Group 30 Electrical system

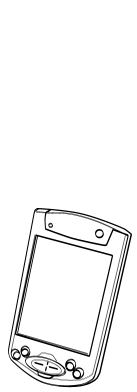
Industrial Engines

TAD734GE, TAD650VE, TAD660VE, TAD750VE, TAD760VE

Contents

7747632 English 03-2007

Special tools



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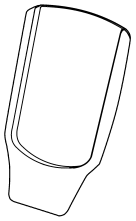

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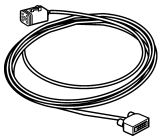

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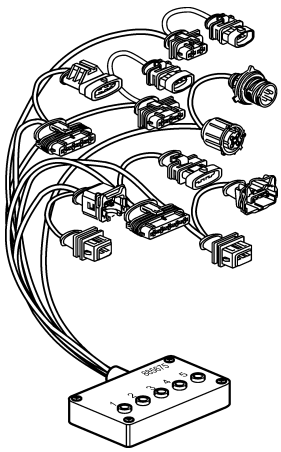

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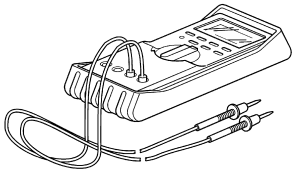

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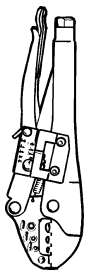

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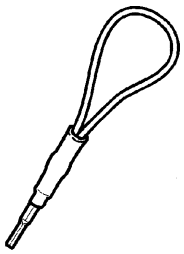

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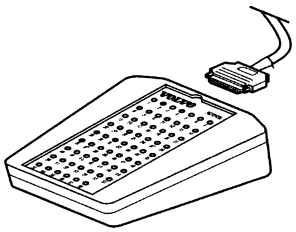

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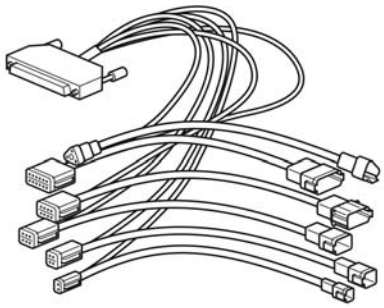


88890016

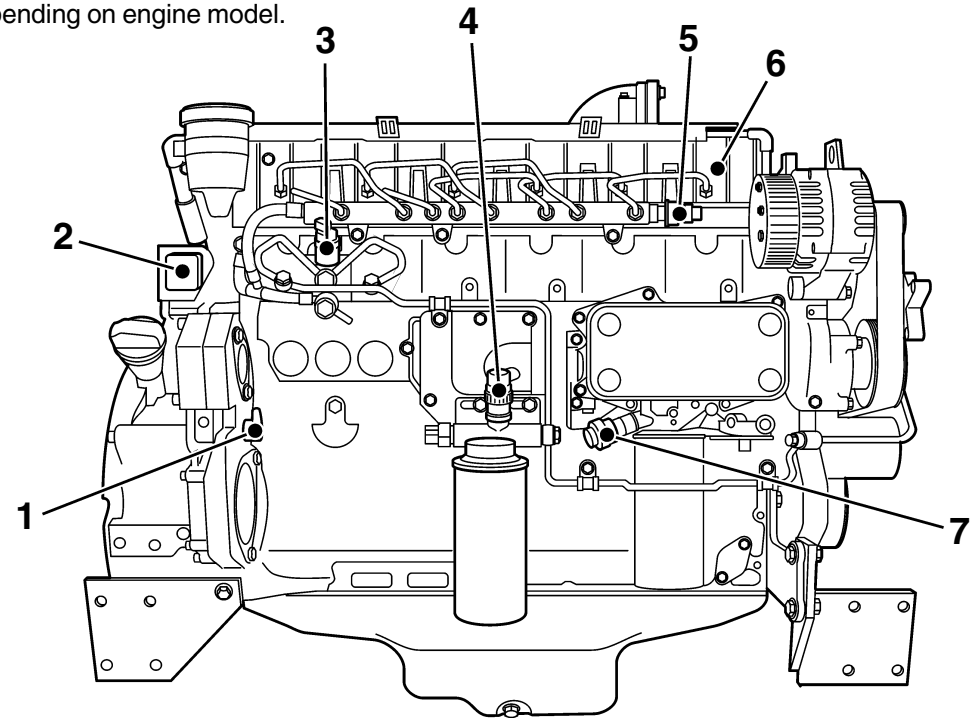
3838619	VODIA complete diagnostic tool.* Components:
3838620	VODIA – palmtop computer (PDA) with SD card.
3838621	VODIA – docking station. Used with VODIA PDA (3838620).
3838622	VODIA – cable with connector. Used with docking station (3838621) on the engine's communication connector.

***Note.** More detailed information about using the VODIA tool can be found in the tool's instruction manual.

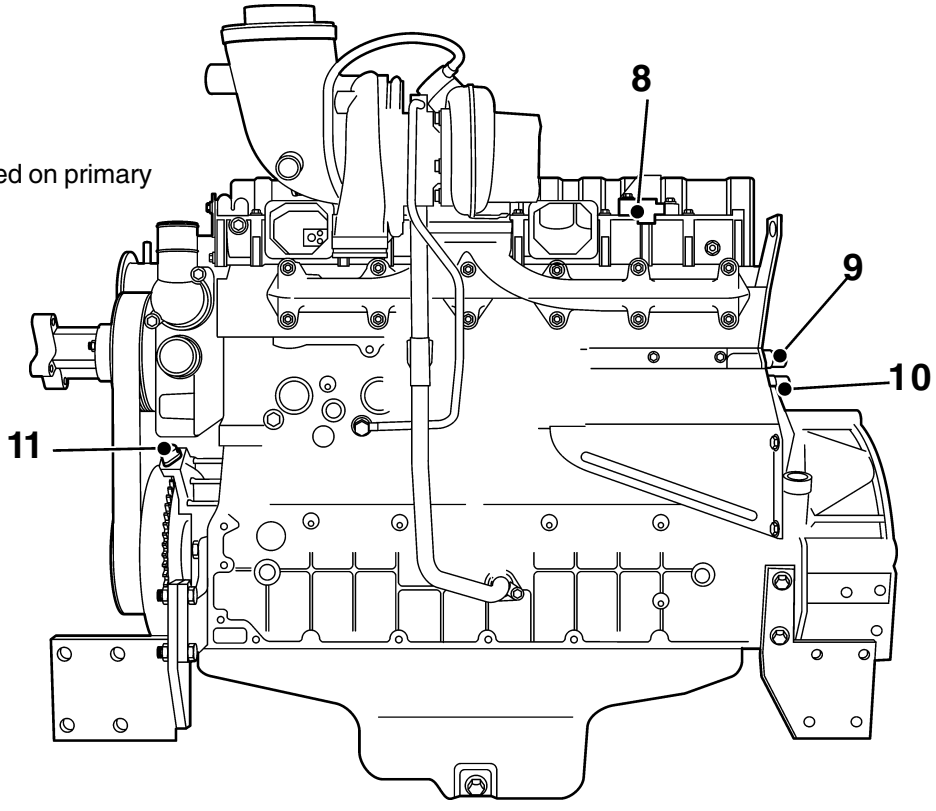
885675	Adapter cable for sensor test
9812519	Multimeter
9999324	Terminal crimping tool
9998482	Gauge for connector on control unit
9998699	Measurebox
88890016	Adapter cable

Component location TAD 650, 660, 750, 760 VE

NOTE! Location can differ, depending on engine model.



1. Speed sensor, camshaft
2. Connection, EMS 2
3. Solenoid controlled proportional valve, high pressure pump – fuel (MPROP)
4. Fuel pressure
5. Fuel pressure in comman rail
6. Glow plugs, one for each injector
7. Oil pressure sensor
8. Boost pressure and temperature
9. Solenoid valve, EGR
10. Coolant temperature
11. Speed sensor, crankshaft
12. Water in fuel (not shown, mounted on primary fuel filter).



Reprogramming a control unit

⚠ **IMPORTANT!** The CHASSIS ID number must be readily available to allow the software to be downloaded.

Action:

1. Log in to **Volvo Penta Partner Network's** website:

   www.vppn.com

2. Choose "VODIA" in the left-hand menu.

3. Choose "ECU programming" in the left-hand menu.

4. Follow the instructions under "Download software". Choose the control units to be reprogrammed and click the "Download" button. The software for the control units is now downloaded to the PDA*.

*** Note.** PDA = "Personal Digital Assistant" (palmtop computer).

5. Take a look under "Settings", "Software information" in VODIA to check that the software has been downloaded.

6. Connect the VODIA to the engine (control unit) to be programmed.

7. Start with the engine control unit.

   Select "Engine with mounting and equipment" in the VODIA menu.

   Select "MID 128 Control unit, programming".

   VODIA will guide you through the entire programming process.

8. The next control unit is the vehicle ECU.

   Select "Electrical system and instruments" in the VODIA menu.

   Select "MID 144 ECU, programming".

   VODIA will guide you through the entire programming process.

9. **NOTE!** Programming must be reported back to Volvo Penta within 28 days. Log in to **Volvo Penta Partner Network's** web site:

   www.vppn.com

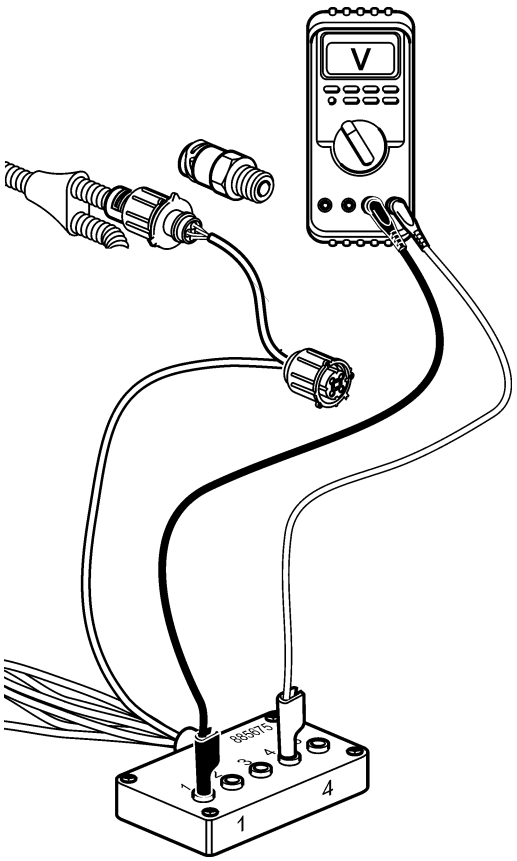
10. Choose "VODIA" in the left-hand menu.

11. Choose "Report software" in the left-hand menu.

12. Follow the instructions for "Report software/parameter". Click "Report software/parameter".

Measurements

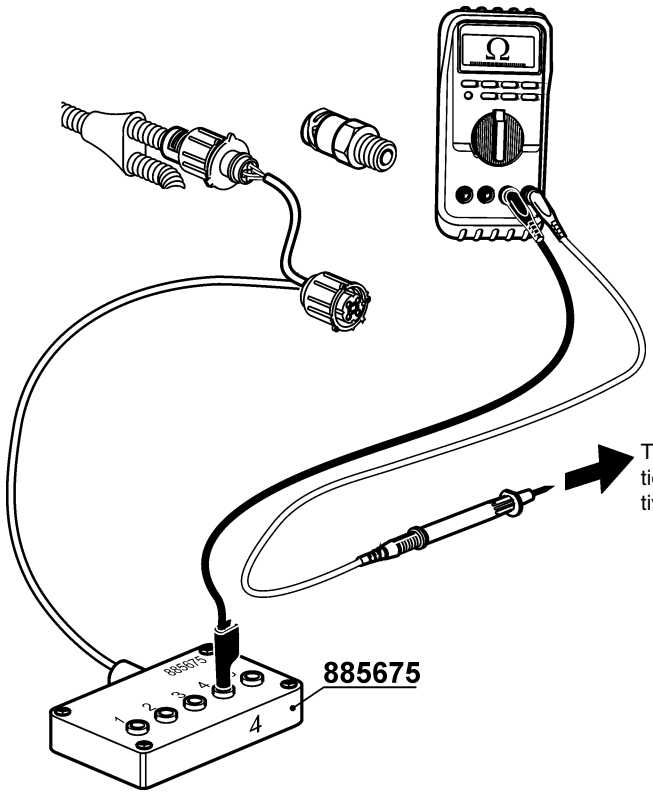
NOTE! If any of the measurements shows an abnormal value, check the wiring to and from the engine interface.



Supply cable

- **NOTE!** Turn ignition off.
- Disconnect the connector from the sensor
- Connect adapter cable 885675 to the cable harness connector to the engine control unit.
- Use multimeter 9812519 for voltage measurement.
- Turn ignition on.

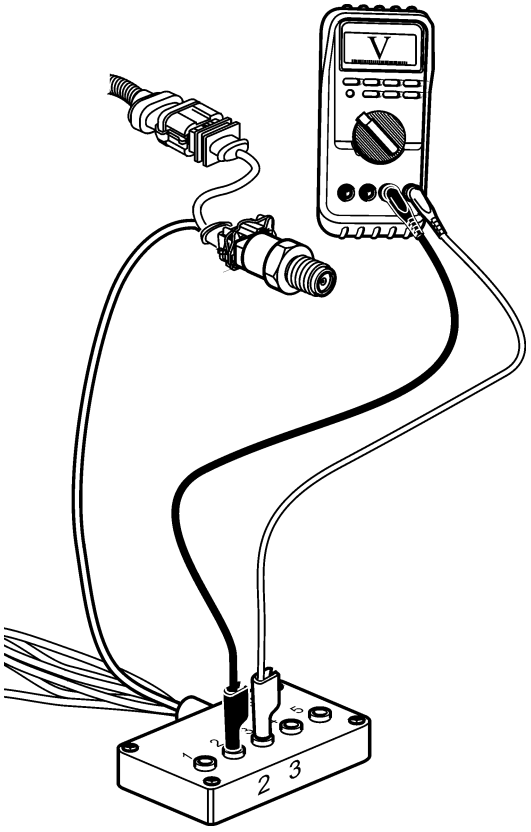
Measurement points	Nominal value
1– 4	U ≈ 5V



Negative cable:

- **NOTE!** Cut the current with the main switch.
- Disconnect the connector from the sensor
- Connect adapter cable 885675 to the cable harness connector to the engine control unit.
- Use multimeter 9812519 to do resistance measurement against the engine control unit.

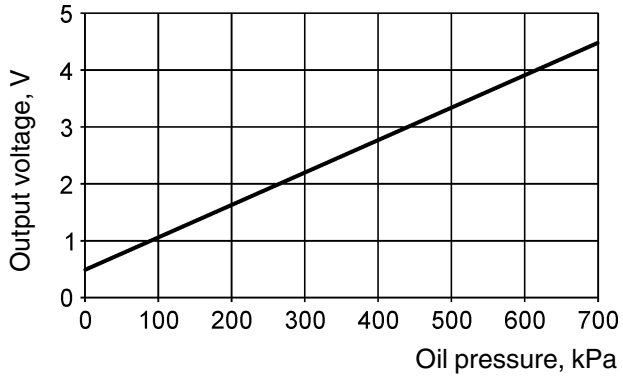
Measurement points	Nominal value
4 – Battery negative	R ≈ 0 Ω



Checking the oil pressure sensor

- **NOTE!** Turn ignition off.
- Disconnect the connector from the sensor
- Connect adapter cable 885675 between the sensor and the engine control unit.
- Use multimeter 9812519 for voltage measurement
- Turn ignition on.

Measurement points	Nominal value
2 – 3	U ≈ 0,5 V (at normal atmospheric pressure)



Component specification

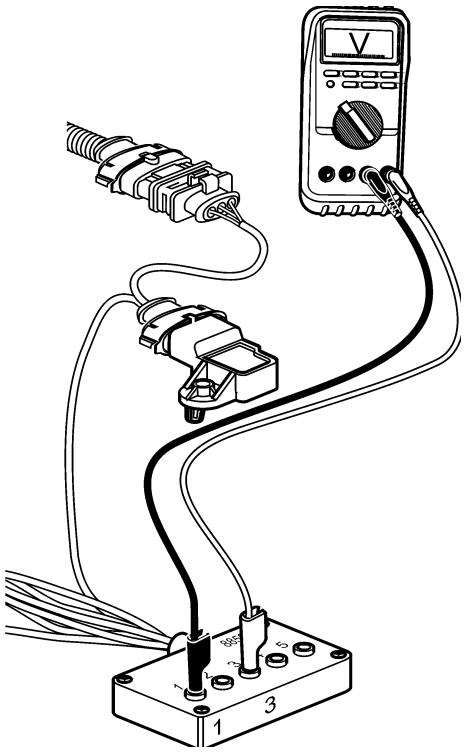
Working range: 0 – 7 bar = 0 – 700 kPa

Supply voltage: 5,00 +/- 0,25 VDC

Nominal output voltage at 25 °C and at supply voltage 5,00 VDC:

0,5 VDC at 0 bar = 0 kPa

4,5 VDC at 7 bar = 700 kPa



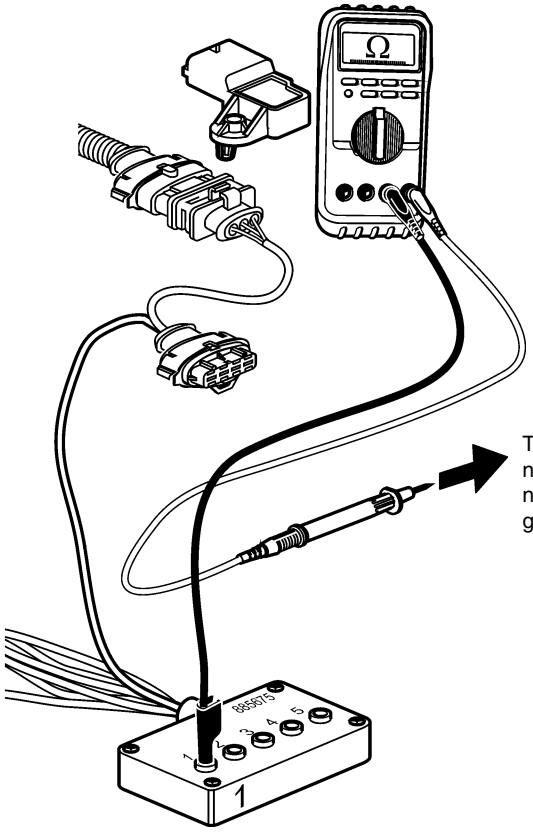
Measurements

NOTE! If any of the measurements shows an abnormal value, check the wiring to and from the engine interface.

Supply cable:

- **NOTE!** Turn ignition off.
- Remove the connector from the sensor. Connect adapter cable 885675 between the sensor and engine control unit.
- Use multimeter 9812519 for voltage measurement
- Turn ignition on.

Measurement points	Nominal value
1 – 3	U ≈ 5 V



The point of connection for battery negative on the engine

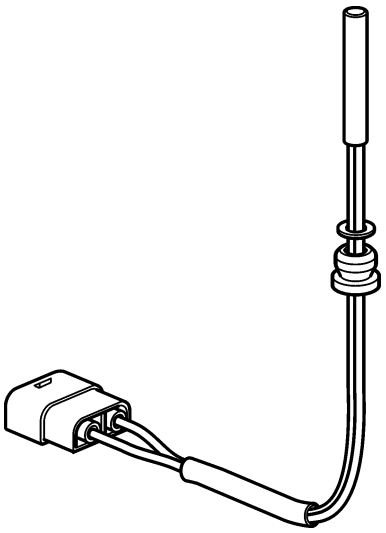
Negative cable:

- **NOTE!** Cut the current with the main switch.
- Disconnect the connector from the sensor
- Connect adapter cable 885675 to the cable harness connector to the engine control unit.
- Use multimeter 9812519 to do resistance measurement against the engine control unit.

Measurement points	Nominal value
1 – Battery negative	R ≈ 0 Ω

MID 128, PID 111

Coolant level



MID 128: Engine control unit

FMI 1: The sensor value is valid but below the normal working range.

FMI 3: The voltage exceeds the normal value or is short circuited to higher voltage.

FMI	Fault code explanation
1	Coolant level is too low
3	Faulty sensor / Faulty sensor circuit

Fault indication

DCU: Engine warning in DCU display.

CIU: Flash code

Flash code

Electrical fault: 2.3

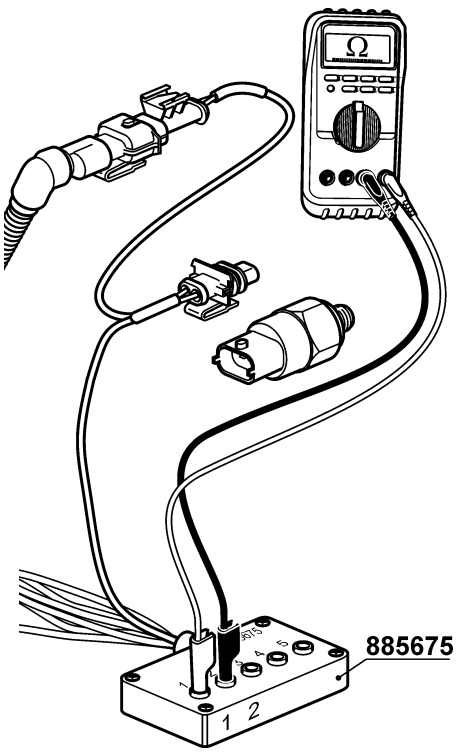
Value fault: 2.2

Symptom

FMI 1

VE engines: Engine is derated if engine protection parameter is activated.

GE engines: Engine is shutdown.



Signal cable:

- **NOTE!** Cut the current with the main switch.
- Disconnect the connector from the sensor
- Connect adapter cable 885675 to the cable harness connector to the engine control unit.
- Use multimeter 9812519 to do resistance measurement against the engine control unit.

Measurement points	Nominal value
1 – 2	R ≈ 4.0 – 5.0 kΩ

NOTE! Measurement is done to eliminate short circuiting or breaks in the cable to the engine control unit.

MID 128, PPID 55

ECU temperature

MID 128: Engine control unit

FMI 0: The sensor value is valid but above the normal working range.

FMI 4: The voltage is less than the normal value or is short circuited to lower voltage.

FMI 5: The current is less than the normal value or is open circuited.

FMI	Fault code explanation
0	ECU temperature is too high
4, 5	Faulty sensor / Faulty sensor circuit

Fault indication

DCU: Engine warning in DCU display.

CIU: None

Flash code

Electrical fault: 8.4

Value fault: None

Symptom

None.

FMI 7

Conditions for fault code:

Injector activated and cylinder balancing above limit.

If a fault code is set when the engine has an unsymmetrical load it can not be rectified. At idle speed the engine control unit is trying to compensate for uneven running by adding more or less fuel to the injectors, cylinder balancing. If the engine load is too unsymmetrical the compensation is not enough and a fault code will be set.

Possible reason:

- Unsymmetrical load of the engine.
- Poor / uneven compression.
- Faulty injector.

Suitable action:

1. Clear the fault code with the Vodia tool. Let the engine run at idle speed without any load and see if the fault code reappear.
2. Perform test of cylinder compression using the VODIA tool.
3. Change only the faulty injector.

FMI 12 Checking injector circuit

Conditions for fault code:

Low injector hold current. Injector activated.

Possible reason:

- Intermittent fault.

Suitable action:

1. Check cables harness and connectors between injector and engine control unit.

Fault tracing

at starter motor problems:

- Check battery condition.
- Check wiring to start motor.
- Check that starter relay click when start button is activated.

FMI 3

Conditions for fault code:

Short circuit too battery voltage.

Possible reason:

- Short circuit in starter relay cable.
- Faulty starter relay.

Suitable action:

1. Check cable harness and connections between starter relay and EMS 2.
2. Check function of starter relay.

FMI 4

Conditions for fault code:

Short circuit too battery negative.

Possible reason:

- Short circuit in starter relay cable.
- Faulty starter relay.

Suitable action:

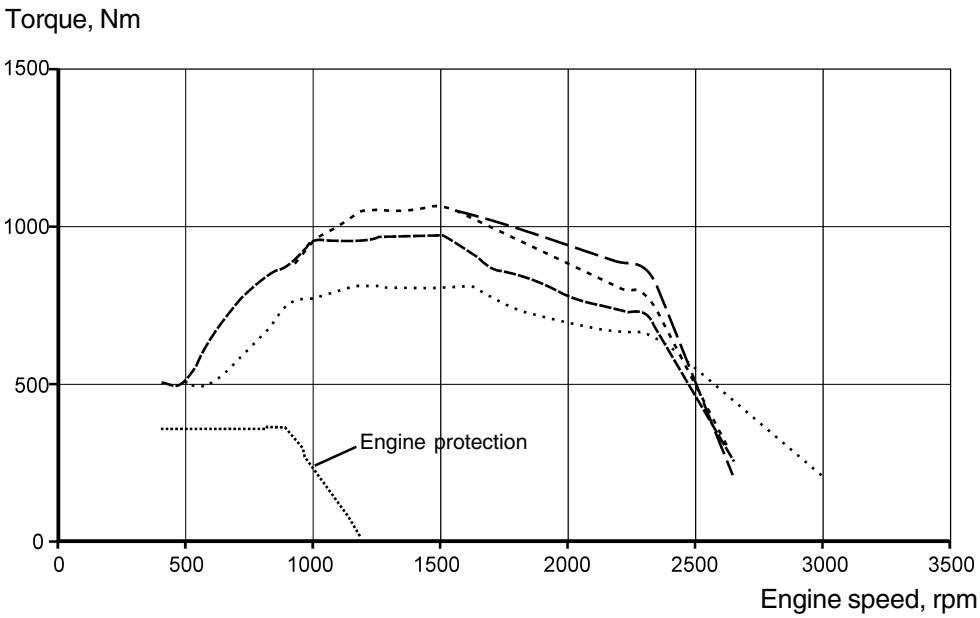
1. Check cable harness and connections between starter relay and EMS 2.
2. Check function of starter relay.

Engine protection

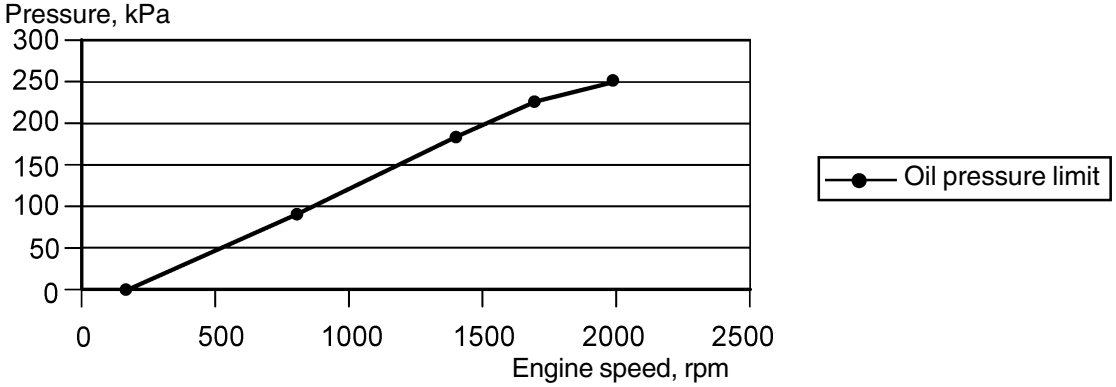
TAD 650, 660, 750, 760 VE

Derate to engine protection map

Parameter	"Yellow lamp"	"Red lamp"	0%	50%	70%	100%	Forced to idle after 5 sec.	Forced shutdown after 15 sec.
High coolant temperature (°C)	98	101	101	-	-	106	>106	>106
High boost temperature (°C)	80	83	83	-	-	90	>90	>90
High boost pressure (kPa)	340	350	-	350	-	-	>355	>355
Low oil pressure (kPa)	Limit	20<limit	-	-	20<limit	-	25<limit	25<limit



Oil pressure limit



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MID 128 (engine control unit EMS):

	SPN	Flashcode Electrical fault/ value fault	PID	PPID	SID	PSID	FMI	Please refer to page:
Ambient air pressure	108	-/-	108				2, 3, 4	64
Battery voltage	158	-/3.9 (EMS) -/6.9 (CIU)	158				1	76
Boost pressure	106	3.4/3.5	106				0, 3, 5	58
Boost temperature	105	3.2/6.2	105				0, 4, 5	52
Communication fault J 1939	639	6.5/- (EMS) 6.4/- (CIU)			231		2	126
Controller error	629	9.9/- (EMS) 9.8/- (CIU)			254		3, 8, 12	132
Coolant temperature	110	3.3/6.1	110				1, 3, 4	66
Coolant level	111	2.3/2.2	111				1	72
ECU temperature		8.4/-		55			0, 4, 5	93
Engine speed	190	-/2.6	190				0	84
Engine starter relay	677/1675	4.6			39		3, 4, 5	115
Engine stop switch	520195 970	4.8/- (EMS) 5.3/- (CIU)		6			3, 4, 5	87
Engine sync acknowledge	608	-		98			9	95
Injection control pressure regulator	679	8.3/-			42		3, 4, 5, 6, 13	118
Injector common rail #1–6	651-656	7.1-7.6/-			1–6		3, 4, 5, 7, 12	100
Internal EGR status		8.5/-		19			3, 4, 5, 7	89
Inlet air heater status	626	5.4/-	45				3, 4, 5	33
J 1939 communication bus	639/1675	-				201	9	141
Fuel pressure	94	3.6/3.8	94				1, 3, 5, 7	36
Oil pressure	100	3.1/6.6	100				1, 3, 5	46
Preheat sensor	729				70		3, 4, 5	122
Program memory	639	9.9/-			240		2, 7, 11, 14	131
Rail pressure	164	8.3	164				0, 2, 4, 5	78
Rail pressure release valve	679	8.3				97	0, 7, 11, 14	137
Rail pressure system	1239					96	0, 1, 4, 7, 12	133
Speed sensor, camshaft	636	2.5/-			21		2, 3, 8	105