < 120 °C | | air-system | | |
| | | | | | | | | ratio: ( MAP Model / Baro ) | < | 0.7 | | < 0.7 | | was active) | | |
| | | | | | | | | no error on altitude detection | avtive | | | | | | | |
| | | | | | | | | error: intake air | false | | | | | | | |
| | | | | | | | | error: motor temperature | false | | | | | | | |
| | | | | | | | | error: secondary air pump (power stage) | false | | | | | | | |
| | | | | | | | | error: power supply voltage UB | false | | | | | | | |
| | | | | | | | | enabled by the diagnostic scheduler | true | | | | | | | |
| | | | | | | | | fuel cut off | false | | | | | | | |
| | | | | | | | | steady state | | | | | | | | |
| | | | | | | | | mass airflow | > | 6 | kg/h | > 6 kg/h | | | | |
| | | | | | | | | mass airflow | < | 130 | kg/h | < 130 kg/h | | | | |
| | | | | | | | | change in air charge per working cycle | <= | 6 | % | <= 6 % | | | | |
| | | | | | | | | | | | | | | | | |
| Pressure sensor | P2432 | cirtcuit continuity - low | measured sensor voltage | < | 0.498 | V | < 0,498 V | | | | | | 0.5 sec | continuous | 0.2 sec | 2 dcy |
| secondary air system | P2433 | cirtcuit continuity - high or open | measured sensor voltage | > | 4.501 | V | > 4,501 V | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P2431 | rationality - | during ECU init- | < | -50 | hPa | < -50 hPa | Barometric pressure signal VALID | TRUE | | | TRUE | | | | |
| | | comparisson between: | difference SAI pressure vs BARO pressure | > | 50 | hPa | > 50 hPa | secondary air injection during CAT heat executed | TRUE | | | TRUE | | | | |
| | | SAI system pressure signal & | | | | | | secondary air injection during CAT heat finished | TRUE | | | TRUE | | | | |
| | | Barometric pressure signal | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fuel System Rich/Lean | P2191 | fuel trim limits exceeded | delta lambda correction | > | 1.175 | factor | >1.175factor | fuel system status | closed loop | - | - | closed loop-- | approx. | 0.1 sec | 0.4 sec | two driving |
| Multiplicative | P2192 | range - multiplicative | or delta lambda correction | < | 0.825 | factor | <0.825factor | long term fuel trim status | active | - | - | active-- | 300 sec | continuous | continuous | cycles each |
| and Additive | | ( load > threshold and air flow > threshold ) | | | | | | engine coolant temperature | > | 50.3 | °C | >50.3°C | from engine | | or 4 sec | with: 0.4 sec |
| | P2187 | range - additive | delta fuel load correction | > | 5.25 | % | >5.25% | purge control | not active | - | - | not active-- | start ( after | | cumulative | continuous |
| | P2188 | low speed and low load | or delta fuel load correction | < | -5.25 | % | <-5.25% | intake air temperature | <= | 65.3 | °C | <=65.3°C | adaptation | | | or 4 sec |
| | | | | | | | | fuel level | > | 6.19 | % | > 5.92 % | has | | After | cumulative |
| | | | | | | | | or fuel level error | set | - | - | set-- | stabilized ) | | detection, | |
| | | | | | | | | integrated air mass | >= | 2800 | g | >=2800g | | | diagnostic | |
| | | | | | | | | | | | | | | | can only | |
| | | | | | | | | | | | | | | | pass if | |
| | | | | | | | | | | | | | | | similar | |
| | | | | | | | | | | | | | | | conditions | |
| | | | | | | | | | | | | | | | are | |
| | | | | | | | | | | | | | | | encountered | |
| demand controlled fuel supply | | | | | | | | | | | | | | | | |
| (DECOS) | P0088 | difference between measured | fuel rail pressure difference | < | - 150 | kPa | < - 150 kPa | DECOS fuel pump is active | true | | | true | 5 sec | continuous | 0.2 sec | 2 dcy |
| | | and set-point fuel rail pressure | | | | | | DECOS fuel control is enabled | true | | | true | | | | |
| | | | | | | | | time after engine start | > | 1 | sec | > 1 sec | | | | |
| | P0089 | difference between actual | duty cycle difference | < | -25 | % | < -25 % | time after hot start | > | 6 | sec | > 6 sec | | | | |
| | | necessary and pre-control | | | | | | no fault of | | | | | | | | |
| | | duty cycle | | | | | | - fuel pressure sensor | | | | | | | | |
| | | | | | | | | (DECOS) | true | | | true | | | | |
| | | | | | | | | - power stage of demand | | | | | | | | |
| | | | | | | | | controlled fuel pump | true | | | true | | | | |
| | P0087 | difference between measured | fuel rail pressure difference | > | 150 | kPa | > 150 kPa | DECOS fuel pump is active | true | | | true | | | | |
| | | and set-point fuel rail pressure | | | | | | DECOS fuel control is enabled | true | | | true | | | | |
| | | | | | | | | time after engine start | > | 1 | sec | > 1 sec | | | | |
| | P0089 | difference between actual | duty cycle difference | > | 25 | % | > 25 % | time after hot start | > | 6 | sec | > 6 sec | | | | |
| | | necessary and pre-control | | | | | | no fault of | | | | | | | | |
| | | duty cycle | | | | | | - low pressure fuel sensor | | | | | | | | |
| | | | | | | | | (DECOS) | true | | | true | | | | |
| | | | | | | | | - power stage of demand | | | | | | | | |
| | | | | | | | | controlled fuel pump | true | | | true | | | | |
| | | | | | | | | no empty or | | | | | | | | |
| | | | | | | | | almost empty fuel tank | true | | | true | | | | |
| fuel pressure sensor (DECOS) | | | | | | | | | | | | | | | | |
| | P0193 | cirtcuit continuity - high or open | measured sensor voltage | > | 4.7 | V | > 4.7 V | fuel supply system is active | true | | | true | 0.5 sec | continuous | 0.2 sec | 2 dcy |
| | P0192 | cirtcuit continuity - low | measured sensor voltage | < | 0.3 | V | < 0.3 V | | | | | | | | | |
| | P0193 | range check - high | measured fuel pressure | > | 680 | kPa | > 680 kPa | | | | | | 5 sec | | | |
| | P0192 | range check - low | measured fuel pressure | < | 60 | kPa | < 60 kPa | fuel supply system is active | true | | | true | 5 sec | | | |
| | | | | | | | | time after power fail | >= | 360 | sec | >= 360 sec | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diagnosis of Power Control Module | | | | | | | | **general enabling conditions** | | | | | 0.6 sec | continuous | 0.2 sec | 2 dcy |
| | | | | | | | | battery voltage | < | 18 | V | < 18 V | | | | |
| | | | | | | | | | > | 10 | V | > 10 V | | | | |
| | | | | | | | | locking request immobilizer | false | | | false | | | | |
| | P0092 | diagnosis short circuit to battery voltage | | | | | | **special enabling condition** | | | | | | | | |
| | | only active if powerstage on | backward powerstage voltage of | > | 3.9014 | V | > 3.9014 V | condition output duty cycle PCM | true | | | true | | | | |
| | | | fuel pump diagnosis | | | | | for power on diagnosis | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | backward powerstage voltage of | > | 2.7979 | V | > 2.7979 V | | | | | | | | | |
| | | | fuel pump diagnosis | | | | | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | duty cycle PCM | < | 100 | % | < 100 % | | | | | | | | | |
| | | diagnosis short circuit to battery voltage | | | | | | condition output duty cycle PCM | false | | | false | | | | |
| | | only active if powerstage off | backward powerstage voltage of | > | 3.9014 | V | > 3.9014 V | for power off diagnosis | | | | | | | | |
| | | | fuel pump diagnosis | | | | | | | | | | | | | |
| | P0091 | diagnosis short circiut to ground | | | | | | condition output duty cycle PCM | true | | | true | | | | |
| | | only active if powerstage on | backward powerstage voltage of | <= | 2.3486 | V | <= 2.3486 V | for power on diagnosis | | | | | | | | |
| | | | fuel pump diagnosis | | | | | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | duty cycle PCM | > | 0 | % | > 0 % | | | | | | | | | |
| | P0090 | diagnosis wire interruption | | | | | | condition output duty cycle PCM | true | | | true | | | | |
| | | only active if powerstage on | backward powerstage voltage of | > | 2.4414 | V | > 2.4414 V | for power on diagnosis | | | | | | | | |
| | | | fuel pump diagnosis | | | | | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | duty cycle PCM | < | 100 | % | < 100 % | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | max-fault; powerstage diagnosis | false | | | false | | | | | | | | | |
| | | diagnosis wire interruption | backward powerstage voltage of | > | 2.4414 | V | > 2.4414 V | condition output duty cycle PCM | false | | | false | | | | |
| | | only active if powerstage off | fuel pump diagnosis | | | | | for power off diagnosis | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | backward powerstage voltage of | < | 3.9014 | V | < 3.9014 V | | | | | | | | | |
| | | | fuel pump diagnosis | | | | | | | | | | | | | |
| | P0090 | powerstage locked | condition fault message of PCM | true | | | true | | | | | | | | | |
| | | | powerstage is locked | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| sensor voltage | | A/F sensor voltage | A/F sensor voltage | > | 3.7 | V | >3.7V | A/F sensor heater | TRUE | - | - | TRUE-- | 10 sec | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P0130 | exceeds threshold | and | | | | | at operating temperature | | | | | | continuous | continuous | cycles each |
| | | but not out of full range | A/F sensor voltage | < | 4.81 | V | <4.81V | engine starting | complete | - | - | complete-- | additional | | or 4 sec | with: 0.4 sec |
| | | | | | | | | desired A/F | < | 1.6 | lambda | <1.6lambda | time if | | cumulative | continuous |
| | | | or | | | | | all injectors activated | TRUE | - | - | TRUE-- | fuel level | | | or 4 sec |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE-- | is low and | | | cumulative |
| | | | AF sensor voltage | > | 2.5 | V | >2.5V | | | | | | not failed | | | |
| | | | and | | | | | | | | | | 600 sec | | | |
| | | | A/F sensor voltage | < | 3.06 | V | <3.06V | | | | | | | | | |
| | | | ( if using rich calibration | | | | | | | | | | | | | |
| | | | curve characteristic ) | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| integrated circuit interface | | | | | | | | | | | | | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| bank 1 | P0130 | A/F sensor voltage | A/F sensor voltage IC corrective value | > | 0.1 | V | >0.1V | battery voltage | < | 18 | V | <18V | 10 sec | 0.1 sec | 0.4 sec | two driving |
| | | IC correction too high | | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | | | | | | | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | | | | | | | | | | | | | | or 4 sec |
| | | | | | | | | | | | | | | | | cumulative |
| | | A/F sensor IC operating voltage | low voltage | = | TRUE | - | =TRUE- | battery voltage | > | 10.7 | V | >10.7V | 10 sec | | | |
| | | too low | | | | | | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | - | - | engine | running | - | - | running-- | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | - | - | engine starting | complete | - | - | complete-- | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | A/F sensor IC SPI interface | communication error | = | TRUE | | =TRUE | | > | 10.7 | V | >10.7V | | | | |
| | | communication error | | | | | | | < | 18 | V | <18V | | | | |
| | | A/F sensor IC circuit write error | write error | = | TRUE | | =TRUE | | running | - | - | running-- | | | | |
| | | at INIT register | | | | | | | | | | | | | | |
| | | | | | | | | | complete | - | - | complete-- | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| pumping current circuit open | | lambda control factor change | absolute value of lambda control factor | > | 0.025 | lambda | >0.025lambda | battery voltage | < | 18 | V | <18V | 1.5 sec | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2239 | above threshold | change from the point when the | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | | secondary conditions are met | | | | | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | | | | | | A/F sensor voltage | < | 1.51 | V | <1.51V | | | | or 4 sec |
| | | | | | | | | A/F sensor voltage | > | 1.49 | V | >1.49V | | | | cumulative |
| | | | | | | | | A/F sensor electrical trimming | not active | - | - | not active-- | | | | |
| | | | | | | | | A/F sensor heater at op.temp. | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | A/F sensor warm up control | complete | - | - | complete-- | | | | |
| | | | | | | | | lambda closed loop control | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | forced fuel trim amplitude | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | \| fuel trim forced amplitude \| | > | 0.015 | lambda | >0.015lambda | | | | |
| | | | | | | | | catalyst warm up control | stable | - | - | stable-- | | | | |
| | | | | | | | | sec. O2 sensor proportional trim | stable | - | - | stable-- | | | | |
| | | | | | | | | lean mixture inhibit | stable | - | - | stable-- | | | | |
| | | | | | | | | lambda closed loop control init | FALSE | - | - | FALSE-- | | | | |
| | | | | | | | | closed loop control startup | FALSE | - | - | FALSE-- | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| pumping current circuit open | | A/F sensor voltage within upper | A/F sensor voltage | < | 1.51 | V | <1.51V | battery voltage | < | 18 | V | <18V | approx. | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2237 | and lower thresholds | and A/F sensor voltage | > | 1.49 | V | >1.49V | battery voltage | > | 10.7 | V | >10.7V | 8 sec | continuous | continuous | cycles each |
| | | and desired lambda is outside | | | | | | engine | running | - | - | running-- | once the | | or 4 sec | with: 0.4 sec |
| | | of upper or lower threshold | | | | | | engine starting | complete | - | - | complete-- | driving | | cumulative | continuous |
| | | | | | | | | target lambda above upper limit | > | 1.01 | lambda | >1.01lambda | condition | | | or 4 sec |
| | | | | | | | | or below lower limit | < | 0.99 | lambda | <0.99lambda | is met | | | cumulative |
| | | | | | | | | closed loop control | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | A/F sensor heater | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | at operating temperature | | | | | | | | |
| | | | | | | | | A/F sensor electrical trimming | not active | - | - | not active-- | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | A/F sensor dynamic response | not slow | - | - | not slow-- | | | | |
| | | | | | | | | error: A/F sensor heating | not set | - | - | not set-- | | | | |
| | | | | | | | | integrated exhaust gas mass | > | 400 | g | >400g | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| pumping current circuit open | | A/F sensor not lean enough | A/F sensor voltage | < | 1.7 | V | <1.7V | battery voltage | < | 18 | V | <18V | 5 sec | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2238 | during fuel shut off operation | | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | | | | | | | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | | | | | | time after fuel shut off | > | 3 | sec | >3sec | | | | or 4 sec |
| | | | | | | | | A/F sensor heater | TRUE | - | - | TRUE-- | | | | cumulative |
| | | | | | | | | at operating temperature | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| reference voltage circuit open | | A/F sensor voltage | A/F sensor voltage | < | 0.2 | V | <0.2V | battery voltage | < | 18 | V | <18V | 2 sec | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2243 | above upper threshold | A/F sensor voltage | > | 4.7 | V | >4.7V | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | or below lower threshold | | | | | | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | for time | > | 1 | sec | >1sec | A/F sensor heating normal | > | 10 | sec | >10sec | | | | or 4 sec |
| | | | | | | | | operation range for time | | | | | | | | cumulative |
| | | | | | | | | error: A/F sensor heater circuit | not set | - | - | not set-- | | | | |
| | | | | | | | | A/F sensor internal resistance | > | 1500 | Ohms | >1500Ohms | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| reference ground circuit open | | measured A/F sensor internal | A/F sensor internal resistance | > | 1500 | Ohms | >1500Ohms | battery voltage | < | 18 | V | <18V | 5 sec | 0.1 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2251 | resistance above upper threshold | | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | | | | | | | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | | for time | > | 5 | sec | >5sec | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | | | | | | A/F sensor voltage | < | 1.48 | V | <1.48V | | | | |
| | | | | | | | | A/F sensor voltage | > | 1.36 | V | >1.36V | | | | |
| | | | | | | | | error: A/F sensor heater circuit | not set | | | not set | | | | |
| | | | | | | | | A/F sensor pump voltage shut off | FALSE | - | - | FALSE-- | | | | |
| | | | | | | | | A/F sensor warm up control | complete | - | - | complete-- | | | | |
| | | | | | | | | A/F sensor heater operation time | > | 28 | sec | >28sec | | | | |
| | | | | | | | | engine run time | > | 28 | sec | >28sec | | | | |
| | | | | | | | | battery voltage below heater | | | | | | | | |
| | | | | | | | | switch off voltage for time | > | 28 | sec | >28sec | | | | |
| | | | | | | | | fuel cut in time | > | 28 | sec | >28sec | | | | |
| | | | | | | | | for a fuel cut off time | > | 10 | sec | >10sec | | | | |
| | | | | | | | | battery voltage exceed 11V time | > | 28 | sec | >28sec | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| measuring (trim) current | | A/F sensor voltage | A/F sensor voltage | > | 4.81 | V | >4.81V | battery voltage | < | 18 | V | <18V | 2 sec | 0.1 sec | 0.4 sec | two driving |
| circuit open | | above threshold | | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| bank 1 sensor 1 | P2626 | | | | | | | engine | running | - | - | running-- | additional | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine starting | complete | - | - | complete-- | time if | | cumulative | continuous |
| | | | | | | | | fuel cut off | TRUE | - | - | TRUE-- | fuel level | | | or 4 sec |
| | | | | | | | | modeled exhaust temp | < | 750 | ° C | <750° C | is low and | | | cumulative |
| | | | | | | | | in front of catalyst | | | | | not failed | | | |
| | | | | | | | | A/F sensor heater | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | at operating temperature | | | | | 600 sec | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| general error | P0130 | general A/F sensor electrical fault | A/F sensor internal resistance | > | 1500 | Ohms | >1500Ohms | A/F sensor heater operation time | > | 15 | sec | >15sec | 15 sec | 0.1 sec | immediate | two driving |
| causing open loop | | | | | | | | fuel cut in time | > | 15 | sec | >15sec | | continuous | | cycles |
| | | | | | | | | for a fuel cut off time | > | 3 | sec | >3sec | | | | |
| | | | | | | | | battery voltage | > | 10.7 | V | >10.7V | | | | |
| | | | | | | | | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | | | A/F sensor | ready | | | ready | | | | |
| | | | | | | | | A/F sensor heater pwr. stage err. | FALSE | | | FALSE | | | | |
| | | | | | | | | A/F sensor IC internal error | FALSE | | | FALSE | | | | |
| | | | | | | | | A/F sensor pin short circuit error | FALSE | | | FALSE | | | | |
| | | | | | | | | modeled exhaust gas temp. invalid | FALSE | | | FALSE | | | | |
| | | | | | | | | modeled exhaust gas temperature | > | 0 | °C | >0°C | | | | |
| | | | | | | | | | | | | | | | | |
| | | | calculated A/F sensor temperature | < | 640 | °C | <640°C | A/F sensor heater operation time | > | 15 | sec | >15sec | 15 sec | | | |
| | | | | | | | | fuel cut in time | > | 15 | sec | >15sec | | | | |
| | | | | | | | | for a fuel cut off time | > | 3 | sec | >3sec | | | | |
| | | | | | | | | battery voltage | > | 10.7 | V | >10.7V | | | | |
| | | | | | | | | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | | | A/F sensor | ready | | | ready | | | | |
| | | | | | | | | A/F sensor heater pwr. stage err. | FALSE | | | FALSE | | | | |
| | | | | | | | | A/F sensor IC internal error | FALSE | | | FALSE | | | | |
| | | | | | | | | A/F sensor pin short circuit error | FALSE | | | FALSE | | | | |
| | | | | | | | | modeled exhaust gas temp. invalid | FALSE | | | FALSE | | | | |
| | | | | | | | | modeled exhaust gas temperature | > | 0 | °C | >0°C | | | | |
| | | | | | | | | | | | | | | | | |
| | | | A/F sensor pin UN error set | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | A/F sensor pin VM error set | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | A/F sensor heater error set by | = | TRUE | | =TRUE | | | | | | | | | |
| | | | after engine start diagnosis | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | A/F sensor heater error set by | = | TRUE | | =TRUE | | | | | | | | | |
| | | | maximum heater output diagnosis | = | TRUE | | =TRUE | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| reference ground circuit; reference voltage circuit; or measuring current circuit | | | | | | | | | | | | | | | | |
| bank 1 sensor 1 - low volt | P0131 | A/F sensor signal at VM | IC Circuit Status shorted low | = | TRUE | - | =TRUE- | battery voltage | < | 18 | V | <18V | 25 sec | 0.1 sec | 0.4 sec | two driving |
| | | ( reference ground ) below lower limit | | | | | | battery voltage | > | 10.7 | V | >10.7V | | continuous | continuous | cycles each |
| | | or A/F sensor signal at UN | IC Circuit Status shorted low | = | TRUE | - | =TRUE- | engine | running | - | - | running-- | | | or 4 sec | with: 0.4 sec |
| | | ( reference voltage [Nernst voltage] ) below lower limit | | | | | | engine starting | complete | - | - | complete-- | | | cumulative | continuous |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | or A/F sensor signal at IA | IC Circuit Status shorted low | = | TRUE | - | =TRUE- | | | | | | | | | or 4 sec |
| | | ( measuring current trim circuit ) below lower limit | | | | | | | | | | | | | | cumulative |
| | | | | | | | | | | | | | | | | |
| bank 1 sensor 1 - high volt | P0132 | A/F sensor signal at VM | IC Circuit Status shorted high | = | TRUE | - | =TRUE- | | | | | | | | | |
| | | ( reference ground ) above upper limit | | | | | | | | | | | | | | |
| | | or A/F sensor signal at UN | IC Circuit Status shorted high | = | TRUE | - | =TRUE- | | | | | | | | | |
| | | ( reference voltage [Nernst voltage] ) above upper limit | | | | | | | | | | | | | | |
| | | or A/F sensor signal at IA | IC Circuit Status shorted high | = | TRUE | - | =TRUE- | | | | | | | | | |
| | | ( measuring current trim circuit ) above upper limit | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| response | | dynamic response | A/F sensor dynamic value | < | 0,2 | ratio | < 0.2ratio | fuel trim forced amplitude | active | - | - | active-- | | | | |
| Bank 1 Sensor 1 | P0133 | slow or low amplitude | | | | | | A/F sensor | ready | - | - | ready-- | dynamic | 0.01 sec | 0.4 sec | two driving |
| | | | | | | ( versus | ( versus | short term fuel trim (o.k.) | < MAX | 1.25 | factor | < MAX1.25factor | test | continuous | continuous | cycles each |
| | | | | | | reference | reference | short term fuel trim (o.k.) | > MIN | 0.75 | factor | > MIN0.75factor | sample | | or 4 sec | with: 0.4 sec |
| | | | | | | sensor ) | sensor ) | measured A/F minus integral | < | 1,05 | lambda | <1.05lambda | count | | cumulative | continuous |
| | | | | | | | | control of secondary O2 | | | | | | | | or 4 sec |
| | | | | | | | | measured A/F minus integral | > | 0,95 | lambda | >0.95lambda | > | | | cumulative |
| | | | | | | | | control of secondary O2 | | | | | | | | |
| | | | | | | | | engine speed | < | 2800 | rpm | <2800rpm | 35 | | | |
| | | | | | | | | engine speed | > | 1160 | rpm | >1160rpm | samples | | | |
| | | | | | | | | volumetric efficiency | < | 45 | % | <45% | | | | |
| | | | | | | | | volumetric efficiency | > | 17.25 | % | >17.25% | then | | | |
| | | | | | | | | volumetric efficiency gradient | < | 30 | %/sec | <30%/sec | 2 sec | | | |
| | | | | | | | | A/F sensor housing model temp | < | 570 | °C | <570°C | | | | |
| | | | | | | | | filtered purge HC conc. factor | < | 15 | factor | <15factor | total time | | | |
| | | | | | | | | or evap purge | not active | | | not active | = approx. | | | |
| | | | | | | | | all fuel injectors active | TRUE | | | TRUE | 600 sec | | | |
| | | | | | | | | evap purge high HC conc. | FALSE | - | - | FALSE-- | | | | |
| | | | | | | | | A/F pumping current circuit | checked OK | - | - | checked OK-- | | | | |
| | | | | | | | | error: evap purge valve | not set | - | - | not set-- | | | | |
| | | | | | | | | error: evap purge valve circuit | not set | - | - | not set-- | | | | |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | forced amplitude | > | 0.01 | lambda | >0.01lambda | | | | |
| | | | | | | | | | | | | | | | | |
| Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| primary A/F signal RICH / secondary O2 signal LEAN | | | | | | | | | | | | | | | | |
| Bank 1 | P2096 | A/F sensor long term secondary | secondary O2 sensor trim | < | -0.03 | lambda | <-0.03lambda | engine starting | complete | - | - | complete- - | 2 sec | 0.1 sec | 0.4 sec | two driving |
| | | trim - rich shift | integral control | | | | | secondary O2 trim active | TRUE | - | - | TRUE-- | | continuous | continuous | cycles each |
| | | - correction below threshold | | | | | | and secondary O2 oscillation | TRUE | - | - | TRUE- - | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | check finished | | | | | | | cumulative | continuous |
| primary A/F signal LEAN / secondary O2 signal RICH | | | | | | | | then timer | > | 25 | sec | >25sec | | | | or 4 sec |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bank 1 | P2097 | A/F sensor long term secondary | secondary O2 sensor trim | > | 0.03 | lambda | >0.03lambda | scheduled by System Manager | TRUE | | | TRUE | | | | cumulative |
| | | trim - lean shift | integral control | | | | | sec. O2 trim - fast lean correction | FALSE | | | FALSE | | | | |
| | | - correction above threshold | | | | | | sec. O2 trim - fast rich correction | FALSE | | | FALSE | | | | |
| | | | | | | | | suspicion A/F sensor lean shift | FALSE | | | FALSE | | | | |
| | | | | | | | | secondary O2 oscillation test | checked OK | | | checked OK | | | | |
| | | | | | | | | | | | | | | | | |
| Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| Bank 1 | P2195 | secondary O2 sensor operation | secondary O2 sensor voltage | > | 0.75 | V | >0.75V | A/F sensor measured lambda | > | 1.08008 | lambda | >1.08008lambda | approx. | 0.1 sec | 0.4 sec | two driving |
| | | too rich - strong correction | | | | | | short term fuel trim | = MAX | 1.25 | factor | = MAX1.25factor | 100 sec | continuous | continuous | cycles each |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | or 4 sec | with: 0.4 sec |
| | | A/F sensor measured too lean | or | | | | | secondary O2 sensor | ready | - | - | ready-- | | | cumulative | continuous |
| | | | | | | | | then | | | | | | | | or 4 sec |
| | | | | | | | | accumulated exhaust gas mass | > | 300 | g | >300g | | | | cumulative |
| | | | secondary O2 sensor voltage | > | 0.75 | V | >0.75V | A/F sensor measured lambda | > | 1.08008 | lambda | >1.08008lambda | | | | |
| | | | | | | | | secondary O2 sensor fuel trim | > | 0.014008 | lambda | >0.014008lambda | | | | |
| | | | | | | | | proportional trim dominating | | | | | | | | |
| | | | | | | | | secondary O2 aging diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | secondary O2 circuit diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | secondary O2 fuel trim active | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | secondary O2 sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | then | | | | | | | | |
| | | | | | | | | accumulated exhaust gas mass | > | 300 | g | >300g | | | | |
| | | | secondary O2 sensor voltage | > | 0.75 | V | >0.75V | target lambda | > | 1.04 | lambda | >1.04lambda | 0.9 sec | | | |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | secondary O2 sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | lambda closed loop control | active | - | - | active-- | | | | |
| | | | | | | | | secondary O2 circuit diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | short term fuel trim (o.k.) | > MIN | 0.75 | factor | > MIN0.75factor | | | | |
| | | | | | | | | then | | | | | | | | |
| | | | | | | | | accumulated exhaust gas mass | > | 800 | g | >800g | | | | |
| | | | | | | | | | | | | | | | | |
| Oxygen Sensor (secondary O2) Trim of Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| Bank 1 | P2196 | secondary O2 sensor operation | secondary O2 sensor voltage | < | 0.2012 | V | <0.2012V | A/F sensor measured lambda | < | 0.92 | lambda | <0.92lambda | approx. | 0.1 sec | 0.4 sec | two driving |
| | | too lean - strong correction | | | | | | short term fuel trim | = MIN | 0.75 | factor | = MIN0.75factor | 100 sec | continuous | continuous | cycles each |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | or 4 sec | with: 0.4 sec |
| | | A/F sensor measured too rich | | | | | | secondary O2 sensor | ready | - | - | ready-- | | | cumulative | continuous |
| | | | | | | | | then | | | | | | | | or 4 sec |
| | | | | | | | | accumulated exhaust gas mass | > | 300 | g | >300g | | | | cumulative |
| | | | secondary O2 sensor voltage | < | 0.2012 | V | <0.2012V | A/F sensor measured lambda | < | 0.92 | lambda | <0.92lambda | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | secondary O2 sensor fuel trim | < | 0.014 | lambda | <0.014lambda | | | | |
| | | | | | | | | proportional trim dominating | | | | | | | | |
| | | | | | | | | secondary O2 aging diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | secondary O2 circuit diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | secondary O2 fuel trim active | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | secondary O2 sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | then | | | | | | | | |
| | | | | | | | | accumulated exhaust gas mass | > | 300 | g | >300g | | | | |
| | | | secondary O2 sensor voltage | < | 0.2012 | V | <0.2012V | target lambda | < | 0.96 | lambda | <0.96lambda | 0.9 sec | | | |
| | | | | | | | | A/F sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | secondary O2 sensor | ready | - | - | ready-- | | | | |
| | | | | | | | | lambda closed loop control | active | - | - | active-- | | | | |
| | | | | | | | | secondary O2 circuit diagnosis | complete | - | - | complete-- | | | | |
| | | | | | | | | short term fuel trim (o.k.) | < MAX | 1.25 | factor | < MAX1.25factor | | | | |
| | | | | | | | | then | | | | | | | | |
| | | | | | | | | accumulated exhaust gas mass | > | 800 | g | >800g | | | | |
| | | | | | | | | | | | | | | | | |
| Air / Fuel Ratio Sensor (primary A/F) | | | | | | | | | | | | | | | | |
| electrical | | | | | | | | | | | | | | | | |
| wire to wire short circuit | | sensor short to heater | filtered maximum pump current variation | > | 0.00019 | A | >0.00019A | all injectors activated | TRUE | - | - | TRUE-- | 15 sec | 0.01 sec | 0.4 sec | two driving |
| bank 1 sensor 1 | P2231 | | within every 10ms | | | | | battery voltage | < | 18 | V | <18V | | continuous | continuous | cycles each |
| | | | | | | | | battery voltage | > | 10,7 | V | >10.7V | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | A/F sensor IC diagnosis | complete | - | - | complete-- | | | cumulative | continuous |
| | | | | | | | | error: A/F sensor IC | not set | - | - | not set-- | | | | or 4 sec |
| | | | | | | | | engine rpm | < | 1800 | rpm | <1800rpm | | | | cumulative |
| | | | | | | | | modeled exhaust gas temperature | < | 800 | ° C | <800° C | | | | |
| | | | | | | | | heater duty cycle | > | 20 | % | >20% | | | | |
| | | | | | | | | heater duty cycle | < | 80 | % | <80% | | | | |
| | | | | | | | | A/F sensor heater at op.temp. | TRUE | | | TRUE | | | | |
| | | | | | | | | after A/F sensor curve switching | | | | | | | | |
| | | | | | | | | for time | > | 0.06 | sec | >0.06sec | | | | |
| | | | | | | | | | | | | | | | | |
| Diagnosis of Heater upstream HO2S | | | | | | | | | | | | | | | | |
| | P0032 | short circuit to battery voltage | Voltage | IC internal | | | IC internal | for time | > | 5 | sec | > 5 sec | 5 sec | continous | 0.2 sec | 2 dcy |
| | | | | | | | | battery voltage via main relay | <= | 18 | V | <= 18 V | | | | |
| | P0031 | short circiut to ground | | | | | | battery voltage via main relay | >= | 10,7 | V | >= 10,7 V | | | | |
| | | | | | | | | condition end of start | True | | | True | | | | |
| | P0030 | wire interruption | | | | | | condition engine speed: n > NMIN | True | | | True | | | | |
| | | | | | | | | | | | | | | | | |
| A/F Sensor Heating | | | | | | | | | | | | | | | | |
| heater performance (primary A/F) | | | | | | | | | | | | | | | | |
| bank 1 sensor 1 | P0135 | A/F sensor calculated temperature | A/F sensor temperature calculation | < | 715 | ° C | <715° C | battery voltage | > | 10,7 | V | >10.7V | 35 sec | 0.1 sec | 0.4 sec | two driving |
| | | too low | | | | | | battery voltage | < | 18 | V | <18V | | continuous | continuous | cycles each |
| | | | | | | | | internal resistance measurement | valid | - | - | valid-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | all injectors activated | TRUE | - | - | TRUE-- | | | cumulative | continuous |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | A/F sensor internal resistance | FALSE | - | - | FALSE-- | | | | or 4 sec |
| | | | | | | | | excessive correction required | | | | | | | | cumulative |
| | | | | | | | | engine stop time | > | 5400 | sec | >5400sec | | | | |
| | | | | | | | | engine temperature at start | > | -9,8 | ° C | >-9.8° C | | | | |
| | | | | | | | | A/F sensor heating ready | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | A/F heater control shut off | FALSE | - | - | FALSE-- | | | | |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE-- | | | | |
| heater performance (primary A/F) | | | | | | | | | | | | | | | | |
| bank 1 sensor 1 (primary) | P0135 | A/F sensor calculated | A/F sensor temperature calculation | < | 715 | ° C | <715° C | A/F Heater at Maximum Power | TRUE | | | TRUE | 60 sec | 0.1 sec | 0.4 sec | two driving |
| | | temperature below threshold | | | | | | modeled exhaust temp. at sensor | > | 300 | ° C | >300° C | | continuous | continuous | cycles each |
| | | | | | | | | timer expires after either: | > | 50 | sec | >50sec | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | fuel shut off >= 3 sec dur. ends | - | - | - | --- | | | cumulative | continuous |
| | | | | | | | | or initial A/F heater turn on | - | - | - | --- | | | | or 4 sec |
| | | | | | | | | battery voltage | > | 10,7 | V | >10.7V | | | | cumulative |
| | | | | | | | | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | | | A/F heater control shut off | FALSE | - | - | FALSE-- | | | | |
| | | | | | | | | modeled exhaust temp. valid | TRUE | | | TRUE | | | | |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE-- | | | | |
| A/F Sensor Heating | | | | | | | | | | | | | | | | |
| heater performance (secondary O2) | | | | | | | | | | | | | | | | |
| bank 1 sensor 1 | P0053 | correction value for A/F sensor | absolute value of correction value for | > | 45 | Ohms | >45Ohms | battery voltage | > | 10.7 | V | >10.7V | 40 sec | 0.1 sec | 0.4 sec | two driving |
| bank 2 sensor 1 | | internal resistance measurement | A/F sensor internal resistance | | | | | battery voltage | < | 18 | V | <18V | | continuous | continuous | cycles each |
| | | too much | | | | | | engine starting | complete | - | - | complete-- | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | | | | | | | | cumulative | continuous |
| | | | | | | | | | | | | | | | | or 4 sec |
| | | | | | | | | | | | | | | | | cumulative |
| Oxygen Sensor | | | | | | | | | | | | | | | | |
| sensor circuit (secondary O2) | | | | | | | | | | | | | | | | |
| bank 1 sensor 2 | P0137 | short circuit to ground | secondary O2 sensor voltage | < | 0.06 | V | <0.06V | secondary O2 heating stable | > | 10 | sec | > 10sec | 0.1 sec | 0.1 sec | 0.4 sec | two driving |
| | | | | | | | | and mod. exhaust gas temp. | > | 250 | ° C | >250° C | | continuous | continuous | cycles each |
| | | | | | | | | for time | > | 90 | sec | >90sec | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | engine running | TRUE | - | - | TRUE-- | | | cumulative | continuous |
| | | | | | | | | battery voltage | > | 10.7 | V | >10.7V | | | | or 4 sec |
| | | | | | | | | mod. exhaust-gas temp. | < | 800 | ° C | <800° C | | | | cumulative |
| | | | | | | | | time after start | < | 1 | sec | <1sec | | | | |
| | | | | | | | | engine temp at stop | > | 60 | ° C | >60° C | | | | |
| | | | | | | | | engine temp | < | 40 | ° C | <40° C | | | | |
| | | | | | | | | error: engine coolant temp | not set | - | - | not set-- | | | | |
| bank 1 sensor 2 | P0138 | short circuit to battery voltage | secondary O2 sensor voltage > | > | 1.08 | V | >1.08V | secondary O2 heating stable | > | 10 | sec | > 10sec | 5.1 sec | | | |
| | | | | | | | | and mod. Exhaust-gas temp. | > | 250 | ° C | >250° C | | | | |
| | | | | | | | | for time | > | 90 | sec | >90sec | | | | |
| | | | | | | | | engine running | TRUE | - | - | TRUE-- | | | | |
| | | | | | | | | battery voltage | > | 10.7 | V | >10.7V | | | | |
| | | | | | | | | mod. exhaust-gas temp. | < | 800 | ° C | <800° C | | | | |
| bank 1 sensor 2 | P0140 | sensor line disconnection | secondary O2 sensor voltage | > | 0.401 | V | >0.401V | secondary O2 heating stable | > | 10 | sec | > 10sec | 600 sec | | | |
| | | | and secondary O2 sensor voltage | < | 0.499 | V | <0.499V | and mod. Exhaust-gas temp. | > | 250 | ° C | >250° C | | | | |
| | | | | | | | | for time | > | 90 | sec | >90sec | | | | |
| | | | or | | | | | engine running | TRUE | - | - | TRUE-- | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | secondary O2 sensor internal resistance | > | 40000 | Ohm | >40000Ohm | battery voltage | > | 10.7 | V | >10.7V | | | | |
| | | | when modeled exhaust gas temperature | > | 600 | ° C | >600° C | mod. exhaust-gas temp. | < | 800 | ° C | <800° C | | | | |
| Oxygen Sensor | | | | | | | | | | | | | | | | |
| sensor circuit (secondary O2) | | | | | | | | | | | | | | | | |
| bank 1 sensor 2 | P2232 | sensor line short circuit | secondary O2 sensor | | | | | secondary O2 heating stable | > | 10 | sec | > 10sec | 10 sec | 0.01 sec | 0.4 sec | two driving |
| | | to heater output line | voltage gradient | > | 2 | V | >2V | and mod. Exhaust-gas temp. | > | 250 | ° C | >250° C | | continuous | continuous | cycles each |
| | | | within time after heater turn off | < | 0.04 | sec | <0.04sec | for time | > | 90 | sec | >90sec | | | or 4 sec | with: 0.4 sec |
| | | | for occurrences | > | 4 | count | >4count | engine running | TRUE | - | - | TRUE-- | | | cumulative | continuous |
| | | | out of heater turn offs | = | 6 | count | =6count | battery voltage | > | 10.7 | V | >10.7V | | | | or 4 sec |
| | | | | | | | | mod. exhaust-gas temp. | < | 800 | ° C | <800° C | | | | cumulative |
| | | | | | | | | time after dew point exceeded | > | 10 | sec | >10sec | | | | |
| Oxygen Sensor Heating | | | | | | | | | | | | | | | | |
| heater performance (secondary O2) | | | | | | | | | | | | | | | | |
| bank 1 sensor 2 (secondary) | P0141 | secondary O2 sensor | measured secondary O2 sensor internal | | | | | battery voltage | > | 10,7 | V | >10.7V | 6 sec | 0.1 sec | 0.4 sec | two driving |
| | | internal resistance | resistance | | | | | battery voltage | < | 18 | V | <18V | | continuous | continuous | cycles each |
| | | above threshold | nominal internal resistance | > | 88 . . . 408 | Ohms | >88 . . . 408Ohms | engine running | TRUE | - | - | TRUE-- | | | or 4 sec | with: 0.4 sec |
| | | | | | KFRINH | | KFRINH | engine starting | complete | - | - | complete-- | | | cumulative | continuous |
| | | | multipy times degradation factor | > | 3 . . . 20 | factor | >3 . . . 20factor | fuel cut off | FALSE | - | - | FALSE-- | | | | or 4 sec |
| | | | | | FRINH | | FRINH | sec. O2 internal resistance | valid | - | - | valid-- | | | | cumulative |
| | | | for time | > | 6 | sec | >6sec | intake air temperature | > | -9,8 | C | >-9.8C | | | | |
| | | | | | | | | engine off soak time | > | 120 | sec | >120sec | | | | |
| | | | | | | | | modeled exhaust temp. | in range | 350 . . . 550 | C | in range350 . . . 550C | | | | |
| | | | | | | | | at secondary O2 sensor | | | | | | | | |
| | | | | | | | | suspicion of secondary | FALSE | | | FALSE | | | | |
| | | | | | | | | O2 sensor open circuit | | | | | | | | |
| | | | | | | | | secondary O2 voltage supply | ON | | | ON | | | | |
| | | | | | | | | scheduled by System Manager | | | | | | | | |
| | | | | | | | | for time | > | 120 | sec | >120sec | | | | |
| sensor response (secondary O2) | | | | | | | | | | | | | | | | |
| bank 1 sensor 2 | P2270 | oscillation check low | secondary O2 sensor voltage | < | 0.499 . . . 0.603 | V | <0.499 . . . 0.603V | secondary O2 sensor | ready | - | - | ready - - | approx. | 0.1 sec | 0.4 sec | two driving |
| | | | for time | > | 5 | sec | >5sec | for time | > | 10 | sec | >10sec | 600 sec | continuous | continuous | cycles each |
| | | | then | | | | | secondary O2 closed loop control | active | - | - | active - - | | | or 4 sec | with: 0.4 sec |
| | | | ramping in enrichment by | = | 0.25 | lambda | =0.25lambda | all injectors activated | TRUE | - | - | TRUE - - | additional | | cumulative | continuous |
| | | | at gradient | = | 0.0513 | l / sec | 0,0513 l / sec | engine air flow (intrusive test) | > | 9.72 | g/sec | 9.72g/sec | time if | | | or 4 sec |
| | | | for time (after enrichment limit reached) | > | 7 | sec | >7sec | and engine air flow | < | 33.33 | g/sec | 33.33g/sec | fuel level | | | cumulative |
| | | | | | | | | for time | > | 3 | sec | >3sec | is low and | | | |
| | | | | | | | | engine air flow (passive monitor) | > | 9.72 | g/sec | 9.72g/sec | not failed | | | |
| | | | | | | | | sec. O2 trim - fast lean correction | FALSE | | | FALSE | 600 sec | | | |
| | | | | | | | | sec. O2 trim - fast rich correction | FALSE | | | FALSE | | | | |
| | | | | | | | | engine | running | | | running | | | | |
| | | | | | | | | scheduled by System Manager | TRUE | | | TRUE | | | | |
| bank 1 sensor 2 | P2271 | oscillation check high | secondary O2 sensor voltage | > | 0.499 . . . 0.603 | V | >0.499 . . . 0.603V | secondary O2 sensor | ready | - | - | ready - - | approx. | 0.1 sec | 0.4 sec | two driving |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | for time | > | 5 | sec | >5sec | for time | > | 10 | sec | >10sec | 600 sec | continuous | continuous | cycles each |
| | | | then | | | | | secondary O2 closed loop control | active | | | active | | | or 4 sec | with: 0.4 sec |
| | | | ramping in enleanment by | = | 0.07 | lambda | =0.07lambda | all injectors activated | TRUE | | | TRUE | | | cumulative | continuous |
| | | | at gradient | = | 0,0513 | l / sec | 0,0513 l / sec | engine air flow (intrusive test) | > | 9.72 | g/sec | 9.72g/sec | | | | or 4 sec |
| | | | for time (after enleanment limit reached) | > | 7 | sec | >7sec | and engine air flow | < | 33.33 | g/sec | 33.33g/sec | | | | cumulative |
| | | | | | | | | for time | > | 3 | sec | >3sec | | | | |
| | | | | | | | | engine air flow (passive monitor) | > | 9.72 | g/sec | 9.72g/sec | | | | |
| | | | | | | | | sec. O2 trim - fast lean correction | FALSE | | | FALSE | | | | |
| | | | | | | | | sec. O2 trim - fast rich correction | FALSE | | | FALSE | | | | |
| | | | | | | | | engine | running | | | running | | | | |
| | | | | | | | | scheduled by System Manager | TRUE | | | TRUE | | | | |
| bank 1 sensor 2 | P2271 | fuel cut off check high | secondary O2 sensor voltage | > | 0.202 | V | >0.202V | secondary O2 heating stable | > | 10 | sec | > 10sec | 0.2 sec | 0.1 sec | 0.4 sec | two driving |
| | | | time after fuel cut off | > | 2,5 | sec | >2,5sec | secondary O2 dew point exceeded | TRUE | - | - | TRUE - - | | continuous | continuous | cycles each |
| | | | | | | | | for time | > | 30 | sec | >30sec | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | air passed after fuel cut off | > | 15 | g | >15g | | | cumulative | continuous |
| | | | | | | | | modeled exhaust temp | > | 350 | ° C | >350° C | | | | or 4 sec |
| | | | | | | | | at secondary O2 sensor | | | | | | | | cumulative |
| | | | | | | | | scheduled by System Manager | TRUE | - | - | TRUE - - | | | | |
| | | | | | | | | error: cam sensor | not set | - | - | not set - - | | | | |
| | | | | | | | | error: evap canister purge sys. | not set | - | - | not set - - | | | | |
| | | | | | | | | error: evap purge valve ckt | not set | - | - | not set - - | | | | |
| | | | | | | | | error: battery voltage | not set | - | - | not set - - | | | | |
| bank 1 sensor 2 | P0139 | fuel cut off check high | secondary O2 sensor voltage | > | 0,152 | V | >0.152V | secondary O2 heating stable | > | 10 | sec | > 10sec | 0.2 sec | 0.1 sec | 0.4 sec | two driving |
| | | | time after fuel cut off | > | 3,0 | sec | >3,0sec | secondary O2 dew point exceeded | TRUE | - | - | TRUE - - | | continuous | continuous | cycles each |
| | | | lambda actual value | > | 2 | | lambda >2 | for time | > | 30 | sec | >30sec | | | or 9,5 sec | with: 0.4 sec |
| | | | | | | | | air passed after fuel cut off | > | 15 | g | >20g | | | cumulative | continuous |
| | | | | | | | | bank 1 sensor 2 voltage | | | | >0,6 V | | | | or 9,5 sec |
| | | | | | | | | for time | | | | > 3 sec | | | | cumulative |
| | | | | | | | | battery voltage | | | | > 10,7V | | | | |
| Camshaft Control | | | | | | | | | | | | | | | | |
| System - Locking Pin | | | | | | | | | | | | | | | | two driving |
| Bank 1 Intake | P0011 | rationality high | average of actual angle measurements | > | 10 | degrees | >10degrees | engine speed | > | 560 | rpm | >560rpm | 10 sec | 0.01 sec | 0.4 sec | cycles each |
| Bank 2 Intake | P0021 | | versus locked position angle | | | | | engine run time | > | 1 | sec | >1sec | | | continuous | with: 0.4 sec |
| | | | | | | | | camshaft control circuit test | complete | - | - | complete-- | | | or 4 sec | continuous |
| | | | | | | | | error: camshaft control circuit | not set | - | - | not set-- | | | cumulative | or 4 sec cum |
| System - Control | P000A | rationality low / high | difference to start test (filtered actual | > | 6 . . . 11 | degrees | > 6 . . . 11 degrees | engine speed | > | 560 | rpm | >560rpm | approx. | 0.01 sec | 0.4 sec | two driving |
| Bank 1 Intake | P000C | | angle versus filtered desired angle) | | | | | engine run time | > | 1 | sec | >1sec | 20 sec | continuous | continuous | cycles each |
| Bank 2 Intake | | | (desired must remain above value | | | | | camshaft control circuit test | complete | - | - | complete-- | | | or 4 sec | with: 0.4 sec |
| | | | to test to complete the evaluation) | | | | | error: camshaft control circuit | not set | - | - | not set-- | (4 times | | cumulative | continuous |
| | | | filtered actual angle remains | < | | | < | coolant temperature | < | 143 | ° C | < 143° C | for 4 sec | | | or 4 sec |
| | | | filtered desired angle from test start | | | | | coolant temperature | > | -48 | ° C | >-48° C | each ) | | | cumulative |
| | | | within time | = | 3 | sec | =3sec | engine oil temperature | < | 143 | ° C | <143° C | | | | |
| | | | (detects 5 sec slow [time constant]) | | | | | engine oil temperature | > | -48 | ° C | >-48° C | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | cam-crank alignment adaptation | complete | - | - | complete-- | | | | |
| | | | for multiple activation occurrences | > | 4 | count | >4count | | | | | | | | | |
| | | | (decrements upon activations where | | | | ( same as stated in "time required" column ) | | | | | | | | | |
| | | | no difference is seen between desired | | | | | | | | | | | | | |
| | | | and actual) | | | | | | | | | | | | | |
| | | | difference (filtered actual angle max | > | 3 | degrees | >3degrees | | | | | | | | | |
| | | | versus actual at test start) | | | | | | | | | | | | | |
| | | | ( to detect slow response versus | | | | | | | | | | | | | |
| | | | stuck cam if above this limit ) | | | | | | | | | | | | | |
| | | | at time | = | 4 | sec | =4sec | | | | | | | | | |
| | | | (overlaps with time to detect above) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (passes after multiple good activations | | | | | | | | | | | | | |
| | | | in both cam phase rotation directions) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| System - Cam - Crank Alignment | | | | | | | | | | | | | | | | |
| Bank 1 Intake | P0016 | cam-crank adapted angle | adapted angle | > | 10 | degrees | >10degrees | engine run time > | > | 2 | sec | >2sec | approx. | 0.2 sec | 0.4 sec | two driving |
| | | limit check | or adapted angle | < | -18 | degrees | <-18degrees | engine coolant temp > | > | 9.8 | ° C | >9.8° C | 600 sec | continuous | continuous | cycles each |
| Bank 2 Intake | P0018 | (applies for each camshaft) | or actual angle with parked cams | > | 20 | degrees | >20degrees | engine coolant temp < | < | 105 | ° C | <105° C | | | or 4 sec | with: 0.4 sec |
| | | | and | < | 25 | degrees | <25degrees | model: engine oil temp < | < | 140 | ° C | <140° C | fail after | | cumulative | continuous |
| | | | | | | | | | | | | | | | | |
| Bank 1 / Idler Sprocket | P0008 | | adapted angle for both cams | > | 10 | degrees | >10degrees | error: camshaft sensor | not set | - | - | not set-- | 2 adaptation | | | or 4 sec |
| Bank 2 / Idler Sprocket | P0009 | | adapted angle for both cams | < | -18 | degrees | <-18degrees | error: camshaft control circuit | not set | - | - | not set-- | cycles - | | | cumulative |
| | | | | | | | | | | | | | required | | | |
| | | | | | | | | | | | | | | | | |
| Engine coolant | P0117 | range check high | coolant temperature | > | 138.8 | ° C | >138.8° C | hot restart timer after engine start | >= | 60 | sec | >=60sec | 0.1 sec | 0.1 sec | 0.4 sec | two driving |
| | | | | | | | | | | | | | | | | |
| temperature sensor | P0118 | range check low | coolant temperature | < | -38.3 | ° C | <-38.3° C | If Startup ECT+O155 | < | -38.3 | ° C | <-38.3° C | | | continuous | cycles each |
| | | | | | | | | \| ECT-Startup ECT \| (abs value) | <= | 2.3 | ° C | <=2.3° C | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | integrated air mass increases | >= | 0 | g | >=0g | | | cumulative | cont. or 4 |
| | | | | | | | | and air mass timer | >= | 30 | sec | >=30sec | | | | sec cum. |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0119 | intermittent ( discontinuity ) | delta coolant temperature | < | -20.25 | ° C | <-20.25° C | ignition | = | ON | | =ON | approx. | 0.01 sec | immediate | |
| | | | or | | | | | | | | | | 150 sec | continuous | | |
| | | | delta coolant temperature | > | 20.25 | ° C | >20.25° C | | | | | | | | | |
| | | | (between A/D read sample count offset) | = | 3 | count | =3count | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Engine coolant | P0116 | plausibility check (low side check) | calculated coolant temperature model | > | 9.8 | ° C | >9.8° C | the model temperature increases | | | | | | | or 0.4 sec | two driving |
| temperature sensor | | | minus measured temperature | | | | | depending on air flow | | | | | | | continuous | cycles each |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | plausibility check (high side check) | measured temperature | | 9.8 | ° C | | measured temperature | < | 93.8 | ° C | <93.8° C | | | | |
| | | | minus calculated coolant temperature model | | | | | engine speed | > | 520 | rpm | >520rpm | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | integrated air mass | > | 3000 | g | > 3000g | | | cumulative | continuous |
| | | | | | | | | no error engine speed | | | | | | | | or 4 sec |
| | | | | | | | | no error air mass flow meter | | | | | | | | cumulative |
| Engine coolant | P050C | difference from intake air | filtered difference | | | | | key up IAT - previous min IAT | < | 1.5 | ° C | <1.5° C | 160 sec | 0.2 sec | immediate | two driving |
| temperature sensor | | temperature after soaking | ( ECT at key on - IAT at key on ) | > | 15 | ° C | >15° C | key up IAT - previous min IAT | > | -24.75 | ° C | >-24.75° C | for block | continuous | additional | cycles each |
| | | | | | | | | previous accumulated air mass | > | 2000 | g | >2000g | heating | | after block | with: 0.4 sec |
| | | | | | | | | previous accumulated air mass | > | 4000 | g | >4000g | | | heater | cumulative |
| | | | or | | | | | previous engine run time | > | 500 | sec | >500sec | | | check | |
| | | | | | | | | or | | | | | | | | |
| | | | filtered difference | | | | | ECT at shut down | > | 84.75 | ° C | >84.75° C | | | | |
| | | | ( ECT at key on - IAT at key on ) | < | -10 | ° C | <-10° C | Controller Shut Down at end of | last cycle | - | - | last cycle-- | | | | |
| | | | | | | | | Strong Wind / Open Hood | not detected | - | - | not detected-- | | | | |
| | | | | | | | | based on IAT rise at shut down | | | | | | | | |
| | | | | | | | | Block Heater | not detected | - | - | not detected-- | | | | |
| Engine Coolant | P0128 | Coolant Temperature Below | (calculated reference model coolant temp | > | 5.3 | ° C | >5.3° C | debouncing time | > | 15 | sec | >15sec | approx. | 0.1 sec | 0.4 sec | two driving |
| Thermostat Monitoring | | Thermostat Regulating | minus measured coolant temperature) | | | | | error: engine coolant temp | not set | - | - | not set-- | 900 sec | continuous | continuous | cycles each |
| | | Temperature (plausibility check) | | | | | | error: vehicle speed sensor | not set | - | - | not set-- | | | or 4 sec | with: 0.4 sec |
| | | | reference model calculation limit | | 74,3 ... 75,8 | ° C | 74,3 ... 75.8° C | est. ambient temperature | > | -39.8 | °C | > -39.8°C | | | cumulative | continuous |
| | | | | | | | | est. ambient temperature | < | 140 | °C | <140°C | | | | or 4 sec |
| | | | ( development vehicles indicated | | | | | vehicle speed | >= | 3.125 | mph | >=3.125mph | | | | cumulative |
| | | | steady thermostat regulating | | | | | engine speed | > | 640 | rpm | >640rpm | | | | |
| | | | temperatures of 89°C, as measured | | | | | coolant temperature at start | < | 69.8 | °C | < 69.8°C | | | | |
| | | | by the engine coolant temp. sensor. | | | | | integrated air mass flow | > | 1000 | g | > 1000g | | | | |
| | | | The thermostat opening temp. | | | | | | | | | | | | | |
| | | | is 82°C. The thermostat is fully open | | | | | | | | | | | | | |
| | | | by 95°C. All critical OBD and | | | | | | | | | | | | | |
| | | | emission functions are enabled | | | | | | | | | | | | | |
| | | | above 60°C. ) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Intake air temperature | P0111 | response check | max intake air temperature - | | | | | drive period - count | >= | 5 | count | >=5count | 2 sec | 0.1 sec | 0.4 sec | two driving |
| sensor | | | min intake air temperature | > | 2.3 | ° C | >2.3° C | each with | | | | | | continuous | continuous | cycles each |
| | | | | | | | | vehicle speed | >= | 56.25 | mph | >=56.25mph | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | mass flow | < | 250 | g / sec | <250g / sec | | | cumulative | continuous |
| | | | | | | | | mass flow | > | 25.6 | g / sec | > 25.6g/sec | | | | or 4 sec |
| | | | | | | | | coolant temperature at start | <= | 120 | ° C | <=120° C | | | | cumulative |
| | | | | | | | | no fuel shut-off | | | | | | | | |
| | | | | | | | | idle period - count | >= | 4 | count | >=4count | | | | |
| | | | | | | | | each with | | | | | | | | |
| | | | | | | | | vehicle speed | <= | 1.5625 | mph | <=1.5625mph | | | | |
| | | | | | | | | coolant temperature at start | <= | 120 | ° C | <=120° C | | | | |
| | | | | | | | | coolant temperature | > | 64.5 | ° C | >64.5° C | | | | |
| | | | | | | | | ECT decrease since prior shutdown | > | 0 | ° C | >0° C | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| | P0112 | range check low | intake air temperature | > | 125.3 | ° C | >125.3° C | | | | | | | | | |
| | P0113 | range check high | intake air temperature | < | -35.3 | ° C | <-35.3° C | time after start | > | 15 | sec | > 15sec | | | | |
| | | | | | | | | then time in idle | > | 3 | sec | >3sec | | | | |
| | | | | | | | | and intake air temperature | < | -35.3 | ° C | <-35.3° C | | | | |
| | | | | | | | | then \| IAT change \| (abs value) | <= | 2.3 | ° C | <=2.3° C | | | | |
| | | | | | | | | while | | | | | | | | |
| | | | | | | | | integrated air mass increases | >= | 0 | g | >=0g | | | | |
| | | | | | | | | | | | | | | | | |
| Mass air flow sensor | P0101 | range check low | mass air flow | < | 1.83 . . . 78.9 | g/sec | <1.83 . . . 78.9 g/sec | battery voltage | > | 10.5 | V | >10.5V | 0.40 sec | 0.01 sec | 0.4 sec | two driving |
| | | or | and | | KFMLDMN | | KFMLDMN | time after start | > | 0.4 | sec | >0.4sec | | continuous | continuous | cycles each |
| | | fuel trim limits exceded | delta lambda correction | > | 0,16 | factor | >0.16factor | crankshaft revolution counter | > | 150 | rev | >150rev | | | or 4 sec | with: 0.4 sec |
| | | range - multiplicative | | | | | | error: throttle position sensor | not set | - | - | not set -- | | | cumulative | continuous |
| | | and | | | | | | | | 0 | 0 | 00 | | | | or 4 sec |
| | | correction factor (modeled air | correction factor air mass | < | 0.83 | factor | <0.83factor | | | 0 | g/s | 0g/s | | | | cumulative |
| | | mass at throttle / air mass | | | | | | ratio: MAP to Baro | < | 1 | - | <1 - | | | | |
| | | measured by air mass flow meter) | | | | | | air mass flow | > | 8.3 | g/sec | | | | | |
| | | | | | | | | time after start | > | 1 | sec | | | | | |
| | | range check high | mass air flow | > | 26.9 . . . 312.5 | g/sec | > 26.9 . . . 312.5 g/sec | errors: | not set | | | | | | | |
| | | or | and | | KFMLDMX | | KFMLDMX | throttle body | | | | -- | | | | |
| | | fuel trim limits exceded | delta lambda correction | < | -0.175 | factor | <-0.175factor | Leak upstream throttle | | - | - | | | | | |
| | | range - multiplicative | | | | | | | | | | | | | | |
| | | and | | | | | | | | | | | | | | |
| | | correction factor (modeled air | correction factor air mass | > | 1.1699 | factor | >1.1699factor | | | | | | | | | |
| | | mass at throttle / air mass | | | | | | | | | | | | | | |
| | | measured by air mass flow meter) | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0102 | circuit check low | mass air flow | < | -10.3 | g/sec | >10.3g/sec | battery voltage | > | 7.5 | V | >7.5V | 0.2 sec | | | |
| | | | | | | | | | | | | | | | | |
| | P0103 | circuit check high | mass air flow | > | 333.3 | g/sec | >33.3g/sec | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| pressure sensor | | | | | | | | | | | | | | | | |
| upstream throttle valve | P0238 | cirtcuit continuity - high or open | measured sensor voltage | > | 4.65 | V | > 4.65 V | | | | | | 0.5 sec | continuous | 0.2 sec | 2 dcy |
| | P0237 | cirtcuit continuity - low | measured sensor voltage | < | 0.45 | V | < 0.45 V | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0238 | range check - high | measured pressure | > | 300 | kPa | > 300 kPa | enabled by diagnostic | | | | | 2 sec | | | |
| | P0237 | range check - low | measured pressure | < | 50 | kPa | < 50 kPa | scheduler | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0236 | rationality - | measured fuel pressure lies below | | | | | | | | | | | | | |
| | | comparison between measured | expected minimum pressure | true | | | true | | | | | | | | | |
| | | pressure and expected | | | | | | | | | | | | | | |
| | | (calculated) pressure | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0236 | rationality - | ('measured') compression ratio exceeds | | | | | | | | | | | | | |
| | | comparison between ('measured') | expected maximum compression ratio | true | | | true | | | | | | | | | |
| | | compression ratio and expected | | | | | | | | | | | | | | |
| | | (calculated) compression ratio | | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| boost pressure control | | | | | | | | | | | | | | | | |
| | P2281 | comparison between | ratio between | > | 0.098 | | > 0.098 | engine speed | > | 1520 | rpm | > 1520 rpm | 1 sec | continuous | 0.2 sec | 2 dcy |
| | | MAF based pressure ratio | MAF based pressure ratio | | to | | to | time after engine start | > | 10 | sec | > 10 sec | | | | |
| | | over the throttle valve | over the throttle valve | | 1.25 | | 1.25 | no fault of | | | | | | | | |
| | | and | and | | | | | - pressure sensor | | | | | | | | |
| | | throttle body based pressure ratio | throttle body based pressure ratio | | | | | upstream throttle valve | true | | | true | | | | |
| | | over the throttle valve | over the throttle valve | | | | | - throttle position sensors | true | | | true | | | | |
| | | | | | | | | - MAF sensor | true | | | true | | | | |
| | | (detection of leakage) | (fine leakage) | | | | | boost pressure control | | | | | | | | |
| | | | | | | | | is active | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| | | | ratio between | > | 0.101 | | > 0.101 | | | | | | 1 sec | | | |
| | | | MAF based pressure ratio | | to | | to | | | | | | | | | |
| | | | over the throttle valve | | 1.297 | | 1.297 | | | | | | | | | |
| | | | and | | | | | | | | | | | | | |
| | | | throttle body based pressure ratio | | | | | | | | | | | | | |
| | | | over the throttle valve | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (coarse leakage) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | ratio between | > | 0.109 | | > 0.109 | engine speed | > | 1520 | rpm | > 1520 rpm | 1.8 sec | | | |
| | | | MAF based pressure ratio | | to | | to | time after engine start | > | 10 | sec | > 10 sec | | | | |
| | | | over the throttle valve | | 1.398 | | 1.398 | no fault of | | | | | | | | |
| | | | and | | | | | - pressure sensor | | | | | | | | |
| | | | throttle body based pressure ratio | | | | | upstream throttle valve | true | | | true | | | | |
| | | | over the throttle valve | | | | | - throttle position sensors | true | | | true | | | | |
| | | | | | | | | - MAF sensor | true | | | true | | | | |
| | | | (coarse leakage) | | | | | - canister purge system | true | | | true | | | | |
| | | | | | | | | boost pressure control | | | | | | | | |
| | | | | | | | | is not active | true | | | true | | | | |
| | | | | | | | | for time | > | | | > | | | | |
| | | | | | | | | cruise control not active | true | | | true | | | | |
| | | | | | | | | setpoint canister purge rate | < | 0.03 | | < 0.03 | | | | |
| | | | | | | | | no dynamic engine condition | true | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0299 | comparison between | difference (positive) between | > | 12 | kPa | > 12 kPa | boost pressure control | | | | | 6 sec | | | |
| | | desired boost pressure | set-point boost pressure | | | | | is active | true | | | true | | | | |
| | | and | and | | | | | engine speed | > | 2000 | rpm | > 2000 rpm | | | | |
| | | current boost pressure | current boost pressure | | | | | | | or | | or | | | | |
| | | | | | | | | | | 2800 | rpm | 2800 rpm | | | | |
| | | | (boost pressure to low) | | | | | atmospheric pressure | > | 66 | kPa | > 66 kPa | | | | |
| | | | | | | | | setpoint boost pressure | > | base | | > base | | | | |
| | | | | | | | | | | boost | | boost | | | | |
| | | | | | | | | | | pressure | | pressure | | | | |
| | | | | | | | | | | + | | + | | | | |
| | | | | | | | | | | 5 | kPa | 5 kPa | | | | |
| | | | | | | | | | | | | | | | | |
| | P0234 | comparison between | difference (negative) between | > | 32 | kPa | > 32 kPa | pressure upstream throttle | | | | | 0.8 sec | | | |
| | | desired boost pressure | set-point boost pressure | | to | | to | valve is valid | true | | | true | | | | |
| | | and | and | | 127.5 | kPa | 127.5 kPa | | | | | | | | | |
| | | current boost pressure | current boost pressure | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (boost pressure to high) | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | |
| | | | (Remark: for comparison the negative | | | | | | | | | | | | | |
| | | | value is converted to an absolute value) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| dump valve | | | | | | | | | | | | | | | | |
| | P2261 | counting of increased pulsation | normalized difference between | | | | | engine coolant temperature | > | 50.3 | °C | > 50.3 °C | 0.48 sec | continuous | 0.2 sec | 2 dcy |
| | | in the intake manifold | measured MAF sensor value and | | | | | intake air temperature | > | -10.5 | °C | > -10.5 °C | | | | |
| | | | modeled value | > | 0,352 | | > 0,352 | pressure in front of | | | | | | | | |
| | | (increased pulsation may occure | | | | | | throttle valve | > | 60 | kPa | > 60 kPa | | | | |
| | | when dump valve is jammed | for | | | | | supervision phase is active | true | | | true | | | | |
| | | in closed position) | | | | | | | | | | | | | | |
| | | | number of times | > | 4 | counts | > 4 counts | conditions for an active | | | | | | | | |
| | | | | | | | | supervision phase are | | | | | | | | |
| | | | | | | | | - negative load gradient | | | | | | | | |
| | | | | | | | | detected | true | | | true | | | | |
| | | | | | | | | - ratio of pressure in front of | > | 1.05 | | > 1.05 | | | | |
| | | | | | | | | throttle valve to minimum | | to | | to | | | | |
| | | | | | | | | pressure after air filter | | 3.12 | | 3.12 | | | | |
| | | | | | | | | - dump valve is active | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| Barometric Pressure Sensor | P2227 | rationality | difference between barometric pressure | | | | | | | | | | 3 sec | 0.1 sec | 0.4 sec | two driving |
| ( ambient air pressure sensor ) | | signal discontinuity | signal pressure and pressure in front of throttle | > | 15 | kPa | >15kPa | plausible pressure signal pressure sensor | TRUE | | | TRUE | | | continuous | cycles each |
| | | | | | | | | in front of throttle | | | | | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | and | | | | | | | cumulative | continuous |
| | | | | | | | | throttle angle | < | 5 | % | <5% | | | | or 4 sec |
| | | | | | | | | and | | | | | | | | cumulative |
| | | | | | | | | engine speed | < | 1000 | rpm | <1000rpm | | | | |
| | | | or | | | | | enabled by scheduler for time | > | 3 | sec | >3sec | | | | |
| | | | | | | | | | | | | | | | | |
| | | | barometric pressure signal pressure | | | | | | | | | | | | | |
| | | | jump from previous key off | > | 10 | kPa | >10kPa | Baro from previous drive | valid | - | - | valid-- | | | | |
| | | | | | | | | difference: Baro substitute | > | 15 | kPa | >15kPa | | | | |
| | | | and | | | | | model versus sensor | | | | | | | | |
| | | | | | | | | engine speed lower | < | 621 | rpm | < 621 rpm | | | | |
| | | | difference between barometric pressure | > | 10 | kPa | >10kPa | and | | | | | | | | |
| | | | signal pressure and pressure in front of throttle | | | | | throttle angle | < | 5 | % | < 5% | | | | |
| | | | | | | | | both for time | > | 3 | sec | >3sec | | | | |
| | | | | | | | | | | | | | | | | |
| | P2228 | range check low | sensor signal | < | 45 | kPa | <45kPa | enabled by scheduler for time | > | 1 | sec | >1sec | 2 sec | | | |
| | | | sensor voltage | < | 0.45 | V | < 0,45V | | | | | | 0.5 sec | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P2229 | range check high | sensor signal | > | 115 | kPa | >115kPa | enabled by scheduler for time | > | 1 | sec | >1sec | 2 sec | | | |
| | | | sensor voltage | > | 4.8 | V | >4,8V | | | | | | 0.5 sec | | | |
| | | | | | | | | | | | | | | | | |
| Idle Speed System | | | | | | | | | | | | | | | | |
| (disabled during cold start) | P0506 | functional check | desired rpm - actual rpm | > | 100 | rpm | >100rpm | load (for underspeed only) | < | 39.75 | % | <39.75% | 10 sec | 0.1 sec | 0.4 sec | two driving |
| | | | | | | | | coolant temp. | > | 64.5 | ° C | >64.5° C | | continuous | continuous | cycles each |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P0507 | | desired rpm - actual rpm | < | -200 | rpm | <-200rpm | intake air temp | > | -10.5 | ° C | >-10.5° C | | | or 4 sec | with: 0.4 sec |
| | | | or | | | | | vehicle | at idle | | | at idle | | | cumulative | continuous |
| | | | fuel cut off due to overspeed | > | 3 | count | >3count | altitude factor ( sea level = 1.0 ) | > | 0.703 | factor | >0.703factor | | | | or 4 sec |
| | | | during this idle | | | | | time after engine start | > | 0 | sec | >0sec | | | | cumulative |
| | | | | | | | | cold start idle speed control | FALSE | | | FALSE | | | | |
| | | | | | | | | intrusive evap test | not active | | | not active | | | | |
| Idle Speed System | | | | | | | | | | | | | | | | |
| (enabled during cold start) | P0506 | functional check | desired rpm - actual rpm | > | 100 | rpm | >100rpm | load (for underspeed only) | < | 39.75 | % | <39.75% | 5 sec | 0.1 sec | 0.4 sec | two driving |
| | | | during catalyst heating on | | | | | Engine coolant start temp. | > | -10 …. +40 | ° C | > -10 …. +40° C | | continuous | continuous | cycles each |
| | P0507 | | desired rpm - actual rpm | < | -200 | rpm | <-200rpm | intake air temp | > | 40 | ° C | >40° C | | | or 4 sec | with: 0.4 sec |
| | | | during catalyst heating on | | | | | vehicle | at idle | | | at idle | | | cumulative | continuous |
| | | | | | | | | altitude factor ( sea level = 1.0 ) | > | 0.703 | factor | >0.703factor | | | | or 4 sec |
| | | | | | | | | time after engine start | > | 0 | sec | >0sec | | | | cumulative |
| | | | | | | | | idle speed control catalyst heating | TRUE | | | TRUE | | | | |
| | | | | | | | | intrusive evap test | not active | | | not active | | | | |
| Vehicle speed sensor | | | | | | | | | | | | | | | | |
| | P0500 | rationality | vehicle speed | > | 171.875 | mph | >171.875mph | - | - | - | - | --- | 2 sec | 0.1 sec | 0.4 sec | two driving |
| | | (high range check) | | | | | | | | | | | | continuous | continuous | with: 0.4 sec |
| | | rationality | vehicle speed minus | = | 0 | mph | =0mph | vehicle speed | > | 0 | mph | >0mph | | | or 4 sec | continuous |
| | | (stuck check) | previous vehicle speed | | | | | vehicle speed | < | 319.375 | mph | <319.375mph | | | cumulative | or 4 sec |
| | | | | | | | | time | > | 10 | sec | >10sec | | | | cumulative |
| | | CAN wheel speed message check | CAN wheel speed message corrupt | = | corrupt | | =corrupt | | | | | | | | | |
| | | | or missing | = | missing | | =missing | | | | | | | | | |
| Crankshaft Position Sensor | P0335 | circuit continuity | no engine signal | = | 0 | rpm | =0rpm | camshaft revolutions detected | > | 12 | counts | >12counts | approx. | 0.01 sec | 0.4 sec | two driving |
| | | | but phase signals available | | | | | | | | | | 5 sec | continuous | continuous | cycles each |
| | | rationality check | reference gap missing | > | 6 | gaps | >6gaps | | | | | | | | or 4 sec | with: 0.4 sec |
| | | | ( sensor signal but no reference ) | | | | | | | | | | | | cumulative | continuous |
| | P0336 | rationality check | unexpected re-synchronization | > | 6 | count | >6count | | | | | | | | | or 4 sec |
| | | | ( loss of reference mark ) | | | | | | | | | | | | | cumulative |
| | | rationality check | intermittent loss of engine speed signal | > | 14 | count | >14count | | | | | | | | | |
| | P0338 | rationality check | difference in counted teeth between | > | 8 | teeth | >8teeth | | | | | | approx. | 1 per rev | | |
| | | | reference gap position events | | | | | | | | | | 2 sec | continuous | | |
| Camshaft Position Sensor | | | | | | | | | | | | | | | | |
| Bank 1 Intake | P0341 | plausibility check | no cam position sensor signal | > | 5 | count | >5count | engine in synchronized mode | TRUE | - | - | TRUE-- | 10 | 1 per rev | 0.4 sec | two driving |
| | P0342 | circuit low | | > | | | > | | | | | | revolutions | continuous | continuous | cycles each |
| | P0343 | circuit continuity or high | | > | | | > | | | | | | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | | | | | | | | cumulative | continuous |
| | | | | | | | | | | | | | | | cumulative | continuous |
| Bank 2 Intake | P0345 | plausibility check | no cam position sensor signal | > | 5 | count | >5count | | | | | | | | | or 4 sec |
| | P0347 | circuit low | | > | 5 | count | >5count | | | | | | | | | cumulative |
| | P0348 | circuit continuity or high | | > | 5 | count | >5count | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fuel tank pressure sensor | | | | | | | | barometric pressure | >= | 68 | kPa | >= 68 kPa | 14 sec | continous | 0.4 sec | 2 dcy |
| | P0453 | circuit continuity - high or open | fuel tank pressure | > | 3781 | Pa | > 3781 Pa | vehicle speed | = | 0 | mph | = 0 mph | | | | |
| | | | | | | | | fuel level | > | 6,2 | % | > 6,2 % | | | | |
| | | | | | | | | fuel level | < | 87 | % | < 87 % | | | | |
| | P0452 | circuit continuity - low | fuel tank pressure | < | -4000 | Pa | < -4000 Pa | engine start finished | true | | | true | | | | |
| | | | | | | | | enabled by diagnostic scheduler | true | | | true | | | | |
| | P0451 | rationality - | fuel tank pressure difference | >= | 813 | Pa | >= 813 Pa | | | | | | 25.5 sec | continous | 0.4 sec | 2 dcy |
| | | sensor signal change within time | within | = | 1 | sec | = 1 sec | canister vent valve open | true | | | true | | | | |
| | | (oscillation check) | for integrated time | >= | 25.5 | sec | >= 25.5 sec | for time | > | 3 | sec | > 3 sec | | | | |
| | | | | | | | | vehicle speed | <= | 18.64 | mph | <= 18.64 mph | | | | |
| | | | | | | | | enabled by diagnostic scheduler | true | | | true | | | | |
| | P0451 | rationality - sensor signal stuck (incremental check) | max-min difference of canister purge valve duty cycle | >= | 39.84 | % | >= 39.84 % | vehicle speed | >= | 6.22 | mph | >= 6.22 mph | 25 sec | continous | 0.4 sec | 2 dcy |
| | | | and | | | | | canister purge is active | true | | | true | | | | |
| | | | max-min difference of fuel tank pressure signal | < | 80 | Pa | < 80 Pa | ratio of intake manifold pressure to atmospheric pressure | <= | 0.477 | - | <= 0.477 - | | | | |
| | | | for number of checks | >= | 2 | counts | >= 2 counts | atmospheric pressure | >= | 68 | kPa | >= 68 kPa | | | | |
| | | | | | | | | incremental check without result yet | true | | | true | | | | |
| | | | | | | | | fuel level | > | 6,2 | % | > 6,2 % | | | | |
| | | | | | | | | fuel level | < | 87 | % | < 87 % | | | | |
| | | | | | | | | enabled by diagnostic scheduler | true | | | true | | | | |
| | P0327 | Monitoring via knock-sensor- and | Cylinder individual signal value | < | 0.7422 ... 6.8164 | V | < 0.7422 ... 6.8164 V | - Knock control is active. | true | | | true | 0,3 sec | continuous | 2.6 sec | no MIL |
| | | cylinder-based basic reference noise | (depends on engine speed) | | | | | - engine coolant tempetature | > | 45 | °C | > 45 °C | | | | |
| | P0328 | signal (voltage). | Cylinder individual signal value | > | 57.8908 ... 72.7541 | V | > 57.8908 ... 72.7541 V | - load | > | 30 | % | > 30 % | | | | |
| | | | (depends on engine speed) | | | | | - Engine speed for strong signals. | > | 2520 | rpm | > 2520 rpm | | | | |
| | | | | | | | | - Engine speed for weak signals. | > | 2520 | rpm | > 2520 rpm | | | | |
| | | | | | | | | - No phase sensor faults during | true | | | true | | | | |
| | | | | | | | | engine start. | | | | | | | | |
| | | | | | | | | - Engine speed dynamics for | false | | | false | | | | |
| | | | | | | | | knock detection exist. | | | | | | | | |
| | | | | | | | | - Load dynamics for knock | false | | | false | | | | |
| | | | | | | | | detection exist. | | | | | | | | |
| | | | | | | | | - No ECM knock-control ciruit | true | | | true | | | | |
| | | | | | | | | error. | | | | | | | | |
| | | | | | | | | - Engine stpeed limp home | false | | | false | | | | |
| | | | | | | | | function is active. | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0332 | Monitoring via knock-sensor- and | Cylinder individual signal value | < | 0.7422 ... 6.8164 | V | < 0.7422 ... 6.8164 V | - Knock control is active. | true | | | true | 0,3 sec | continuous | 2.6 sec | no MIL |
| | | cylinder-based basic reference noise | (depends on engine speed) | | | | | - engine coolant tempetature | > | 45 | °C | > 45 °C | | | | |
| | P0333 | signal (voltage). | Cylinder individual signal value | > | 57.8908 ... 72.7541 | V | > 57.8908 ... 72.7541 V | - load | > | 30 | % | > 30 % | | | | |
| | | | (depends on engine speed) | | | | | - Engine speed for strong signals. | > | 2520 | rpm | > 2520 rpm | | | | |
| | | | | | | | | - Engine speed for weak signals | > | 2520 | rpm | > 2520 rpm | | | | |
| | | | | | | | | - No phase sensor faults during | true | | | true | | | | |
| | | | | | | | | engine start. | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | - Engine speed dynamics for | false | | | false | | | | |
| | | | | | | | | knock detection exist. | | | | | | | | |
| | | | | | | | | - Load dynamics for knock | false | | | false | | | | |
| | | | | | | | | detection exist. | | | | | | | | |
| | | | | | | | | - No ECM knock-control ciruit | true | | | true | | | | |
| | | | | | | | | error. | | | | | | | | |
| | | | | | | | | - Engine speed limp home | false | | | false | | | | |
| | | | | | | | | function is active. | | | | | | | | |
| Knock control sensor's evaluation IC | | | | | | | | | | | | | 250 working | Zero and | 2.6 s | 2 dcy |
| | | Response to Zero Pulse | | | | | | | | | | | cylces | Test pulse | | |
| | P0324 | monitor IC's integrator offset | integrator's value - 715mV | > | 0.215 | V | > 0.215 V | knock control active | true | - | - | true - - | | alternate every | | |
| | | | | | | | | no dynamic condition on engine speed | true | - | - | true - - | | 250 working | | |
| | | | | | | | | no dynamic condition on engine load | true | - | - | true - - | | cycles. | | |
| | | | | | | | | no fault assumption from knock control | | | | | | | | |
| | | | | | | | | test pulse. | true | - | - | true - - | | | | |
| | | | | | | | | the engine speed is within a calibrated | | | | | | | | |
| | | | | | | | | range | true | - | - | true - - | | | | |
| | P0324 | monitor IC's integrator gradient | integrator gradient | > | measuring window length dependent | V/s | | same as for IC integrator's offset monitoring | | | | | | | | |
| | | Response to Test Pulse | | | | | | | | | | | | | | |
| | P0324 | integrator value check | integrator value of test pulse | < | 3.691 | V | < 3.691 V | the engine coolant temperature > calibration | true | | | true | | | | |
| | | | | | | | | no dynamic condition on engine speed | true | | | true | | | | |
| | | | | | | | | no dynamic condition on engine load | true | | | true | | | | |
| | | | | | | | | no fault assumption from the knock | | | | | | | | |
| | | | | | | | | control zero test. | true | | | true | | | | |
| Transmission Control Module | P0700 | OBD emission fault | signal input | = | TCM MIL | FAULT | =TCM MILFAULT | - | - | - | - | --- | 0.01 sec | 0.01 sec | immediate | immediate |
| MIL Illumination Request | | detected by the TCM | | | | | | | | | | | | continuous | | |
| | (Specific TCM DTC shown in freeze frame) | | | | | | | | | | | | | | | |
| fuel injector | | | | | | | | | | | | | | | | |
| cylinder #1 | P0201 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediatel y | continuous | 0.2 sec | 2 dcy |
| | P0261 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0262 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| cylinder #2 | P0202 | circuit continuity - open | | | | | | output activated and | | | | | | | | |
| | P0264 | circuit continuity - ground | | | | | | deactivated for complete | | | | | | | | |
| | P0265 | circuit continuity - voltage | | | | | | checking | true | | | true | | | | |
| cylinder #3 | P0203 | circuit continuity - open | | | | | | | | | | | | | | |
| | P0267 | circuit continuity - ground | | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P0268 | circuit continuity - voltage | | | | | | | | | | | | | | |
| cylinder #4 | P0204 | circuit continuity - open | | | | | | | | | | | | | | |
| | P0270 | circuit continuity - ground | | | | | | | | | | | | | | |
| | P0271 | circuit continuity - voltage | | | | | | | | | | | | | | |
| cylinder #5 | P0205 | circuit continuity - open | | | | | | | | | | | | | | |
| | P0273 | circuit continuity - ground | | | | | | | | | | | | | | |
| | P0274 | circuit continuity - voltage | | | | | | | | | | | | | | |
| cylinder #6 | P0206 | circuit continuity - open | | | | | | | | | | | | | | |
| | P0276 | circuit continuity - ground | | | | | | | | | | | | | | |
| | P0277 | circuit continuity - voltage | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| canister ventilation valve | P0449 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediately | continuous | 0.2 sec | 2 dcy |
| | P0498 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0499 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| canister purge valve | P0443 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediately | continuous | 0.2 sec | 2 dcy |
| | P0458 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0459 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| downstream oxygen sensor heater | | | | | | | | | | | | | | | | |
| Bank #1 | P0036 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediately | continuous | 0.2 sec | 2 dcy |
| | P0037 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0038 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| secondary air pump | P0418 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediately | continuous | 0.2 sec | 2 dcy |
| | P2445 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P2444 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| intake camshaft control | | | | | | | | | | | | | | | | |
| Intake Bank #1 | P0010 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediatel y | continuous | 0.2 sec | 2 dcy |
| | P2088 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P2089 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| Intake Bank #2 | P0020 | circuit continuity - open | | | | | | output activated and | | | | | | | | |
| | P2092 | circuit continuity - ground | | | | | | deactivated for complete | | | | | | | | |
| | P2093 | circuit continuity - voltage | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Dump valve turbo | P0033 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediatel y | continuous | 0.2 sec | no MIL |
| | P0034 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0035 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Boost control valve | P0244 | circuit continuity - open | Voltage | IC internal | | | IC internal | engine speed | > | 80 | rpm | > 80 rpm | immediatel y | continuous | 0.2 sec | no MIL |
| | P0245 | circuit continuity - ground | | | | | | battery voltage | > | 9,99 | V | > 9,99 V | | | | |
| | P0246 | circuit continuity - voltage | | | | | | battery voltage | < | 17,99 | V | < 17,99 V | | | | |
| | | | | | | | | output activated and | | | | | | | | |
| | | | | | | | | deactivated for complete | | | | | | | | |
| | | | | | | | | checking | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| Ignition Coil | | | | | | | | | | | | | | | | |
| circuit continuity | | | | | | | | | | | | | | | | |
| Cylinder #1 | P0351 | circuit continuity - open or signal not plausible | Voltage > during | | 20 | revs | >20revs | engine speed | > | 600 | rpm | >600rpm | approx. | engine | 0.4 sec | two driving |
| | | | or minimum two fault counters | > | 3 | | | engine speed | < | 5000 | rpm | <5000rpm | 1 sec | cycle | continuous | cycles each |
| | P2300 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | battery voltage | > | 10 | V | >10V | | frequency | or 4 sec | with: 0.4 sec |
| | P2301 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | battery voltage | < | 18 | V | <18V | | | cumulative | continuous |
| Cylinder #2 | P0352 | circuit continuity - open or signal not plausible | Voltage > during | | 20 | revs | >20revs | | | | | | | continuous | | or 4 sec |
| | | | or minimum two fault counters | > | 3 | | | | | | | | | | | cumulative |
| | P2303 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | P2304 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| Cylinder #3 | P0353 | circuit continuity - open | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | | | or minimum two fault counters | > | 3 | | | | | | | | | | | |
| | P2306 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | P2307 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| Cylinder #4 | P0354 | circuit continuity - open | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | | | or minimum two fault counters | > | 3 | | | | | | | | | | | |
| | P2309 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |

# 08 GRP04 All Engines

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P2310 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| Cylinder #5 | P0355 | circuit continuity - open | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | | | or minimum two fault counters | > | 3 | | | | | | | | | | | |
| | P2312 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | P2313 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| Cylinder #6 | P0356 | circuit continuity - open | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | | | or minimum two fault counters | > | 3 | | | | | | | | | | | |
| | P2315 | circuit continuity - ground | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| | P2316 | circuit continuity - voltage | Voltage > during | | 20 | revs | >20revs | | | | | | | | | |
| Electronic Throttle Control | | | | | | | | | | | | | | | | |
| | P0638 | motor control range check | \| powerstage duty cycle \| | > | 80 | % | >80% | battery voltage | > | 7 | V | >7V | 0.6 sec | 0.01 sec | immediate | immediate |
| | | short term | ( absolute value ) | > | 80 | % | >80% | | | | | | (recoverable) | continuous | | |
| | | | | | | | | | | | | | | | | |
| | | motor control range check | | | | | | | | | | | 5.0 sec | | | |
| | | long term | | | | | | | | | | | (latched) | | | |
| Electronic Throttle Control | | | | | | | | | | | | | | | | |
| | P1551 | limp-home throttle position | throttle position | < | 1.8006 | % | <1.8006% | vehicle speed | <= | 0 | mph | <=0mph | 5 sec | 0.01 sec | immediate | immediate |
| | | out of range | OR | | | | | engine speed | < | 40 | rpm | <40rpm | | at key on | | |
| | | | throttle position | > | 13.0785 | % | >13.0785% | engine coolant temperature | >= | 5.25 | ° C | >=5.25° C | | | | |
| | | | | | | | | engine coolant temperature | <= | 84.75 | ° C | <=84.75° C | | | | |
| | | | | | | | | intake air temperature | >= | 5.25 | ° C | >=5.25° C | | | | |
| | | | | | | | | intake air temperature | <= | 60 | ° C | <=60° C | | | | |
| | | | | | | | | battery voltage | > | 9.99 | V | >9.99V | | | | |
| | | | | | | | | accelerator pedal position | < | 14.9 | % | <14.9% | | | | |
| Electronic Throttle Control | | | | | | | | | | | | | | | | |
| | P2100 | powerstage circuit switch-off | output circuits not deactivated | = | deactivation | fault | =deactivationfault | - | - | - | - | --- | 0.1 sec | 0.01 sec | immediate | immediate |
| | | | as commanded | | | | | | | | | | | at key on | | |
| | P2101 | difference between set and | difference between set and | > | 4 . . . 50 | % | >4 . . . 50% | electronic throttle adaptation | not active | - | - | not active-- | 0.5 sec | 0.01 sec | immediate | immediate |
| | | actual position of throttle blade | actual position of throttle blade | | dep. on rate of change | | dep. on rate of change | battery voltage | > | 7 | V | >7V | | continuous | | |
| | | | | | | | | | | | | | | | | |
| | P2107 | amplifier adjustment of | amplification value | < | 3.9961 | V | <3.9961V | vehicle speed | <= | 0 | mph | <=0mph | < 6 sec | 0.01 sec | immediate | immediate |
| | | throttle position | or | | | | | engine speed | < | 40 | rpm | <40rpm | | once per throttleAdaption | | |
| | | | amplification value | > | 4.3242 | V | >4.3242V | engine coolant temperature | >= | 5.25 | ° C | >=5.25° C | | | | |
| | | | or | | | | | engine coolant temperature | <= | 84.75 | ° C | <=84.75° C | | | | |
| | | | offset value | < | -0.1501 | V | <-0.1501V | intake air temperature | >= | 5.25 | ° C | >=5.25° C | | | | |
| | | | or | | | | | intake air temperature | <= | 60 | ° C | <=60° C | | | | |
| | | | offset value | > | 0.1501 | V | >0.1501V | battery voltage | > | 9.99 | V | >9.99V | | | | |
| | | | | | | | | accelerator pedal position | < | 14.9 | % | <14.9% | | | | |
| | P2119 | functionality of return spring | throttle blade return response | > | 0.56 | sec | >0.56sec | vehicle speed | <= | 0 | mph | <=0mph | 0.56 sec | 0.01 sec | immediate | immediate |
| | | | | | | | | engine speed | < | 40 | rpm | <40rpm | | at key on | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | engine coolant temperature | >= | 5.25 | ° C | >=5.25° C | once | | | |
| | | | | | | | | engine coolant temperature | <= | 84.75 | ° C | <=84.75° C | per | | | |
| | | | | | | | | intake air temperature | >= | 5.25 | ° C | >=5.25° C | ignition | | | |
| | | | | | | | | intake air temperature | <= | 60 | ° C | <=60° C | on | | | |
| | | | | | | | | battery voltage | > | 9.99 | V | >9.99V | | | | |
| | | | | | | | | accelerator pedal position | < | 14.9 | % | <14.9% | | | | |
| Electronic Throttle Control | | | | | | | | | | | | | | | | |
| | P2176 | throttle exchange detection | range check poti1 value at lower stop | | | | | vehicle speed | <= | 0 | mph | <=0mph | 1 sec | 0.01 sec | immediate | immediate |
| | | learn fail | throttle potentiometer 1 voltage | < | 0.212 | V | <0.212V | engine speed | < | 40 | rpm | <40rpm | | at key on | | |
| | | or | or | | | | | engine coolant temperature | >= | 5.25 | ° C | >=5.25° C | once | | | |
| | | initial throttle learn failed | throttle potentiometer 1 voltage | > | 0.865 | V | >0.865V | engine coolant temperature | <= | 84.75 | ° C | <=84.75° C | per | | | |
| | | or | | | | | | intake air temperature | >= | 5.25 | ° C | >=5.25° C | ignition | | | |
| | | learning prohibited due to | range check poti2 value at lower stop | | | 0 | 0 | intake air temperature | <= | 60 | ° C | <=60° C | on | | | |
| | | secondary parameters not met | throttle potentiometer 2 voltage | < | 4.14 | V | <4.14V | battery voltage | > | 9.99 | V | >9.99V | | | | |
| | | or | or | | | | | accelerator pedal position | < | 14.9 | % | <14.9% | | | | |
| | | minimum throttle position | throttle potentiometer 2 voltage | > | 4.84 | | >4.84 | | | | | | | | | |
| | | out of range | | | | | | | | | | | | | | |
| Throttle Position | P0121 | range check poti voltage | sensor difference | > | 9 | % | >9% | battery voltage | > | 7 | V | >7V | continuous | 0.1 sec | 0.4 sec | two driving |
| Sensor 1 (primary) | P0122 | plausibility to other poti | sensor circuit low voltage | < | 0.176 | V | <0.176V | | | | | | | continuous | continuous | cycles each |
| | P0123 | | sensor circuit high voltage | > | 4.629 | V | >4.629V | | | | | | | | or 4 sec | with: 0.4 sec |
| | | | | | | | | | | | | | | | cumulative | continuous |
| Sensor 2 (redundant) | P0221 | range check poti voltage, | sensor difference | > | 9 | % | >9% | battery voltage | > | 7 | V | >7V | continuous | 0.1 sec | | or 4 sec |
| | P0222 | plausibility to other poti | sensor circuit low voltage | < | 0.156 | V | <0.156V | | | | | | | continuous | | cumulative |
| | P0223 | | sensor circuit high voltage | > | 4.883 | V | >4.883V | | | | | | | | | |
| function monitoring of microcontroller | P0606 | torque comparison | irreversible error of torque comparison | true | | | true | | | | | | 5.5 sec | continuous | 0.2 sec | 2 dcy |
| (PCM level 2 command check) | | | | | | | | | | | | | | | | |
| | | | (current and maximum allowed engine | | | | | | | | | | | | | |
| | | | torque out of range) | | | | | | | | | | | | | |
| | | engine load comparison | irreversible error of engine load | | | | | | | | | | | | | |
| | | | comparison | true | | | true | | | | | | | | | |
| | | | (calculated and measured engine load | | | | | | | | | | | | | |
| | | | out of range) | | | | | | | | | | | | | |
| | | engine speed comparison | irreversible error of engine speed | | | | | | | | | | | | | |
| | | | comparison | true | | | true | | | | | | | | | |
| | | | (calculated and measured engine speed | | | | | | | | | | | | | |
| | | | out of range) | | | | | | | | | | | | | |
| | | accelerator pedal signal comparison | irreversible error of accelerator pedal | | | | | | | | | | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | signal comparison | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (synchronism between the two | | | | | | | | | | | | | |
| | | | pedal sensors out of range) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | monitoring of AD converter queue | irreversible error of AD-converter queue | | | | | | | | | | | | | |
| | | | monitoring | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (queue not running) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | range check of lower mechanical | irreversible error of lower mechanical | | | | | | | | | | | | | |
| | | throttle valve position | throttle valve position limit check | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (position out of range) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | check of variant coding | irreversible error of variant coding | | | | | | | | | | | | | |
| | | | check | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (coding is incorrect) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | check of AD-converter signal | irreversible error of AD-converter signal | | | | | | | | | | | | | |
| | | | check | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (converted low voltage test impuls | | | | | | | | | | | | | |
| | | | out of range) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | check of ignition timing | irreversible error of comparison of | | | | | | | | | | | | | |
| | | | ignition timing value | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (comparison of ignition timing value | | | | | | | | | | | | | |
| | | | with its one's complement is wrong) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | verification of engine load value | irreversible error of engine load value | | | | | | | | | | | | | |
| | | | verification | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | (engine load value and verification | | | | | | | | | | | | | |
| | | | value are not identical) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | function controller response check | monitoring module has detected a fault | | | | | | | | | | | | | |
| | | | of function controller | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | watchdog output signal check | WDA signal activated | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | overvoltage detection | internal supply voltage exceeded | true | | | true | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| ECM Monitoring | | | | | | | | | | | | | | | | |
| | P0605 | rationality check - | wrong ROM checksum | true | | | true | PCM after-run time of the last | | | | | 30 sec | at key off | 2.6 sec | immediataly |
| | | verification of ROM checksum | | | | | | driving cycle completly | | | | | | once per | | |
| | | | | | | | | finished | true | | | true | | dcy | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | P0605 | rationality check - | wrong cyclic ROM checksum of | true | | | true | | | | | | 5 sec | 0.04 sec | 2.6 sec | immediataly |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | verification of ROM checksum | critical regions | | | | | | | | | | | continous | | |
| | P0604 | writeability check of RAM | RAM read and write test failed | true | | | true | PCM after-run time of the last driving cycle completly finished | true | | | true | 30 sec | at key off once per dcy | 2.6 sec | immediataly |
| | P0604 | writeability check of RAM | cyclic RAM read and write test of critical regions failed | true | | | true | | | | | | 1 sec | 0.04 sec continous | 2.6 sec | immediataly |
| | P0606 | rationality check - programming incomplete | shut down of power stages not possible | true | | | true | | | | | | 0.05 sec | at key on once per dcy | 2.6 sec | immediataly |
| | P0606 | writeability check of Time Processing Unit (TPU) parameter RAM | TPU parameter RAM read and write test failed | true | | | true | | | | | | 0.05 sec | at key on once per dcy | 2.6 sec | immediataly |
| | P0606 | rationality check - verification of Time Processing Unit (TPU) code RAM checksum | wrong TPU code RAM checksum | true | | | true | | | | | | 0.3 sec | 0.1 sec continous | 2.6 sec | immediataly |
| | P0606 | rationality check - time difference check | difference between Time Processing Unit and PCM time | > | 0.001 | sec | > 0.001 sec | | | | | | 0.3 sec | 0.1 sec continous | 2.6 sec | immediataly |
| accelerator accelerator position sensor | | Voltage accelerator position sensor | | | | | | | | | | | | | | |
| | P 2123 | range check high | accelerator position sensor voltage 1 | > | 4.824 | V | > 4.824 V | for time<br>condition batterie voltage is sufficient for 5V accelerator sensor supply | ><br>true | 0.2 | sec | > 0.2 sec<br>true | immediatal y | continuously | 0.2 sec | 0.4 sec |
| | P 2122 | range check low | accelerator sensor voltage 1<br>**and**<br>accelerator sensor voltage 2<br>**or**<br>accelerator sensor voltage 1<br>**and**<br>synchronization between voltages 1 and 2 violated (see values of absolute difference in accelerator sensor voltages depending on ranges in FP1P absolute difference check below)<br>**and** | <<br><<br><<br>true | 0.898<br>0.664<br>0.898 | V<br>V<br>V | < 0.898 V<br>< 0.664 V<br>< 0.898 V<br>true | for time | > | 0.2 | sec | > 0.2 sec | | | | |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | error reaction accelerator-travel sensor limphome | false | | | false | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | high contact resistance at accelerator voltage 1 | false | | | false | | | | | | | | | |
| | P 2138 | absolute difference check | absolute difference between both | | | | | condition lower limit voilated (see min fault path of FP1P) | false | | | false | | | | |
| | | fault time | accelerator sensor voltages in the range | | | | | condition lower limit voilated (see min fault path of FP2P) | false | | | false | | | | |
| | | | below 1.25 V | > | 0.215 | V | > 0.215 V | error reaction accelerator-travel sensor limphome | false | | | false | | | | |
| | | | **or** | | | | | condition batterie voltage is sufficient for 5V accelerator sensor supply | true | | | true | | | | |
| | | | absolute difference between both | | | | | | | | | | | | | |
| | | | accelerator sensor voltages in the range | | | | | | | | | | | | | |
| | | | from 1.25 V to 3.496 V | > | 0.273 | V | > 0.273 V | | | | | | | | | |
| | | | **or** | | | | | | | | | | | | | |
| | | | absolute difference between both | | | | | | | | | | | | | |
| | | | accelerator sensor voltages in the range | | | | | | | | | | | | | |
| | | | above 3.496 V | > | 1.035 | V | > 1.035 V | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | fullfilled for the time | > | 0.24 | sec | > 0.24 sec | | | | | | | | | |
| | P 2128 | range check high | accelerator sensor voltage | > | 4.824 | V | > 4.824 V | for time | > | 0.2 | sec | > 0.2 sec | | | | |
| | | fault time | | | | | | condition batterie voltage is sufficient for 5V accelerator sensor supply | true | | | true | | | | |
| | P 2127 | range check low | accelerator sensor voltage 1 | < | 0.898 | V | < 0.898 V | for time | > | 0.2 | sec | > 0.2 sec | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | accelerator sensor voltage 2 | < | 0.684 | V | < 0.684 V | | | | | | | | | |
| | | | **or** | | | | | | | | | | | | | |
| | | | accelerator sensor voltage 2 | < | 0.684 | V | < 0.684 V | for time | > | 0.2 | sec | > 0.2 sec | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | synchronization between potentiometers 1 and 2 violated (see values of absolute difference in accelerator sensor voltages depending on ranges in FP1P absolute difference check below) | true | | | true | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | error reaction accelerator-travel sensor limphome | false | | | false | | | | | | | | | |
| | | | **and** | | | | | | | | | | | | | |
| | | | high contact resistance at accelerator voltage 2 | false | | | false | | | | | | | | | |
| Diagnosis of CAN signal timeout – instrument panel | U0212 | CAN signal missing | CAN message of Gateway ID 0x380/1 received | < | 1.250 | s | < 1.250 s | battery voltage | > | 10 | V | > 10 V | | continuous | immediately | immediately |

| Component/ System | Fault Code | Monitor Strategy Description | Primary Malfunction Signal and Criteria | Threshold Logic | Threshold Value | Threshold Units | Threshold Conditions | Secondary Parameters | Enable Logic | Enable Value | Enable Units | Threshold Conditions | Time Required | Frequency of Checks | Criteria for Code | MIL Illum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | battery voltage | < | 18 | V | < 18 V | | | | |
| | | | | | | | | condition ignition switch on for time | > | 3 | s | > 3 s | 3 s | | | |
| | | | | | | | | CAN-Status Enable normal message transmission | true | | | true | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| OBD ISO-15765 Communication Bus | | | | | | | | | | | | | | | | |
| | U0001 | ISO-15765 Bus Error | Invalid Message Received | = | invalid | | =invalid | CAN Bus | initialized | | | initialized | 0.5 sec | 0.01 sec | immediately | immediately |
| | | | or Dual Port Ram Hardware Error; | = | error | | =error | consisting of: | and ready | | | and ready | 0.01 sec | continuous | | |
| | | | or No Communication / Bus Off | = | bus off | | =bus off | ignition on for | > | 3 | sec | >3sec | 0.03 | | | |
| | | | | | | | | battery voltage | > | 10 | V | >10V | | | | |
| | | | | | | | | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | | | normal bus communication | running | - | - | running-- | | | | |
| | U0101 | Communication with TCM | TCM Message Timeout | = | message | | =message | Automatic Transmission | equipped | - | - | equipped-- | 2.5 sec | 0.01 sec | immediately | immediately |
| | U0402 | | or Invalid Message Content | = | missing, | | =missing, | CAN Bus | initialized | - | - | initialized-- | | continuous | | |
| | | | | | delayed, | | delayed, | consisting of: | and ready | | | and ready | | | | |
| | | | | | or | | or | ignition on for | > | 3 | sec | >3sec | | | | |
| | | | | | invalid | | invalid | battery voltage | > | 10 | V | >10V | | | | |
| | | | | | content | | content | battery voltage | < | 18 | V | <18V | | | | |
| | | | | | | | | normal bus communication | running | - | - | running-- | | | | |
| end | | | | | | | | | | | | | | | | |