

Hako- Citymaster 1200 (1433.11-12)  
Hako-Citycleaner (6150.10)  
Hako Citytrac 4200 (8010.11-12)

## 9.0.1 Yanmar Engine



### Contents, engine

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## 9.0.1 Yanmar Engine

### Contents, engine

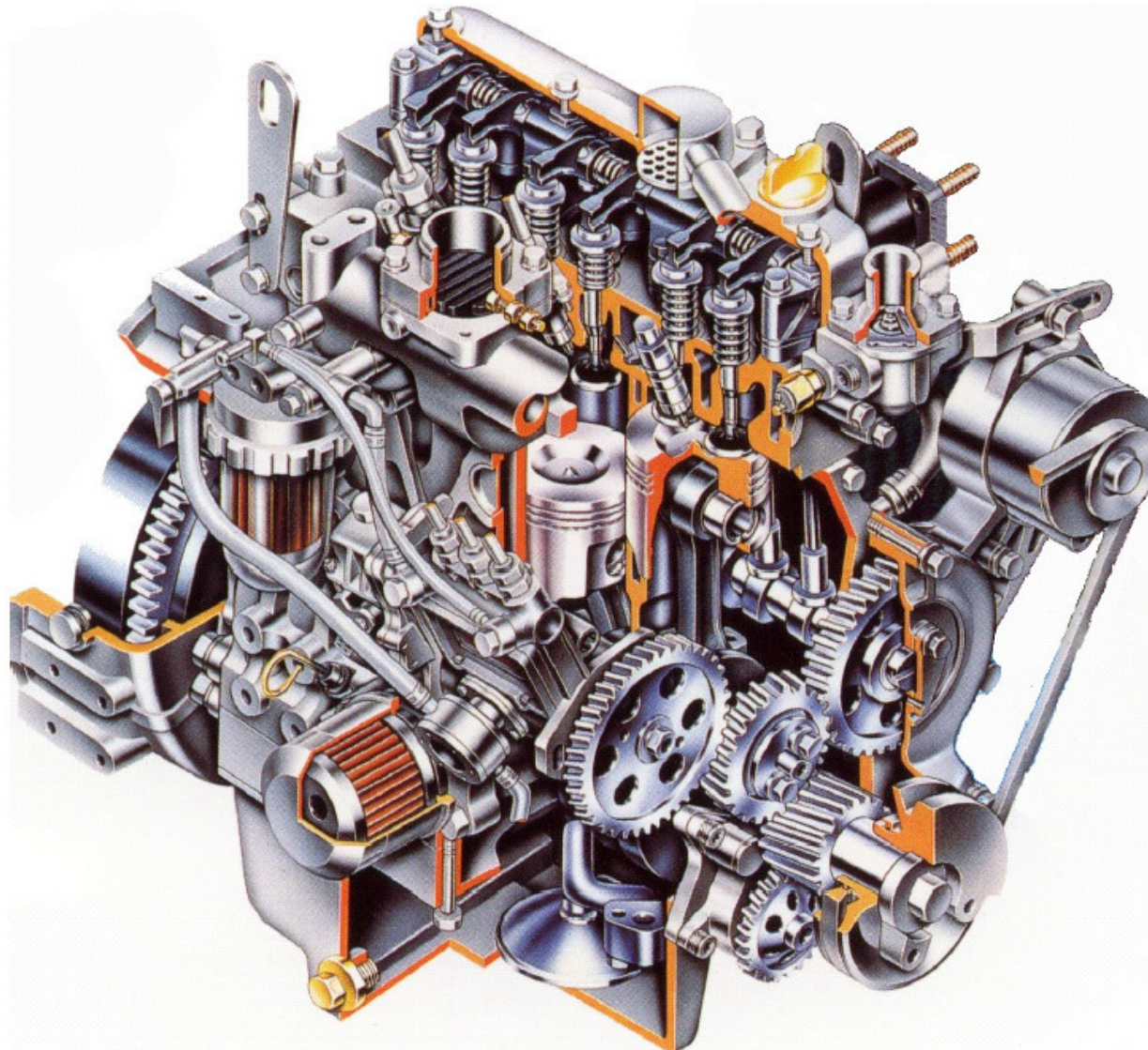


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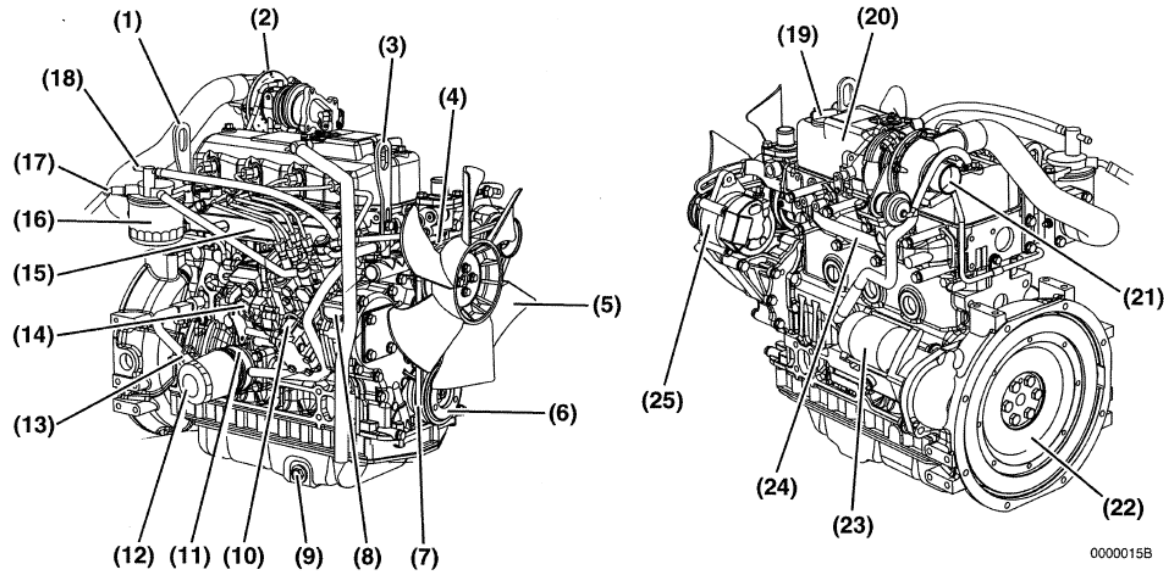
Yanmar diesel engine, 4 TNV 88 BM HW



## 9.0.1 Yanmar Engine

### COMPONENT IDENTIFICATION

Figure 1 shows where major engine components are located.



**Figure 1**

- |   |  |
|---|--|
| 1. Lifting Eye (Flywheel End)           | 14. Governor Lever                     |
| 2. Turbocharger*                        | 15. Intake Manifold                    |
| 3. Lifting Eye (Engine Cooling Fan End) | 16. Fuel Filter                        |
| 4. Engine Coolant Pump                  | 17. Fuel Inlet                         |
| 5. Engine Cooling Fan                   | 18. Fuel Return To Fuel Tank           |
| 6. Crankshaft V-Pulley                  | 19. Top Filler Port (Engine Oil)       |
| 7. V-Belt                               | 20. Rocker Arm Cover                   |
| 8. Side Filler Port (Engine Oil)        | 21. Air Intake Port (From Air Cleaner) |
| 9. Drain Plug (Engine Oil)**            | 22. Flywheel                           |
| 10. Fuel Injection Pump                 | 23. Starter Motor                      |
| 11. Engine Oil Cooler                   | 24. Exhaust Manifold                   |
| 12. Engine Oil Filter                   | 25. Alternator                         |
| 13. Dipstick (Engine Oil)               |  |

\*Only applies to 3TNV84T, 4TNV84T, 4TNV98T, 4TNV106T

\*\* Engine oil drain plug location may vary based on oil pan options.

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## 9.0.1 Yanmar Engine

### Yanmar engine identification

### Yanmar diesel engine, 4 TNV 88 BM HW



This engine will be installed from **June 2009!**

The following parts have been modified in comparison to its predecessor engine model **4TNV88- MHW** :

Glow plugs instead of air preheating

Injection pump

Injection nozzle

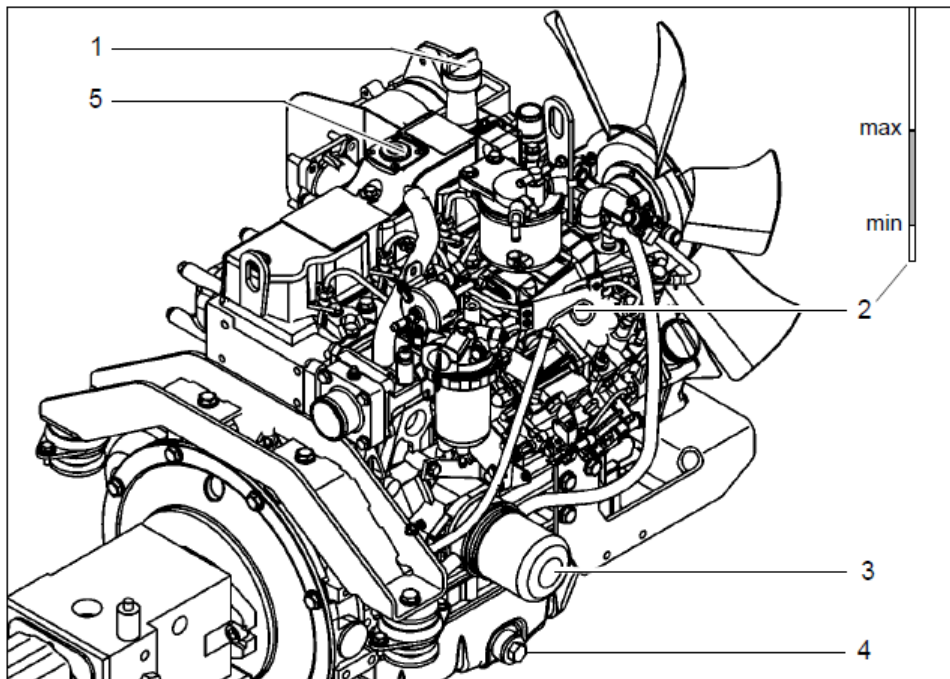
Please note in the case of spare part orders!

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## 9.0.1 Yanmar Engine



### Daily maintenance, check engine oil and coolant levels

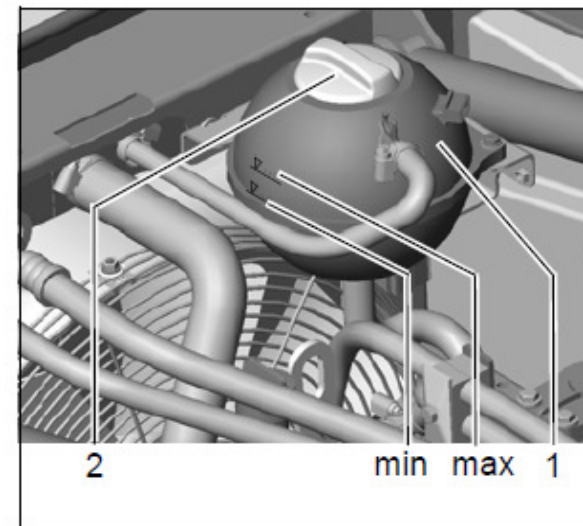


**Fig. 26 Engine**  
1 Engine oil filler neck  
2 Dipstick  
3 Engine oil filter  
4 Engine oil drain plug  
5 Diaphragm (valve bonnet)

Check coolant level of compensation tank (Fig. 32/1) at daily intervals and re-fill if required.



Collect spilled coolant and provide for disposal with regard to environmental protection.



**Fig. 32 Compensation tank**  
1 Compensation tank  
2 Lid

## 9.0.1 Yanmar Engine

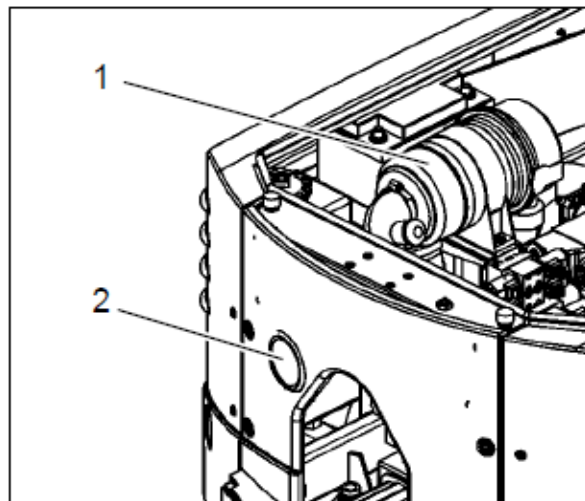
**Daily maintenance, check air filter soiling service indicator**

**Replace air filter element every 500 operating hours**

**Replace air filter element and safety cartridge every 1000 operating hours**

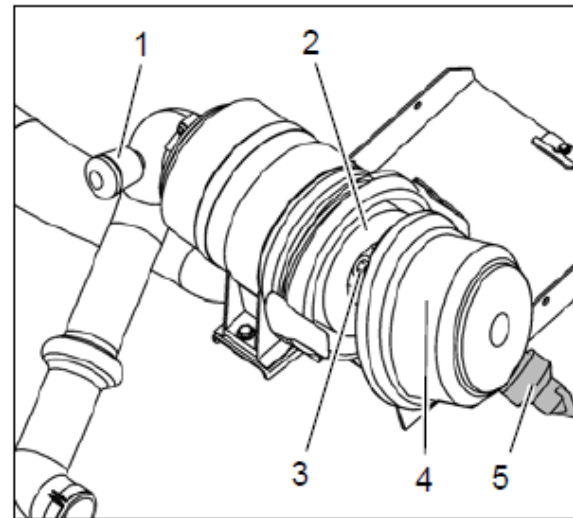
### 6.6.2 Maintenance Indicator

Check the air cleaner for soiling at daily intervals. The maintenance indicator (Fig. 30/1) shows degree of soiling.



**Fig. 29** Air cleaner

1 Air cleaner



**Fig. 30** Filter element

1 Maintenance indicator  
2 Filter element  
3 Safety cartridge  
4 Pre-filter  
5 Dust evacuation valve

### 6.6.3 Clean Filter element

Check the filter element (Fig. 30/2) according to maintenance indicator (Fig. 30/1) and clean if required.

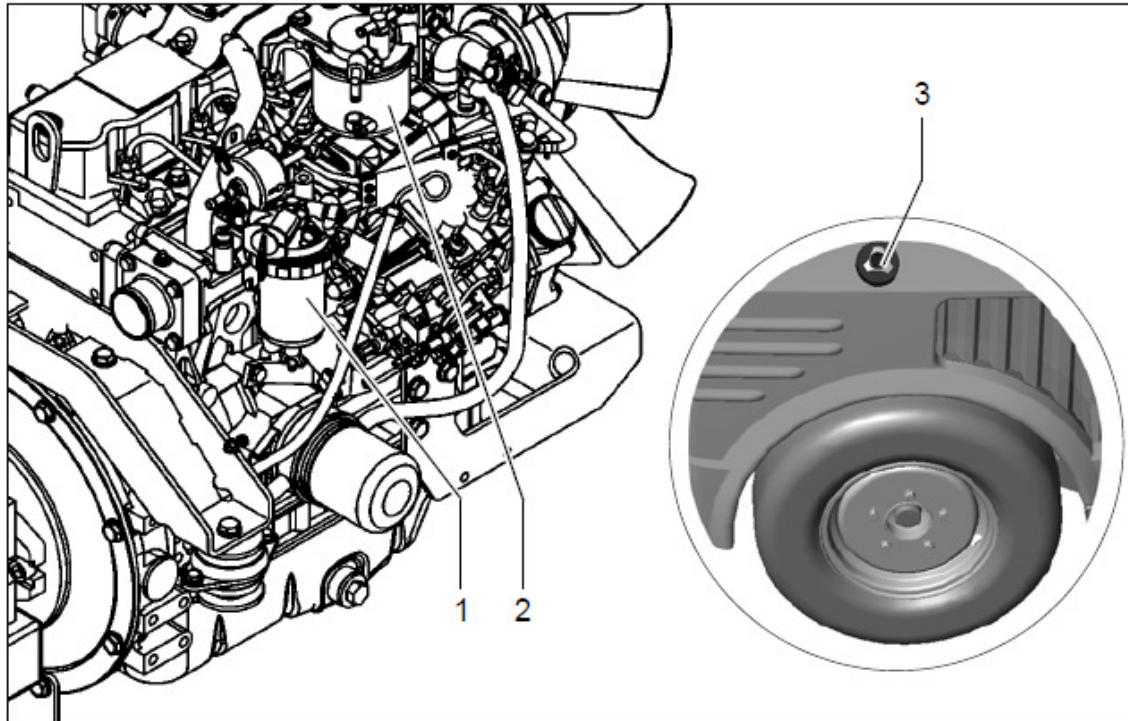
1. Stop vehicle on level ground and engage parking brake.
2. Lift dirt hopper up to final stop position.
3. Turn engine off and pull ignition key.
4. Remove filter element and clean by compressed dry air (3 bar max.) by thoroughly moving the tube up and downwards.
5. Replace if filter element is heavily soiled or damaged.
6. Clean filter case inside.
7. Re-install filter element.



**We do not grant warranty for cleaned filter elements. Never let the engine run without filter element fitted!**

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**Change fuel filter after 50 and subsequently every 500 operating hours**

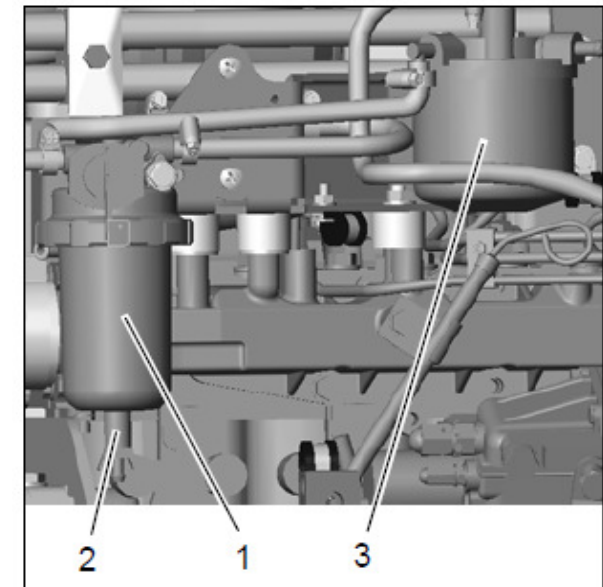


- 1 Water separator
- 2 Fuel filter
- 3 Tank cap

**6.5.2 Water Separator Maintenance**  
Drain condensation water from water separator (Fig. 28/1) after every 250 hours of operation.



**Collect spilled fuel and provide for disposal with regard to environmental protection.**



**Fig. 28 Fuel system**

- 1 Water separator
- 2 Drain plug
- 3 Fuel filter

**Note: Drain any condensation from the water separator after 50 operating hours**





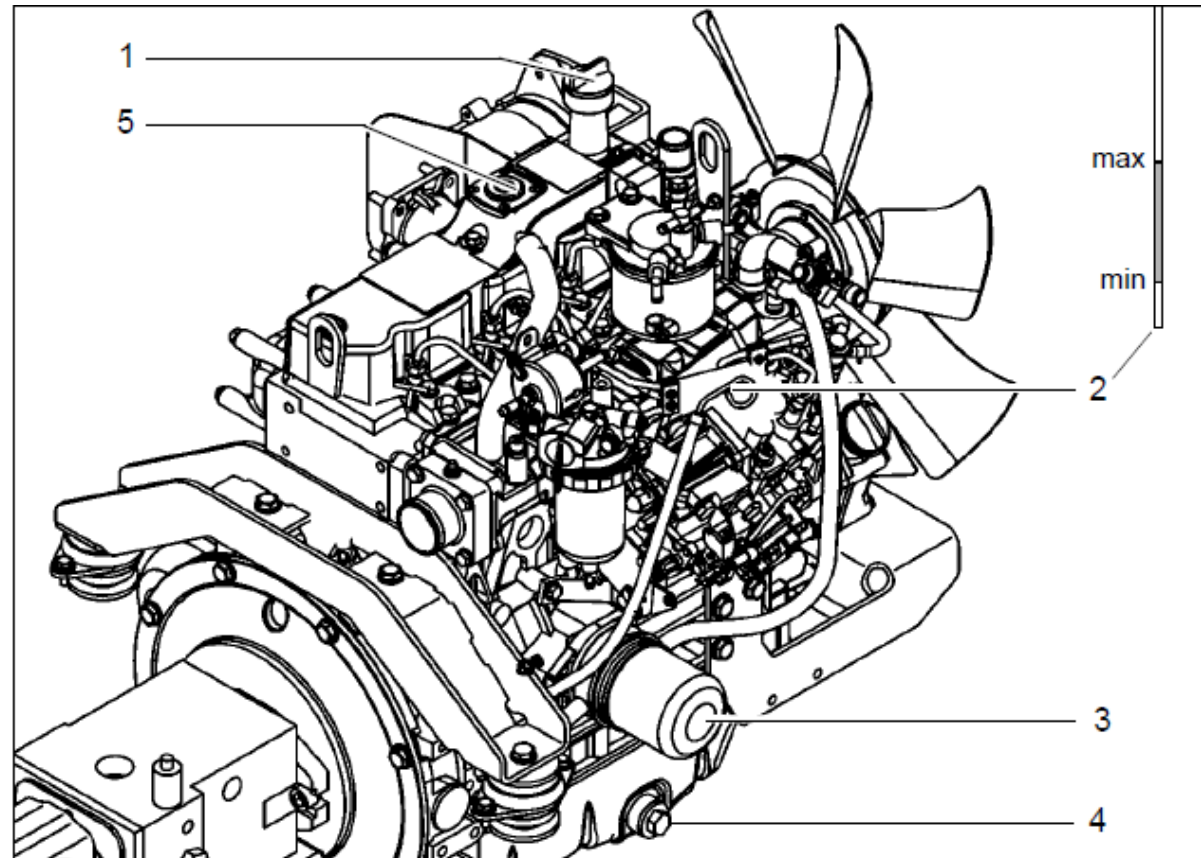
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### 9.0.1 Yanmar Engine

Change engine oil and filter after 50 and subsequently every 250 operating hours

Oil quantity  
8.5l engine oil  
SAE 15 W40



**Fig. 26 Engine**  
1 Engine oil filler neck  
2 Dipstick  
3 Engine oil filter  
4 Engine oil drain plug  
5 Diaphragm (valve bonnet)

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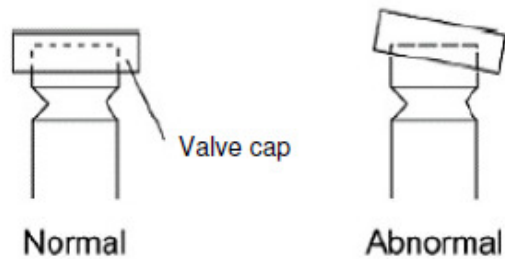
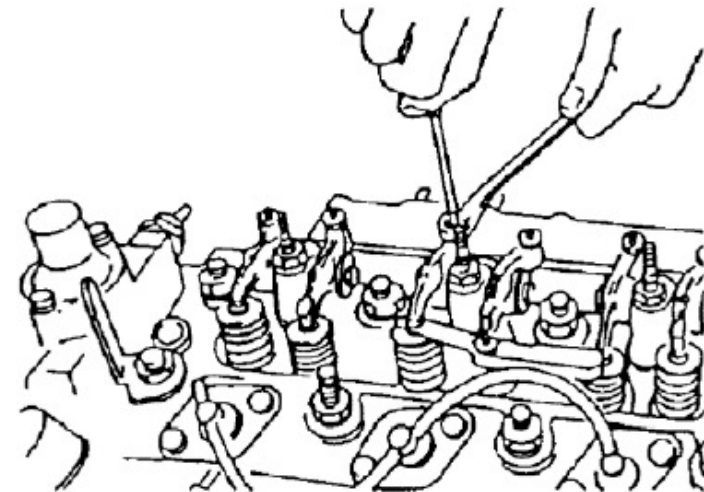
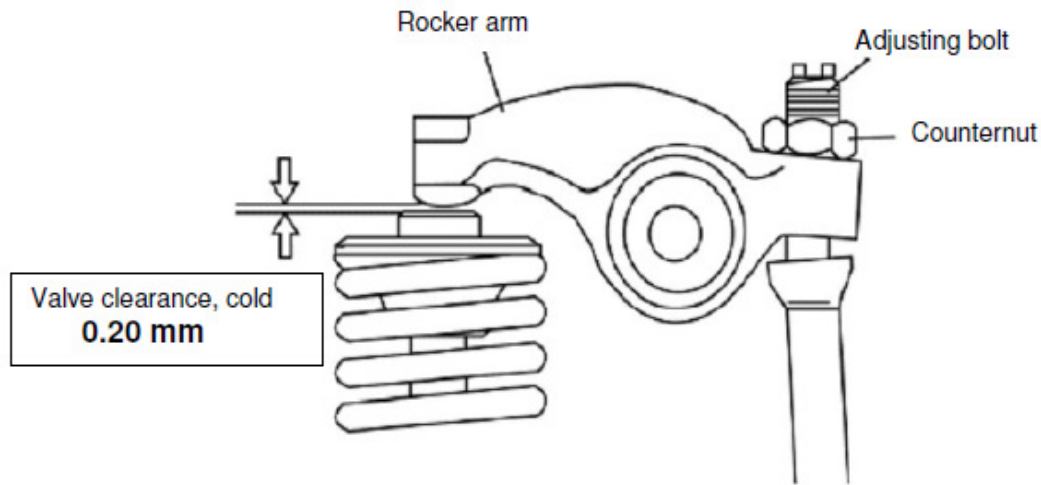
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### Check/Adjust valve clearance on Yanmar engine every 1000 operating hours

The valve clearance must be checked every 1000 operating hours or at least once a year and readjusted, as necessary.

During this maintenance work, check whether the valve caps are set square on the valves or if they have become misaligned due to wear or infiltration of dirt.



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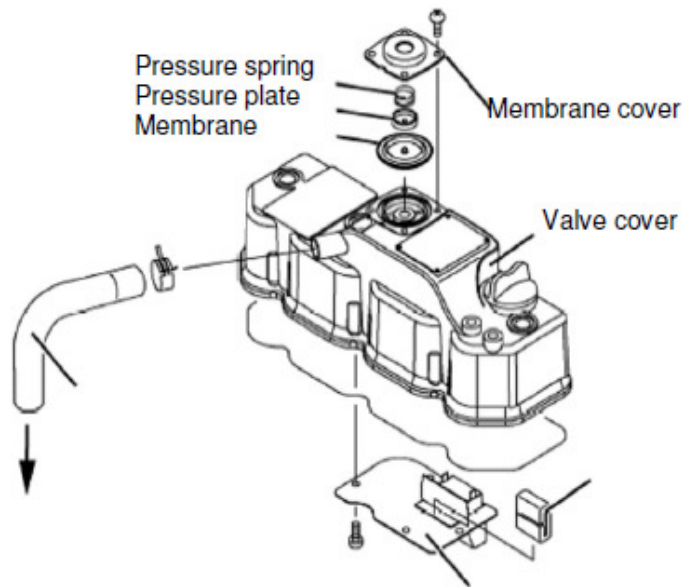
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**Change membrane in valve cover of Yanmar engine every 1000 operating hours**

Complete the following every 1000 operating hours or every 2 years:

- Check whether any oil or condensate has penetrated between the membrane and cover.





9.0.1 Yanmar Engine  
 Troubleshooting, Yanmar engine

# TROUBLESHOOTING

If a problem occurs, stop the engine immediately.  
 Refer to the SYMPTOM column in the  
 Troubleshooting Chart to identify the problem.

<b>CAUTION</b>
<p><b>If any indicator fails to illuminate when the key switch is in the ON position, see your authorized Yanmar industrial engine dealer or distributor for service before operating the engine.</b></p>

<b>CAUTION</b>
<p><b>If any indicator illuminates during engine operation stop the engine immediately. Determine the cause and repair the problem before you continue to operate the engine.</b></p>

## TROUBLESHOOTING CHART

SYMPTOM	PROBABLE CAUSE	ACTION	REFER TO
<b>Indicator Turns On - Engine Running</b>			
Engine oil pressure indicator	<ul style="list-style-type: none"> <li>• Low level of engine oil</li> <li>• Too high an oil level</li> </ul>	<ul style="list-style-type: none"> <li>• Check and adjust oil level as necessary</li> </ul>	<i>Checking Engine Oil on page 38</i>
	<ul style="list-style-type: none"> <li>• Clogged engine oil filter</li> </ul>	<ul style="list-style-type: none"> <li>• Replace engine oil filter element</li> </ul>	<i>Replace Engine Oil and Engine Oil Filter on page 73</i>



## 9.0.1 Yanmar Engine

### Troubleshooting, Yanmar engine

SYMPTOM	PROBABLE CAUSE	ACTION	REFER TO
Engine coolant indicator	• Low engine coolant level	• Add engine coolant	<i>Filling Radiator With Engine Coolant on page 40</i>
	• Dirty radiator fins	• Clean the radiator fins	<i>Check and Clean Radiator Fins on page 81</i>
	• Engine coolant leaking	• See authorized Yanmar industrial engine dealer or distributor	—
	• V-belt loose or damaged	• Adjust V-belt or replace	<i>Check and Adjust Cooling Fan V-belt on page 75</i>
	• Contaminated engine coolant	• See authorized Yanmar industrial engine dealer or distributor	—
	• Faulty engine coolant pump		—
Battery indicator	• V-belt loose or damaged	• Adjust V-belt or replace	<i>Check and Adjust Cooling Fan V-belt on page 75</i>
	• Battery failure	• Check battery condition	<i>Check Battery on page 78</i>
	• Faulty alternator	• See authorized Yanmar industrial engine dealer or distributor	—



## 9.0.1 Yanmar Engine

### Troubleshooting, Yanmar engine

<b>Indicator Does Not Turn ON - Key Switch is Turned to ON (OFF → ON)</b>			
	<ul style="list-style-type: none"> <li>Faulty electrical wiring or faulty indicator</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
<b>Indicator Stays On - Key Switch is Turned from Start to ON (START → ON)</b>			
<ul style="list-style-type: none"> <li>Battery indicator stays ON</li> </ul>	<ul style="list-style-type: none"> <li>Faulty alternator</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
<ul style="list-style-type: none"> <li>Engine oil pressure indicator stays ON</li> </ul>	<ul style="list-style-type: none"> <li>Faulty engine oil pressure switch</li> </ul>		—
<b>Engine Does Not Start</b>			
<ul style="list-style-type: none"> <li>Starter motor operates but engine does not start</li> </ul>	<ul style="list-style-type: none"> <li>No diesel fuel</li> </ul>	<ul style="list-style-type: none"> <li>Refuel and prime fuel system</li> </ul>	<i>Filling the Fuel Tank on page 34</i>
	<ul style="list-style-type: none"> <li>Air in fuel system</li> </ul>	<ul style="list-style-type: none"> <li>Prime fuel system</li> </ul>	<i>Priming The Fuel System on page 36</i>
	<ul style="list-style-type: none"> <li>Improper diesel fuel</li> </ul>	<ul style="list-style-type: none"> <li>Replace with recommended diesel fuel</li> </ul>	<i>Diesel Fuel Specifications on page 33</i>
	<ul style="list-style-type: none"> <li>Clogged fuel filter</li> </ul>	<ul style="list-style-type: none"> <li>Replace fuel filter</li> </ul>	<i>Replace Fuel Filter on page 84</i>
	<ul style="list-style-type: none"> <li>Poor fuel injection</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
	<ul style="list-style-type: none"> <li>Compressed air leakage from intake / exhaust valves</li> </ul>		—
	<ul style="list-style-type: none"> <li>Faulty engine stop solenoid</li> </ul>		—



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### Troubleshooting, Yanmar engine

SYMPTOM	PROBABLE CAUSE	ACTION	REFER TO
<ul style="list-style-type: none"> <li>Starter motor does not operate or rotates too slowly (engine can be turned manually)</li> </ul>	<ul style="list-style-type: none"> <li>Battery needs charging</li> </ul>	<ul style="list-style-type: none"> <li>Check electrolyte, recharge</li> </ul>	<i>Check Battery on page 78</i>
	<ul style="list-style-type: none"> <li>Faulty cable connection at battery terminals</li> </ul>	<ul style="list-style-type: none"> <li>Clean terminals, retighten</li> </ul>	—
	<ul style="list-style-type: none"> <li>Faulty starter switch</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
	<ul style="list-style-type: none"> <li>Faulty starter motor</li> </ul>		—
<ul style="list-style-type: none"> <li>Engine cannot be manually turned</li> </ul>	<ul style="list-style-type: none"> <li>Inner parts seized or damaged</li> </ul>		—
<b>White or Black Exhaust Smoke</b>			
<ul style="list-style-type: none"> <li>Black exhaust smoke</li> </ul>	<ul style="list-style-type: none"> <li>Engine overloaded</li> </ul>	<ul style="list-style-type: none"> <li>Reduce load</li> </ul>	—
	<ul style="list-style-type: none"> <li>Clogged air cleaner element</li> </ul>	<ul style="list-style-type: none"> <li>Clean element or replace</li> </ul>	<i>Clean Air Cleaner Element on page 82</i>
	<ul style="list-style-type: none"> <li>Improper diesel fuel</li> </ul>	<ul style="list-style-type: none"> <li>Replace with recommended diesel fuel</li> </ul>	<i>Diesel Fuel Specifications on page 33</i>
	<ul style="list-style-type: none"> <li>Faulty spraying of fuel injection</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
	<ul style="list-style-type: none"> <li>Excessive intake / exhaust valve clearance</li> </ul>		—
<ul style="list-style-type: none"> <li>White exhaust smoke</li> </ul>	<ul style="list-style-type: none"> <li>Improper diesel fuel</li> </ul>	<ul style="list-style-type: none"> <li>Replace with recommended diesel fuel</li> </ul>	<i>Diesel Fuel Specifications on page 33</i>
	<ul style="list-style-type: none"> <li>Faulty spray pattern of fuel injection</li> </ul>	<ul style="list-style-type: none"> <li>See authorized Yanmar industrial engine dealer or distributor</li> </ul>	—
	<ul style="list-style-type: none"> <li>Fuel injection timing delay</li> </ul>		—
	<ul style="list-style-type: none"> <li>Engine burning oil</li> </ul>		—

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## 9.0.1 Yanmar Engine



**Further detailed information on the Yanmar engine is provided in the following:**

**9.0.2 Spare parts list for Yanmar engine 4TNV 88 BM HW**

**9.0.3 Service manual for Yanmar engine (English)**



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### Notes



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### Notes

