M9961-03E070

# YANMAR

## SERVICE MANUAL

# FUEL INJECTION EQUIPMENT

## MODEL YPD-MP2/YPD-MP4 SERIES

YANMAR CO.,LTD.

# Introduction

This document describes the features, disassembly, reassembly and adjustment procedure of the fuel injection unit (Model YPD-MP2,MP4) for Yanmar Diesel Engine Model TNV.

Fuel injection unit is an essential mechanism of diesel engines, and thus, has to be designed to allow fine adjustment to the engine load.

Therefore, the components of the fuel injection pumps are required to be given high-precision. To meet this requirement, we process and assemble them very accurately.

Accordingly, when performing disassembly and adjustment works in the market, keep the workbenches and their environment clean to surely prevent dirt and dust from attaching to the components of the unit, and take special care that the components are not rusted.

Please note that the specifications of the components are revised to improve the quality of the product, and thus, the details of the changed specifications will be notified through the correction table every time the change occurs.

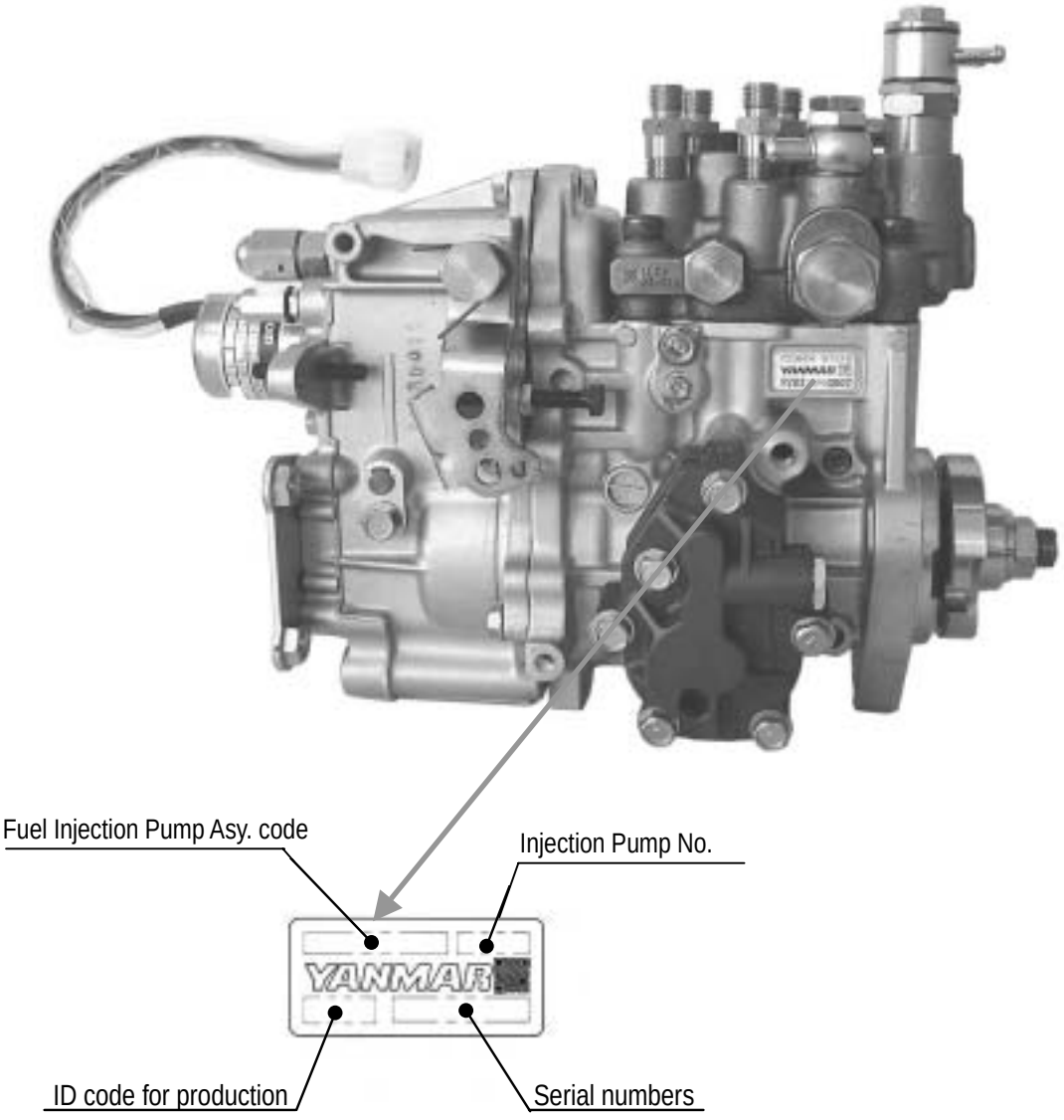
# Contents

# 2. General information

## 2.1. Outline of MP pump

MP pump is a fuel injection pump that has been newly developed to be installed on Yanmar direct injection system diesel engines for the purpose of complying with the regulation for the exhaust gas emission that are becoming tighter in the future.
The fuel injection pump is a fuel distribution type pump that supplies fuel to each cylinder of the engine through a distribution shaft by using a single plunger unlike conventional rail system or distribution system pumps.

- Pump name plate



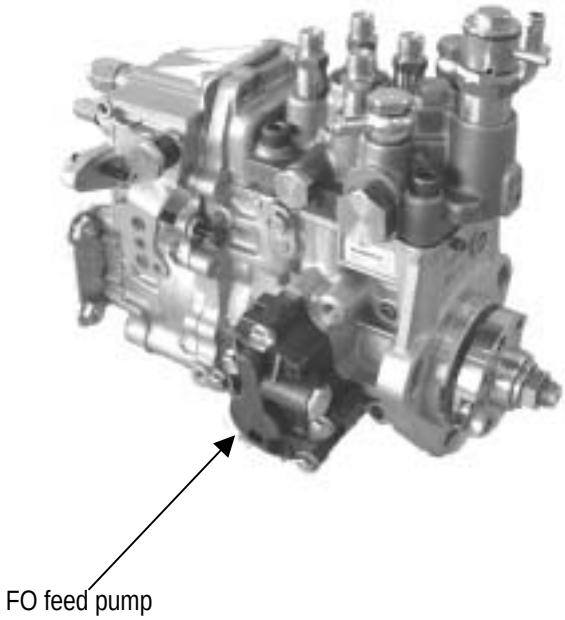
## 2.2. Specifications

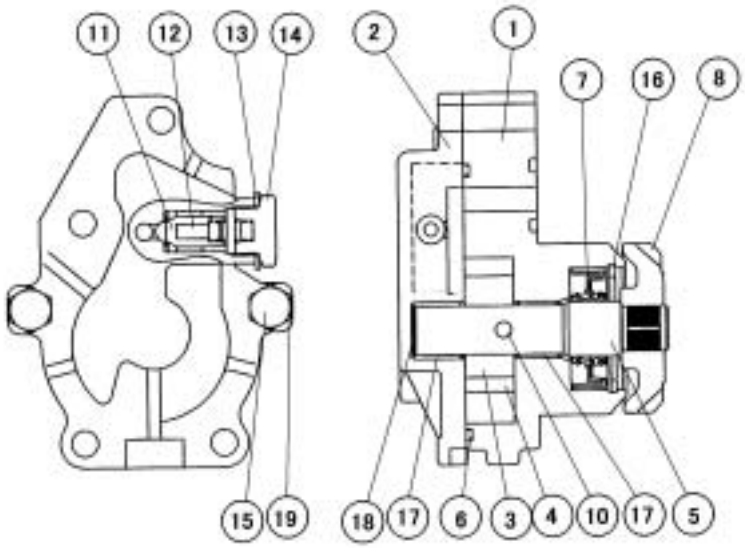
| Model | YPD-3MP2 | YPD-4MP2 | YPD-4MP4 |
|---|---|---|---|
| Applicable Engine | 3TNV82A /84(T)/88 | 4TNV84(T) /88 | 4TNV94 /98(T)/106(T) |
| Plunger Diameter (mm) | 9mm | | 10mm |
| Max. Cam Lift (mm) | 8.1mm | | 10mm |
| Governor-System | Mechanical All Speed Governor | | |
| Fuel Injection Timing Control System | Built-in Hydraulic Control Timer | | |
| Fuel feed pump | Forced Lubrication System With Trochoid Pump | | |
| Lubrication system | Engine System Oil | | |
| Dry Weight (kg) | 8.4 | 8.6 | 11.5 |

# 2.5. Function of Component

## 2.5.1. F.O. Feed Pump

The FO feed pump feeds fuel oil from the fuel tank to the fuel injection pump via the water separator and fuel filter.
The trochoid FO feed pump, installed on the fuel injection pump side, is driven by the fuel camshaft via the bevel gear.
This feed pump can feed high pressure fuel oil into the FO injection pump, but while the fuel oil inside the piping is empty due to shortage of gases, etc., the pump's self-feeding performance is low. Accordingly, the manual priming pump with FO filter or solenoid pre-feed pump is used together. The feed pump failure causes the delivery pressure and volume to drop. This, in turn, shortens the service life of the fuel injection pump and causes the pump to become faulty.
Replace the feed pump assembly after 10,000 hours' use as a standard.




① Pump case
② Pump cover
③ Inner rotor
④ Outer rotor
⑤ Shaft
⑥ Molded ring
⑦ Oil seal
⑧ Bevel gear

⑩ Drive pin
⑪ Relief valve
⑫ Spring
⑬ Seal washer
⑭ Relief plug
⑮ Bolt
⑯ C-ring
⑰ Bush
⑱ Thrust washer
⑲ Washer

### 2.5.1.1. Specifications of F.O. Feed Pump

| | YPD-MP2 | YPD-MP4 |
|---|---|---|
| Suction Head (kPa) | -10 | |
| Std. Delivery Pressure (MPa) | 0.4-0.5 | 0.6-0.7 |
| Std. Delivery Volume ($cm^3$/min) | 500 | 600 |

Pressure & delivery volume figures at conditions below:

Conditions:

Outlet orifice dia. : $\phi$ 0.7mm
F.O. grade : ISO 8217
Revolutions : 1000$min^{-1}$
F.O. temp. : 40 degC (104 degF)

### 2.5.1.2. Inspection of F.O. Feed Pump

(1) Check for the abnormal flaws and chipping on the bevel gear face. If found to be abnormal, replace the whole feed pump assembly.

(2) Check for the abnormal flaws or wear on the face contacting with the pump case, pump cover, inner rotor and outer rotor. If wear exceeds 0.1mm, replace the whole feed pump assembly.

(3) Check for the abnormal wear of the shaft and oil seal moving area. If wear exceeds 0.05mm in depth, replace the whole feed pump assembly.

(4) When no abnormality was found, just replace the molded ring and seal washer and re-assemble.

(5) After install the fuel injection pump, operate the fuel injection pump to check that no oil leaks from each part.

Remove the whirl-stop, (tappet).

Take out the tappet.

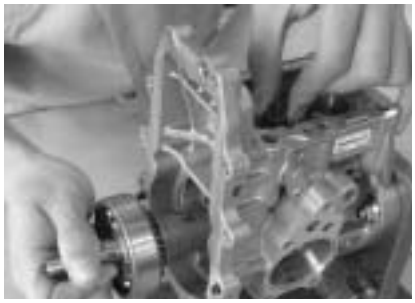
Tappet disassembled and FIC adjust shim.

Remove the retainer, (bearing) fastening bolt.

Remove the retainer, (bearing).

Lift the transmission shaft slightly by your hand.

Align the camshaft's key groove with the embossed mark on the body.



Lift the transmission shaft a little and pull out the camshaft.

Camshaft extracted

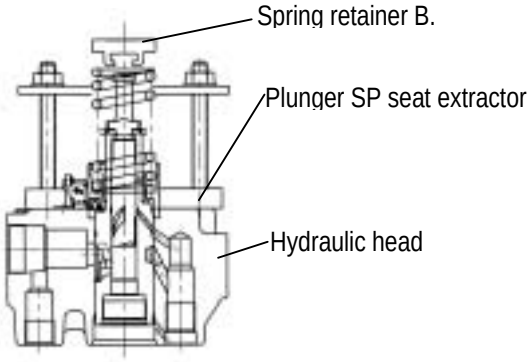
Remove the transmission shaft CMP.

Remove the transmission shaft CMP.

### 3.1.6. Disassembling the hydraulic head CMP

Compress the plunger spring and remove the spring retainer, (B).

While compressing the plunger spring using special service tool, remove spring retainer B.




Remove the rack return spring.

Remove the rack guide fastening bolt.

Remove the spring retainer.

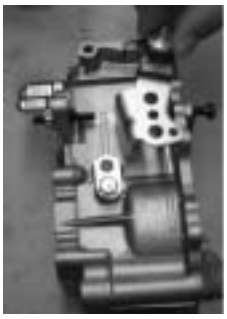
Remove the control sleeve.


Remove the plunger.


Parts removed from hydraulic head CMP

Disassembled parts must be separately stored in the cleaning oil sump.

## 3.2. Disassembling the Governor



Remove the lock nut, (Control lever).

Remove the regulator lever.

Remove the shim.

Remove the removal stop, (governor lever shaft) fixing bolt.

Remove the removal stop, (governor lever shaft).

Pull out the governor lever shaft.

Removed governor lever shaft

Take out the governor lever CMP.

Remove the spring.