

GENERAL MANUAL

ELECTRONIC UNIT PUMP (EUP) - DAF - MX

DDNX303(EN)



2007



Kommen Sie nicht mit dem Hochdruckstrahl in Verbindung! Besonders nicht, wenn Druckrohrleitung oder Dichtung geprüft werden! Hochdruckflüssigkeiten können tödliche Verletzungen verursachen! Im Falle einer Berührung mit der Haut, kontaktieren Sie sofort einen Arzt. Bitte beachten Sie die Gesundheits-/und Sicherheitsunterlagen.



Mantenga las manos y el cuerpo lejos del rociado del líquido, especialmente inyectoras, tuberías y juntas de alta presión con fugas. La inyección de alta presión puede perforar la piel humana y producir una lesión fatal. En caso de que la inyección atraviese la piel, consiga atención médica inmediatamente. Vea la hoja de Datos de Sanidad y Seguridad.



Do not put your skin into the fuel jets under pressure, especially those due to pressure pipe or seal leaks. High pressure liquids can cause deadly injuries. In case of an injection under the skin, contact a doctor immediately. Please refer to the health and security fuel documents.



Ne pas approcher les mains ni le corps des jets de liquides, particulièrement ceux provenant des fuites de tuyaux et des joints soumis à la haute pression. Le liquide sous haute pression injecté sous la peau peut causer des blessures mortelles. En cas d'injection sous la peau, consulter immédiatement un médecin. Se reporter à la fiche de santé et de sécurité du gazole.



Non esporre le mani o altre parti del corpo a getti di gasolio ad alta pressione, specialmente a quelli provenienti da tubi o paraolii. I getti di liquidi ad alta pressione possono causare ferite anche mortali. In caso di iniezione sotto pelle contattare immediatamente un medico. Fare riferimento alle schede di sicurezza del gasolio.



Zorg dat uw handen of andere lichaamsdelen niet in contact komen met vloeistofstralen onder hoge druk, met name bij een lek aan een leiding of dichting. Als de vloeistof onder hoge druk onder de huid terechtkomt, kan dit zelfs tot dodelijke verwondingen leiden. Als de vloeistof onder de huid terechtkomt, onmiddellijk een arts raadplegen. Lees de gezondheids-en veiligheidsfiche met betrekking tot de brandstof.



Não exponha a pele a jactos de combustível sob pressão, especialmente os devidos a fugas de tubos de pressão ou vedantes. Líquidos a alta pressão podem causar ferimentos mortais. No caso de injeção subcutânea, consulte imediatamente um médico. Consulte or favor a documentação respeitante a saúde e segurança de combustíveis.



Schutzbrille/Gesichtsschutz tragen.



Proteggersi gli occhi/la faccia.



Úsese protección para los ojos/la cara.



Veiligheidsbril/-masker gebruiken.



Wear eye/face protection.



Use protecção da face/olhos.



Porter un appareil de protection des yeux / du visage.



Von Zündquellen fernhalten - Nicht rauchen.



Conservare lontano da fiamme e scintille - Non fumare.



Conservar alejado de toda llama o fuente de chispas - No fumar.



Ver van open vuur en ontstekingsbronnen houden - Niet reken.



Keep away from sources of ignition - No smoking.



Mantenha afastado de fontes de ignição - Proibido fumar.



Conservar à l'écart de toute flamme ou source d'étincelles - Ne pas fumer.



Geeignete Schutzhandschuhe tragen.



Usare guanti adatti.



Usen guantes adecuados.



Aangepaste veiligheidshandschoenen dragen.



Wear suitable gloves.



Use luvas apropriadas.



Porter des gants appropriés.



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DIAGNOSTICS

I



APPENDIX

II

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READING DIAGNOSTIC FAULT CODES

1.1 Principle

This function is used to read the data relating to the faults recorded in the ECU memory. This data consists of:

- The number of faults recorded in the ECU memory.
- The diagnostic fault code (DTC).
- The status :
 - Permanent (Current and Historic code recorded with environmental data).
 - Historic (Historic code recorded with environmental data).
 - Current (Current code recorded with no environmental data).
- The environment data.

Information relating to a fault is automatically erased if the fault is not detected again during 40 operating cycles. The ECU memory can contain 127 separate faults .

1.2 Environment Data

The environment data gives information on the operating conditions of the system when the fault appeared (fault context).

CAUTION

Care must be taken when interpreting the environment data as this information is recorded in the memory at the same time as the fault. This means that the environment data does not describe the engine operating conditions the first time the fault was detected but instead the nth time it was detected (n being the number of detections required to save the fault in the memory). In addition, as the fault was already present when it was saved in the memory, the environment data may be corrupt. In this case, sometimes the linearised data is used which is obtained by converting the raw signal, which provides the first set of usable data available in the ECU.

Variable	Definition	units
Pedal	Measurement of the position of the accelerator position	%
Battery voltage	Measurement of the validated battery voltage	V
Engine speed	Engine speed measured over a complete cycle (720 degrees)	rpm
Coolant temperature	Measurement of the engine coolant temperature	K
Air Pressure	Measurement of air pressure	kPa
Fuel Rate	Measurement of the rate of fuel	lim_mg
System state	<ul style="list-style-type: none"> - Cranking - Idling - IO Control - Overspeeding - Power Down - Reprogramming - Running - Stationary 	No units

READING DIAGNOSTIC FAULT CODES

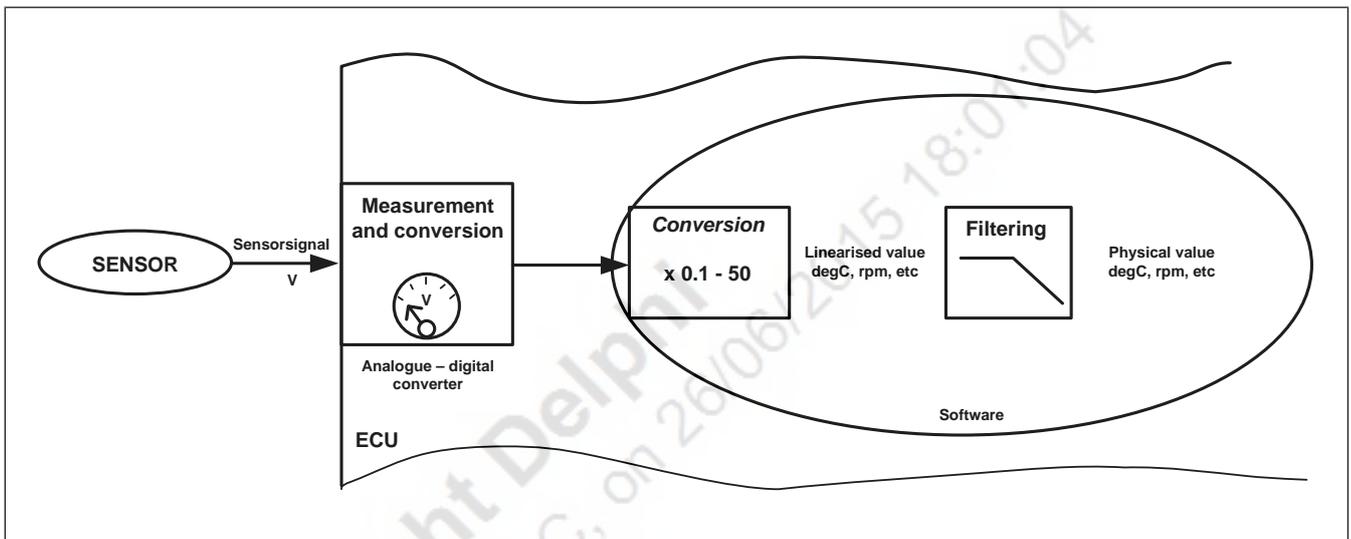
1.3 Reading Dynamic Parameters

Dynamic parameters are used to check the system status in real time.

Note: Some variables can be represented in three different ways:

- Gross value
- Linearised value
- Physical value

The figure below represents the processing sequence of an analogue signal with the various associated variable representations:

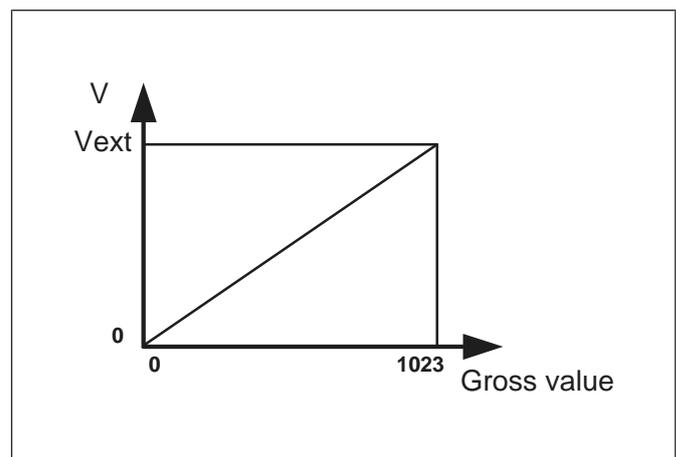


The gross value

(e.g.: gross atmospheric pressure, gross air flow, gross diesel temperature, etc.)

The gross value is the image supplied by the analogue-digital converter, of the voltage transmitted by the sensor to the ECU input. This value is difficult to interpret, but allows a sensor or ECU fault (analogue-digital converter) or a fault on the harness to be detected. This value is typically between 0 and 1023.

In certain cases, it can also be converted into a physical value by the diagnostic tool (°C, bar etc.).



The linearised value

(e.g.: linearised atmospheric pressure, linearised air flow, linearised diesel temperature, etc.)

The linearised value of a variable is the gross value returned by the sensor, to which a conversion function has been applied to obtain a physical value representing the measured variable. For example, values in degrees Celsius, rpm, etc. are obtained.

READING DIAGNOSTIC FAULT CODES

The physical value

(e.g: atmospheric pressure, requested air flow, diesel temperature, etc.)

This is a "default" value of a variable used in the various system strategies. Under normal conditions, the linearised value and the physical value are practically the same.

When a fault appears on a sensor (e.g. OC or SC+), the physical value associated to the sensor takes into account a limp home value and the linearised value displays a corrupt value.

1.4 List Of Parameters

Variable	Definition	units
Battery voltage	Measurement of the battery voltage	V
Coolant Temperature (Sensor 2)	Measurement of the engine coolant temperature	°K
Engine Speed	Engine speed measured over a complete cycle (720 degrees)	rpm
Vehicle Speed	Speed vehicle is travelling	Kph
Injector Setpoint	Measurement of injector advance angle	engine deg
Injection Duration Time	Measurement from start to end of injection	engine deg
Accelerator pedal	Measurement of the accelerator pedal position	%
Oil Pressure	Measurement of the oil pressure	kPa
Ambient Air Pressure	Measurement of the manifold air pressure	kPa
Boost Pressure	Measurement of boost pressure	kPa
Exhaust Pressure	Measurement of exhaust pressure	kPa
Fuel Pressure	Measurement of fuel pressure	kPa
Coolant temperature (sensor 1)	Measurement of the engine coolant temperature	°K
Oil Temperature	Measurement of the oil temperature	°K
Ambient Air Temperature	Measurement of the ambient air temperature	°K
Boost Temperature	Measurement of the boost temperature	°K
Exhaust Temperature	Measurement of the Exhaust temperature	°K
Fuel Temperature	Measurement of the fuel temperature	°K
Reed Valve Temperature	Measurement of the reed valve temperature	°K
Intake Air Mass	Measurement of air entering system	
VGT Speed	Measurement of VGT speed	rpm
Fan Speed	Measurement of fan speed	rpm
EGR Valve Position	Measurement of EGR valve position	
Combined Digital Values		
Brake Pedal Switch	-Off -ON	No units
Clutch Pedal Switch	-Off -On	No units

READING DIAGNOSTIC FAULT CODES

Variable	Definition	units
Parking Brake Switch	-Off -On	No units
Exhaust Brake Status	- Off - On	No units
Engine Stop Switch	- Off - On	No units
Transmission Neutral Switch	-Off -On	No units
Throttle Inhibit - not in code	-Off -On	No units
Cruise Control off Switch	-Off -On	No units
Pedal Validation	In idle/Not in idle	No units
Cruise Resume Switch	-Off -On	No units
Cruise Control Increment	-Off -On	No units
Cruise Control Decrement	-Off -On	No units
Application Speed Limiter SW	-Off -On	No units
Cruise Control Status	-Off -On	No units
PTO Status	-Off -On	No units
Preheat Relay	-Off -On	No units
Spare	-Off -On	No units
Adjustable Speed Limiter	-Off -On	No units
Diagnostic Request	-Off -On	No units
Starter Status - Not in Code	-Off -On	No units
Starting	- Engine cranking	No Units

READING DIAGNOSTIC FAULT CODES

Variable	Definition	units
Key Switch	- Off - On	No Units
Engine Synchronised	- Off - On	No units
Spare	- Off - On	No units
Spare Byte	- Off - On	No units
Total Engine Hours	Measurement of the total engine hours	S
Total ECU Hours	Measurement of the total ECU hours	S
Total Cruise Control Hours	Measurement of the total Cruise control hours	S
Total Idle Control Hours	Measurement of the total idle control hours	S
Total Engine Brake Hours	Measurement of the total engine brake hours	S
Total Engine Revolutions	Measurement of the total engine revolutions	engine rpm
Total ESC Hours	Measurement of the total ESC hours	S
Total Overspeed Hours	Measurement of the total overspeed hours	S
Total ESC Fuel used	Measurement of the total ESC fuel used	L
Total Cruise Fuel Used	Measurement of the total cruise fuel used	L
Total Idle Fuel Used	Measurement of the total idle fuel used	L
Total Fuel Used	Measurement of the total fuel used	L
Total Full Load Hours	Measurement of the total full load hours	S
Highest engine rpm	Measurement of the highest engine rpm	engine rpm
Amount of Overspeeding	Measurement of the amount of overspeeding	Counts
Fan Clutch Drive		
VGT Drive		
EGR Drive		
CBP Drive	Measurement of the CBP position	%
Current Fuel Used	Measurement of the current fuel used	L
MIL Lamp Status Flag	-Off -On	No units
Red Stop Lamp Status Flag	- Off - On	No Units
Amber Warning Lamp Status Flag	-Off -On	No Units
Engine Time while MIL Active (OBD Version)	Measurement of the engine time while MIL active	Min

READING DIAGNOSTIC FAULT CODES

Variable	Definition	units
Distance Travelled while MIL Active	Measurement of the distance travelled while MIL active	km
Engine Time while Red Stop Lamp Active	Measurement of the engine time while red stop lamp active	S
Distance Travelled while Red Stop Lamp Active	Measurement of the distance travelled while red stop lamp active	km
Engine Time while Amber Warning Lamp Active	Measurement of the engine time while amber warning lamp active	S
Distance Travelled while Amber Warning Lamp Active	Measurement of the distance travelled while amber warning lamp active	km
Combined Digital Values		No units
Increment Target ESPD		
Active ESC		
Decrement Target ESPD		
Enable Remote PTO		
Set Target ESPD to		
Set Target ESPD to		
Limp Home State		No units
Oil Level Sensor Value	Measurement of the oil level	V
ECU Temperature	Measurement of the ECU temperature	°K
Multi-Position Switch Level	-Off -On	No units
Required Engine Brake Level	Measurement of the required engine brake level	%
Air Pressure 5V Reference		V
Sensor 5V Reference		V
Pedal 5V Reference		V
Injection Boost 50V Reference		V
Unbalance Detection Cylinder 1		
Unbalance Detection Cylinder 2		
Unbalance Detection Cylinder 3		
Unbalance Detection Cylinder 4		
Unbalance Detection Cylinder 5		
Unbalance Detection Cylinder 6		
Fan Clutch State		No units
Engine Time while MIL active	Measurement of engine time while MIL is active	S

READING DIAGNOSTIC FAULT CODES

Variable	Definition	units
Distance Travelled while MIL Active	Measurement of distance travelled while MIL is active	km
Total Misfire Events Cylinder 1	Count of the total misfire events in cylinder 1	Counts
Total Misfire Events Cylinder 2	Count of the total misfire events in cylinder 2	Counts
Total Misfire Events Cylinder 3	Count of the total misfire events in cylinder 3	Counts
Total Misfire Events Cylinder 4	Count of the total misfire events in cylinder 4	Counts
Total Misfire Events Cylinder 5	Count of the total misfire events in cylinder 5	Counts
Total Misfire Events Cylinder 6	Count of the total misfire events in cylinder 6	Counts
Amber Warning Lamp via ECU Output (Hard-Wired)		No units
MIL (Lamp) via ECU Output (Hard-Wired)		No units
IMMO Basic Function Enable		No unit
DAF Parameters 1	Display of DAF determined Parameters	No units
DAF Parameters 2	Display of DAF determined Parameters	No units
Exhaust Regulation		
System/Engine Name		
Tester Serial Number		
System Supplier		
Pump Matrix Data 1	Measurement of pump T3 trim delay time	μ S
Pump Matrix Data 2	Measurement of pump T4 trim delay time	μ S
Nozzle Matrix Data 1	Measurement of injector T3 trim delay time	μ S
Nozzle Matrix Data 2	Measurement of injector T4 trim delay time	μ S
Nozzle Matrix Data 3		
MFL at Low Gear		
MFL at High Gear		
Max Fuel Allowed		
DAF Component Group 1020		
DAF Component Group 1021		
DAF Component Group 1022		
DAF Component Group 1030		
DAF Component Group 1033		
DAF Component Group 1073		
DAF Component Group 1083		
DAF Component Group XXXX		

READING DIAGNOSTIC FAULT CODES

Variable	Definition	units
Maximum PTO Vehicle Speed		
Additional PTO Maximum Vehicle Speed Offset		
PTO Slew Rate to Higher Target Engine Speed		
PTO Slew Rate to Lower Target Engine Speed		
PTO Engine Speed Delta Step Up		
PTO Engine Speed Delta Step Down		
PTO Slew Rate from Idle to Target Engine Speed		
PTO Slew Rate from Target to Idle Engine Speed		
PTO Default Target Speed for Cab Switch N 1		rpm
Remote PTO Default Target Speed		rpm
Remote PTO Default Target Speed		rpm
Minimum PTO Engine Speed		rpm
Maximum PTO Engine Speed		rpm
Maximum PTO Torque		
PTO Footbrake Override Mode		No units
PTO Clutch Override Mode		No units
PTO Parkbrake Override Mode		No units
PTO Pedal Override Mode		No units
Idle Engine Speed		rpm
Minimum CRS Set Vehicle Speed		
Maximum CRS Set Vehicle Speed		
Minimum CRS Vehicle Speed		
Maximum RSGl Vehicle Speed		
Maximum ASL Vehicle Speed		
Red Stop Lamp via ECU Output (Hard-Wired)		No units
Immobilizer Enable Flag		No units

READING DIAGNOSTIC FAULT CODES

1.5 ECU Identification

This service is used to identify:

- The ECU calibration and software version.

ECU identification	Meaning
Supplier Code	Indicates who the supplier of the ECU is, in this case Delphi
Delphi Hardware Identification	Indicates the hardware of the ECU
Delphi Software Identification	Indicates the software of the ECU
Vehicle Identification	Indicates the vehicle manufacturer:
Customer Software Identification	Indicates the customer software of the ECU
Customer Hardware Version	Indicates the customer hardware version of the ECU
Programming Data	Indicates which programming data the ECU has stored
ECU Installation Date	Indicates when the ECU was installed with the software

Note: The above identification is given as an example.

To display the identification, select "ECU IDENTIFICATION" in the tool's diagnostic menu.

FAULT CODES AND CHECKS

2.1 Diagnostic Charts/Diagnostic Fault Codes

Note: The fault code descriptions below that use the term *Injectors* are also referring to *Electronic Unit Pumps*, therefore a fault code with the description of *Injector* will be referring to a fault code that is related to the *Electronic Unit Pump*.

CAMSHAFT SENSOR SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0016	Cam sensor signal not in sync with engine position	5V supply fault or analogue / digital converter fault
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine Stalls • Long cranking time • Engine will not start 		
Electrical faults	Diagnostic tool title	
OC on J1 -53	Open circuit on camshaft sensor supply voltage	
SC On J1 - 53	Short circuit on camshaft sensor supply voltage	
OC on J1 -54	Open circuit on camshaft sensor earth	
SC on J1 -54	Short circuit on camshaft sensor earth	

Fault chart (Code P0016)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor Problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

CRANKSHAFT SENSOR SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0017	Crank sensor signal not in sync with engine position	5v supply fault or analogue / digital converter fault
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Long cranking time Engine will not fire 		
Electrical faults	Diagnostic tool title	
OC on J1 -49	Open circuit on crankshaft sensor voltage supply	
SC on J1 -49	Short circuit on crankshaft sensor voltage supply	
OC on J1 -50	Open circuit on crankshaft sensor earth	
SC on J1 -50	Short circuit on crankshaft sensor earth	

Fault chart (Code P0017)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor Problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring Wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

VGT PWM Driver		
Diagnostic trouble code	Diagnostic tool title	Detection
P0045	VGT PWM driver open circuit	
P0047	VGT PWM driver short circuit low	
P0048	VGT PWM driver short circuit high	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

BOOST AIR PRESSURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0069	Boost air pressure out of range at powerup	Boost pressure above 15 Kpa
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Lower engine power Wastegate valve fixed in a certain position 		
Electrical faults	Diagnostic tool title	
OC on J1 -27	Open circuit on boost pressure earth signal	
SC on J1 -27	Short circuit on boost pressure earth signal	
OC on J1 -28	Open circuit on boost pressure sensor circuit	
SC on J1 -28	Short circuit on boost pressure sensor circuit	
OC on J1 -30	Open circuit on boost pressure signal	
SC on J1 -30	Short circuit on boost pressure signal	

Fault chart (Code P0069)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor Problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

AMBIENT AIR TEMPERATURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0070	AC_V	
P0072	Ambient air temperature under range	
P0073	Ambient air temperature over range	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FUEL PRESSURE SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0087	Fuel pressure too low	Pressure drop in fuel below 3 bar
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Unable to start engine • Poor engine starting • Engine noisy • Idle unstable • Lack of performance 		
Electrical faults	Diagnostic tool title	
OC on J1 - 42	Open circuit on fuel pressure positive circuit	
SC on J1 - 42	Short circuit on fuel pressure positive circuit	
OC on J1 - 45	Open circuit on fuel pressure signal	
SC on J1 - 45	Short circuit on fuel pressure signal	
OC on J1 - 46	Open circuit on fuel pressure signal earth	
SC on J1 - 46	Short circuit on fuel pressure signal earth	

Fault chart (Code P0087)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor Problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

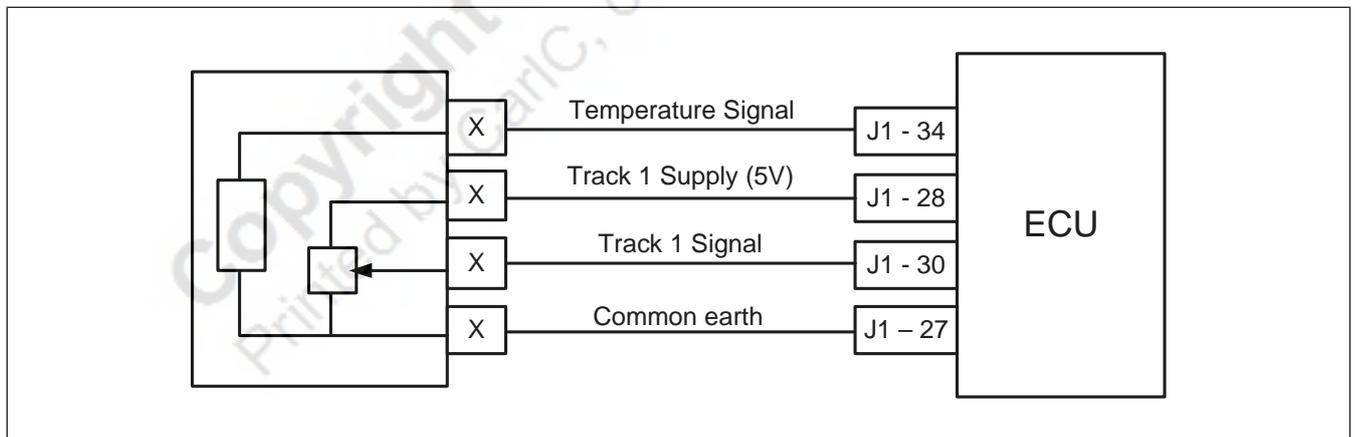
PRESSURE RELIEF VALVE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0088	Pressure relief valve is stuck in closed position	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

BOOST AIR TEMPERATURE AND PRESSURE SIGNAL

Diagnostic trouble code	Diagnostic tool title	Detection
P0107	Boost air pressure under range	Boost pressure less than 50 kPa
P0108	Boost air pressure over range	Boost pressure greater than 300 kPa
P0112	Boost air temp under range	Inlet air temperature less than -40°C
P0113	Boost air temp over range	Inlet air temperature greater than 135°C
Fault LED	Recovery mode	
On	None	
Symptoms		
Lack of performance		
Electrical faults	Diagnostic tool title	
OC on J1 - 27	Open circuit on Boost Air Pressure signal earth	
SC on J1 - 27	Short circuit on Boost Air Pressure signal earth	
OC on J1 - 28	Open circuit on Boost Air/Pressure positive circuit	
SC on J1 - 28	Short circuit on Boost Air/Pressure signal positive circuit	
OC on J1 - 30	Open circuit on Boost Air Pressure signal	
SC on J1 - 30	Short circuit on Boost Air Pressure signal	
OC on J1 - 34	Open circuit on Boost Air Temperature signal	
SC on J1 - 34	Short circuit on Boost Air Temperature signal	



FAULT CODES AND CHECKS

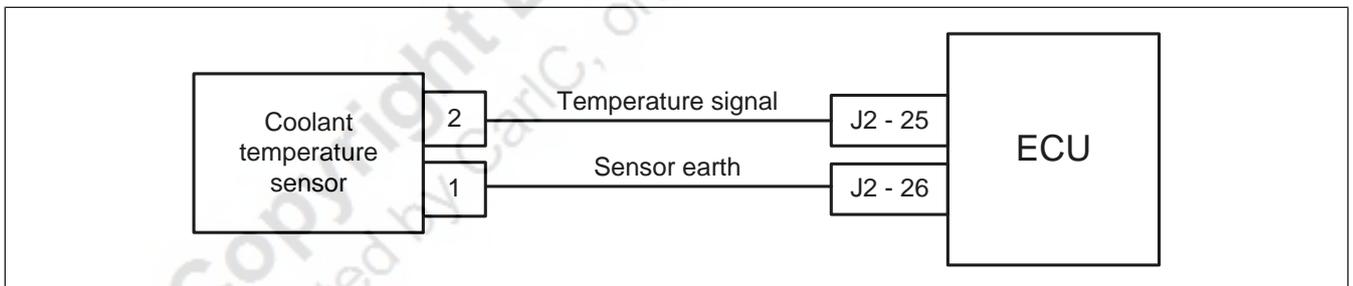
Fault chart (Code P0107 - P0108 - P0112 - P0113)		
Stage	Operation / Decision	Result
1	Fault code P0107, P0108, P0112 and/or P0113 present?	Disconnect the sensors one by one and check if the fault disappears. If the fault is no longer present, the sensor which has been disconnected is faulty. If the fault is still present after replacing the sensor, then check the electrical continuity and insulation of the disconnected line.
2	Check the high pressure circuit (no leaks) Leaks detected?	Perform the necessary repairs
3	Check the sensor connection Connection problem?	Perform the necessary repairs
4	Sensor Problem? Visually check sensor	Change the sensor
5	Check the ECU connection Connection problem?	Perform the necessary repairs
6	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

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FAULT CODES AND CHECKS

COOLANT TEMPERATURE SIGNAL

Diagnostic trouble code	Diagnostic tool title	Detection
P0115	Coolant temperature out of range at power up	Coolant temperature above 135°C at power up
P0116	If coolant temperature under range after the engine warmup, a plausibility error is flagged	Coolant temperature is below -40°C after 5 mins
P0117	Coolant temp sensor under range	If the coolant temperature is below -40°C
P0118	Coolant temp sensor over range	If the coolant temperature is above 135°C
P0217	Coolant temp high warning level	If the coolant temperature is above 135°C
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Incorrect reading displayed on instrumental panel 		
Electrical faults	Diagnostic tool title	
OC on J2 - 25	Open circuit on coolant temperature signal positive circuit	
SC on J2 - 25	Short circuit on coolant temperature signal positive circuit	
OC on J2 - 26	Open circuit on coolant temperature signal earth	
SC on J3 - 26	Short circuit on coolant temperature signal earth	



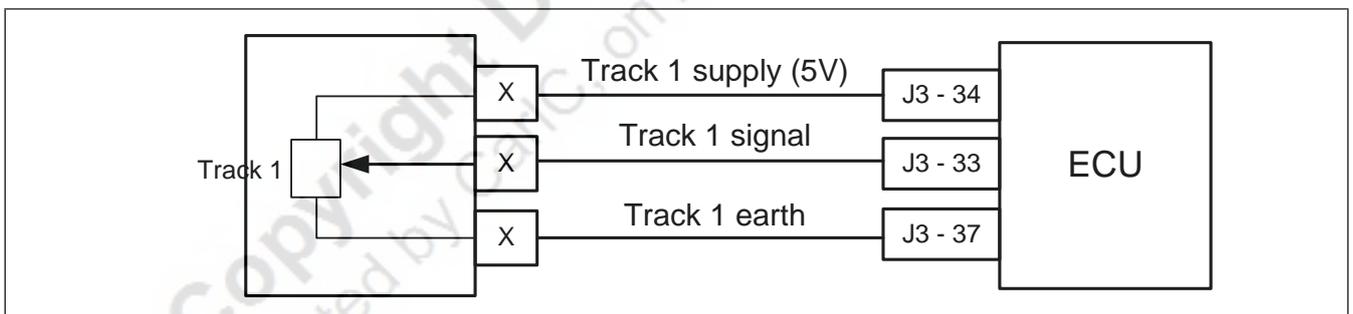
FAULT CODES AND CHECKS

Fault chart (Code P0115 - P0116 - P0117 - P0118 - P0217)		
Stage	Operation / Decision	Result
1	Fault code P0115, P0116, P0117, P0118 and/or P0217 present?	Disconnect the sensor and check if the fault disappears. If the fault is no longer present, the sensor which has been disconnected is faulty. If the fault is still present after replacing the sensor, then check the electrical continuity and insulation of the disconnected line.
2	Check the sensor connection Connection problem?	Perform the necessary repairs
3	Measure the sensors voltage and/or resistance at its terminals voltage and/or resistance problem?	Replace the sensor
4	Check the ECU connection Connection problem?	Perform the necessary repairs
5	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

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FAULT CODES AND CHECKS

PEDAL SENSOR SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0121	Sticking Pedal Fault	Pedal not resting in correct position
P0122	Pedal position under range	Pedal position less than 5%
P0123	Pedal position over range	Pedal position greater than 95%
Fault LED	Recovery mode	
On	<ul style="list-style-type: none"> Increased engine idling speed Limp home mode activated 	
Symptoms		
<ul style="list-style-type: none"> Lack of performance Increased engine idle speed 		
Electrical faults	Diagnostic tool title	
OC on J3 - 33	Open circuit on pedal sensor signal	
SC on J3 - 33	Short circuit on pedal sensor signal	
OC on J3 - 34	Open circuit on pedal sensor signal positive circuit	
SC on J3 - 34	Short circuit on pedal sensor signal positive circuit	
OC on J3 - 37	Open circuit on pedal sensor signal earth	
SC on J3 - 37	Short circuit on pedal sensor signal earth	



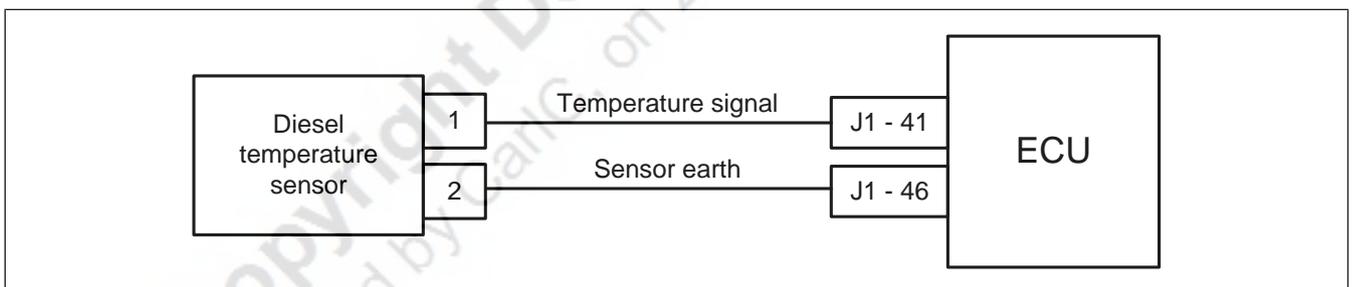
FAULT CODES AND CHECKS

Fault chart (Code P0121 - P0122 - P0123)		
Stage	Operation / Decision	Result
1	Fault code P0122 and/or P0123 present?	Disconnect the sensors and check if the fault disappears. If the fault is no longer present, the sensor which has been disconnected is faulty. If the fault is still present after replacing the sensor, then check the electrical continuity and insulation of the disconnected line.
2	Check the sensor connection Connection problem?	Perform the necessary repairs
3	Visually check sensor Sensor problem?	Replace the sensor
4	Check the ECU connection Connection problem?	Perform the necessary repairs
5	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

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FAULT CODES AND CHECKS

FUEL TEMPERATURE SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0180	Fuel temperature out of range at powerup	
P0181	If difference between fuel temp and air temp, then plausibility error flagged.	Difference between coolant and diesel temperature.
P0182	Fuel temperature signal - low	If the diesel temperature is below -40°C.
P0183	Fuel temperature signal - high	If the diesel temperature is above 135°C.
Fault LED	Recovery mode	
On	None	
Symptoms		
None		
Electrical faults	Diagnostic tool title	
OC on J1 - 41	Open circuit on fuel temperature signal	
SC on J1 - 41	Open circuit on fuel temperature signal	
OC on J1 - 42	Open circuit on fuel temperature signal positive circuit	
SC on J1 - 42	Short circuit on fuel temperature signal positive circuit	
OC on J1 - 46	Open circuit on fuel temperature signal earth	
SC on J1 - 46	Short circuit on fuel temperature signal earth	



FAULT CODES AND CHECKS

Fault chart (Code P0180 - P0181 - P0182 - P0183)		
Stage	Operation / Decision	Result
1	Fault code P0182 and/or P0183 present?	Disconnect the sensors and check if the fault disappears. If the fault is no longer present, the sensor which has been disconnected is faulty. If the fault is still present after replacing the sensor, then check the electrical continuity and insulation of the disconnected line.
2	Check the sensor connection Connection problem?	Perform the necessary repairs
3	Measure the sensor's voltage and/or resistance at its terminals Characteristic problem?	Replace the sensor
4	Check the ECU connection Connection problem?	Perform the necessary repairs
5	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

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FAULT CODES AND CHECKS

OIL TEMPERATURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0195	Oil temperature out of range at powerup	Oil temperature above 20°C at cranking
P0197	Oil temperature under range	Oil temperature below -33°C
P0198	Oil temperature over range	Oil temperature above 137°C
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Incorrect oil temperature display 		
Electrical faults	Diagnostic tool title	
OC on J2 -29	Open circuit on oil temperature sensor signal	
SC on J2 -29	Short circuit on oil temperature sensor signal	
OC on J2 -30	Open circuit on oil temperature sensor earth	
SC on J2 -30	Short circuit on oil temperature sensor earth	
OC on J2 -34	Open circuit on oil temperature sensor positive circuit	
SC on J2 -34	Short circuit on oil temperature sensor positive circuit	

Fault chart (Code P0195 - P0197 - P0198)		
Stage	Operation / Decision	Result
1	Fault code P0195, P0197 and/or P0198 present?	Disconnect the sensors and check if the fault disappears. If the fault is no longer present, the sensor which has been disconnected is faulty. If the fault is still present after replacing the sensor, then check the electrical continuity and insulation of the disconnected line.
2	Check the sensor connection Connection problem?	Perform the necessary repairs
3	Measure the sensors voltage and/or resistance at its terminals Characteristic problem?	Replace the sensor
4	Check the ECU connection Connection problem?	Perform the necessary repairs
5	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

FAULT CODES AND CHECKS

CYLINDER SPILL VALVE OPEN CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P0201	Cylinder 1: Injector spill valve open circuit	
P0202	Cylinder 2: Injector spill valve open circuit	
P0203	Cylinder 3: Injector spill valve open circuit	
P0204	Cylinder 4: Injector spill valve open circuit	
P0205	Cylinder 5: Injector spill valve open circuit	
P0206	Cylinder 6: Injector spill valve open circuit	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

COOLANT TEMPERATURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0217	Coolant temperature high warning level	Coolant temperature above 135°C
Fault LED	Recovery mode	
On	None	
Symptoms		

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FAULT CODES AND CHECKS

OVERSPEED		
Diagnostic trouble code	Diagnostic tool title	Detection
P0219	Overspeed warning	
Fault LED	Recovery mode	
On	None	
Symptoms		

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FAULT CODES AND CHECKS

BOOST PRESSURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0234	Boost pressure over range	
Fault LED	Recovery mode	
On	None	
Symptoms		

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FAULT CODES AND CHECKS

TURBO WASTEGATE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0243	Turbo wastegate CBP PWM driver open circuit	
P0245	Turbo wastegate CBP PWM driver short circuit low	
P0246	Turbo wastegate CBP PWM driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		

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FAULT CODES AND CHECKS

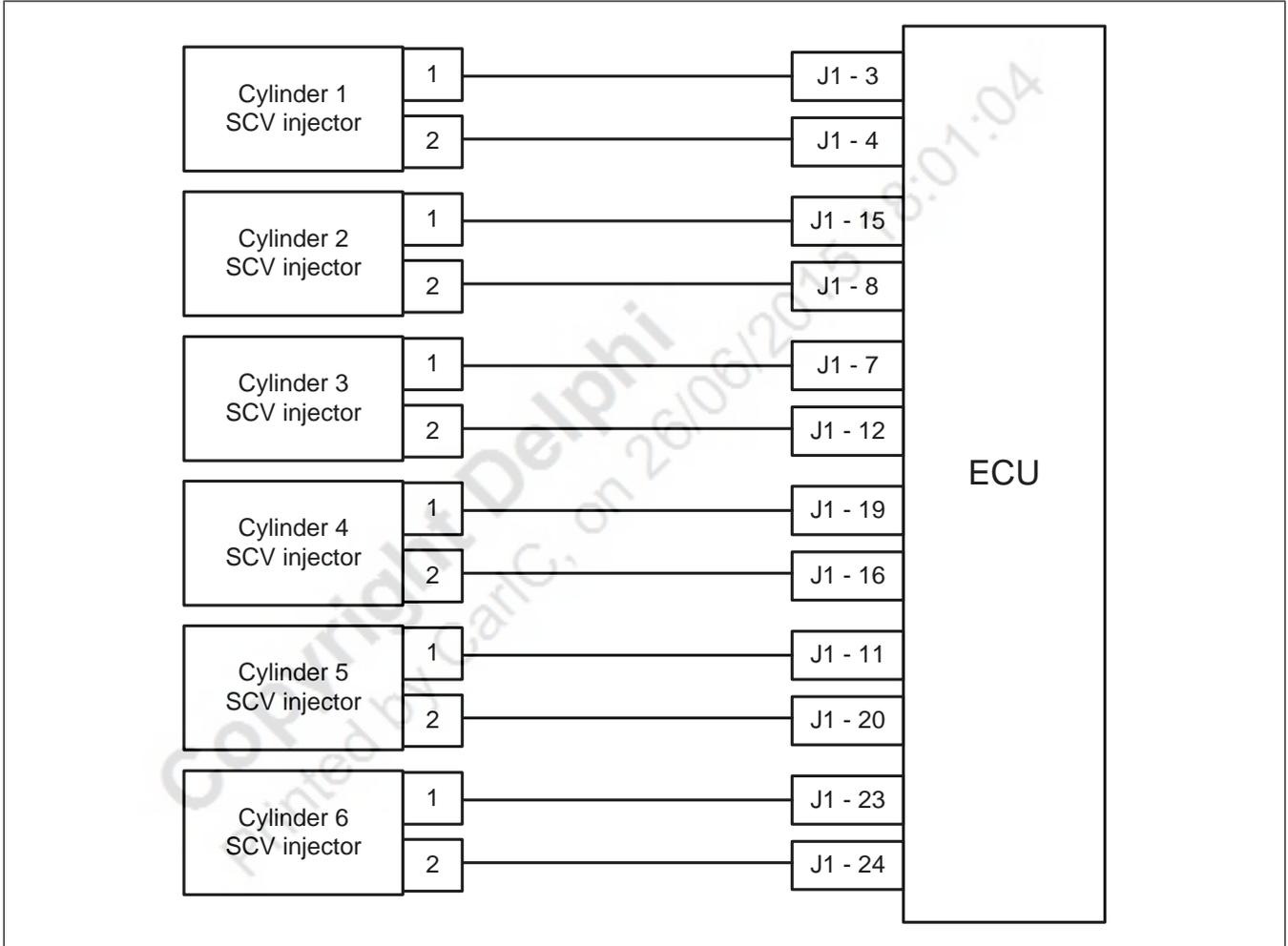
INJECTOR BALANCE ERROR		
Diagnostic trouble code	Diagnostic tool title	Detection
P0261	Cylinder 1: Injector spill valve low side short circuit to ground	
P0262	Cylinder 1: Injector spill valve low side short circuit to battery	
P0263	Injector 1 balance max range error	Cylinder 1 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
P0264	Cylinder 2: Injector spill valve low side short circuit to ground	
P0265	Cylinder 2: Injector spill valve low side short circuit to battery voltage	
P0266	Injector 2 balance max range error	Cylinder 2 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
P0267	Cylinder 3: Injector spill valve low side short circuit to ground	
P0268	Cylinder 3: Injector spill valve low side short circuit to battery voltage	
P0269	Injector 3 balance max range error	Cylinder 3 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
P0270	Cylinder 4: Injector spill valve low side short circuit to ground	
P0271	Cylinder 4: Injector spill valve low side short circuit to battery voltage	
P0272	Injector 4 balance max range error	Cylinder 4 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
P0273	Cylinder 5: Injector spill valve low side short circuit to ground	
P0274	Cylinder 5: Injector spill valve low side short circuit to battery voltage	
P0275	Injector 5 balance max range error	Cylinder 5 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
P0276	Cylinder 6: Injector spill valve low side short circuit to ground	
P0277	Cylinder 6: Injector spill valve low side short circuit to battery voltage	
P0278	Injector 6 balance max range error	Cylinder 6 has too much of a performance disadvantage to enable it to be trimmed in line with the cylinders
Fault LED	Recovery mode	
On	None	

FAULT CODES AND CHECKS

INJECTOR BALANCE ERROR

Symptoms

- Unable to start engine
- Poor engine starting
- Engine noisy
- Idle unstable
- Lack of performance



FAULT CODES AND CHECKS

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and wait 10 seconds. Disconnect the injector and check the injector connection . Connection problem?	Perform the necessary repairs
2	Check the electrical continuity between the two injector terminals using a multimeter Open circuit?	Replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Change the harness
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

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FAULT CODES AND CHECKS

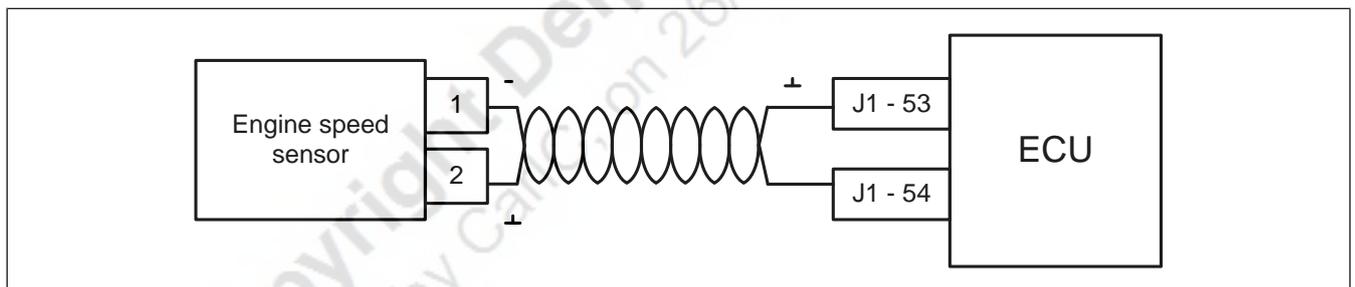
BOOST PRESSURE SENSOR SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0229	Boost pressure under range	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Lack of performance • Wastegate valve fixed in position 		

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FAULT CODES AND CHECKS

ENGINE CRANKSHAFT SENSOR SIGNAL

Diagnostic trouble code	Diagnostic tool title	Detection
P0335	Crank sensor signal not present or not plausible	Loss of crank speed signal
P0336	High frequency corruption of crank signal during normal running	Disruption of crankshaft signal
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine stalls • Long cranking time • Engine will not start 		
Electrical faults	Diagnostic tool title	
OC on J1 - 49	Open circuit on crankshaft sensor signal positive circuit	
SC on J1 - 49	Short circuit on crankshaft sensor signal positive circuit	
OC on J1 - 50	Open circuit on crankshaft sensor signal earth	
SC on J1 - 50	Short circuit on crankshaft sensor signal earth	

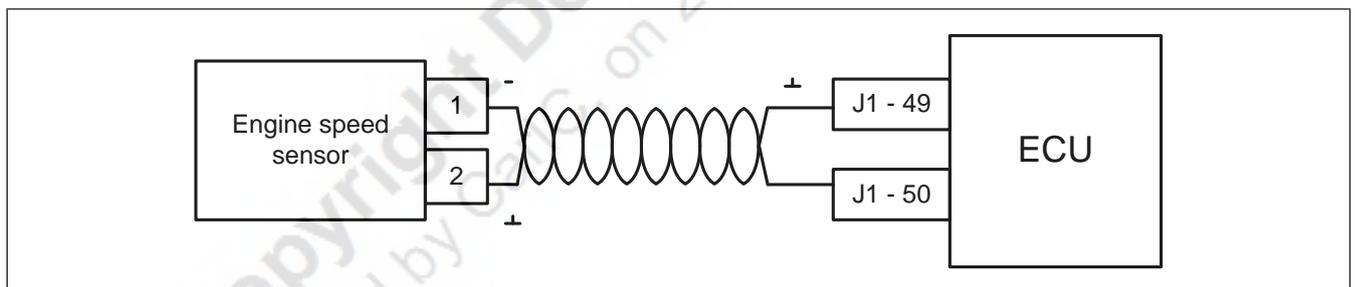


Fault chart (Code)		
Stage	Operation / Decision	Result
1	Connection problem? Check the sensor connection	Perform the necessary repairs
2	Check the ECU connection Connection	Perform the necessary repairs
3	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
4	Check the sensor Sensor Problem?	Replace the sensor
5	Check the end component End component problem?	Replace the end component
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

FAULT CODES AND CHECKS

ENGINE CAMSHAFT SENSOR SIGNAL

Diagnostic trouble code	Diagnostic tool title	Detection
P0340	Cam sensor signal not present or not plausible (assumed that crank sensor has previously established sync)	Loss of camshaft speed signal
P0341	High frequency corruption of cam signal during normal running	Disruption of camshaft signal
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine stalls • Long cranking time • Engine will not start 		
Electrical faults	Diagnostic tool title	
OC on J1 - 53	Open circuit on camshaft sensor signal positive circuit	
SC on J1 - 53	Short circuit on camshaft sensor signal positive circuit	
OC on J1 - 54	Open circuit on camshaft sensor signal earth	
SC on J1 - 54	Short circuit on camshaft sensor signal earth	



FAULT CODES AND CHECKS

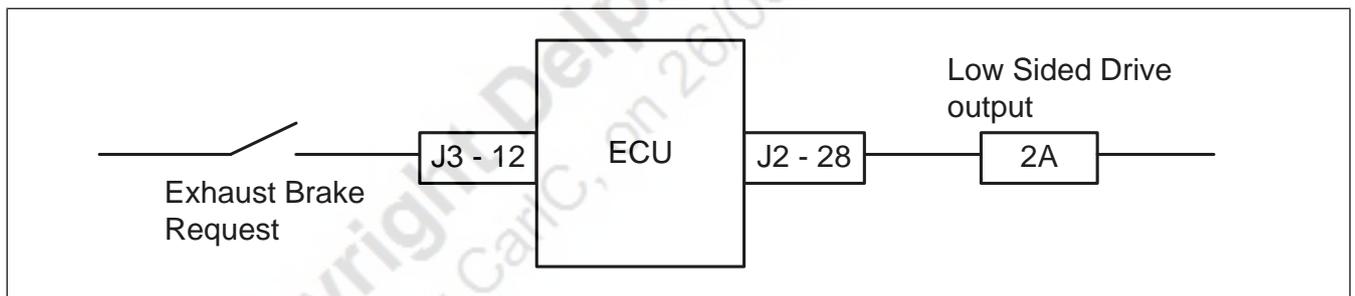
Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

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FAULT CODES AND CHECKS

EXHAUST BRAKE ACTUATOR

Diagnostic trouble code	Diagnostic tool title	Detection
P0475	Exhaust brake actuator low side driver open circuit	Disruption of actuator signal
P0477	Exhaust brake actuator low side driver short circuit low	
P0478	Exhaust brake actuator low side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Exhaust brake cannot be engaged or constantly engaged Engine braking power too low 		
Electrical faults	Diagnostic tool title	
OC on J2 - 28	Open circuit on exhaust brake actuator circuit	
SC on J2 - 28	Short circuit on exhaust brake actuator circuit	

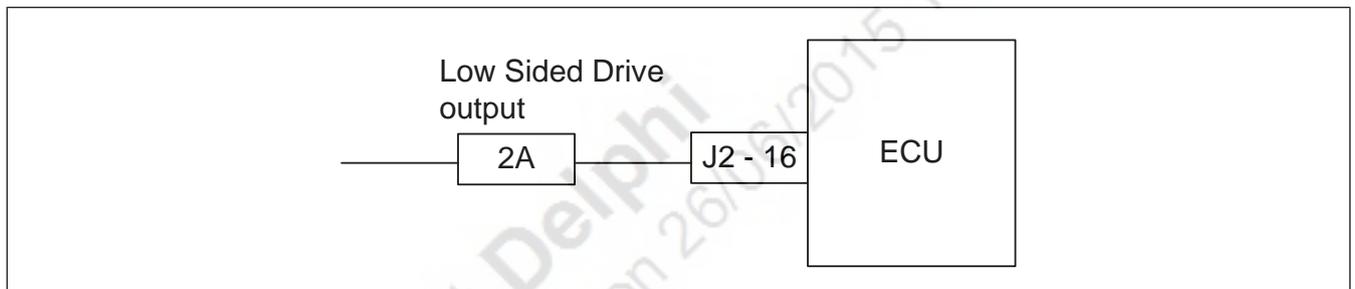


Fault chart (Code P0475 - P0477 - P0478)

Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

FAN CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P0480	Fan low side driver open circuit	Disruption of fan signal
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> High engine temperature Engine overheating Coolant being activated, limiting performance 		
Electrical faults	Diagnostic tool title	
OC on J2 - 16	Open circuit on fan circuit	
SC on J2 - 16	Short circuit on fan circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

EXHAUST GAS RECIRCULATION		
Diagnostic trouble code	Diagnostic tool title	Detection
P0403	EGR valve actuator low side driver open circuit	
P0489	EGR valve actuator low side driver short circuit low	
P0489	EGR valve actuator low side driver short circuit high	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

VEHICLE SPEED		
Diagnostic trouble code	Diagnostic tool title	Detection
P0500	Vehicle speed not valid	
P0501	Tachograph vehicle speed "out of range" fault	
P0503	Vehicle speed out of range	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Cruise control cannot be engaged • Variable vehicle speed limiting cannot be engaged 		
Electrical faults	Diagnostic tool title	
OC on J3 -48	Open circuit on vehicle speed sensor circuit	
SC on J3 -48	Short circuit on vehicle speed sensor circuit	

Fault chart (Code P0500 - P0501 - P0503)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Does the problem persist?	Replace the ECU
7	The problem is resolved	

FAULT CODES AND CHECKS

IMMOBILIZER		
Diagnostic trouble code	Diagnostic tool title	Detection
P0513	Bad Immobilizer key. May prevent start.	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine cranks but will not fire 		
Electrical faults	Diagnostic tool title	

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FAULT CODES AND CHECKS

OIL PRESSURE

Diagnostic trouble code	Diagnostic tool title	Detection
P0522	Oil Pressure out of range low	
P0523	Oil pressure out of range high	
P0524	Oil pressure too low	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Oil pressure too high/Low 		
Electrical faults	Diagnostic tool title	
OC on J2 -33	Open circuit on oil pressure sensor circuit	
SC on J2 -33	Short circuit on oil pressure sensor circuit	

Fault chart (Code P0522 - P0523 - P0524)

Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

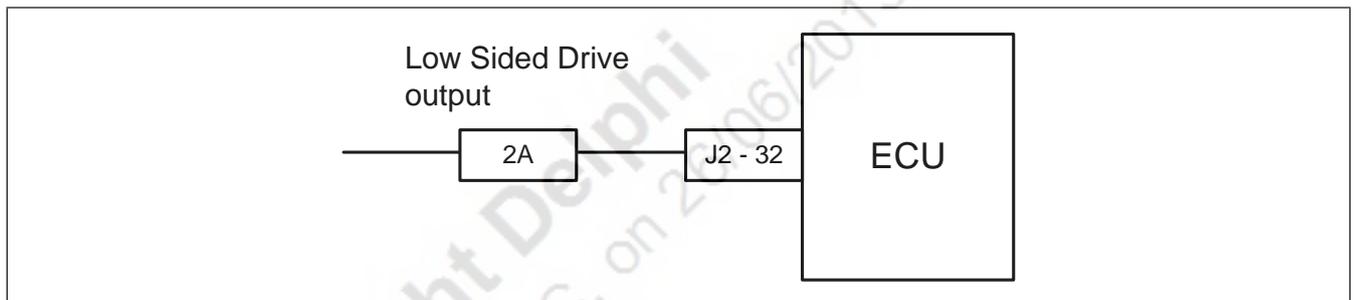
FAULT CODES AND CHECKS

FAN SPEED		
Diagnostic trouble code	Diagnostic tool title	Detection
P0527	Fan speed out of range high	
P0528	Fan speed out of range low	
Fault LED	Recovery mode	
On	None	
Symptoms		
Electrical faults	Diagnostic tool title	
OC on J2- 36	Open circuit on fan speed sensor circuit	
SC on J2- 36	Short circuit on fan speed sensor circuit	

Fault chart (Code		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

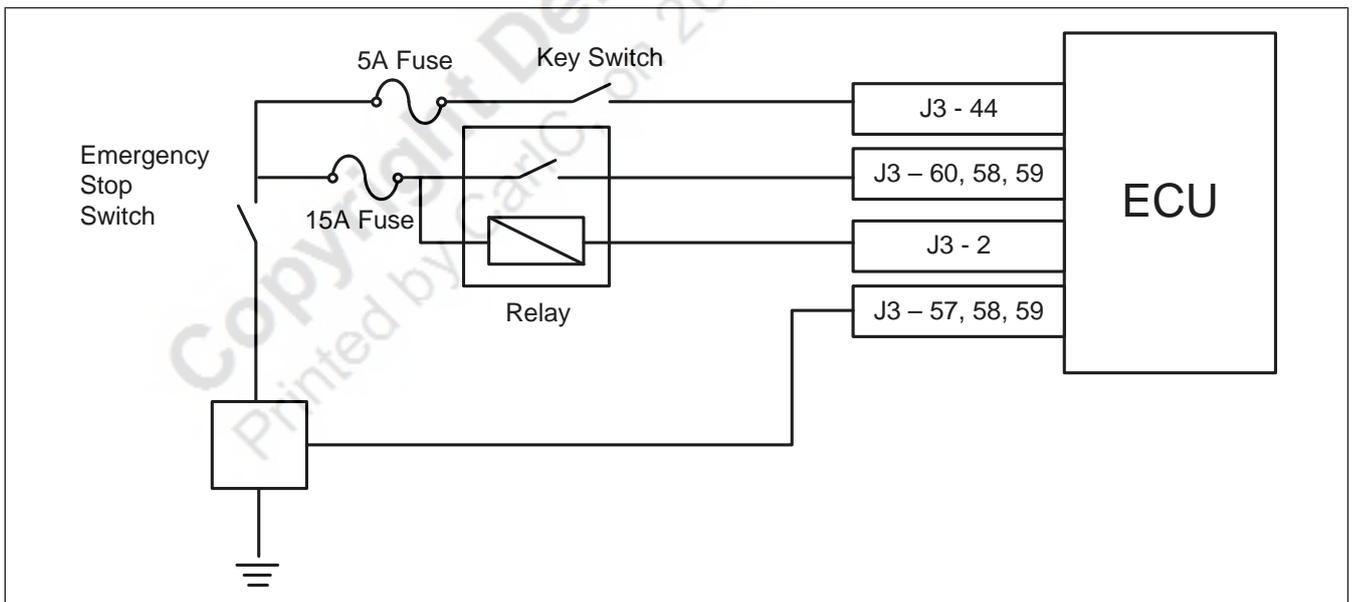
PRE/POST HEAT DRIVE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0541	PHT low side driver short circuit low	Short circuit on low side driver
P0542	PHT low side driver short circuit high	Short circuit on low side driver
P0543	PHT low side driver open circuit	Open circuit on low side driver
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Pre/post heat drive constantly activated Pre/post heat drive cannot be activated 		
Electrical faults	Diagnostic tool title	
OC on J2 - 32	Open circuit on pre/post heat drive	
SC on J2 - 32	Short circuit on pre/post heat drive	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

BATTERY VOLTAGE SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P0562	System battery voltage too low	Battery voltage below 9 volts
P0563	System battery voltage too high	Battery voltage above 32 volts
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Starting impossible Alternator warning lamp illuminated constantly Battery voltage either lower than 9V or above 32V 		
Electrical faults	Diagnostic tool title	
LV on J3 - 60	Low battery voltage signal	
HV on J3 - 60	High battery voltage signal	
LV on J3 - 61	Low battery voltage signal	
HV on J3 - 61	High battery voltage signal	
LV on J3 - 62	Low battery voltage signal	
HV on J3 - 62	High battery voltage signal	



FAULT CODES AND CHECKS

Fault chart (Code P0562 - P0563)		
Stage	Operation / Decision	Result
1	Check the battery voltage with the ignition switched on Voltage too low?	Check the battery and recharge it
2	Check the battery terminals and that the connectors are tight Terminal or connector problem?	Perform the necessary repairs
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the charging circuit Charging problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

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FAULT CODES AND CHECKS

FAULT DATA (SWITCH)		
Diagnostic trouble code	Diagnostic tool title	Detection
P0565	Fault data received for F_Ref_trim_disable_sw	
P0567	Fault data received for F_Res_sw	
P0569	Fault data received for F_Set_dec_sw	
P0570	Fault data received for F_Set_inc_sw	
P0585	inc & dec both active	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

HARDWARE/SOFTWARE FAULT		
Diagnostic trouble code	Diagnostic tool title	Detection
P0601	Fault on the engine controller CPU watchdog	Internal fault
P0602	Software error has caused system reset	System has been reset due to an internal software fault
P060A	Fault on engine controller CPU watchdog	
P060C	Bootstrap memory fault with bootstrap checksum	System internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

Fault chart (Code P0601 - P0602 - P060A - P060C)		
Stage	Operation / Decision	Result
1	Check the ECU earth Earth problem?	Perform the necessary repairs
2	Does the problem persist?	Replace the ECU
3	The problem is resolved	

FAULT CODES AND CHECKS

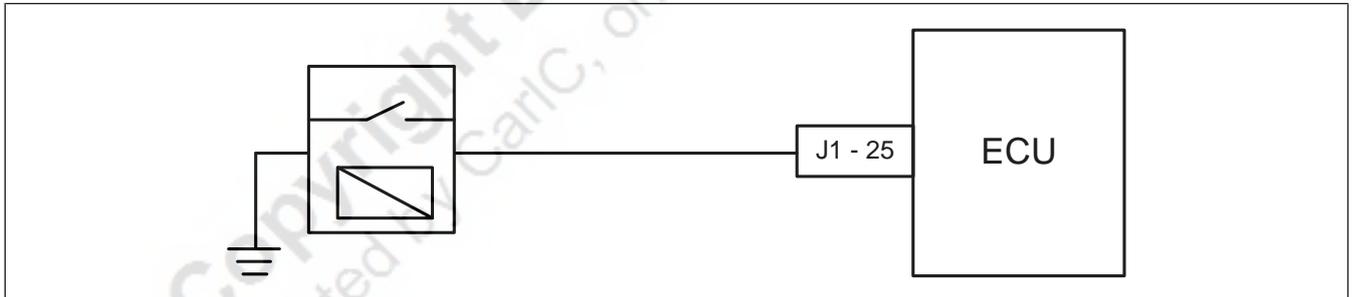
INJECTOR CONTROL FAULT		
Diagnostic trouble code	Diagnostic tool title	Detection
P0611	Output error from TPU for injector control	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the ECU earth Earth problem?	Perform the necessary repairs
2	Does the problem persist?	Replace the ECU
3	The problem is resolved	

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FAULT CODES AND CHECKS

STARTER MOTOR DRIVE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0615	Starter motor high side driver open circuit	Open circuit on starter motor high side driver
P0616	Starter motor high on side driver short circuit low	
P0617	Starter motor high side driver short circuit high	
P0616	Starter motor high side driver short circuit low	Short circuit on low side starter motor circuit
P0617	Starter motor high side driver short circuit high	Short circuit on starter motor high side driver
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Unable to turn over engine • Unable to start engine 		
Electrical faults	Diagnostic tool title	
OC on J1 - 25	Open circuit on starter motor drive	
SC on J1 - 25	Short circuit on starter motor drive	



FAULT CODES AND CHECKS

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

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FAULT CODES AND CHECKS

INJECTOR BOOST VOLTAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
P062B	Injector boost voltage over range	
P062D	Injector boost voltage under range	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

PRE-HEAT RELAY DRIVE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0640	Preheat relay short circuit	
Fault LED	Recovery mode	
Symptoms		

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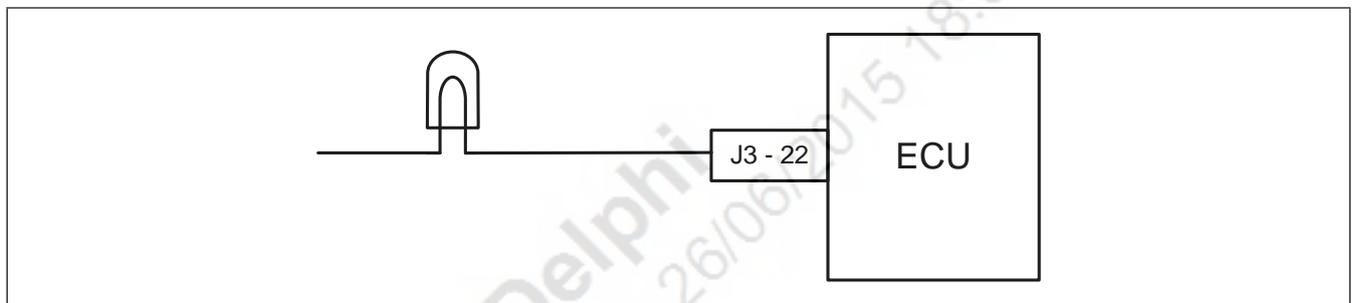
FAULT CODES AND CHECKS

SENSOR 5V SUPPLY		
Diagnostic trouble code	Diagnostic tool title	Detection
P0642	Sensor 5V reference under range	Reference voltage too low for sensors
P0643	Sensor 5V reference over range	Reference voltage too high for sensors
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

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FAULT CODES AND CHECKS

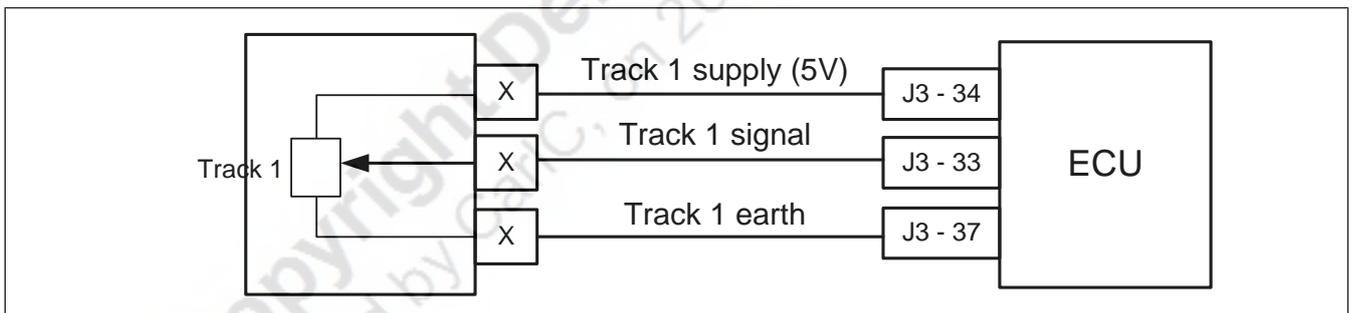
AMBER WARNING LAMP		
Diagnostic trouble code	Diagnostic tool title	Detection
P0650	Amber warning lamp low side driver open circuit	Open circuit on red stop lamp low side driver
Fault LED	Recovery mode	
On	None	
Symptoms		
None		
Electrical faults	Diagnostic tool title	
OC on J3 - 22	Open circuit on red stop lamp circuit	
SC on J3 - 22	Short circuit on red stop lamp circuit	



Fault chart (Code P0650)		
Stage	Operation / Decision	Result
1	Connection problem? Check the bulb connection	Perform the necessary repairs
2	Visually check bulb Bulb problem?	Replace the bulb
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

PEDAL SUPPLY		
Diagnostic trouble code	Diagnostic tool title	Detection
P0652	Pedal supply under range	Low pedal supply voltage
P0653	Pedal supply over range	High pedal supply voltage
Fault LED	Recovery mode	
On	<ul style="list-style-type: none"> Increased engine idle speed Limp home mode activated 	
Symptoms		
<ul style="list-style-type: none"> Lack of performance Increased engine idle speed 		
Electrical faults	Diagnostic tool title	
OC on J3 - 33	Open circuit on pedal sensor signal	
SC on J3 - 33	Short circuit on pedal sensor signal	
OC on J3 - 34	Open circuit on pedal sensor signal positive circuit	
SC on J3 - 34	Short circuit on pedal sensor signal positive circuit	
OC on J3 - 37	Open circuit on pedal sensor signal earth	
SC on J3 - 37	Short circuit on pedal sensor signal earth	



FAULT CODES AND CHECKS

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

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FAULT CODES AND CHECKS

STARTER MOTOR DRIVER		
Diagnostic trouble code	Diagnostic tool title	Detection
P0657	Starter motor low side driver open circuit	
P0658	Starter motor low side driver short circuit low	
P0659	Starter motor low side driver short circuit high	
Fault LED	Recovery mode	
Symptoms		
<ul style="list-style-type: none"> • Impossible to start engine 		

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FAULT CODES AND CHECKS

INTERNAL ECU TEMPERATURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0666	Internal ECU temperature out of range at powerup	
P0668	Internal ECU Temperature under range	Internal fault
P0669	Internal ECU Temperature over range	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • No system response 		

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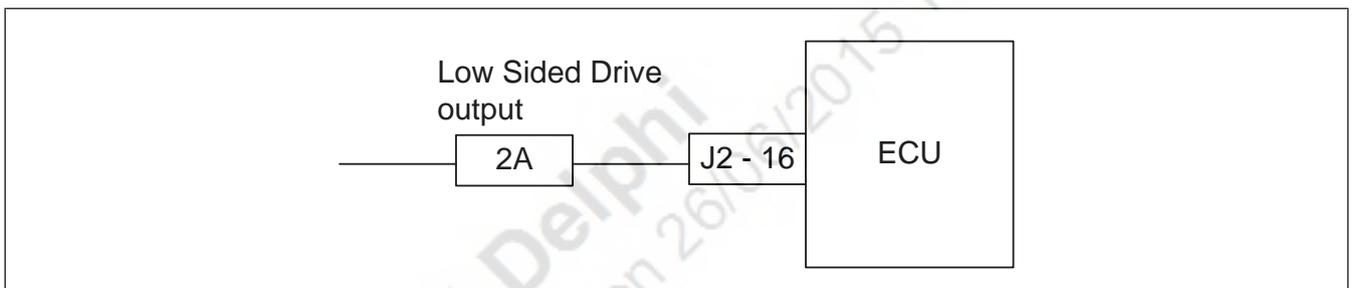
FAULT CODES AND CHECKS

ECU SUPPLY		
Diagnostic trouble code	Diagnostic tool title	Detection
P0685	ECU will lose power & be unable to power up again or will be permanently powered on	No supply voltage or constant supply voltage
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Starting impossible • Engine stalls 		
Electrical faults	Diagnostic tool title	
OC on J3 - 2	Open circuit on ECU supply voltage	
SC on J3 - 2	Short circuit on ECU supply voltage	

Fault chart (Code		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

FAN DRIVE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0691	Fan low side driver short circuit low	Short circuit on fan drive low side driver
P0692	Fan low side driver short circuit high	Short circuit on fan drive high side driver
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> High engine temperature Engine overheating 		
Electrical faults		Diagnostic tool title
OC on J2 - 16		Open circuit on fan circuit
SC on J1 - 16		Short circuit on fan circuit



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

SENSOR SUPPLY VOLTAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
P0698	Sensor supply voltage under range	Low sensor supply voltage
P0699	Sensor supply voltage over range	High sensor supply voltage
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Power Reduction • Wastegate valve is in fixed position 		

Fault chart (Code		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

FAULT DATA (BRAKE)		
Diagnostic trouble code	Diagnostic tool title	Detection
P0703	Fault data received for F_Footbrake_sw	
P081C	Fault data received for F_Parking_brake_sw	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

CLUTCH SWITCH		
Diagnostic trouble code	Diagnostic tool title	Detection
P0830	Clutch switch plausible fault	
P0833	Fault data received for F_Clutch_sw	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FUEL PRESSURE LEVEL		
Diagnostic trouble code	Diagnostic tool title	Detection
P1087	Fuel Pressure Derate Level 1	The fuelling is adjusted if a reduction in the fuel feed pressure is detected
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Unable to start engine Poor engine starting Engine noisy Idle unstable Lack of performance 		
Electrical faults	Diagnostic tool title	
OC on J1 - 42	Open circuit on fuel pressure positive circuit	
SC on J1 - 42	Short circuit on fuel pressure positive circuit	
OC on J1 - 45	Open circuit on fuel pressure signal	
SC on J1 - 45	Short circuit on fuel pressure signal	
OC on J1 - 46	Open circuit on fuel pressure signal earth	
SC on J1 - 46	Short circuit on fuel pressure signal earth	

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

BOOST PRESSURE SENSOR		
Diagnostic trouble code	Diagnostic tool title	Detection
P1108	If boost pressure sensor value below calculated boost pressure, a plausibility low error is flagged	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

LEAK FLOW RESTRICTION		
Diagnostic trouble code	Diagnostic tool title	Detection
P1168	Indicates that leak flow restriction is blocked	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FUEL TEMPERATURE		
Diagnostic trouble code	Diagnostic tool title	Detection
P1180	Fuel is hot due to, to low fuel level and high ambient temperature	
Fault LED	Recovery mode	
Symptoms		

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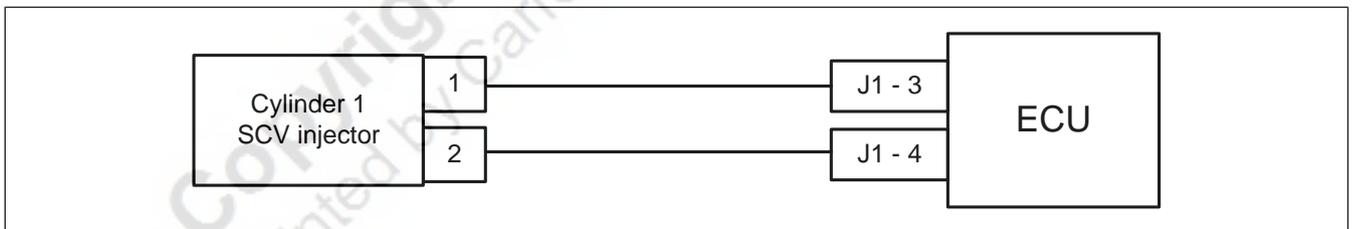
FAULT CODES AND CHECKS

FUEL FILTER		
Diagnostic trouble code	Diagnostic tool title	Detection
P1191	Indicates that the fuel filter is clogged	
P1194	Indicates that the fuel filter is very clogged	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced fuel flow entering cylinders • Limited power 		

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FAULT CODES AND CHECKS

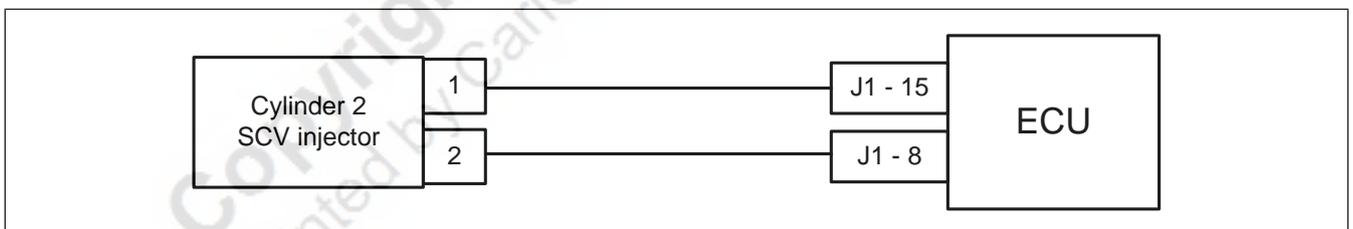
INJECTOR 1 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1201	Injector 1 needle valve open circuit	Open circuit in injector 1
P1202	Injector 1 needle valve short circuit across injector	Short circuit across injector 1
P1203	Injector 1 needle valve low side short circuit to ground	Short circuit to ground on injector 1
P1204	Injector 1 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 1
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 3	Open circuit on Injector 1 circuit	
SC on J1 - 3	Short circuit on Injector 1 circuit	
OC on J1 - 4	Open circuit on Injector 1 circuit	
SC on J1 - 4	Short circuit on Injector 1 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

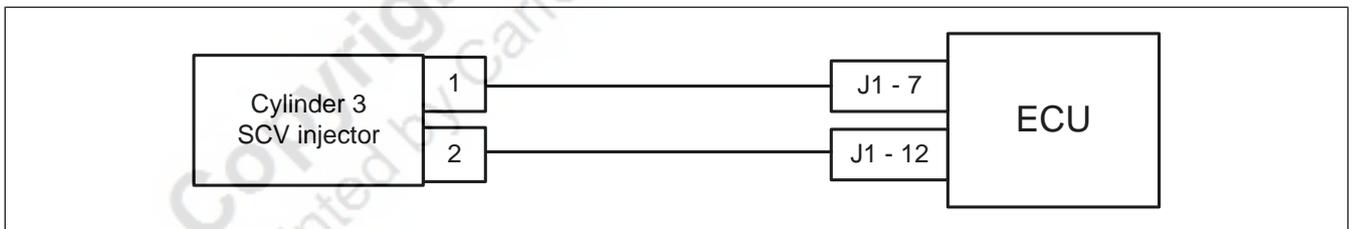
INJECTOR 5 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1205	Injector 5 needle valve open circuit	Open circuit in injector 2
P1206	Injector 5 needle valve short circuit across injector	Short circuit across injector 2
P1207	Injector 5 needle valve low side short circuit to ground	Short circuit to ground on injector 2
P1208	Injector 5 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 2
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 15	Open circuit on Injector 2 circuit	
SC on J1 - 15	Short circuit on Injector 2 circuit	
OC on J1 - 8	Open circuit on Injector 2 circuit	
SC on J1 - 8	Short circuit on Injector 2 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

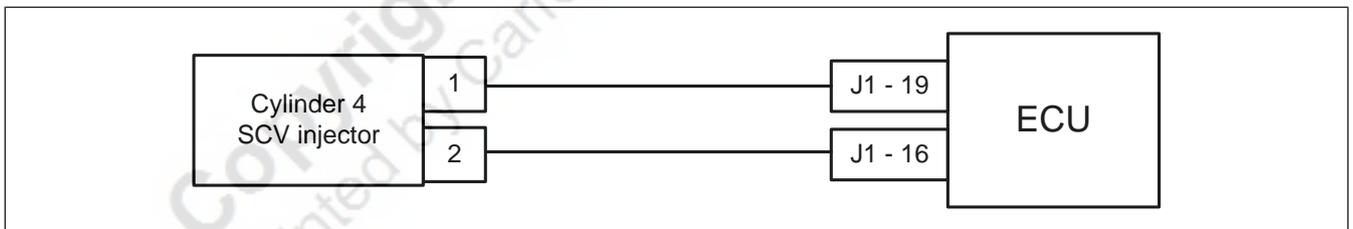
INJECTOR 3 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1209	Injector 3 needle valve open circuit	Open circuit in injector 3
P1210	Injector 3 needle valve short circuit across injector	Short circuit across injector 3
P1211	Injector 3 needle valve low side short circuit to ground	Short circuit to ground on injector 3
P1212	Injector 3 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 3
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 7	Open circuit on Injector 3 circuit	
SC on J1 - 7	Short circuit on Injector 3 circuit	
OC on J1 - 12	Open circuit on Injector 3 circuit	
SC on J1 - 12	Short circuit on Injector 3 circuit	



Fault chart (Code P1209 - P1210 - P1211 - P1212)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

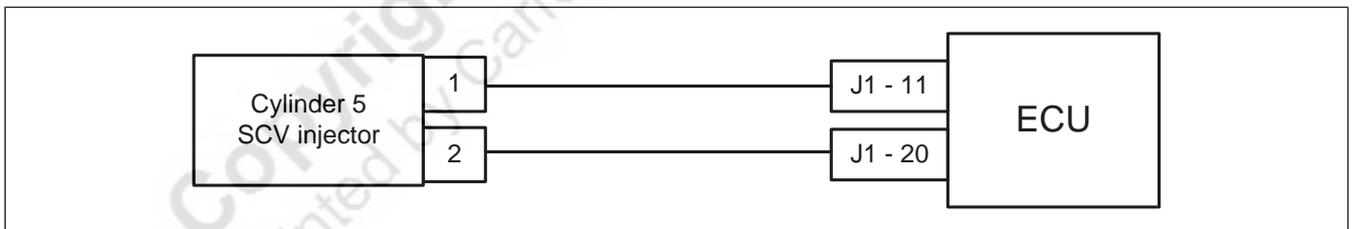
INJECTOR 6 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1213	Injector 6 needle valve open circuit	Open circuit in injector 4
P1214	Injector 6 needle valve short circuit across injector	Short circuit across injector 4
P1215	Injector 6 needle valve low side short circuit to ground	Short circuit to ground on injector 4
P1216	Injector 6 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 4
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 19	Open circuit on Injector 4 circuit	
SC on J1 - 19	Short circuit on Injector 4 circuit	
OC on J1 - 16	Open circuit on Injector 4 circuit	
SC on J1 - 16	Short circuit on Injector 4 circuit	



Fault chart (Code		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

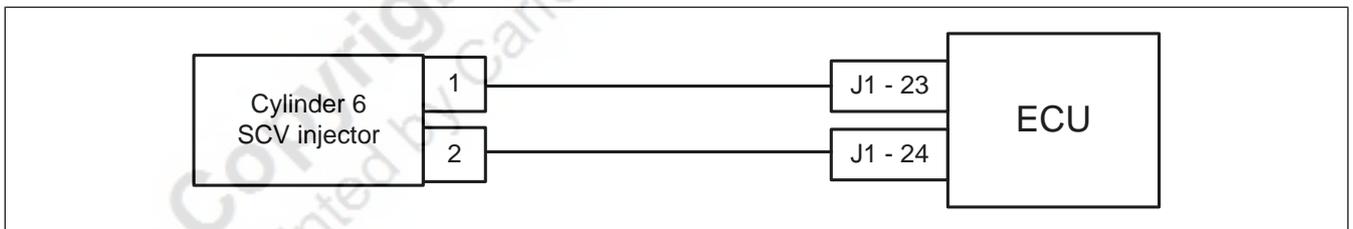
INJECTOR 2 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1217	Injector 2 needle valve open circuit	Open circuit in injector 5
P1218	Injector 2 needle valve short circuit across injector	Short circuit across injector 5
P1219	Injector 2 needle valve low side short circuit to ground	Short circuit to ground on injector 5
P1220	Injector 2 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 5
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Engine noisy Unstable idle Lack of power Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 11	Open circuit on Injector 5 circuit	
SC on J1 - 11	Short circuit on Injector 5 circuit	
OC on J1 - 20	Open circuit on Injector 5 circuit	
SC on J1 - 20	Short circuit on Injector 5 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

INJECTOR 4 VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1221	Injector 4 needle valve open circuit	Open circuit in injector 6
P1222	Injector 4 needle valve short circuit across injector	Short circuit across injector 6
P1223	Injector 4 needle valve low side short circuit to ground	Short circuit to ground on injector 6
P1224	Injector 4 needle valve low side short circuit to battery voltage	Short circuit to battery voltage on injector 6
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 23	Open circuit on Injector 6 circuit	
SC on J1 - 23	Short circuit on Injector 6 circuit	
OC on J1 - 24	Open circuit on Injector 6 circuit	
SC on J1 - 24	Short circuit on Injector 6 circuit	

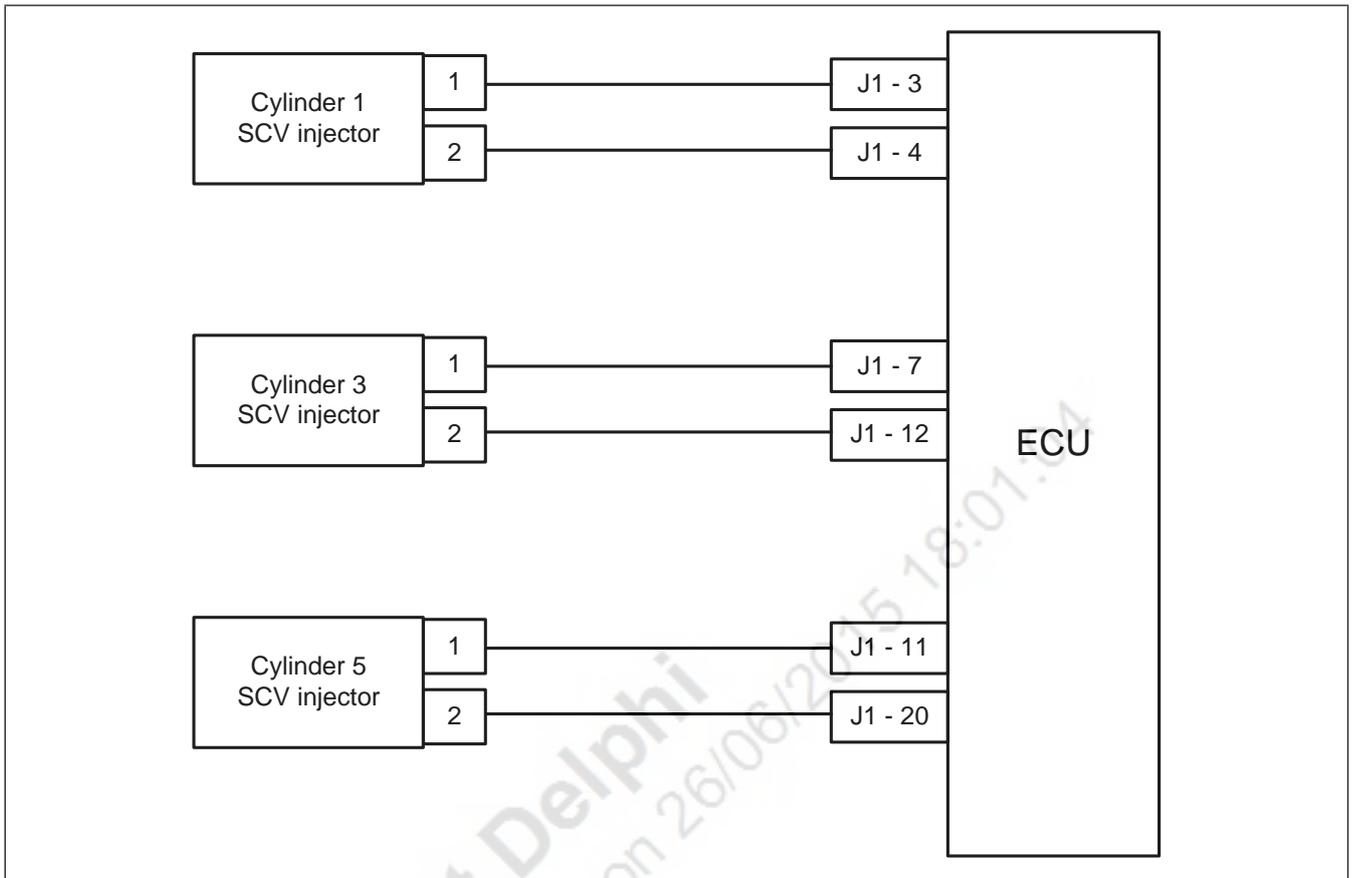


Fault chart (Code		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

INJECTOR 1, 3 or 5 VALVE HIGH SIDE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1225	Injector 1,3, or 5 needle valve high side short circuit to ground	Short circuit to ground on injectors 1, 3 or 5
P1226	Injector 1,3, or 5 needle valve high side short circuit to battery voltage	Short circuit to battery voltage on injectors 1, 3 or 5
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 3	Open circuit on Injector 1 circuit	
SC on J1 - 3	Short circuit on Injector 1 circuit	
OC on J1 - 4	Open circuit on Injector 1 circuit	
SC on J1 - 4	Short circuit on Injector 1 circuit	
OC on J1 - 7	Open circuit on Injector 3 circuit	
SC on J1 - 7	Short circuit on Injector 3 circuit	
OC on J1 - 12	Open circuit on Injector 3 circuit	
SC on J1 - 12	Short circuit on Injector 3 circuit	
OC on J1 - 11	Open circuit on Injector 5 circuit	
SC on J1 - 11	Short circuit on Injector 5 circuit	
OC on J1 - 20	Open circuit on Injector 5 circuit	
SC on J1 - 20	Short circuit on Injector 5 circuit	

FAULT CODES AND CHECKS

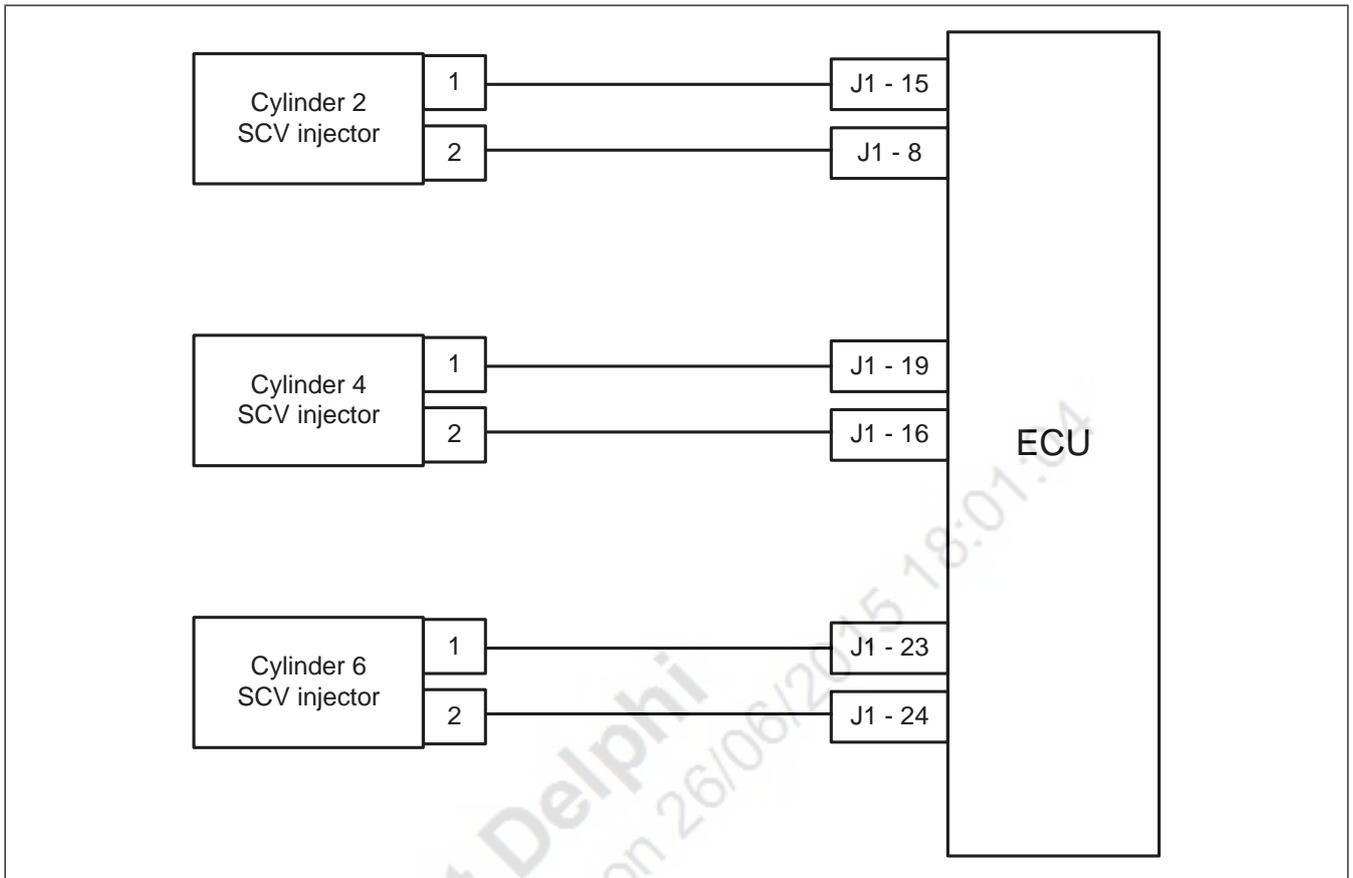


Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

INJECTOR 2, 4, or 6 VALVE HIGH SIDE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1227	Injector 2, 4, or 6 needle valve high side short circuit to ground	Short circuit to ground on injectors 2, 4 or 6
P1228	Injector 2, 4, or 6 needle valve high side short circuit to battery voltage	Short circuit to battery voltage on injectors 2, 4 or 6
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 15	Open circuit on Injector 2 circuit	
SC on J1 - 15	Short circuit on Injector 2 circuit	
OC on J1 - 8	Open circuit on Injector 2 circuit	
SC on J1 - 8	Short circuit on Injector 2 circuit	
OC on J1 - 19	Open circuit on Injector 4 circuit	
SC on J1 - 19	Short circuit on Injector 4 circuit	
OC on J1 - 16	Open circuit on Injector 4 circuit	
SC on J1 - 16	Short circuit on Injector 4 circuit	
OC on J1 - 23	Open circuit on Injector 6 circuit	
SC on J1 - 23	Short circuit on Injector 6 circuit	
OC on J1 - 24	Open circuit on Injector 6 circuit	
SC on J1 - 24	Short circuit on Injector 6 circuit	

FAULT CODES AND CHECKS

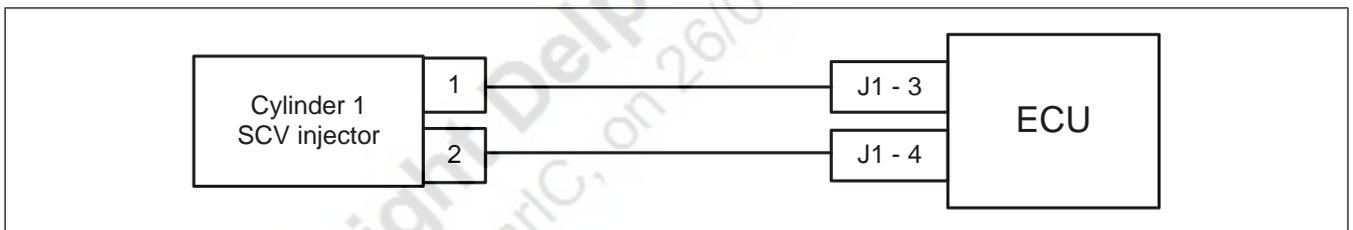


Fault chart (Code P1227 - P1228)

Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

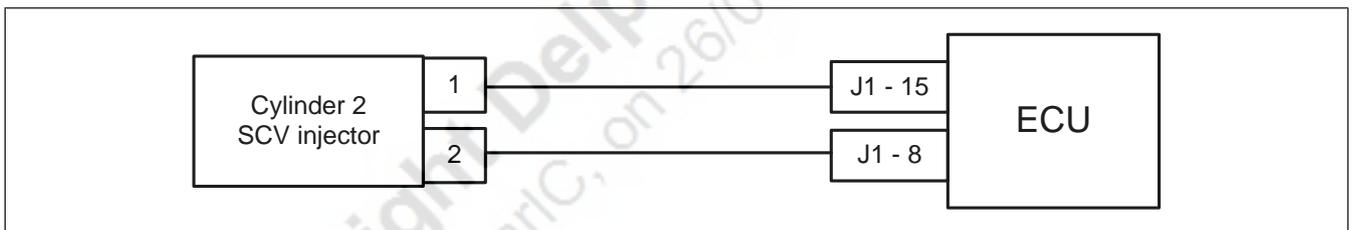
INJECTOR 1 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1230	Injector 1 spill valve short circuit across injector	Spill valve short circuit to ground on injector 1
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 3	Open circuit on Injector 1 circuit	
SC on J1 - 3	Short circuit on Injector 1 circuit	
OC on J1 - 4	Open circuit on Injector 1 circuit	
SC on J1 - 4	Short circuit on Injector 1 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

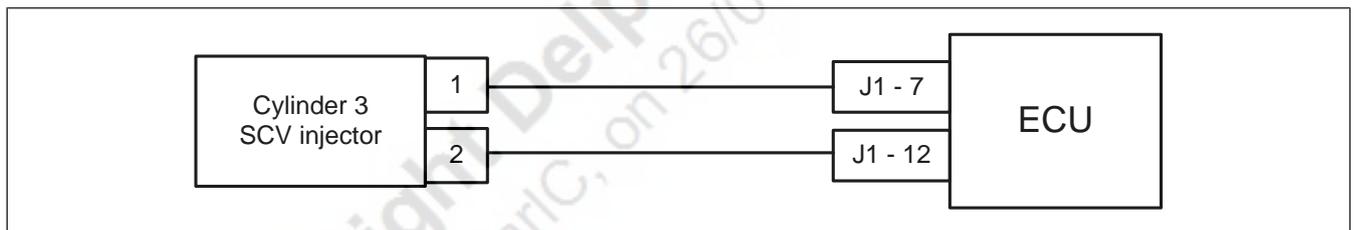
INJECTOR 5 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1234	Injector 5 spill valve short circuit across injector	Spill valve short circuit to ground on injector 5
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Engine noisy Unstable idle Lack of power Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 15	Open circuit on Injector 2 circuit	
SC on J1 - 15	Short circuit on Injector 2 circuit	
OC on J1 - 8	Open circuit on Injector 2 circuit	
SC on J1 - 8	Short circuit on Injector 2 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

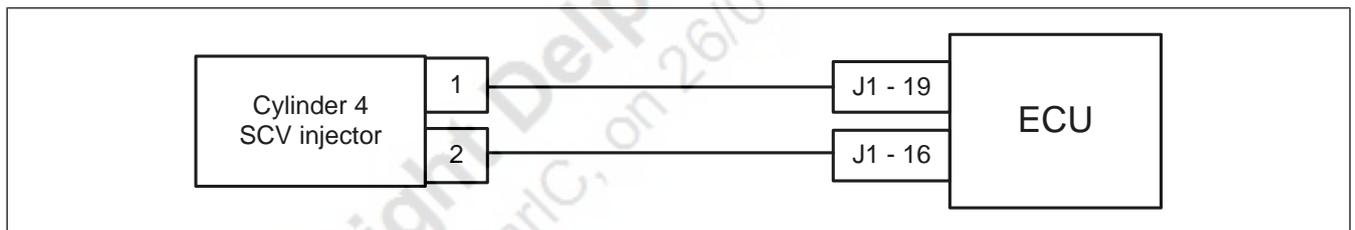
INJECTOR 3 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1238	Injector 3 spill valve short circuit across injector	Spill valve short circuit to ground on injector 3
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 7	Open circuit on Injector 3 circuit	
SC on J1 - 7	Short circuit on Injector 3 circuit	
OC on J1 - 12	Open circuit on Injector 3 circuit	
SC on J1 - 12	Short circuit on Injector 3 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

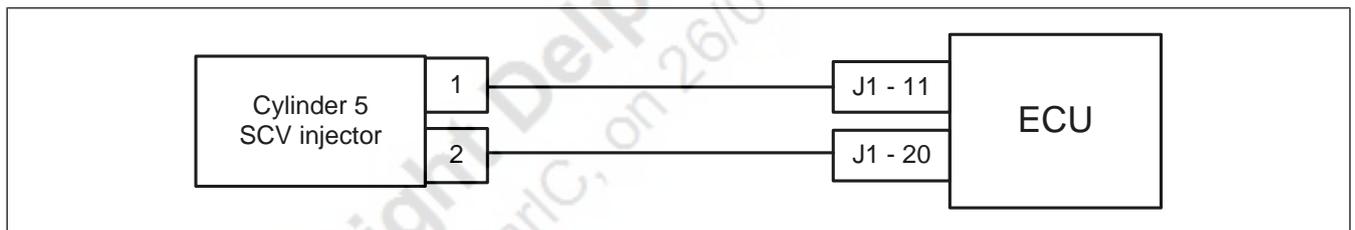
INJECTOR 6 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1242	Injector 6 spill valve short circuit across injector	Spill valve short circuit to ground on injector 6
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 19	Open circuit on Injector 4 circuit	
SC on J1 - 19	Short circuit on Injector 4 circuit	
OC on J1 - 16	Open circuit on Injector 4 circuit	
SC on J1 - 16	Short circuit on Injector 4 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

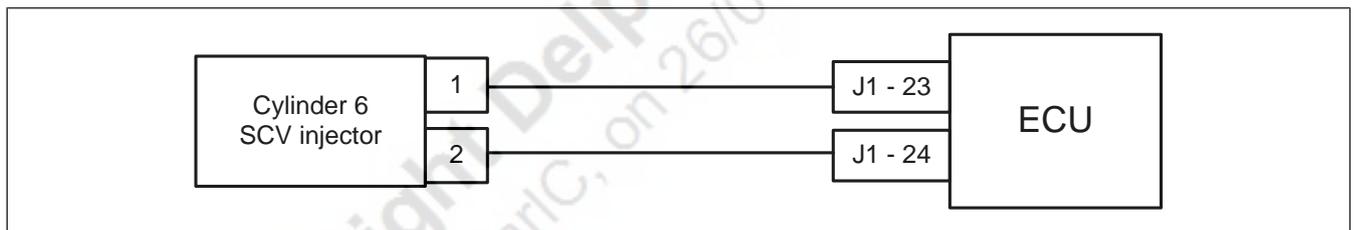
INJECTOR 2 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1246	Injector 2 spill valve short circuit across injector	Spill valve short circuit to ground on injector 2
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 11	Open circuit on Injector 5 circuit	
SC on J1 - 11	Short circuit on Injector 5 circuit	
OC on J1 - 20	Open circuit on Injector 5 circuit	
SC on J1 - 20	Short circuit on Injector 5 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

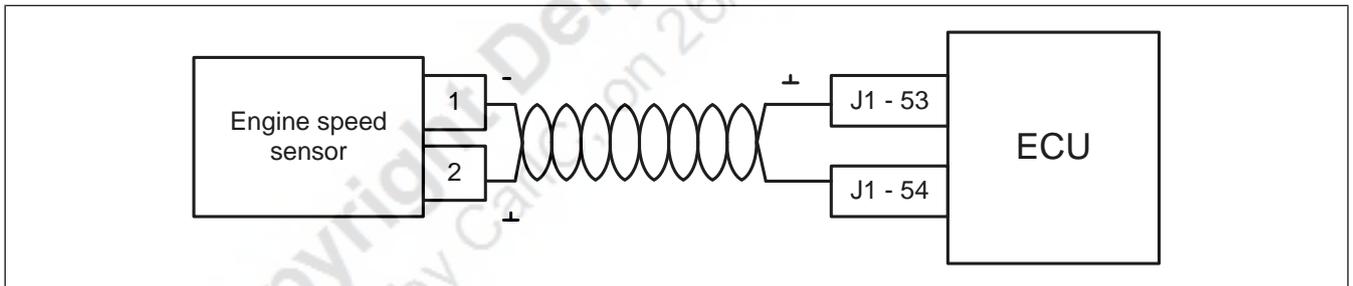
INJECTOR 4 SPILL VALVE CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1246	Injector 4 spill valve short circuit across injector	Spill valve short circuit to ground on injector 4
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine noisy • Unstable idle • Lack of power • Engine runs on reduced cylinders 		
Electrical faults	Diagnostic tool title	
OC on J1 - 23	Open circuit on Injector 6 circuit	
SC on J1 - 23	Short circuit on Injector 6 circuit	
OC on J1 - 24	Open circuit on Injector 6 circuit	
SC on J1 - 24	Short circuit on Injector 6 circuit	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

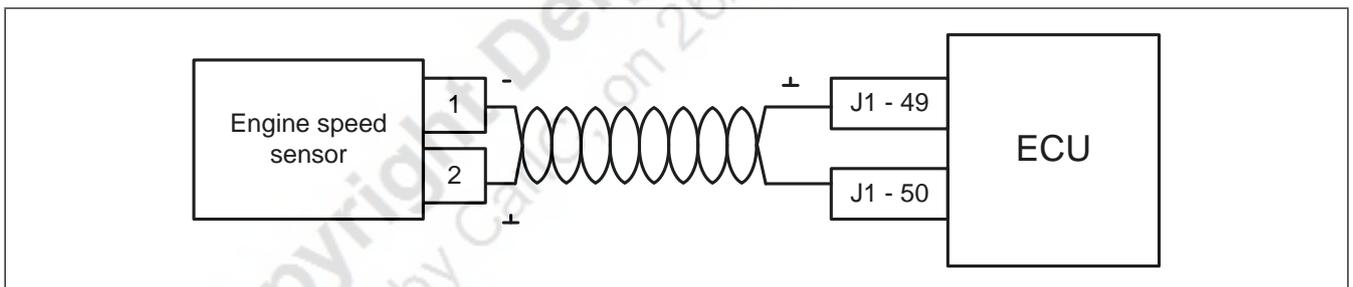
CRANK SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P1335	No crank signal - Start on cam only with fixed timing	No signal from crankshaft sensor
P1336	High frequency corruption of crank signal during start up	Disturbed signal from crankshaft sensor
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Engine stalls Long cranking time Engine will not start 		
Electrical faults	Diagnostic tool title	
OC on J1 - 49	Open circuit on crankshaft sensor signal positive circuit	
SC on J1 - 49	Short circuit on crankshaft sensor signal positive circuit	
OC on J1 - 50	Open circuit on crankshaft sensor signal earth	
SC on J1 - 50	Short circuit on crankshaft sensor signal earth	



Fault chart (Code)		
Stage	Operation / Decision	Result
1	Switch off the ignition and check the injector connection Connection problem?	Perform the necessary repairs
2	Disconnect the injector Does the fault persist?	Faulty injector replace the injector
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Does the problem persist?	Replace the ECU
6	The problem is resolved	

FAULT CODES AND CHECKS

CAM SIGNAL		
Diagnostic trouble code	Diagnostic tool title	Detection
P1340	No cam sync - Possible long cranking period	No signal from camshaft sensor
P1341	High frequency corruption of cam signal during start up. Possible long crank	Disturbed signal from camshaft sensor
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> Engine stalls Long cranking time Engine will not start 		
Electrical faults	Diagnostic tool title	
OC on J1 - 53	Open circuit on camshaft sensor signal positive circuit	
SC on J1 - 53	Short circuit on camshaft sensor signal positive circuit	
OC on J1 - 54	Open circuit on camshaft sensor signal earth	
SC on J1 - 54	Short circuit on camshaft sensor signal earth	
??	??	



FAULT CODES AND CHECKS

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

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FAULT CODES AND CHECKS

VEHICLE SPEED RATE		
Diagnostic trouble code	Diagnostic tool title	Detection
P1500	Vehicle speed rate of change not valid	
P1501	"Tacho output shaft speed" out of range	
Fault LED	Recovery mode	
Symptoms		

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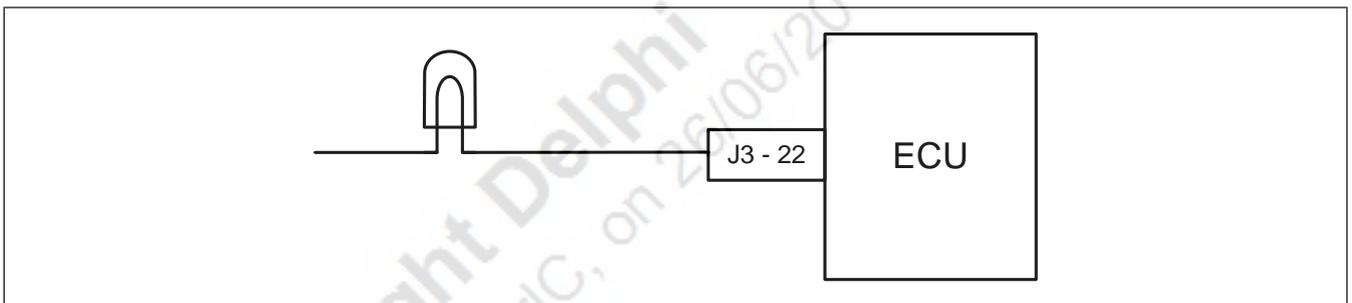
FAULT CODES AND CHECKS

OIL PARAMETERS		
Diagnostic trouble code	Diagnostic tool title	Detection
P150F	Oil level startup low warning level	
P1524	Oil pressure low	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

RED STOP LAMP CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
1650	Red stop lamp low side driver open circuit	
P1651	Red stop lamp low side driver short circuit low	A short circuit to Vbatt on the output drive for the Red Stop Lamp
P1652	Red stop lamp low side driver short circuit high	A short circuit to ground on the output drive for the Red Stop Lamp
Fault LED	Recovery mode	
On	None	
Symptoms		
None		
Electrical faults	Diagnostic tool title	
OC on J3 - 22	Open circuit on red stop lamp circuit	
SC on J3 - 22	Short circuit on red stop lamp circuit	



Fault chart (Code 1650 - P1651 - P1652)		
Stage	Operation / Decision	Result
1	Connection problem? Check the bulb connection	Perform the necessary repairs
2	Visually check bulb Bulb problem?	Replace the bulb
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

AMBER WARNING LAMP DRIVER		
Diagnostic trouble code	Diagnostic tool title	Detection
P1654	Amber warning lamp low side driver short circuit low	
P1655	Amber warning lamp low side driver short circuit high	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

ENGINE SPEED TACHO CIRCUIT

Diagnostic trouble code	Diagnostic tool title	Detection
P1656	Engine speed tacho low side driver short circuit low	Short circuit on engine speed tacho low side driver
P1657	Engine speed tacho low side driver short circuit high	Short circuit on engine speed tacho high side driver
Fault LED	Recovery mode	
On	None	
Symptoms		
No engine speed indication on tacho		
Electrical faults	Diagnostic tool title	
OC on J3 - 1	Open circuit on engine speed tacho circuit	
SC on J3 - 1	Short circuit on engine speed tacho circuit	



Fault chart (Code P1656 - P1657)

Stage	Operation / Decision	Result
1	Check the sensor connection Connection problem?	Perform the necessary repairs
2	Visually check sensor Sensor problem?	Replace the sensor
3	Check the ECU connection Connection problem?	Perform the necessary repairs
4	Check the electrical continuity and insulation of the wiring wiring problem?	Perform the necessary repairs
5	Check the end component End component problem?	Change the end component
6	Check the setting of the timing Timing problem?	Adjust the timing
7	Does the problem persist?	Replace the ECU
8	The problem is resolved	

FAULT CODES AND CHECKS

HARDWARE WATCHDOG		
Diagnostic trouble code	Diagnostic tool title	Detection
P1658	Fault on the hardware watchdog	Internal Fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

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FAULT CODES AND CHECKS

BOOTSTRAP MEMORY FAULT		
Diagnostic trouble code	Diagnostic tool title	Detection
P1674	Bootstrap memory fault with CODE-ID	Internal Fault
P1676	Bootstrap memory fault with MPI checksum	Internal Fault
P1677	Bootstrap memory fault with FRC checksum	Internal Fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

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FAULT CODES AND CHECKS

OIL LEVEL DRIVER		
Diagnostic trouble code	Diagnostic tool title	Detection
P1682	Oil level high side driver open circuit	
P1683	Oil level high side driver short circuit high	
P1684	Oil level high side driver short circuit low	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

BOOST SENSOR VALUE		
Diagnostic trouble code	Diagnostic tool title	Detection
P2074	If boost pressure sensor value above calculated boost pressure, a plausibility high error is flagged	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

PEDAL LIMP HOME		
Diagnostic trouble code	Diagnostic tool title	Detection
P2106	Pedal limp home active	Pedal limp home mode has been activated
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Engine runs but engine speed limited • Engine runs but on reduced engine power 		

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FAULT CODES AND CHECKS

PEDAL SENSOR		
Diagnostic trouble code	Diagnostic tool title	Detection
P2135	Pedal sensor out of range relative to idle valid switch	Pedal sensor out of range in proportion to the idle switch
Fault LED	Recovery mode	
On	Increased engine idle speed	
Symptoms		
<ul style="list-style-type: none"> • Lack of performance • Increased engine idle speed 		

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FAULT CODES AND CHECKS

CYLINDER 1, 2 OR 3 SHORT CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P2147	Cylinder 1, 2 or 3: Injector spill valve high side short circuit to ground	Internal fault
P2148	Cylinder 1, 2 or 3: Injector spill valve high side short circuit to battery voltage	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

CYLINDER 4, 5 OR 6 SHORT CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P2150	Cylinder 4, 5 or 6: Injector spill valve high side short circuit to ground	Internal fault
P2151	Cylinder 4, 5 or 6: Injector spill valve high side short circuit to battery voltage	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

COOLANT TEMPERATURE SENSOR 2 UNDER/OVER RANGE		
Diagnostic trouble code	Diagnostic tool title	Detection
P2184	Coolant temperature sensor 2 under range	
P2185	Coolant temperature sensor 2 over range	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

AMBIENT AIR PRESSURE UNDER/OVER RANGE		
Diagnostic trouble code	Diagnostic tool title	Detection
P2228	Ambient air pressure under range	Internal fault, pressure too low
P2229	Ambient air pressure over range	Internal fault, pressure too high
Fault LED	Recovery mode	
On	none	
Symptoms		
None		

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FAULT CODES AND CHECKS

OIL LEVEL SENSOR		
Diagnostic trouble code	Diagnostic tool title	Detection
P250A	Oil level diag low warning level	
P250B	Oil level startup not plausible	
P250C	Oil level out of range low	
P250D	Oil level out of range high	
P250E	Oil level tendency fault	
P250F	Oil level very low warning level	
P252F	Oil level high warning level	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FUEL PRESSURE SENSOR		
Diagnostic trouble code	Diagnostic tool title	Detection
P2541	Fuel pressure sensor under range	Fuel pressure sensor supply under 5V
P2542	Fuel pressure sensor over range	Fuel pressure sensor supply over 5V
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Unable to start engine • Poor engine starting • Engine noisy • Idle unstable • Lack of performance 		
Electrical faults	Diagnostic tool title	
OC on J1 - 42	Open circuit on fuel pressure positive circuit	
SC on J1 - 42	Short circuit on fuel pressure positive circuit	
OC on J1 - 45	Open circuit on fuel pressure signal	
SC on J1 - 45	Short circuit on fuel pressure signal	
OC on J1 - 46	Open circuit on fuel pressure signal earth	
SC on J1 - 46	Short circuit on fuel pressure signal earth	

FAULT CODES AND CHECKS

FAULT DATA RECEIPT		
Diagnostic trouble code	Diagnostic tool title	Detection
P2544	Fault data received for F_ENBR_Request_sw	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

ENGINE BRAKE REQUEST		
Diagnostic trouble code	Diagnostic tool title	Detection
P2550	Engine brake request level under range	
P2551	Engine brake request level over range	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

PRE-HEAT RELAY CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P2609	Preheat relay open circuit	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

RESERVE 2		
Diagnostic trouble code	Diagnostic tool title	Detection
P2669	Reserve 2 low side driver open circuit	
P2670	Reserve 2 low side driver short circuit low	
P2671	Reserve 2 low side driver short circuit high	
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 1 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3405	Jake brake cylinder 1 high side driver open circuit	
P3407	Jake brake cylinder 1 high side driver short circuit low	
P3408	Jake brake cylinder 1 high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 2 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3413	Jake brake cylinder 2 high side driver open circuit	
P3415	Jake brake cylinder 2 high side driver short circuit low	
P3416	Jake brake cylinder 2 high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 3 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3421	Jake brake cylinder 3 high side driver open circuit	
P3423	Jake brake cylinder 3 high side driver short circuit low	
P3424	Jake brake cylinder 3 high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 4 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3429	Jake brake cylinder 4 high side driver open circuit	
P3431	Jake brake cylinder 4 high side driver short circuit low	
P3432	Jake brake cylinder 4 high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 5 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3437	Jake brake cylinder 5 high side driver open circuit	
P3439	Jake brake cylinder 5 high side driver short circuit low	
P3440	Jake brake cylinder 5high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

JAKE BRAKE CYLINDER 6 CIRCUIT		
Diagnostic trouble code	Diagnostic tool title	Detection
P3445	Jake brake cylinder 6 high side driver open circuit	
P3447	Jake brake cylinder 6 high side driver short circuit low	
P3448	Jake brake cylinder 5high side driver short circuit high	
Fault LED	Recovery mode	
On	None	
Symptoms		
<ul style="list-style-type: none"> • Reduced engine braking ability 		

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FAULT CODES AND CHECKS

HARDWARE/SOFTWARE FAULT		
Diagnostic trouble code	Diagnostic tool title	Detection
PC011	Hardware or software fault on CAN1 bus	Internal fault
PC101	ETC1 message rate too low	Internal fault
PC103	ETC2 message rate too low	Internal fault
PC104	CCVS1 message rate too low	Internal fault
PC113	Ti1 message rate too low	Internal fault
PC120	Etc7 message rate too low	Internal fault
PC128	CCVS2 message rate too low	Internal fault
PC129	EBC1 message rate too low	Internal fault
PC133	VDC_1 message rate too low	Internal fault
PC140	HRVD message rate too low	Internal fault
PC141	TC01 message rate too low	Internal fault
PC142	TD message rate too low	Internal fault
PC155	J1939 proprietary message A rate too low	Internal fault
PC156	J1939 proprietary message B rate too low	Internal fault
PC157	AC_V message rate to low	Internal fault
PC404	"Selected gear" out of range fault	Internal fault
PC405	CCVS1 message rate to high	Internal fault
PC417	CCVS2 message rate too high	Internal fault
PC418	EBC1 message rate too high	Internal fault
PC422	HRVD message rate too high	Internal fault
PC431	TC01 message rate too high	Internal fault
PD011	Hardware or software fault on CAN2 bus	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

FAULT CODES AND CHECKS

ETC1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD101	ETC1 message rate too high	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

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FAULT CODES AND CHECKS

ETC2 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD103	ETC2 message rate too high	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

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FAULT CODES AND CHECKS

RC1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD110	RC1 message rate too low	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

Ti1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD113	Ti1 message rate too high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

TSC1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD119	TSC1_BE message rate too high	Internal fault
PD120	TSC1_BE message rate too low	Internal fault
PD121	TSC1_TE message rate too high	Internal fault
PD122	TSC1_TE message rate too low	Internal fault
PD123	TSC1_VE message rate too high	Internal fault
PD124	TSC1_VE message rate too low	Internal fault
PD125	TSC1_SE message rate too high	Internal fault
PD126	TSC1_SE message rate too low	Internal fault
PD127	TSC1_BR message rate too high	Internal fault
PD128	TSC1_BR message rate too low	Internal fault
PD129	TSC1_TR message rate too high	Internal fault
PD130	TSC1_TR message rate too low	Internal fault
PD133	TSC1_SR message rate too high	Internal fault
PD134	TSC1_SR message rate too low	Internal fault
Fault LED	Recovery mode	
On	None	
Symptoms		
None		

FAULT CODES AND CHECKS

TD MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD142	TD message rate too high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

J1939 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD155	J1939 proprietary message A rate too high	Internal fault
PD156	J1939 proprietary message B rate too high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

AC_V MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD157	AC_V message rate too high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FAULT DATA		
Diagnostic trouble code	Diagnostic tool title	Detection
PD179	Fault data received for F_Flex_RSG_sw	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

PARASITIC LOSSES		
Diagnostic trouble code	Diagnostic tool title	Detection
PD180	Parasitic losses "out of range" fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

FRONT AXLE SPEED		
Diagnostic trouble code	Diagnostic tool title	Detection
PD188	Front axle speed "out of range" fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

ERC1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD189	Erc1_dr message rate to high	Internal fault
PD190	Erc1_dr message rate to low	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

ETC7 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD192	Etc7 message rate to high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

DD MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD193	DD message rate too high	Internal fault
PD194	DD message rate too low	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

EBC2 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD197	EBC2 message rate too high	Internal fault
PD198	EBC2 message rate too low	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

TSCR1_DR MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD199	TSCR1_DR message rate too high	Internal fault
PD200	TSCR1_DR message rate too low	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

DSC FAULT DATA		
Diagnostic trouble code	Diagnostic tool title	Detection
PD205	Fault data received for DSC_Off_request_sw	Internal fault
PD206	Fault data received for DSC_On_request_sw	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

ACTUAL RETARDER		
Diagnostic trouble code	Diagnostic tool title	Detection
PD544	"Actual retarder - percent torque" out of range fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

INTENDED RETARDER		
Diagnostic trouble code	Diagnostic tool title	Detection
PD545	"Intended retarder - percent torque" out of range fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

DRIVER RETARDER		
Diagnostic trouble code	Diagnostic tool title	Detection
PD546	"Driv retarder dem - percent torque" out of range fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

RETARDER SELECTION		
Diagnostic trouble code	Diagnostic tool title	Detection
PD547	"Retarder selection" out of range fault	Internal fault
Fault LED	Recovery mode	
Symptoms		

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FAULT CODES AND CHECKS

VDC_1 MESSAGE		
Diagnostic trouble code	Diagnostic tool title	Detection
PD645	VDC_1 message rate too high	Internal fault
Fault LED	Recovery mode	
Symptoms		

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LIST OF FAULTS / SYMPTOMS

These are faults which cannot be detected by the auto-diagnostic function of the ECU.

- Irregular acceleration - deceleration
- Engine hesitation
- Engine stops – stalls
- Rushing noise
- Interference noise
- Engine knocking
- High fuel consumption
- Engine difficult to start when warm
- Engine starts then stalls
- Smoke when accelerating
- Blue and white smoke
- Black smoke
- Lack of power
- Engine does not start
- Engine does not stop
- Engine fades when moving off
- Strong smell of fuel
- Exhaust smells
- Idle speed stuck
- Unsteady idle – Hunting
- Engine overheating
- Excess engine speed upon releasing accelerator
- Too much power
- Hesitation when accelerating

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LIST OF FAULTS / SYMPTOMS

3.1 Irregular Acceleration - Deceleration

⚠ CAUTION**Refer to relevant cleanliness and safety instructions before starting work .**

Stage	Operation / Decision	Result
1	Sensor pedal fault ?	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of pedal signal (0 - 100%)
2	Change in Fuel Pressure sensor not detected	Check fuel pressure when cranking
3	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection • SV breather • Valve is not seized or broken
4	Intermittent wiring fault	<ul style="list-style-type: none"> • EUP connections • EGR solenoid valve connector (if applicable)
5	Check engine oil	<ul style="list-style-type: none"> • Oil grade is correct • Oil level is correct • Oil is not diluted by fuel • Condition of engine breathing system • Condition of turbo bearings (if applicable)
6	Intermittent Wiring fault	<ul style="list-style-type: none"> • Fuel pressure sensor connections • EUP connections • Knock Sensor (accelerometer) connections (if applicable)
7	Fuel problem	Fuel is correct
8	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
9	Software problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.2 Engine Hesitation

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Out of fuel?	<ul style="list-style-type: none"> For fuel in tank / priming unit Level sender operation Fuel is correct (petrol, water)/ take sample
2	Check fuel supply system	<ul style="list-style-type: none"> Return circuit is correct (not split, blocked, etc.) Pump supply hoses and air intake for splits etc. Fuel filter seal for leaks Low pressure connections incorrect Fuel filter clogged Incorrect fuel filter fitted (part number) Low pressure fuel circuit blocked Air leak in low pressure circuit Pump return circuit blocked Tank seals leaking / breather blocked
3	Engine cooling	Cooling fans are in good condition and working correctly
4	Engine electrical & mechanical systems	<ul style="list-style-type: none"> Alternator charge Battery voltage Air con compressor Automatic transmission Power steering, etc.
5	Check EUP Trim Code	Cylinder by cylinder
6	Sensor fault	<ul style="list-style-type: none"> Read manifold temperature and pressure values Read coolant temperature Read vehicle speed (if applicable) Read accelerator pedal setting
7	EGR valve (if applicable)	<ul style="list-style-type: none"> Vacuum circuit connection is correct SV breather Valve seized or broken
8	Intermittent Wiring fault	Check using a known method (check connector, wiring, resistance, harness test, etc.)
9	Preheating plugs	Plugs/harness/units are correct
10	Engine compression	Cylinder compression test
11	Injector problem	<ul style="list-style-type: none"> Injector clogged Needle stuck Sealing washers (missing, double or incorrect)
12	ECU Software Problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.3 Engine Stops – Stalls

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check immobiliser function (if applicable)	Immobiliser and ECU function diagnostic
2	ECU power supply U/S?	<ul style="list-style-type: none"> • Fuses • Relays • ECU earth • Harness wiring • Battery & charging circuit
3	Check fuel system	<ul style="list-style-type: none"> • For fuel in tank / priming unit • Level sender operation • Fuel is correct (petrol, water)/ take sample
4	Check fuel supply system	<ul style="list-style-type: none"> • Return circuit is correct (not split, blocked, etc.) • Pump supply hoses and air intake for splits etc • Fuel filter seal for leaks • Fuel filter clogged • Low pressure fuel circuit blocked • Air leak in low pressure circuit • Pump return circuit blocked • Tank seals leaking / breather blocked
5	Presence of a High Pressure Fuel leak?	<ul style="list-style-type: none"> • visually • smell
6	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
7	High Pressure Fuel System	<ul style="list-style-type: none"> • EUP • Injectors • Pipes
8	ECU Software Problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.4 Rushing Noise

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check Pump Trim Code	Cylinder by cylinder
2	Change in Fuel Pressure sensor not detected	Check fuel pressure when cranking
3	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
4	Intermittent Wiring fault	<ul style="list-style-type: none"> Fuel pressure sensor connections EUP connections Knock Sensor (accelerometer) connections
5	Incorrect injector	Injector is correct
6	Fuel problem	Fuel is correct
7	ECU Software Problem	Change ECU

3.5 Interference Noises

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Noise from Injector and/or EUP	<ul style="list-style-type: none"> "Buzzing" noise from EUP Compare with actuator test Injector/EUP incorrectly secured
2	High pressure pipe noise	<ul style="list-style-type: none"> Clips are correct Condition of clips
3	Engine electrical & mechanical systems	<ul style="list-style-type: none"> Alternator Clutch Air con compressor Automatic transmission Power steering Turbo Other, etc.
4	Air intake noises	<ul style="list-style-type: none"> Air filter Air line is correct (flowmeter, exchanger, etc.) Turbo
5	Check exhaust system	<ul style="list-style-type: none"> Exhaust outlet Catalytic converter element broken and loose (if applicable) Catalytic converter clogged (if applicable)
6	Noise from accessories	Auxiliary heating (if applicable)

LIST OF FAULTS / SYMPTOMS

3.6 Engine Knocking

⚠ CAUTION**Refer to relevant cleanliness and safety instructions before starting work .**

Stage	Operation / Decision	Result
1	Check trim code on EUP	Cylinder by cylinder
2	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
3	Change in Fuel Pressure sensor NOT detected	Check fuel pressure when cranking
4	Change in air flow sensor	Read value of air flow and compare with nominal
5	EGR valve stuck open or closed (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
6	Injector fuel return system	<ul style="list-style-type: none"> • Condition of pipes/hoses • Condition of nozzle holes
7	Preheating resistors	<ul style="list-style-type: none"> • Condition of Pre and Post Heating harness • Pre and Post Heating relay • Condition of plugs
8	Engine compression	Cylinder compression test
9	Incorrect injector	<ul style="list-style-type: none"> • Injector is correct • Sealing washer on cylinder head
10	Injector problem	<ul style="list-style-type: none"> • Is injector clogged? • Is the needle stuck?
11	ECU Software Problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.7 High Fuel Consumption

⚠ CAUTION**Refer to relevant cleanliness and safety instructions before starting work .**

Stage	Operation / Decision	Result
1	Check vehicle	<ul style="list-style-type: none"> • Tyres are correct • Accessories (roof rack, etc) • Handbrake • Equipment, etc.
2	Check EUP trim code	Cylinder by cylinder
3	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering, etc.
4	Check fuel Supply system	<ul style="list-style-type: none"> • Injector return system • Pump return system
5	Check quality of fuel	<ul style="list-style-type: none"> • Fuel is correct (presence of petrol, water, etc.) • Take a sample
6	Presence of a leak?	<ul style="list-style-type: none"> • visually • smell
7	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
8	Check air inlet system	<ul style="list-style-type: none"> • Altitude • Condition of turbo(heat exchanger, ducts, etc.) • Leak downstream of turbo • Air filter (clogged & correct) • System is correct • Operation of air throttle (if fitted)
9	Check oil level	Oil level too high
10	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
11	Engine compression	Cylinder compression test
12	Injector problem	Injector is correct
13	ECU Software Problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.8 Engine Difficult To Start When Warm

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check fuel system	<ul style="list-style-type: none"> For fuel in tank / priming unit Level sender operation Fuel is correct (petrol, water)/ take sample
2	Check starter motor / battery	Battery charge / voltage
3	Battery or starter motor U/S?	Replace
4	Check fuel supply system	<ul style="list-style-type: none"> Return system is correct (not split, blocked, etc.) Pump supply hoses and air intake for splits etc. Fuel filter seal for leaks Fuel filter clogged Low pressure fuel system blocked Air leak in low pressure system Pump return circuit blocked Tank seals leaking / breather blocked
5	Presence of a large High Pressure Fuel leak?	<ul style="list-style-type: none"> visually smell
6	Power supply ECU U/S?	<ul style="list-style-type: none"> relays ECU earths corroded
7	Check air inlet system	<ul style="list-style-type: none"> Air filter System layout is correct Operation of air throttle (if fitted)
8	Check exhaust system	<ul style="list-style-type: none"> Exhaust outlet Catalytic converter element broken and loose (if applicable) Catalytic converter clogged (if applicable)
9	Check EUP Trim Codes	Cylinder by cylinder
10	Change in Fuel Pressure sensor not detected	Check fuel pressure when cranking
11	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> Vacuum circuit connection is correct SV breather Valve seized or broken
12	Intermittent wiring fault	Known method (connector, wiring test, etc.)
13	Engine compression	Cylinder compression test
14	Injector problem	<ul style="list-style-type: none"> Injector clogged Needle stuck
15	ECU Software Problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.9 Engine Starts Then Stalls

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Out of fuel?	<ul style="list-style-type: none"> For fuel in tank / priming unit Level sender operation Fuel is correct (petrol, water)/ take sample
2	Control starter motor / battery	Battery charge / voltage
3	Battery or starter motor U/S?	Replace
4	Check fuel supply system	<ul style="list-style-type: none"> Return system is correct (not split, blocked, etc.) Pump supply hoses and air intake for splits etc Fuel filter seal for leaks Fuel filter clogged Low pressure fuel circuit blocked Air leak in low pressure system Pump return system blocked Tank seals leaking / breather blocked
5	Presence of a large High Pressure Fuel leak?	<ul style="list-style-type: none"> visually smell
6	Power supply ECU U/S?	<ul style="list-style-type: none"> relays ECU earthed corroded
7	Check air inlet system	<ul style="list-style-type: none"> Inlet manifold air temperature and pressure Air filter System layout is correct Operation of air throttle (if fitted)
8	Check exhaust system	<ul style="list-style-type: none"> Exhaust outlet Catalytic converter element broken and loose (if applicable) Catalytic converter clogged (if applicable)
9	Check EUP Trim code	Cylinder by cylinder
10	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
11	Change in Fuel Pressure sensor Not detected	Check fuel pressure when cranking
12	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> Vacuum circuit connection is correct SV breather Valve seized or broken
13	Crank signal lost after starting	Cranksignal is correct
14	EUP problem	Fuel pressure when starting
15	Intermittent Wiring fault	Known method (connector, wiring test, etc.)
16	Preheating resistors	Plugs/harness/relay is correct
17	Engine compression	Cylinder compression test

LIST OF FAULTS / SYMPTOMS

Stage	Operation / Decision	Result
18	Injector problem	<ul style="list-style-type: none"> • Injector clogged • needle stuck or blocked open
19	ECU Software Problem	Change ECU

3.10 Smoke When Accelerating

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Driving conditions	Driving conditions when it occurred (Town, altitude, speed, towing, etc.)
2	Check EUP trim code	Cylinder by cylinder
3	Change in air flow sensor	Read value of air flow and compare with nominal
4	Change in Fuel Pressure sensor Not detected	Check fuel pressure when cranking
5	Change in turbo pressure sensor not detected	Read value of turbo pressure and compare with a nominal value
6	Change in Atmospheric pressure sensor not detected	Read value of atmospheric pressure and compare with a nominal value
7	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
8	Check EGR OCR change (if applicable)	Read value of OCR and compare with a nominal value
9	Intermittent Wiring fault	Known method (connector, wiring test, etc.)
10	Check EGR (if applicable)	<ul style="list-style-type: none"> • Condition of the valve (seized or broken) • Vacuum circuit connection is correct • Value of vacuum pump vacuum • SV breather • Condition of valve • Operation of air throttle (if fitted)
11	Check air inlet system	<ul style="list-style-type: none"> • Airflow • Air filter • System is sealed • Operation of air throttle (if fitted)
12	Check engine	<ul style="list-style-type: none"> • Coolant consumption • Oil level (too high) • Oil vapour circuit • Turbo bearings • Injector fixings • Cylinder compression • Injector / cylinder head sealing washer

LIST OF FAULTS / SYMPTOMS

Stage	Operation / Decision	Result
13	Check fuel	<ul style="list-style-type: none"> • Presence of water in the filter • Fuel is correct (mixture, quality) • Unsuitable additive
14	Check exhaust system	<ul style="list-style-type: none"> • Diesel particulate filter damaged or regenerating (if applicable) • Catalytic converter clogged (if applicable)
15	Incorrect injector	<ul style="list-style-type: none"> • Injector is correct • Sealing washer on cylinder head
16	Injector problem	<ul style="list-style-type: none"> • Injector clogged • Needle stuck
17	ECU Software Problem	Change ECU

3.11 Blue And White Smoke

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check fuel	<ul style="list-style-type: none"> • Presence of water in the filter • Fuel is correct (mixture, quality) • Unsuitable additive
2	Unsuitable additive	<ul style="list-style-type: none"> • Coolant consumption • Oil level (too high) • Oil vapour circuit • Turbo bearings • Injector fixings • Cylinder compression • Injector / cylinder head sealing washer
3	Check air inlet system	<ul style="list-style-type: none"> • Airflow • Air filter • System is sealed • Operation of air throttle (if fitted)
4	Check exhaust system	<ul style="list-style-type: none"> • Diesel Particle filter damaged or regenerating (if applicable) • Catalytic converter clogged (if applicable)
5	Check Pre and Post Heat system	<ul style="list-style-type: none"> • Relay • Glow Plugs

LIST OF FAULTS / SYMPTOMS

3.12 Black Smoke

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check EUP Trim Code	EUP trim codes are correct
2	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
3	Change in Fuel Pressure sensor Not detected	Check fuel pressure when cranking
4	Change in air flow sensor	Read value of air flow and compare with nominal value
5	Check air inlet system	<ul style="list-style-type: none"> • Airflow • Air filter • System is sealed • Operation of air throttle (if fitted)
6	Check EGR System (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • condition of valve • operation of air throttle (if fitted)
7	Check exhaust system	<ul style="list-style-type: none"> • "Town" type driving • Exhaust downpipe • Diesel Particle filter clogged (if applicable) • Catalytic converter clogged (if applicable)
8	Check Injector	Injector "leaking"
9	ECU Software Problem	Change ECU

3.13 Lack Of Power

Stage	Operation / Decision	Result
1	Check vehicle	<ul style="list-style-type: none"> • Tyres are correct • Accessories (roof rack, etc.) • Handbrake • Equipment, etc
2	Check EUP Trim Code	Cylinder by cylinder
3	Pedal sensor fault	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of pedal signal (0 - 100%)
4	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering, etc.

LIST OF FAULTS / SYMPTOMS

Stage	Operation / Decision	Result
5	Change in engine Sensors not detected	<ul style="list-style-type: none"> • Read flowmeter value • Read turbocharging pressure • Read accelerator pedal setting
6	Check fuel supply	<ul style="list-style-type: none"> • Pump supply hoses and air intake system for splits etc. • Fuel filter seal for leaks / filter clogged • Fuel heating • Unsuitable fuel filter (part number) • Low pressure fuel system blocked • Air leak in low pressure system • Pump return system blocked • Tank seals leaking / breather blocked
7	Presence of a large high pressure fuel leak?	<ul style="list-style-type: none"> • visually • smell
8	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
9	Check air inlet system	<ul style="list-style-type: none"> • Altitude • Condition of turbo (heat exchanger, ducts, etc.) • Leak downstream of turbo • Air filter (clogged & correct) • System is sealed • Operation of air throttle (if fitted)
10	Check oil level	Oil level too high
11	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable)
12	Engine compression	Cylinder compression test
13	Injector problem	<ul style="list-style-type: none"> • Injector clogged • Needle stuck
14	ECU Software problem	Change ECU

LIST OF FAULTS / SYMPTOMS

3.14 Engine Does Not Start

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check immobiliser function (if applicable)	Immobiliser and ECU function diagnostic
2	Out of fuel?	<ul style="list-style-type: none"> For fuel in tank / priming unit Level sender operation Fuel is correct (petrol, water)/ take sample
3	Check starter motor / battery	Battery charge / voltage
4	Battery or starter motor U/S?	Replace
5	Check fuel supply	<ul style="list-style-type: none"> Pump supply hoses and air intake system for splits etc. Fuel filter seal for leaks / filter clogged Low pressure connection inverted Unsuitable fuel filter (part number) Low pressure fuel system blocked Air leak in low pressure system Pump return system blocked Tank seals leaking / breather blocked
6	Presence of a large high pressure fuel leak?	<ul style="list-style-type: none"> visually smell
7	Power supply ECU U/S?	<ul style="list-style-type: none"> fuse relays ECU earths
8	Check air inlet system	<ul style="list-style-type: none"> Inlet manifold air temperature and pressure Air filter System is sealed operation of air throttle (if fitted)
9	Check exhaust system	<ul style="list-style-type: none"> Exhaust outlet Catalytic converter element broken and loose (if applicable) Catalytic converter clogged (if applicable)
10	Check EUP trim code	Cylinder by cylinder
11	Change in Coolant temperature sensor not detected	Check ambient coolant temperature value
12	Change in Fuel Pressure sensor Not detected	Check fuel pressure when cranking
13	Cam and crank signals missing simultaneously	<ul style="list-style-type: none"> (when cranking) Cam signal is correct Crank signal is correct
14	Fuel quality (presence of water)	Take a fuel sample from the tank
15	Intermittent Wiring fault	Known method (connector, wiring test, etc.)

LIST OF FAULTS / SYMPTOMS

Stage	Operation / Decision	Result
16	Preheating resistors	Preheating resistors
17	Engine compression	Cylinder compression test
18	Transfer pump U/S	Measurement of pump return flow
19	Injector U/S	Change injector
20	ECU Software problem	Change ECU

3.15 Engine Does Not Stop

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check wiring harness	ECU wiring harness is correct (Short circuit to positive)
2	Check engine oil	<ul style="list-style-type: none"> • Oil grade • Oil level is correct • Oil diluted by fuel • Condition of oil vapour recycling circuit) • Condition of turbo bearings (Internal cleanliness of circuit)
3	ECU software problem	change ECU if problem persists

LIST OF FAULTS / SYMPTOMS

3.16 Engine Fades When Moving Off

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Pedal sensor fault	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of pedal signal (0 - 100%)
2	Change in fuel pressure sensor not detected	Check value of fuel pressure
3	Change in turbo pressure sensor not detected	Check value of turbo pressure and compare with a nominal value
4	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering • Brakes stuck on, etc.
5	Check fuel supply	<ul style="list-style-type: none"> • Fuel system for splits, blockages, etc. and injector fuel return system • Pump supply and/or air intake hoses split • Fuel filter seals leaking / filter clogged • Low pressure fuel system blocked • Air leak in low pressure system • Tank seals / breather leaking
6	Check air intake system	<ul style="list-style-type: none"> • air filter • System is sealed (flowmeter, exchanger, etc.) • operation of air throttle (if fitted)
7	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
8	Intermittent Wiring fault	Known method (connector, wiring test, etc.)
9	Check engine	<ul style="list-style-type: none"> • Coolant consumption • Oil level (too high) • Oil vapour circuit • Turbo bearings • Injector fastenings • Cylinder compression • Injector / cylinder head sealing washer
10	ECU Software problem	change ECU if problem persists

LIST OF FAULTS / SYMPTOMS

3.17 Strong Smell Of Fuel

⚠ CAUTION**Refer to relevant cleanliness and safety instructions before starting work .**

Stage	Operation / Decision	Result
1	Check low pressure fuel system	<ul style="list-style-type: none"> • Tank is correct (filler neck, breather, connectors, etc.) • Fuel filter is correct (type, click-fit connectors, heater, etc.) • Pump is correct (click-fit connectors, etc.) • Venturi blocked / correct fuel temp. sensor (type, click-fit connectors, sensor mounting, etc.) • Priming unit is correct • Injector return system is correct • Auxiliary heating is correct (if fitted)
2	Check high pressure fuel system	<ul style="list-style-type: none"> • Electronic unit pump is correct (HP pipes etc.) • Correct pressure sensor (type, thread, etc.) • Injectors are correct (fastening, connectors, etc.)

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LIST OF FAULTS / SYMPTOMS

3.18 Exhaust Smells

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
2	Check oil level	Oil level too high
3	Turbo problem	Condition of turbo bearings
4	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
5	Injector problem	<ul style="list-style-type: none"> • Injector is correct • Injector mounting • Sealing washers (correct, double or missing)
6	ECU software problem	Change ECU if problem persists

3.19 Idle Speed Stuck

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Change in Coolant temperature sensor not detected	<ul style="list-style-type: none"> • Check ambient coolant temperature value • Check sensor circuit (resistance, connector, continuity) • Bleed cooling circuit
2	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering, etc.
3	Battery U/S?	Replace
4	Check accelerator function	<ul style="list-style-type: none"> • Sensor mounting • Pedal travel
5	ECU Software problem	Change ECU if problem persists

LIST OF FAULTS / SYMPTOMS

3.20 Unsteady Idle – Hunting

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check fuel system	<ul style="list-style-type: none"> • For fuel in tank / priming unit • Level sender operation • Fuel is correct (petrol, water)/ take sample
2	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering, etc.
3	Battery U/S?	Replace
4	Check fuel supply	<ul style="list-style-type: none"> • Fuel system for splits, blockages, etc and injector fuel return system • Pump supply and/or air intake hoses split • Fuel filter seals leaking / filter clogged • Low pressure fuel system blocked • Air leak in low pressure system • Pump return system blocked • Tank seals / breather leaking
5	Presence of a large high pressure fuel leak?	<ul style="list-style-type: none"> • visually • smell
6	Harness not correct?	<ul style="list-style-type: none"> • relays • ECU earthed corroded • wiring, etc.
7	Check air inlet system	<ul style="list-style-type: none"> • air filter • System is sealed • operation of air throttle (if fitted)
8	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
9	Check EUP trim code	Cylinder by cylinder
10	Preheating plug circuit	Plugs are correct (post heating)
11	Change in fuel pressure sensor not detected	Read value of fuel pressure
12	EGR circuit (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
13	Knock sensor system (if applicable)	Sensor is fitted correctly

LIST OF FAULTS / SYMPTOMS

Stage	Operation / Decision	Result
14	Intermittent Wiring fault	Known method (connector, wiring test, etc.)
15	Engine compression	Cylinder compression test
16	Injector problem	<ul style="list-style-type: none"> • Injector mounting • Injector clogged • Needle stuck
17	ECU Software problem	Change ECU if problem persists

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LIST OF FAULTS / SYMPTOMS

3.21 Engine Overheating

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check fuel system	<ul style="list-style-type: none"> • Fuel quality • Diesel is correct (petrol, water) • Take sample
2	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Air con compressor • Automatic transmission • Power steering, etc.
3	Change in coolant temperature sensor not detected	<ul style="list-style-type: none"> • Consistency of ambient value • Check sensor system (resistance, connector, continuity) • Bleed cooling system
4	Check cooling system	<ul style="list-style-type: none"> • Fans • Harness • Fan supply (Fuses, relays, etc.)
5	Check exhaust system	<ul style="list-style-type: none"> • Exhaust outlet • Catalytic converter element broken and loose (if applicable) • Catalytic converter clogged (if applicable)
6	Preheater plug circuit	Plug supply is correct
7	EGR system (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
8	Check engine	<ul style="list-style-type: none"> • Coolant consumption • Oil level (too high) • Oil vapour circuit • Turbo bearings • Injector fastening • Cylinder compression • Injector cylinder head sealing washer
9	ECU Software problem	Change ECU if problem persists

LIST OF FAULTS / SYMPTOMS

3.22 Excess Engine Speed Upon Releasing Accelerator

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Clutch problem	<ul style="list-style-type: none"> • Clutch is correct • Mechanism adjustment • Wear condition
2	Check EUP trim code	Cylinder by cylinder
3	Accelerator pedal sensor fault	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of pedal signal (0 - 100%)
4	Clutch pedal sensor fault	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of signal (on / off)
5	Check oil level	Oil level too high
6	Intermittent wiring fault	Known method (connector, wiring, resistance harness test, etc.)
7	Injector problem	Injector is correct
8	Turbo problem	Turbo pressure regulation
9	ECU Software problem	Change ECU if problem persists

LIST OF FAULTS / SYMPTOMS

3.23 Too Much Power

⚠ CAUTION**Refer to relevant cleanliness and safety instructions before starting work .**

Stage	Operation / Decision	Result
1	Check EUP trim code	Cylinder by cylinder
2	Turbo problem	<ul style="list-style-type: none"> • Turbo is correct • Condition of turbo
3	EGR valve blocked closed (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
4	Check oil level	Oil level too high
5	Injector problem	Injector is correct
6	ECU software problem	Change ECU if problem persists

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LIST OF FAULTS / SYMPTOMS

3.24 Hesitation When Accelerating

⚠ CAUTION

Refer to relevant cleanliness and safety instructions before starting work .

Stage	Operation / Decision	Result
1	Check air inlet system	Air inlet system is sealed (all components)
2	Turbo pressure problem	Compare setting and feedback
3	Pedal sensor fault	<ul style="list-style-type: none"> • Sensor mounting • Sensor movement • Consistency of pedal signal (0 - 100%)
4	EGR valve stuck open (if applicable)	<ul style="list-style-type: none"> • Vacuum circuit connection is correct • SV breather • Valve seized or broken
5	Check fuel supply system	<ul style="list-style-type: none"> • Low pressure circuit • Fuel filter clogged • Air leak in low pressure system • Fuel tank seals / breather leaking
6	Engine electrical & mechanical systems	<ul style="list-style-type: none"> • Alternator charge • Battery voltage • Air con compressor • Automatic transmission • Power steering, etc.
7	Engine compression	Cylinder compression test
8	Presence of an high pressure leak?	<ul style="list-style-type: none"> • visually • smell
9	Check exhaust system	Condition of exhaust system (catalytic converter)
10	Injector problem	Replace
11	Fuel problem	Fuel is correct
12	ECU Software problem	Change ECU if problem persists

DESCRIPTION OF THE CHECKS

4.1 Electrical Supply System Checks

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Electrical supply checks: Check battery is charged and alternator is working correctly Charging system correct?	Perform the necessary repairs
2	Check the fuses Fuses correct?	Perform the necessary repairs
3	Check the supply relay is operating correctly Supply relay operating correctly?	Replace the supply relay
4	Check the ECU earth ECU earth OK?	Perform the necessary repairs
5	Electrical supply system OK	

4.2 Inlet Air System Check

Fault chart (Code)		
Stage	Operation / Decision	Result
1	No air leaks? Inlet air system check. Check there are no air leaks	Perform the necessary repairs
2	Check the condition of the air filter Air filter condition OK?	Replace the air filter
3	Ensure that the inlet manifold is not blocked Inlet Manifold blocked?	Clean the inlet manifold
4	Air inlet system OK	

4.3 Low Pressure System Check

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Low pressure system check (fuel supply system and return system): Check the connections are correct Connections ok?	Perform the necessary repairs
2	Look for leaks on the hoses and click-fit connectors Presence of leaks?	Perform the necessary repairs
3	Check the diesel filter is correct Filter incorrect or clogged?	Replace the filter with an original part
4	Check for air leaks (air bubbles in the diesel) Presence of air?	Bleed the low pressure circuit
5	Check the fuel tank is sealed and the breather not clogged Fuel tank problem?	Perform the necessary repairs
6	Low pressure fuel system correct	

DESCRIPTION OF THE CHECKS

4.4 Locating High Pressure Leaks

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Visually/smell High pressure leaks?	Perform the necessary repairs
2	End	

4.5 Engine Parameter Check

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Check the consistency of the dynamic parameters using the diagnostic tool: - Parameters within the tolerances (see table below) - Consistency of parameter values (ensure there is no change) - Stability of values Parameters incorrect?	Perform the necessary repairs
2	End	

Dynamic parameters	Min limit	Max limit	Units	Conditions
Idle setting	600	2250	rpm	1400 rpm corresponds maximum high idle speed
Accelerator pedal	The value displayed must be between 0% and 100%. It increases as the accelerator pedal is pressed. Typical value (accelerator pedal released): 0% Typical value (accelerator pedal pressed): 100%			
Coolant temperature	The coolant temperature must be between -40°C and +135°C			
Air temperature	The air temperature must be between -40°C and +135°C			
Diesel temperature	The diesel temperature must be between -40°C and +135°C			
Battery voltage	9	32	Volt	Engine off
Vehicle speed	0	0	kph	Vehicle stationary
Boost pressure	50	300	kPa	
Linearised sensor supply	4.8	5.2	Volt	Normal operation
Manifold pressure	Boost pressure		kPa	Idling, engine warm

4.6 Check EUP Trim Code

Fault chart (Code)		
Stage	Operation / Decision	Result
1	Read the trim codes saved in the ECU Do the trim codes saved in the memory correspond to the EUPs?	Write trim codes using diagnostic tool. Take care with cylinder number!
2	End	

DESCRIPTION OF THE CHECKS

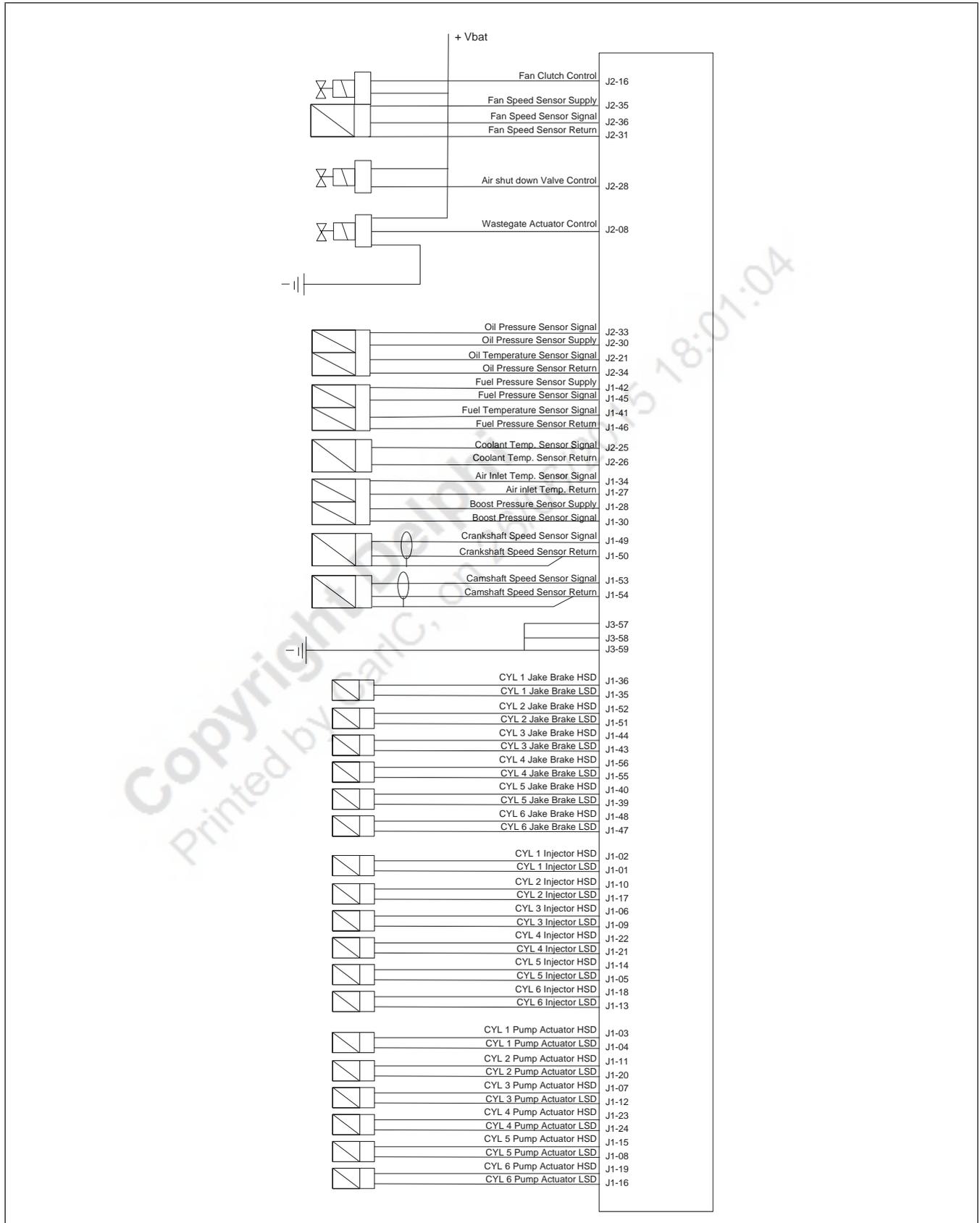
4.7 ECU Check

Fault chart (Code)		
Stage	Operation / Decision	Result
1	ECU check: Check the connectors are correct Connectors incorrect?	Correct the connectors
2	Replace the ECU	

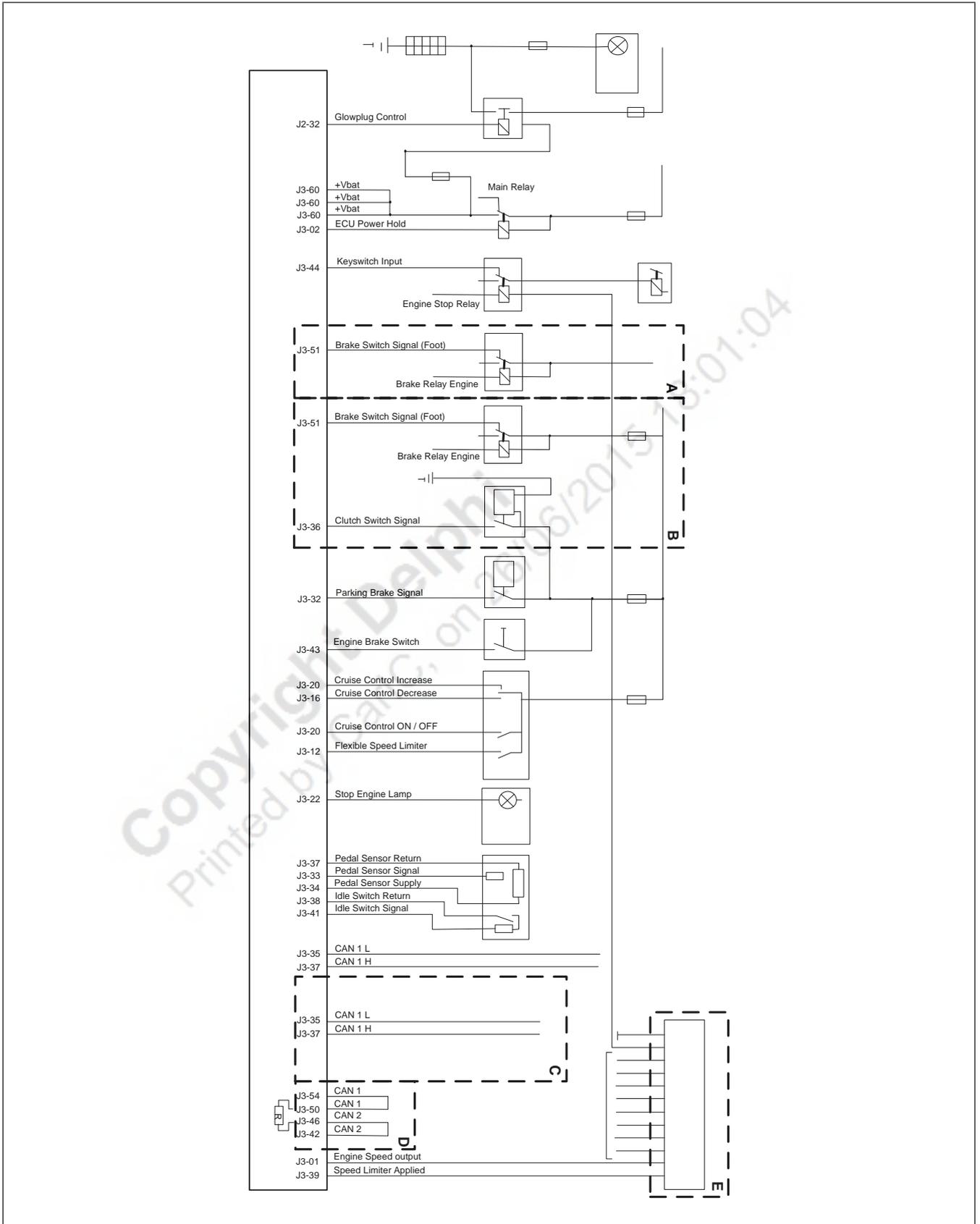
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APPENDIX

5.1 Wiring Diagrams



APPENDIX



APPENDIX

5.2 Abbreviations Used In This Manual

0V	Chassis ground
°C	Degrees Celsius
°K	Degrees Kelvin
DTC	Diagnostic Trouble Code
+BAT	Battery voltage
+Bat or VBat	Battery voltage
+Bat or VBATT	Battery voltage
A	Amps
A/C	Air Conditioning
CAN	Controller Area Network
CPU	Central Processing Unit
DCU	Diesel Control Unit
ECU	Electronic Control Unit
EGR	Exhaust Gas Recirculation
EUP	Electronic Unit Pump
ETC	Electronic Truck Controller
H	High (CAN)
HP	High Pressure.
HV	High Voltage
Hexadecimal	16 character number base from 0 to F
"Key-on/off"	The action of turning the ignition key to the on/off positions
km/h	Kilometres per Hour
kPa	Kilo Pascals
kW	Kilo Watts
LV	Low Voltage
Max	Maximum
Min	Minimum
mm	Millimetres
mV	Millivolts
OBD	On Board Diagnostic (diagnostics linked to emissions)
OC	Open Circuit
PWM	Pulse Width Modulation
rpm	Revolutions per Minute
S	Seconds
SC	Short circuit.
SV	Solenoid valve
SCV	Spill Control Valve
Temp.	Temperature
Trim	Individual Electronic Unit Pump Correction
V	Volts

FAULT CODE INDEX

Diagnostic trouble code	Diagnostic tool title	Page number
1650	Red stop lamp low side driver open circuit	2-83
P0016	Cam sensor signal not in sync with engine position	2-1
P0017	Crank sensor signal not in sync with engine position	2-2
P0045	VGT PWM driver open circuit	2-3
P0047	VGT PWM driver short circuit low	2-3
P0048	VGT PWM driver short circuit high	2-3
P0069	Boost air pressure out of range at powerup	2-4
P0070	AC_V	2-5
P0072	Ambient air temperature under range	2-5
P0073	Ambient air temperature over range	2-5
P0087	Fuel pressure too low	2-6
P0088	Pressure relief valve is stuck in closed position	2-7
P0107	Boost air pressure under range	2-8
P0108	Boost air pressure over range	2-8
P0112	Boost air temp under range	2-8
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P0118	Coolant temp sensor over range	2-10
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P0122	Pedal position under range	2-12
P0123	Pedal position over range	2-12
P0180	Fuel temperature out of range at powerup	2-14
P0181	If difference between fuel temp and air temp, then plausibility error flagged.	2-14
P0182	Fuel temperature signal - low	2-14
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P0197	Oil temperature under range	2-16
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P0203	Cylinder 3: Injector spill valve open circuit	2-17
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P0246	Turbo wastegate CBP PWM driver short circuit high	2-21
P0261	Cylinder 1: Injector spill valve low side short circuit to ground	2-22
P0262	Cylinder 1: Injector spill valve low side short circuit to battery	2-22
P0263	Injector 1 balance max range error	2-22
P0264	Cylinder 2: Injector spill valve low side short circuit to ground	2-22
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