SHOP MANUAL

WEBMTNV000

3D82AE SERIES
3D84E SERIES
3D88E SERIES
4D88E SERIES
4D98E SERIES
4D106 SERIES
S4D84E SERIES
S4D98E SERIES
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DIESEL ENGINE

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(12) 4TNV106T

Engine name		Unit	4TNV106T			
Engine specification class		-	CL		VM	
Type		-	Vertical, in-line, 4-cycle, water-cooled diesel engine			
Combustion chamber		-	Direct injection			
Number of cylinders		-	4			
Cylinder borexstroke		mmxmm	106x125			
Displacement		L	4.412			
Continuous rating	Revolving speed	Min^{-1}	1500	1800	-	
	Output	kW (hp)	51.5 (70.0)	61.8 (84.0)	-	
Rated output	Revolving speed	Min^{-1}	1500	1800	2000	2200
	Output	kW (hp)	56.8 (77.2	68.0 (92.5)	69.9 (95.0)	72.0 (97.9)
Max. no-load speed (±25)		min^{-1}	1600	1895	2180	2400
Ignition order		-	1-3-4-2-1(No.1 cylinder on flywheel side)			
Power take off		-	Flywheel			
Direction of rotation		-	Counterclockwise (viewed from flywheel)			
Cooling system		-	Radiator			
Lubrication system		-	Forced lubrication with trochoid pump			
Starting system		-	Electric			
Applicable fuel		-	Diesel oil-ISO 8217 DMA, BS 2869 A1 or A2 (Cetane No.45 min.)			
Applicable lubricant		-	API grade class CD or CF			
Lubricant capacity (oil pan) *	Total	L	14.0			
	Effective	L	9.0		7.5	
Coolant water capacity (engine only)		L	6.0			
Engine dimensions ** (with flywheel housing)	Overall length	mm	808		776	
	Overall width	mm	629		628.6	
	Overall height	mm	866		866	
Engine mass (dry) ** (with flywheel housing)		kg	355 (equivalent to SAE#3)		340 (equivalent to SAE#3)	
Cooling fan (std.)		mm	500 mm O/D, 7 blades pusher type		500 mm O/D, 7 blades suction type	
Crankshaft V pulley diameter & Fun V pulley diameter (std.)		mm	150x150			

* Engine oil capacity may differ from the above depending on an engine installed on a machine unit.
** Engine mass and dimensions without radiator

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3. TROUBLESHOOTING

3.1 Preparation before troubleshooting

If the signs of a trouble appear, it is important to lecture on the countermeasure and treatment before becoming a big accident not to shorten the engine life.

When the signs of a trouble appear in the engine or a trouble occurs, grasp the trouble conditions fully by the next point and find out the cause of sincerity according to the troubleshooting. Then repair the trouble, and prevent the recurrence of the trouble.

1) What's the occurrence phenomenon or the trouble situation? ····· (e.g. Poor exhaust color)

2) Investigation of the past records of the engine
Check a client control ledger, and examine the history of the engine.

- Investigate the engine model name and the engine number. (Mentioned in the engine label.)
  Examine the machine unit name and its number in the same way.
- When was the engine maintained last time?
- How much period and/or time has it been used after it was maintained last time?
- What kind of problem was there on the engine last time, and what kind of maintenance was dane?

3) Hear the occurrence phenomenon from the operator of the engine in detail.

5W1H of the occurrence phenomenon : the investigation of when (when), where (where), who (who), what (what), why (why) and how (how)

- When did the trouble happen at what kind of time?
- Was there anything changed before the trouble?
- Did the trouble occur suddenly, or was there what or a sign?
- Was there any related phenomenon.
  ·····.(e.g. Poor exhaust color and starting failure at the same time)

4) After presuming a probable cause based on the above investigation, investigate a cause systematically by the next troubleshooting guide, and find out the cause of sincerity.

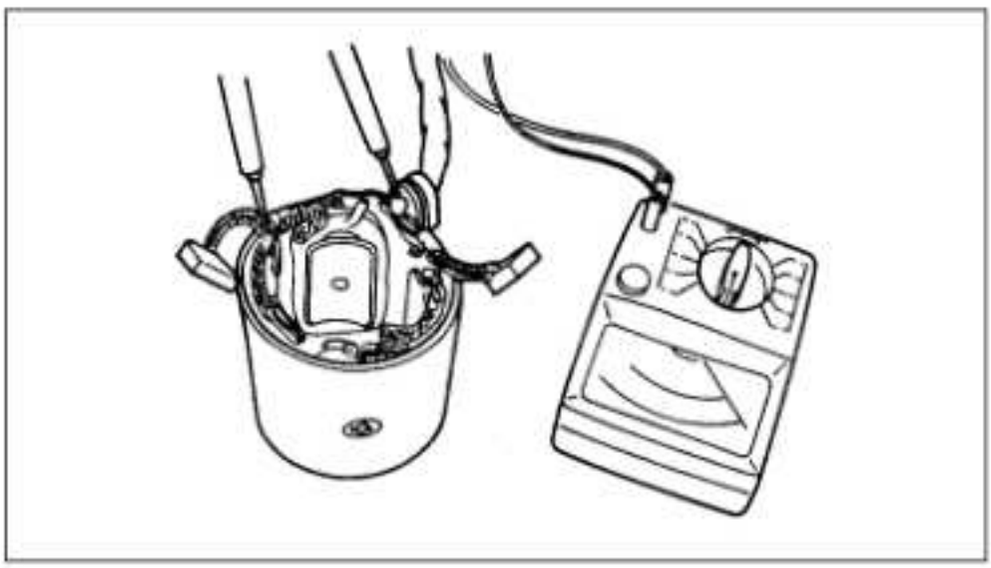
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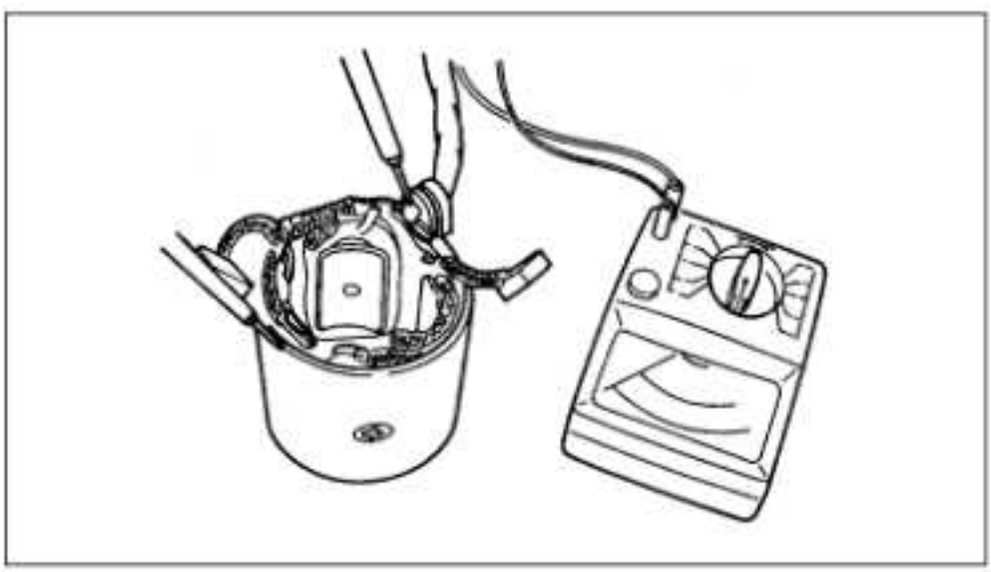
(2) Field coil

1) Field coil continuity and earth tests

Test type	Measurement point	Normal	Abnormal (cause)
Continuity test	Across commutator	Yes	None (open circuit)
Earth test	Between commutator and shaft or armature	None	Yes (short-circuiting)

Replace if needed.





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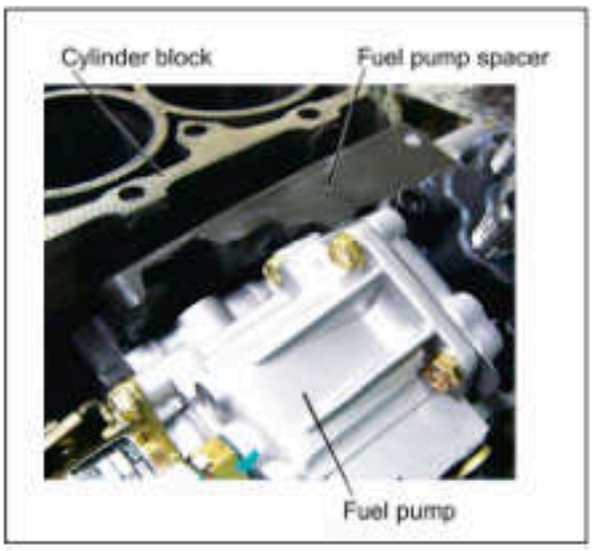
Point 3

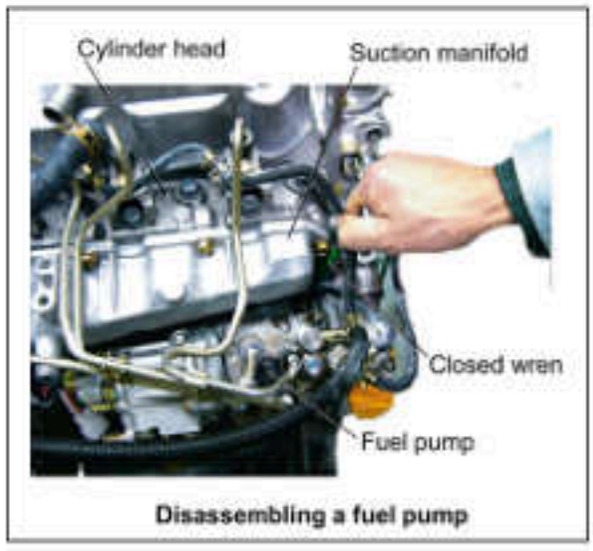
[Disassemble]

There is an acoustic material part to name as fuel pump spacer between the fuel pump and the cylinder block. Loosen fuel pump installation bolts with a closed wrench when disassembling a fuel pump.

[NOTICE]

An intake manifold may obstruct the disassembly of the fuel pump by the engine model. Remove the fuel pump after removing the intake manifold first.





Disassembling a fuel pump

[Reassemble]

When installing a fuel pump on the gear case, put a fuel pump spacer between the cylinder blocks, and install it .

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Cause \ Trouble symptom		Starting failure				Insufficient engine output			Poor exhaust color		High knocking sound during combustion	Abnormal engine sound	Uneven combustion sound	Hunting		Large engine vibration	Difficulty in returning to low speed	Excessive fuel consumption	Lubricating oil					Cooling water		Air intake		Exhaust temperature rise	Corrective action
			Engine starts but stops soon.			Exhaust color			During work																				
		Engine does not start.	Exhaust smoke											During idling	During work				Excessive consumption	Dilution by fuel oil	Mixture with water	Low L.O. pressure	Much blow-by gas	Overheat	Low water temperature	Pressure drop	Pressure rise		
			None	Little	Much	Ordinary	White	Black	White	Black																			
Cooling Water System	Excessive cooling effect of radiator								○									○							○				Defective thermostat (kept closed) (See 2.2.7 in Chapter2.)
	Insufficient cooling effect of radiator							○																○				○	Defective thermostat (kept opened)(See 2.2.7 in Chapter2.) or slipping fan belt (See 2.2.2-2) in Chapter2.)
	Insufficient coolant water level							○																○				○	Check water leakage from cooling water system. (See 2.2.1-4) in Chapter2.)
	Cracked water jacket																				○	○		○					Repair or replace.
	Slackened fan belt							○																○				○	Adjust the belt tension. (See 2.2.2-2) in Chapter2.)
	Defective thermostat							○	○															○	○				Check or replace. (See 2.2.7 in Chapter2.)
Lubricating System	Improper properties of lubricating oil	○	○			○													○			○	○						Use proper lubricating oil. (See 1.3.2 in Chapter1.)
	Leakage from lubricating oil piping system																		○			○							Repair.
	Insufficient delivery capacity of trochoid pump																					○							Check and repair. (See 5.5 in Chapter5.)
	Clogged lubricating oil filter																					○	○						Clean or replace.
	Defective pressure regulating valve																					○							Clean, adjust or replace.
	Insufficient lubricating oil level		○																			○							Add proper lubricating oil. (See 2.2.1-3) in Chapter2.)
Fuel system	Too early timing of fuel injection pump								○	○	○					○													Check and adjust. (See 2.2.7-4) in Chapter2.)
	Too late timing of fuel injection pump						○	○	○	○								○										○	Check and adjust. (See 2.2.7-4) in Chapter2.)
	Improper properties of fuel oil					○	○	○	○	○			○																Use proper fuel oil. (See 1.3.1 in Chapter1.)
	Water entrance in fuel system	○			○		○		○				○	○	○														Perform draining from the fuel filter. (See 2.2.3 and 2.2.5 in Chapter2.)
	Clogged fuel filter	○	○			○																							Clean or replace. (See 2.2.5 in Chapter2.)
	Air entrance in fuel system	○	○			○																							Perform air bleeding. (See 2.2.3 in Chapter2.)
	Clogged or cracked fuel pipe	○	○			○																							Clean or replace.
	Insufficient fuel supply to fuel injection pump	○	○			○																							Check the fuel tank cock, fuel filter, fuel pipe, and fuel feed pump.
	Uneven injection volume of fuel injection pump						○	○	○	○				○	○	○	○												○	Check and adjust.
	Excessive fuel injection volume									○									○	○			○	○			○	○	Check and adjust.
	Poor spray pattern from fuel injection nozzle						○	○	○	○				○	○	○	○		○										Check and adjust. (See 2.2.6 in Chapter2.)
	Priming failure	○																											Foreign matter trapped in the valve inside the priming pump. (Disassemble and clean.)
	Clogged strainer at feed pump inlet					○																							Clean the strainer.

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