



Workshop Manual

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1 Foreword

- Read and observe the information in this documentation. You will avoid accidents, retain the manufacturer's warranty and possess a fully functional and ready to operate engine.
- This engine is built exclusively for purpose according to the scope of delivery - defined by the equipment manufacturer (use for the intended purpose). Any use above and beyond this is considered improper use. The manufacturer will not be liable for damages resulting from this. The user bears the sole risk.
- Use for the intended purpose also includes observance of the operating, maintenance and repair instructions specified by the manufacturer. The engine may only be used, maintained and repaired by persons who are familiar with this and are aware of the risks involved.
- Make sure that this documentation is available to everyone involved in the operation, maintenance and repair and that they have understood the contents.
- Failure to observe this documentation may lead to malfunctions and engine damage as well as injury to persons for which the manufacturer will not accept any liability.
- Prerequisite for proper maintenance and repair is the availability of all the necessary equipment, conventional and special tools and their perfect condition.
- Engine parts such as springs, clamps, elastic retaining rings etc. pose an increased risk of injury when handled incorrectly.
- The pertinent rules for the prevention of accidents and other generally recognised health and safety regulations must be observed.
- Maximum economy, reliability and long life is only guaranteed when using DEUTZ original parts.
- Repair of the engine must correspond to its use for the intended purpose. Only parts released by the manufacturer for the respective purpose may be used for conversion work. Unauthorised modifications to the engine exclude manufacturer liability for resulting damages. Failure to observe this will void the warranty!
- The engines made by DEUTZ are developed for a wide range of applications. A wide range of variants ensures that the respective special requirements are met.
- The engine is equipped according to the installation case, i.e. not all the parts and components described in this documentation are installed in your engine necessarily.
- We have done our best to highlight the differences so that you can easily find the operating, maintenance and repair instructions relevant to your engine.

We are at your service for any questions you may have in this matter.

Your DEUTZ AG

2 General

DEUTZ engines are the product of years of research and development. The profound expertise gained through this, in combination with high demands on quality, attests to the fact that our engines possess all the qualities of long life, high reliability and low fuel consumption. It goes without saying that the high environmental protection requirements are also met.

Maintenance and care are the only way the engine can satisfy the demands you make on it. Compliance with the prescribed maintenance times and the careful execution of maintenance and care work are therefore essential. Difficult operating conditions, deviating from normal operation, must be particularly heeded.

Please consult one of our service representatives responsible for operating faults and spare parts questions. Our trained specialist personnel ensures fast and professional repairs using original DEUTZ spare parts in the event of damage.

Original spare parts from DEUTZ AG are always manufactured according to the state of the art.

3 User notes

3.1 General

The documentation of the workshop manual has been created based on the engine available at the time of going to press.

There may be deviations in the descriptions, illustrations and parts due to further developments.

The maintenance work described in the operation manual and in the workshop manual must be carried out on schedule and completely. The maintenance personnel must have the necessary technical knowledge to perform the work. Safety and protection devices which are removed during maintenance work must be replaced again afterwards.

Caution!

The rules for the prevention of accidents and the safety regulations must be observed during maintenance work.

Reference is made in the workshop manual job cards to the regulations in chapter 3.2. These must be read before working on the engine and must be strictly followed.

The maintenance intervals and the work to be performed are specified in the maintenance schedule of the operation manual. The job cards contain technical documentation on the execution of maintenance work.

3.2 Specifications

3.2.1 Accident prevention and safety regulations

The legally prescribed rules for the prevention of accidents must be observed. These are available from professional associations or from dealers. These are dependent on the application site, operating mode and the operating and auxiliary materials being used.

Special protection measures are specified depending on the work being carried out, and are identified in the job description.

Among other things it generally applies that:

- for the personnel:
 - Only briefed personnel may operate or maintain the engine. Unauthorised persons are prohibited access to the machine room.
 - Wear close-fitting clothing and ear protectors in the machine room when the engine is in operation.
 - Only deploy trained personnel to do repairs and maintenance work.
 - Do not work on the fuel system when the engine is running. The fuel system is under high pressure - danger of death.
 - Go to the workshop immediately in case of leaks in the fuel system.
- for the engine room:
 - Ensure adequate ventilation (do not cover air shafts).
 - Provide first aid kit and suitable fire extinguishers. Check the filling and readiness for operation regularly.
 - Only store inflammable materials in the machine room if they are essential for operation of the system.
 - Smoking and naked flames are prohibited in the machine room.
- for operation, maintenance and repairs on the engine:
 - After all work on the fuel system, it must be bled - see the operation manual, chapter "6.2 Fuel system".
 - Only start the engine when all the protective devices have been fitted. Make sure no-one is standing in the danger area.
 - Cleaning, maintenance and repair work may only be performed with the engine at a standstill and secured against starting.
 - Injection lines and high pressure pipes must not be deformed.
 - Damaged injection lines and high-pressure pipes must be renewed.

- Injection lines and high pressure fuel lines must never be connected when the engine is running.
- Do not place hands near to a leak in the high pressure fuel system.
- Also carefully check all high pressure components visually before performing tests on the running engine. Wear suitable protective clothing (for example protective glasses). Leaks are a potential source of danger for workshop personnel.
- Even if no leaks are discernible on the high pressure fuel system, the workshop personnel should avoid the immediate danger zone or wear suitable protective clothing (such as protective glasses) when performing tests on the running engine and during the first trial run.
- Always stay out of range of a fuel jet, as it could cause severe injury.
- Smoking is strictly prohibited when working on the fuel system.
- Do not work near to sparks and flames.

3.2.2 Disposal regulations

The work described in the operation manual and workshop manual necessitates renewal of parts and operating materials among other things. The renewed parts / operating materials must be stored, transported and disposed of according to regulations. The owner himself is responsible for this.

Disposal includes recycling and the scrapping of parts / operating materials, although recycling has priority.

Details of disposal and their monitoring are governed by regional, national and international laws and directives which the system operator must observe on his own responsibility.

3.3 Operation manual and workshop manual

To structure the information to suit the user, the service documentation is divided into operation manual and workshop manual.

The operation manual contains a general description and instructions for all other maintenance work.

It contains the following chapters:

1. Contents, General
2. Engine description
3. Operation
4. Operating media
5. Maintenance
6. Care and maintenance work
7. Faults, causes and remedies
8. Engine conservation
9. Technical data
10. Service

The workshop manual assumes knowledge of the contents of the operation manual. This applies especially for the safety regulations. The workshop manual describes repairs to the engine and components for which more effort and appropriately qualified technicians are required.

3.4 Job cards

The job cards are divided in the workshop manual into "W" and "I" job cards.

The "W" job card documents standard repairs on the engine and/or its components. The necessary tools and special tools are also specified in the "W" job card.

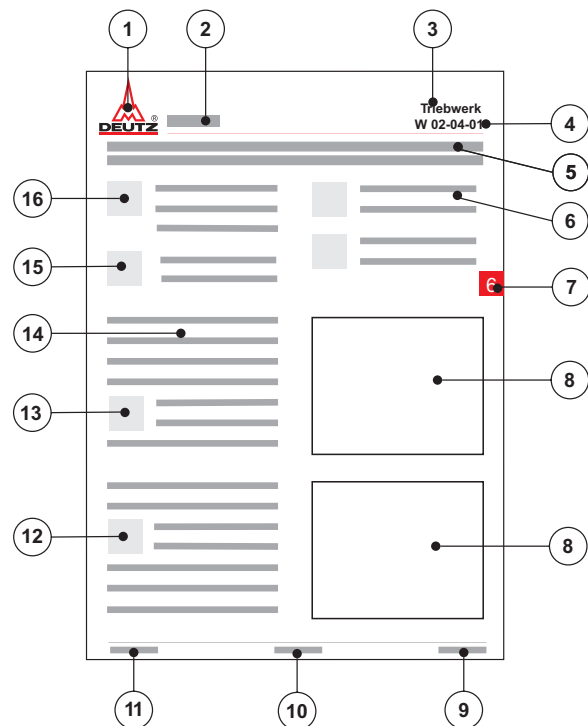
The "I" job card additionally documents the appropriate work procedures for repairing the engine and/or its components. The workshop must satisfy special conditions to perform these work procedures. Special tools and machine tools must be available, for example.

3.4.1 Numbering of job cards

The job card numbers follow the pattern **W 02-04-01**. The individual parts of this pattern are explained below:

- **W 02-04-01**: Documentation type
 - **W** Workshop manual
 - **I**..... Repair instructions
- **W 02-04-01**: Maintenance group
 - 00 ... General / interdisciplinary activities
 - 01 ... Cylinder head
 - **02** ... Drive system
 - 03 ... Crankcase
 - 04 ... Engine control system
 - 05 ... Speed governing
 - 06 ... Exhaust system / Charging
 - 07 ... Fuel system
 - 08 ... Lube oil system
 - 09 ... Cooling system
 - 10 ... Compressed air system
 - 11 ... Monitoring system
 - 12 ... Other components
 - 13 ... Electrical system
- **W 02-04-01**: Component grouping
- **W 02-04-01**: Consecutive number

3.4.2 Structure of a job card



1. DEUTZ AG, publisher of service documentation
2. Engine type (e.g. TCD 2013 4V)
3. Maintenance group
4. Job card number or topic
5. Title of job card
6. Reference to other job cards
7. Chapter
8. Graphic or photo
9. DEUTZ internal creation number
10. Page number
11. Date of issue of job card
12. Note
13. Danger / Important
14. Work sequence
15. Special tools; auxiliary materials
16. Conventional tools

3.5 Explanation of symbols



Danger!

of death or to health. Must be observed!
For example: The incorrect use or conversion of the turbocharger can lead to serious injury.



Caution!

Danger to the component/engine. Non-compliance can lead to destruction of the component/engine.

Must be observed!



Note

General notes on assembly, environmental protection etc. No potential danger for man or machine.



Tool

Conventional and special tools required for the work.



Auxiliary materials

Working materials required in addition to the tools for performing the work (e.g. greases, oils, adhesives, sealants)



References

to important documents or job cards for the work process.

For example: Job card W 04-05-05



Reference

to a document or a job card within the work process.



Test and setting data

The necessary values are specified here.
If several values are necessary, a cross reference is given to the Test and Setting Values table.

For example:

ID no. P01 61 = valve clearance, inlet



Tightening specification

The necessary values are specified here.
If several values are necessary, a cross reference is given to the Tightening Specifications table.

For example:

ID no. A01 001 = cylinder head screws

4 Technical data

4.1 Testing and setting data

ID no.	Name	Information	Series	Value	Unit
General engine data					
P00 01	Length of engine		D 2008	L3 538 L4 627	mm
P00 02	Width of engine		D 2008		mm
P00 03	Height of engine		D 2008		mm
P00 04	Engine weight according to DIN 70020-A approx.		D 2008	L3 155 L4 189	kg
P00 10	Working procedure		D 2008	four-stroke diesel	-
P00 20	Combustion system		D 2008	naturally aspirated engine with indirect injection	-
P00 30	Total volume		D 2008	L3 1170 L4 1560	cm ³
P00 31	Bore		D 2008		mm
P00 32	Stroke		D 2008		mm
P00 40	Compression ratio		D 2008	23,5 : 1	-
P00 50	Direction of rotation	looking onto the flywheel	D 2008	left	-
P00 60	Max. declared speed		D 2008	3000	[rpm]
P00 61	Min. idling speed		D 2008	900	[rpm]
P00 71	Ignition sequence		D 2008	L3 1-2-3 L4 1-3-4-2	-
Power train					
P02 34	Permissible axial backlash of crankshaft		D 2008	0,13 - 0,56	mm
P02 71	Piston, diameter, standard		D 2008	74 ⁺¹ ₋₀	mm

ID no.	Name	Information	Series	Value	Unit
P02 75	Piston projection		D 2008	0,65 - 0,9	mm
P02 78	Piston pin bore		D 2008	25 ^{+0,008} _{+0,003}	mm
P02 79	Piston height		D 2008	66,15	mm
P02 95	Position of the piston ring joints		D 2008	120 (offset to each other)	°
Control system					
P04 35	Camshaft, axial backlash	Nominal	D 2008	0,07 - 0,29	mm
Fuel system					
P07 31	Start of pumping (static)	Part number: 0411 4267, at 1,500 rpm (fixed speed)	D 2008	L3 110	°
P07 31	Start of pumping (static)	Part number: 0411 4267, at 1,800 rpm (fixed speed)	D 2008	L3 110	°
P07 31	Start of pumping (static)	Part number: 0411 4267, at 3,000 rpm (variable speed)	D 2008	L3 not available	°
P07 31	Start of pumping (static)	Part number: 0411 4276, at 1500 rpm (fixed speed)	D 2008	L4 110	°
P07 31	Start of pumping (static)	Part number: 0411 4276, at 1,800 rpm (fixed speed)	D 2008	L4 110,5	°
P07 31	Start of pumping (static)	Part number: 0411 4276, at 300 rpm (variable speed)	D 2008	L4 not available	°
P07 52	Nozzle opening pressure fuel injector		D 2008	150 - 158	bar
Cooling system					
P09 11	Coolant thermostat start of opening		D 2008	86 - 90	°C
P09 13	Coolant thermostat, stroke distance		D 2008	at least 8	mm
Other components					
P12 11	Tension of the V-belt	First assembly	D 2008	450	N

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