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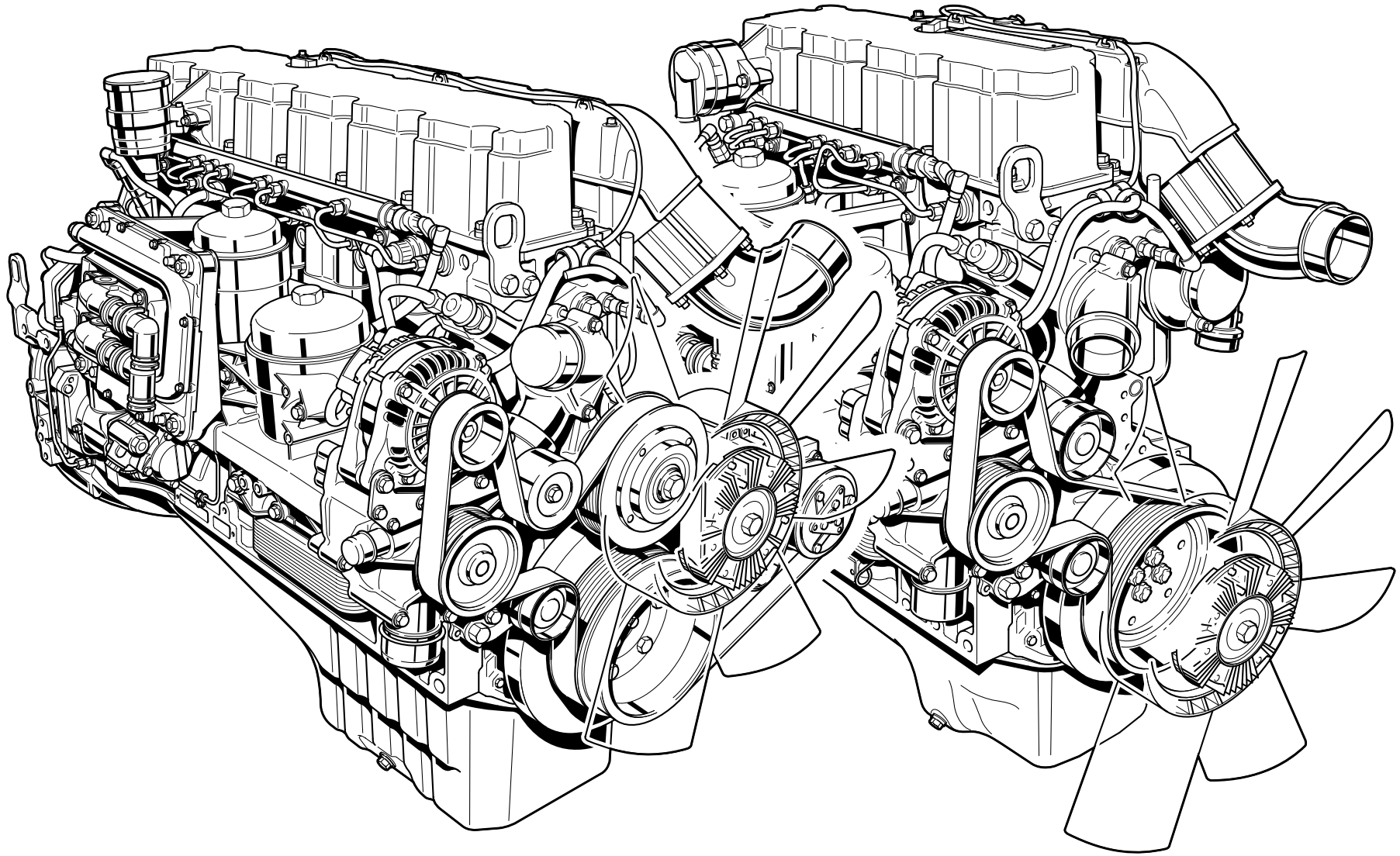
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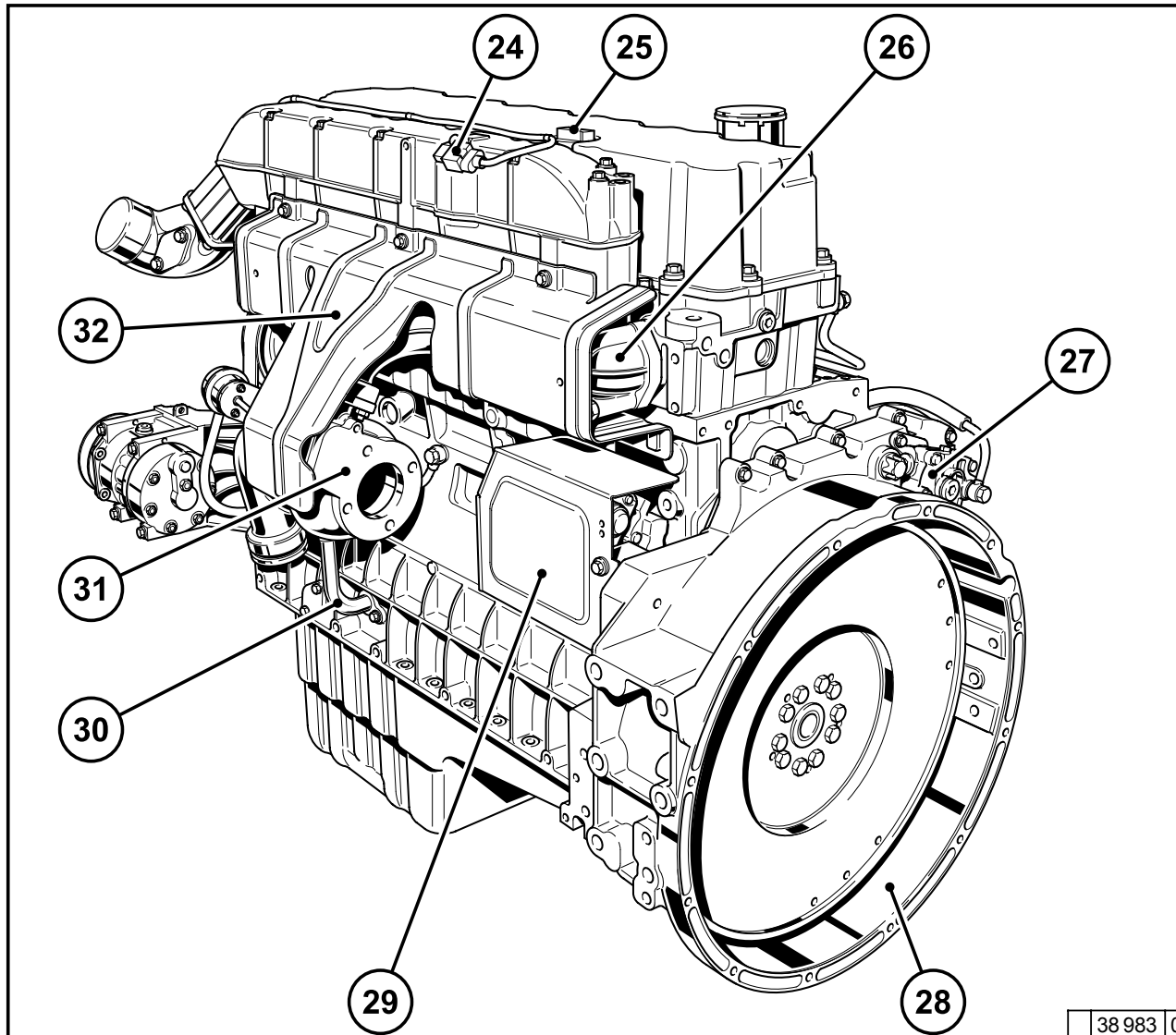
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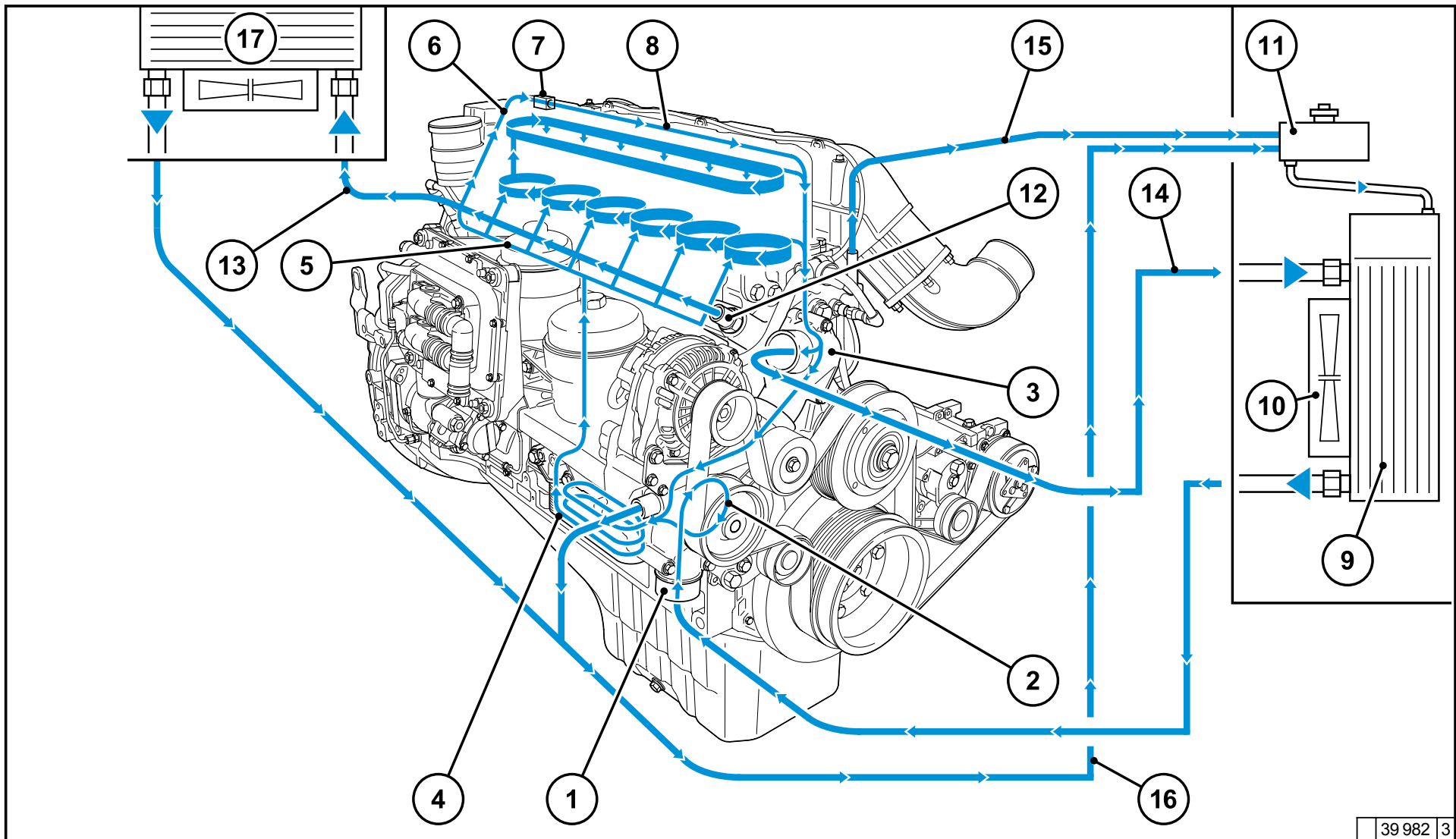
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Engine description

2.2.4 Starter side TDC 2013 L06 4V



- 24 Pressure and temperature transmitter, charge air
- 25 Oil filler neck
- 26 Exhaust manifold
- 27 Compressor (optional)
- 28 SAE housing
- 29 Starter cover
- 30 Oil return line from turbocharger
- 31 Exhaust turbocharger
- 32 Screening plate (thermal protection).



3.2.1 Electrical starting



Before starting make sure that there is nobody in the engine/work machine danger area. After repairs: Check that all protective equipment is

mounted and all tools have been removed from the engine.

When starting with heating plugs/heating flange, do not use additional start aids (e.g. injection with start pilot)! Danger of accidents!

- Engine is electronically controlled by
Example: EMR3 (electronic engine control)
 - engine is programmed and supplied with the necessary function configurations.
- As far as possible separate engine from driven devices by disconnecting.
- Engine connector plug must be connected by the customer (e.g. in driver's cab/device) to at least:

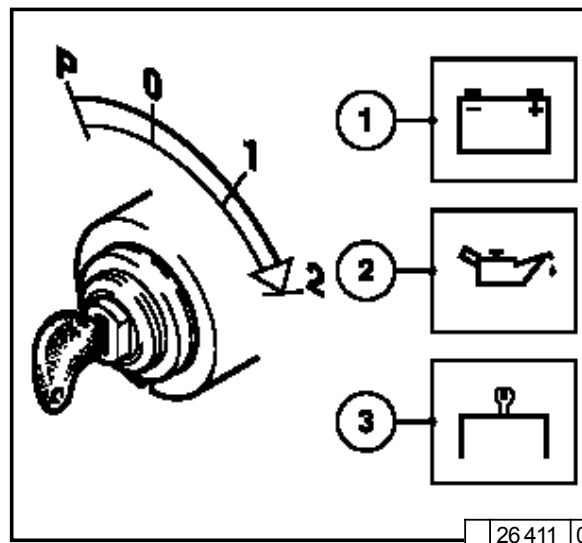
- Supply voltage
- Torque output
- Speed output.

- Warm up the engine for approx. 30 seconds at a low idling speed.
- Do not run up the engine immediately to high idling speed / full load operation from cold.

If the starter is connected by a relay on the EMR3,

- the maximum starting time is limited by the EMR3.
- the pause between two start attempts is given by the EMR3.

without cold start aid



- Insert key
 - Step 0 = no operating voltage.
- Turn key to the right
 - Step 1 = operating voltage,
 - Warning lights light up.
- Turn the key further to the right against the spring load.
 - Step 2 = start
- Release key as soon as the engine starts up.
 - Warning lights go out.

- If the touch start function is programmed, a short start command with the ignition key suffices in position 2 or, if available, by a start button.
The start is then continued automatically by the EMR3.
- For special applications, the EMR3 can be programmed by data record so that the control unit performs other automatic start attempts if the engine fails to start.

Start uninterrupted for max. 20 s. If the engine does not start, repeat the start procedure after a 1 minute pause. If the engine has not started after two attempts, find the cause in the fault table (see 7.1).

Start the engine for a maximum of 20 seconds uninterrupted. If the engine does not start up, wait for one minute and then repeat the starting process. If the engine does not start up after two starting processes, determine the cause as per fault table (see 7.1).

If the engine does not start and the diagnostic lamp flashes, the EMR3 system has activated the start lock to protect the engine.

The start lock is released by switching off the system with the ignition key for about 30 seconds.

4.2.1 Quality

Use standard diesel fuels with a sulphur content of less than 0.5 %. If the sulphur content is higher, the oil change intervals must be reduced (see 6.1.1).

The following fuel specifications are permitted:

- **Diesel fuels**
- DIN EN 590
- **JIS K 2204 grade 1 and 2 ***
- **ASTM D 975-88; 1-D and 2-D ***

* as long as the lubrication properties correspond to diesel fuel EN 590 (positive test results are necessary)

(see TR 0199-99-3005)

If other fuels are used which do not meet the requirements of the technical circular, the warranty will be voided.

Technical circular is obtainable from the DEUTZ Service Organisation.

The certification measurements for the observance of legal emission limits are carried out with the test fuels defined by legislation. These correspond to the diesel fuels described in section 1 in accordance with EN 590 and ASTM D 975. Emission values cannot be guaranteed with the other fuels described in this circular.

4.2.2 Winter fuel

At low ambient temperatures paraffin discharges can lead to blockages in the fuel system and cause operating faults. Use winter fuel at outside temperatures below 0 °C (to -20 °C) (generally offered by petrol stations in good time before the cold season begins).

- Paraffin should be added at temperatures below -20 °C. The mixing ratios required are as per the diagram on the right.
- Special diesel fuels can be used for arctic climates to -44 °C.

If it is necessary to use summer diesel fuel under 0 °C, paraffin can also be added by up to 30% as per the diagram on the right.

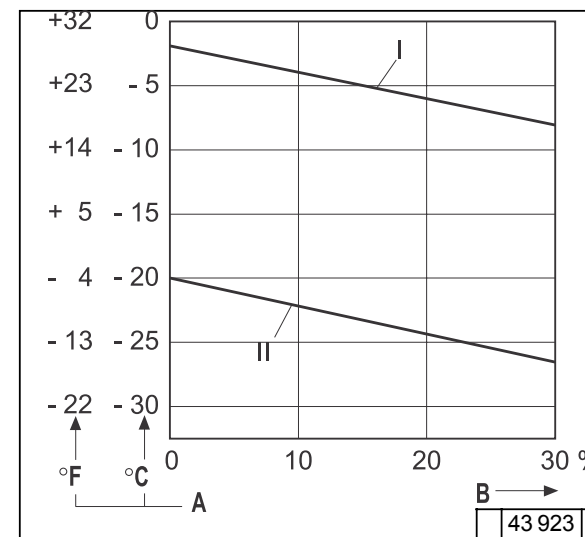


Diagram key:	
I	Summer diesel fuel
II	Winter diesel fuel
A	Outside temperature
B	Paraffin mixing proportion



For the engines **TCD 2013 4V** and fuel according to ASTM D 975 1-D/2-D, adding paraffin is not permissible.

Generally, sufficient resistance to cold can also be achieved by adding a flow ameliorant. For questions regarding this please contact your **DEUTZ partner**.




Only carry out mixing in the tank! First pour in the necessary amount of paraffin, then the diesel fuel.

5.1 Maintenance schedule

Maintenance

check= ● set= ○ clean= ▲ renew= ■										Service Yearly op.		Average		Vehicle engines	
↓ check 2x daily before or during the 1st trial run, during the running-in phase or when commissioning new and overhauled engines. ↓ every 200 km or daily OPERATIONAL PERFORMANCE IN (km) year(s)										group performance	km	Drive speed	approx. km/h	Service group II 100 000km 40 approx. km/h The engine maintenance times given are maximum permissible job times. Depending on the usage circumstances, shorter maintenance times may be necessary. Observe the instruction manual of the equipment manufacturer. #Maintenance only to be carried out by authorised service personnel	
										I	<30 000	20	II		
E10	E20	E30	E40	E40	E50	E60	E70	1	2	Activity	Section				
●	●									Lube oil level, if necessary re-fill	6.1.2				
		■								Lube oil (oil change intervals depending on engine application and oil quality), see TR 0199-99-3002	6.1.1/ 6.1.2				
		■								Oil filter cartridge	6.1.3				
			■							Fuel filter cartridge	6.2.1				
						●				Electronic injector check via EMR3	#				
●			■ ¹⁾							Fuel filter insert ¹⁾ (fuel pre-filter)	4.2				
●		●							■	Coolant (additive concentration)	4.3.1/2/3				
●	●	●								Coolant level	—				
●	●		■							Intake air filter (if available, maintenance as per maintenance display)	6.4.3/6.4.4				
●			●						▲	Charge air cooler (drain lube oil/condensation)					
									▲	EGR (option)* Check non-return valve (option)					
						●			■	EGR (option) Check cap and adjustment mechanism for clearance, renew if necessary.					
									▲	Cooler EGR (option)					
			●							Check function of heating flange					
			●							Battery and cable connections	6.7.1				
●			●							Engine monitoring, warning system &	3.3 #				
				○						Valve clearance	6.6.1				
●					●	■				V-belt/tension pulley (renew when wear limit reached)	6.5.1/6.5.3				
			●							Crankcase pressure bleed valve (option)	#				
●	●									Engine tightness (visual inspection for leaks).	—				
●			●							Engine mounting (renew in case of damage)	9.2				
●			●							Fastenings, hose connections / clamps	—				
								■		General overhaul	#				

EGR* Exhaust gas recirculation (system);  If the warning system (light/siren) is activated, the fuel pre-filter must be emptied immediately.

¹⁾The intervals can be reduced, depending on the degree of soiling of the fuel used.

Maintenance

5.3 Maintenance work carried out

5

Op. hrs.	Date	Signature / stamp	Op. hrs.	Date	Signature / stamp
2875			3000		
3125			3250		
3375			3500		
3625			3750		
3875			4000		
4125			4250		
4375			4500		
4625			4750		
4875			5000		
5125			5250		
5375			5500		
5625			5750		

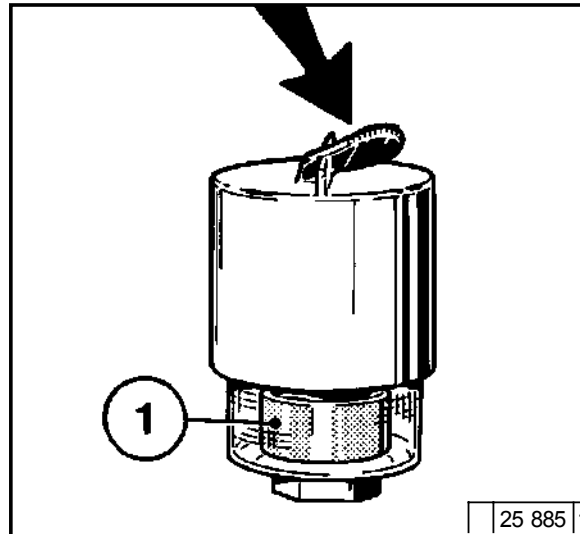
The maintenance work carried out methodically can be recorded in the table and confirmed.

6.1.1.2 Lube oil change intervals for vehicle engines

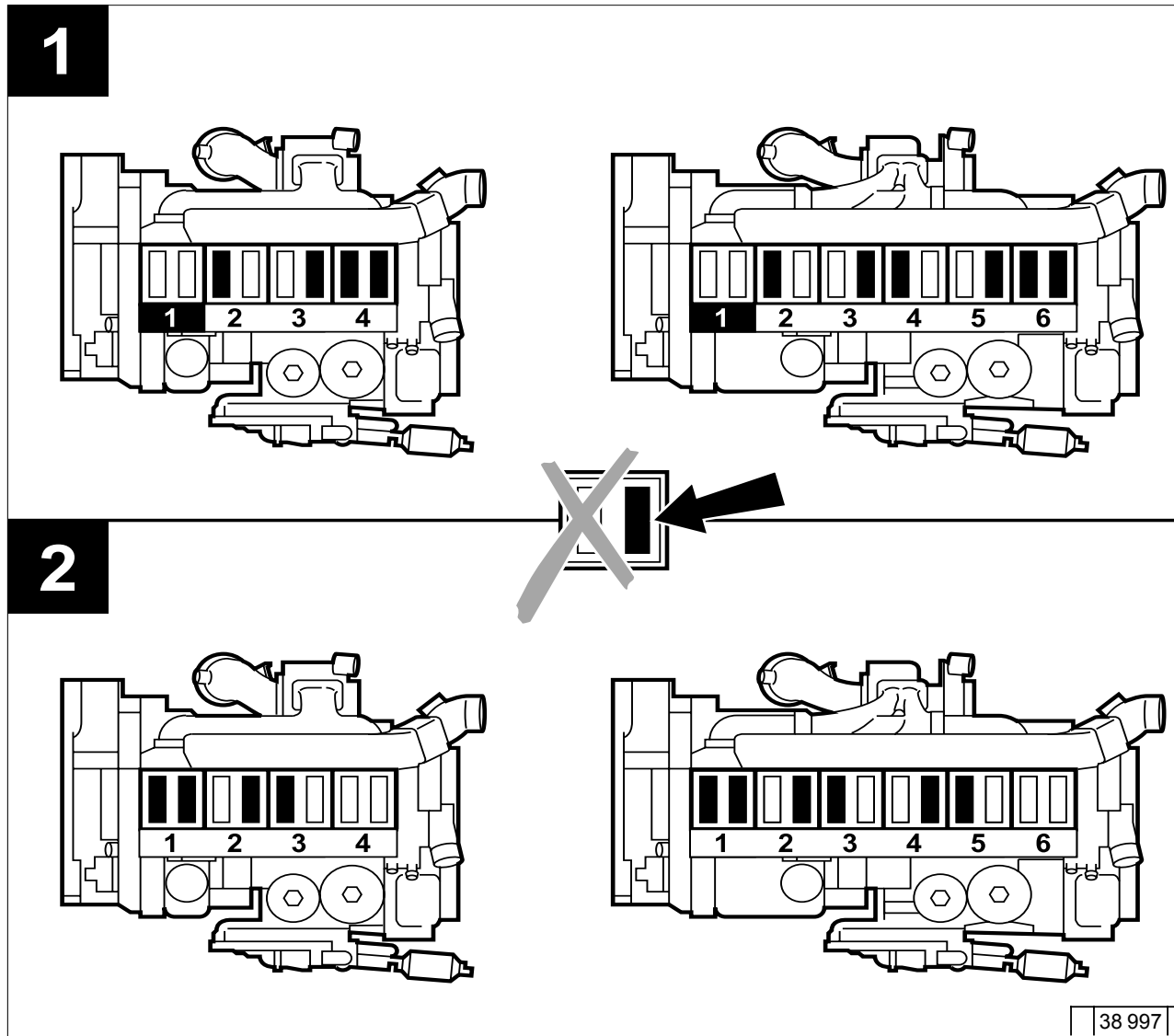
Deutz lube oil quality class			Lube oil quality				
			DQC I-02	DQC II-05	DQC III-05	DQC IV-05	
ACEA specification			E2-96	E3-96/E5-02/E07-04	E4-99/E6-04 see 6.1.1.3	E4-99/E6-04 only fully synthetic	
API specification			CF/CF-4	CG-4/CH-4/CI-4	-	-	
worldwide specification			-	DHD-1	-	-	
special DEUTZ release list			-	-	see chap. 4.1.2.1	-	
Application	Engine version TCD 2012/2013 L04/ 06 4V	Crankcase ventilation	Lube oil change intervals in km				
Building site	25	TCD 2012 4V	open	-	20 000	20 000	20 000
		TCD 2012 4V	closed	-	-	20 000	20 000
vehicles / city buses/	25	TCD 2013 L06 4V					
		Coach bus	closed	-	30 000	50 000	50 000
		Inter city bus	closed	-	20 000	30 000	30 000
		City busbus	closed	-	15 000	20 000	20 000
City transport	25	TCD 2013 L04 4V	closed	-	25 000	45 000	45 000
		TCD 2013 L06 4V	closed	-	30 000	50 000	50 000
Local transport	40	TCD 2012 4V	open	-	30 000	30 000	30 000
		TCD 2012 4V	closed	-	-	30 000	30 000
		TCD 2013 L04 4V	closed	-	40 000	60 000	60 000
	40	TCD 2013 L06 4V	closed	-	50 000	75 000	75 000
		TCD 2012 4V	open	-	40 000	40 000	40 000
Long distance transport	60	TCD 2012 4V	closed	-	-	40 000	40 000
		TCD 2013 L04 4V	closed	-	60 000	80 000	80 000
		TCD 2013 L06 4V	closed	-	75 000	100 000	100 000

6.4.1 Cleaning intervals

- The soiling of the combustion air filter depends on the dust content of the air and the selected filter size. If a high dust exposure is to be expected, a cyclone separator can be connected to the combustion air filter.
- The cleaning intervals cannot be generally defined. They must be defined depending on each case.
- If dry air filters are used, cleaning should only be carried out according to the maintenance display or maintenance switch.
- Filter maintenance is required when on the:
 - **Maintenance display**
the red service field 1 is fully visible when the engine is not running.
 - **Maintenance switch**
the yellow warning light comes on when the engine is running.
- After completion of the maintenance work push the reset button on the maintenance display. The maintenance display is ready for operation again.



6.6.1.1 Valve clearance setting diagram



Setting the valves: (black identification)

- Perform valve clearance setting on appropriate cylinder with valve clearance setting device part no. 8190.

Loosen all lock nuts 2 of the rocker arm assembly to be set. Turn setting screw 1 back with the valve clearance setting device one turn in anti-clockwise direction.

On the valve to be set, turn setting screw 1 in clockwise direction so as to be free of clearance.

That means, there must not be any clearance between the rocker arm and valve and no pressure may be applied to the valve.

- Set needle of measuring plate to ⑤ , not twisting the knurled handle any more.
- Hold the measuring plate exactly in this position and turn the setting screw 1 in anti-clockwise direction with the knurled handle until the needle is on the „in“ or „ex“ marking.
- Hold the knurled handle exactly in this position and tighten lock nut 2 with a torque wrench (20 Nm).
- Put on seal (poss. new seal).
- Visual inspection of screws and rubber elements, renew if necessary.
- Put on valve mechanism cover and tighten screws according to tightening specification: 9 Nm (see 9.2).

Acid density in [kg/ l]		in [°Bé (Baumé degree)*]		Charge level
Normal	Tropics	Normal	Tropics	
1,28	1,23	32	27	well charged
1,20	1,12	24	16	half charged, re-charge
1,12	1,08	16	11	discharged, charge immediately

* The data for acid density in °Bé (Baumé degree) is out of date and rarely still in use.



The gases released by the battery are explosive! Avoid sparks and open fire in the vicinity of the battery! Do not allow acid to get on skin or clothes!
Wear protective glasses!
Do not place any tools on the battery!

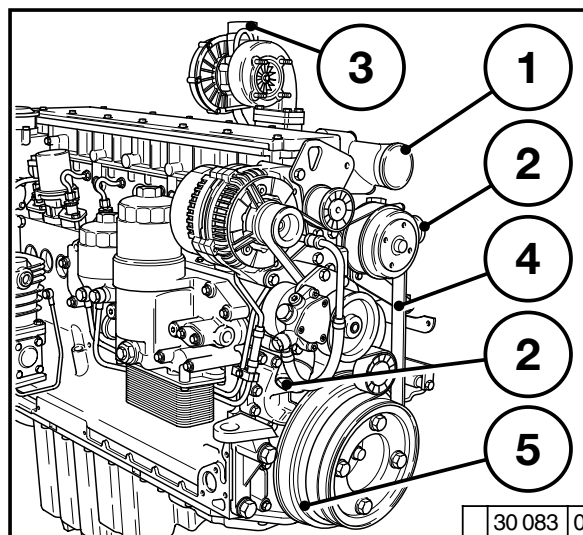
8.1 Corrosion protection

If the engine should be shut down for a long period of time, corrosion protection will be necessary in order to prevent rust formation. The measures described here apply for a shutdown period of up to approx. 6 months. Before the engine is commissioned again the corrosion protection should be removed.

- Corrosion protection oils according to specification:
 - MIL-L21260B
 - TL 9150-037/2
 - Nato Code C640/642
- Recommended cleaning agent for removal of corrosion protection:
 - Petroleum benzine (hazard class A3)

Protecting engine from corrosion:

- Clean engine (possibly with cold cleaner).
- Warm up the engine and switch off.
- Drain off engine oil, see chapter 6.1.2 and pour in corrosion protection oil.
- Drain off coolant, see 6.3.3.
- Pour in corrosion protection agent, see above.
- Drain fuel from container (tank).
- Make fuel mixture from 90% diesel fuel and 10% corrosion protection oil and fill up tank.
- Leave the engine running for approx. 10 minutes.
- Switch off engine.
- Turn over the engine manually several times. When turning over with a starter position the shutdown lever in the Stop position.
- Remove V-belt 4, pack up and store.



- Spray the V-belt pulley 5 with corrosion protection agent.
- Seal intake openings 1 and exhaust openings 3.
- Lightly apply corrosion protection agent to the coolant nozzle 2 and seal.
- Drain off corrosion protection agent.

Note:

Fuel tank/supply line to the engine should also be sealed, so that the sensitive Rail System is protected against dirt and dust.



Removing engine corrosion protection:

- Remove corrosion protection agent from grooves of V-belt pulley 5.
- Assemble V-rib belt 4, see 6.5.2.
- Remove plugs from intake opening 1, exhaust opening 3 and coolant inlet/outlet 2.
- Pour in coolant, see 6.3.3.
- Connect fuel tank / supply line to the engine paying attention to cleanliness.
- Start up the engine.

9.1 Engine and setting data

Technical data

	TDC 2013 L04 V4	TDC 2013 L06 V4
Engine type	Liquid-cooled / cooling system protection	
Cooling	Liquid-cooled / cooling system protection	
Coolant quantity (only engine content without cooler)[approx.ltr.]	5.0	6.6
Permissible continuous coolant temperature engine outlet [°C]	max.110	
Temperature difference between Coolant inlet/outlet [°C]	4 to 8	
Start of thermostat opening at (Bus) [°C]	83(75)	
Thermostat fully open at [°C]	110	
Coolant pre-heating	⁽⁴⁾	
Cooling water pump amount [dm ³ /min]	295	
Delivery pressure in [kPa/bar]	120000/1.2	
Lubrication	Forced feed lubrication	
Oil SAE	15 W 40 /15 W 30	
Maximum oil temperature in oil tray [°C]	125	
Minimum oil pressure in warm state (114 °C) and low idling [kPa/bar]	150000/1,5	
Initial oil filling quantity without filter max.[approx.ltr.]	10 ³⁾	24 ³⁾
min. [approx.ltr.]	6.5 ³⁾	19 ³⁾
Initial oil filling quantity with filter max.[approx.ltr.]	13.5 ³⁾	27.5 ³⁾
min. [approx.ltr.]	9.5 ³⁾	22.5 ³⁾
Oil cooler plate cooling share:		
Water [Quant.]	10	11
Oil [Quant.]	9	10

³⁾ Approximate values can vary depending on version The upper oil dipstick marking is always decisive.

⁴⁾ Only necessary for winter operation, see 3.5.1.