



# Service Manual

## S4Q2 Diesel Engine

24467-up

<b>FD10N</b>	F16D-00011-up, F16D-10001-up
<b>FD15N</b>	F16D-50001-up, F16D-60001-up
<b>FD18N</b>	F16D-70001-up, F16D-80001-up
<b>FD20CN</b>	F16D-85001-up, F16D-87001-up



## **FOREWORD**

This service manual covers S4Q2 Diesel Engine of Mitsubishi Forklift Trucks and gives detailed maintenance and repair information. The instructions are grouped by systems to serve the convenience of your ready reference.

Long productive life of your forklift trucks depends to a great extent on correct servicing – the servicing consistent with what you will learn from this service manual. We hope you read the respective sections of this manual carefully and know all the components you will work on before attempting any work.

All descriptions, illustration, specifications, and serial numbers in this manual are effective as of the date printing of this manual. Mitsubishi reserves the right to change specifications or design without notice and without incurring obligation.

## Hou to Use This Manual

In this service manual, the Mitsubishi Diesel Engine (standard model for land use) specifications, maintenance standards and adjustment procedure as well as service procedures such as disassembly, inspection, repair and reassembly are arranged in groups for quick reference.



There are separate manuals for the fuel injection pump, governor and turbocharger.

A short summary of each Group is given in the General Contents, and there is also a table of contents at the beginning of each Group.

Regarding engine operation and periodical maintenance, refer to the Operation & Maintenance Manual. For component parts and ordering of service parts, refer to the Parts Catalogue. Structure and function of the engine are described in various training manuals.

### 1. Methods of Indication

- (1) Parts shown in illustrations and described in text are numbered to correspond with the sequence of disassembly.
- (2) Inspections to be conducted during disassembly are indicated in a box  in disassembled views.
- (3) Maintenance standards for inspection and repair are described in text where they are relevant, are also listed in Group 1 in the General Contents.
- (4) The sequence in which parts are to be assembled is summarized below each assembled view.  
Such as: **t → r → e → w → q.**
- (5) The following marks are used in this manual to emphasize important safety cautions.

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|--|---|
|  <b>WARNING</b> | ...Indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.  |
|  <b>CAUTION</b> | ...Indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury. |
| <b>NOTE</b>  | ...Indicates important information or information which is useful for engine operation or maintenance.        |

- (6) Tightening torque under wet conditions is indicated as “[Wet]”. When so indicated, apply engine oil to the threaded portion of the fastener. Unless indicated as such, the tightening torque is to be assumed in the dry condition.

## 2. Terms Used in This Manual

Nominal value: Indicates the standard dimension of a part to be measured.

Standard: Indicates the dimension of a part, the clearance between parts, or the standard performance. Since the value is indicated in a range needed for inspection, it is different from the design value.

Limit: A part must be repaired or replaced with a new part when it reaches the limit value.

## 3. Abbreviations, Standards, Etc.

- BTDC = Before Top Dead Center
- ATDC = After Top Dead Center
- BBDC = Before Bottom Dead Center
- ABDC = After Bottom Dead Center
- TIR = Total Indicated Reading
- API = American Petroleum Institute
- ASTM = American Society for Testing and Materials
- JIS = Japanese Industrial Standards
- LLC = Long Life Coolant
- MIL = Military Specifications and Standards (U.S.)
- MSDS = Material Safety Data Sheet
- SAE = Society of Automotive Engineers (U.S.)

## 4. Units of Measurement

Measurements are based on the International System of Units (SI), and their converted metric values are indicated in parentheses ( ). For metric conversion, the following rates are used.

- Pressure: 1 MPa = 10.197 kgf/cm<sup>2</sup>
- Torque: 1 N·m = 0.10197 kgf·m
- Force: 1 N = 0.10197 kgf
- Horsepower: 1 kW = 1.341 HP = 1.3596 PS
- Meter of mercury: 1 kPa = 0.7 cmHg
- Meter of water: 1 kPa = 10.197 cmH<sub>2</sub>O (cmAq)
- Rotational speed: 1 min<sup>-1</sup> = 1 rpm



# GROUP INDEX

GROUP INDEX	Items
<b>GENERAL</b>	Outline, Specifications
<b>GENERAL INSTRUCTIONS</b>	Determination of Engine Overhaul Timing, Testing Compression Pressure, Tips on Disassembly and Reassembly, Precautions for Disassembly and Reassembly
<b>ENGINE MAIN PARTS</b>	Cylinder Heads and Valve Mechanism, Flywheel, Timing Gears, Camshaft and Oil Pan, Pistons, Connecting Rods, Crankshaft and Crankcase
<b>INLET AND EXHAUST SYSTEM</b>	Description, Disassembly, Inspection and Reassembly
<b>COOLING SYSTEM</b>	Description, Water Pump, Fan, Thermostat
<b>FUEL SYSTEM</b>	Description, Fuel System Bleeding, Disassembly, Fuel Filter (Paper-Element Cartridge Type), Fuel Injection Nozzles
<b>OIL SYSTEM</b>	Description, Oil Pump, Oil Filter, Pressure Relief Valve
<b>ELECTRICAL SYSTEM</b>	Starter, Alternator, Glow Plugs
<b>TESTING AND ADJUSTING</b>	Bench Test, Idling Speed and Maximum Speed Setting Inspection and Adjustment, Performance Test
<b>TROUBLESHOOTING</b>	Causes of Engine Problems and Remedies
<b>MAINTENANCE STANDARD</b>	Maintenance Standards Table, Tightening Torques, Thread Sealants, Maintenance Schedule
<b>SPECIAL TOOL</b>	Special Tool List

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