

Workshop Manual

914

0312 0441 en

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- Please read carefully and observe the instructions given in this documentation. Thus you avoid accidents, preserve the manufacturer's warranty and ensure that your engine always functions properly and reliably.
- This engine is constructed solely for the use - as defined by the equipment manufacturer (intended use) - designated in the scope of supply. Any use beyond this is contrary to the intended purpose. The manufacturer is not responsible for any damage incurred on this account. That risk is borne solely by the user.
- Intended use also includes compliance with the operating, maintenance and repair instructions issued by the manufacturer. The engine may only be used, maintained and repaired by those who are familiar with it and have received instruction about the hazards.
- Make sure that this documentation is readily available for all those carrying out operating, maintenance and repair work and that the contents are well understood.
- Non-compliance with this documentation may result in malfunction and engine damage as well as personal injuries for which the manufacturer shall not accept any liability.
- A prerequisite for successful maintenance and repair work is that all required equipment, hand and special tools are available and in perfect working order.
- Engine components such as springs, clamps, snap rings, etc. may cause injury if not handled with care.
- Accident prevention regulations and all other generally recognized regulations on safety and occupational medicine are to be observed.
- Optimal operation economy, reliability and durability of the engine can only be ensured when genuine parts of DEUTZ AG are used.
- Engine repairs must be carried out in accordance with intended use. For conversions, only parts approved by DEUTZ AG for a specific purpose should be used. Unauthorised changes made to the engine invalidate all liability on the part of the manufacturer for damage incurred as a result. Non-compliance with this rule nullifies the warranty!

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DEUTZ engines have been developed for a broad range of applications. The extensive range of models available ensures that each particular requirement can be fulfilled.

The engine is equipped for the specific installation conditions, that means that not all parts and components described in this documentation are actually built onto your engine.

We have tried to point out these differences so that can easily find the operating, maintenance and repair specifications relevant to your engine.

Should you have any further questions, please do not hesitate to contact us.

Yours

DEUTZ AG

DEUTZ Engines

are the product of many years research and development work. Our broad-based expertise acquired over the years, together with stringent quality requirements, ensures that the engines we produce have a long service life, and are very reliable and economic in fuel consumption. It goes without saying that they also fulfil the high requirements placed on environmental protection.

Servicing and maintenance work

is a major factor in ensuring that the engine performs in the way intended. It is therefore essential that the stipulated maintenance schedules are observed and that maintenance and servicing work is performed carefully. Particular attention needs to be paid to this in demanding operating environments beyond normal working conditions.

DEUTZ AG

In case of operating defects or inquiries for spare parts, please get in touch with one of our representative service centres. Our trained personnel are able to repair any damage incurred promptly and professionally using original parts.

Original parts made by DEUTZ AG are always state-of-the-art.

You can find notes on our back-up service at the end of this documentation.

Caution when engine is running

Shut the engine down before performing maintenance and repair work. If any safety fixtures are removed, refit these after concluding the work. When working on a running engine, work clothes must be tightly fitting and may not hang loose.

**Safety**

All safety instructions are marked by this symbol. Observe these carefully. Also pass on safety instructions to your operating personnel. In addition, observe the "General Safety and Accident Prevention Regulations" applicable by law.

**Note**

Notes of a general nature are marked by this symbol. Observe these carefully.

**Asbestos**

The seals used with this engine do not contain asbestos. Please use corresponding spare parts when undertaking maintenance and repair work.



0 Introduction

Editorial, foreword, quick access, contents

1 User instructions

- 1.1 General
- 1.2 Regulations
- 1.3 Operating instructions and workshop manual
- 1.4 Work cards
- 1.5 Key to symbols

2 Technical Data

3 Work cards

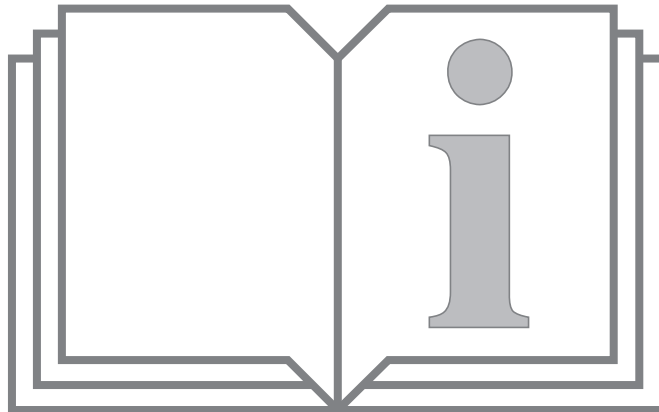
- 3.1 Overview work cards, alphabetical
- 3.2 Overview work cards, numerical

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1 User instructions

- 1.1 General
- 1.2 Regulations
- 1.3 Operating instructions and workshop manual
- 1.4 Work cards
- 1.5 Key to symbols



1 User instructions

1.1 General

The maintenance work prescribed in the operating instructions and the workshop manual must be performed to schedule and in the full scope.

Maintenance personnel must have the skills necessary to perform the work. Any safety fixtures and protective equipment needing to be dismantled during maintenance work must be refitted.



Caution

It is essential to observe the safety and accident prevention regulations during maintenance work.

In this context, also comply with the specific safety provisions for the different maintenance groups which are described in detail as work cards in the chapter on work cards (compare section 1.2).

Maintenance intervals are contained in the maintenance schedules. These also provide information on the work to be performed.

The work cards give technical advice on how to undertake the work.

1.2 Regulations

Safety and accident prevention regulations

Detailed safety instructions have been compiled for the different maintenance groups in the form of work cards, these precede the work cards of the respective maintenance groups.

Observe the accident prevention regulations laid down by law (available from trade associations or specialist outlets). These depend on the place of installation, the operating mode and the consumables and auxiliary aids used.

Special protective action dependent on the respective work is specified and marked in the description of the work.

In general, the following applies

- to personnel:
 - Only instructed personnel may operate or service the engine. No unauthorised persons are allowed in the machine room.
 - Wear tightly clothing and hearing protection in the machine room when the engine is operating.
 - Only deploy skilled personnel for maintenance or repair work.
- to the machine room:
 - Provide adequate ventilation (do not cover air vents).
 - Install first-aid boxes and suitable fire extinguishers. Check that these are filled and ready to use at regular intervals.
 - Do not store inflammable materials in the machine room unless these are required to operate the equipment.
 - Smoking and naked flames are forbidden in the machine room.

- to operating and maintaining the engine:
 - Do not start the engine unless all safety fixtures are installed. Ensure that no-one is loitering in the danger zone.
 - Shut the engine down and secure against re-starting before starting cleaning, maintenance and repair work.

Disposal regulations

The work described in the operating instructions and the workshop manual occasionally requires the renewal of parts and operating materials. These replacement parts / operating materials must be stored, transported and disposed of according to the regulations. The operator is responsible for this.

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

Details on disposal its monitoring are regulated by regional, national and international laws and decrees. It is the responsibility of the plant operator to comply with these.

The servicing documentation has been sub-divided into operating instructions and workshop manual in order to structure the information in the best way for the users.

Among other things, the **operating instructions** contain a general description of and a guide to all maintenance work required

They contain the following chapters:

- 1 General, table of contents
- 2 Engine description
- 3 Operating
- 4 Operating materials
- 5 Maintenance
- 6 Servicing and maintenance work
- 7 Troubleshooting
- 8 Engine conservation
- 9 Technical specifications
- 10 Service

The **workshop manual** requires prior knowledge of the contents of the operating instructions, this applies in particular to the safety regulations. Simple repairs and emergency action on components are described which necessitate a larger scope of work and correspondingly skilled personnel.

1.3 Operating instructions and workshop manual

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1.4 Work cards

The **work cards** are differentiated into those associated with the **workshop manual** e.g. W 4-5-1 and those with the **maintenance instructions I 4-5-1**.

- Please refer to Fig. 1 for an explanation on how the work cards are numbered.
- Fig. 2 shows the shows the layout of a work card.

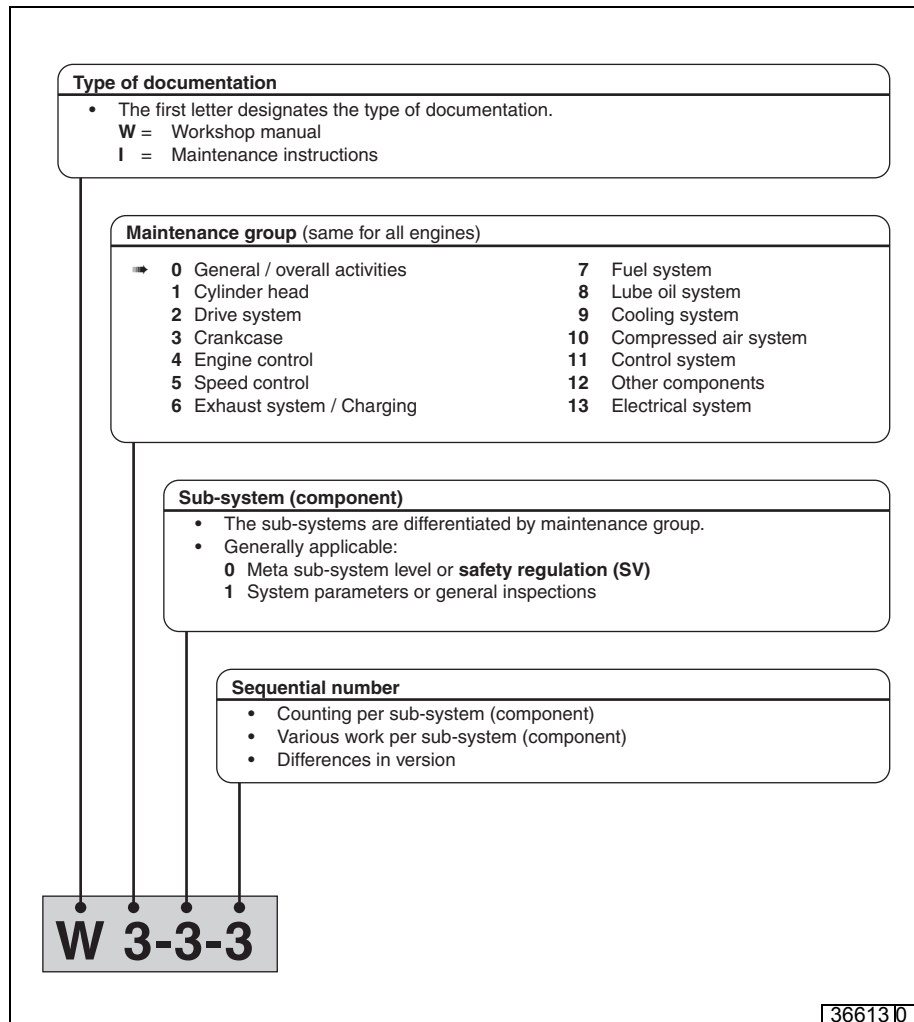


Fig. 1 Numbering of work cards

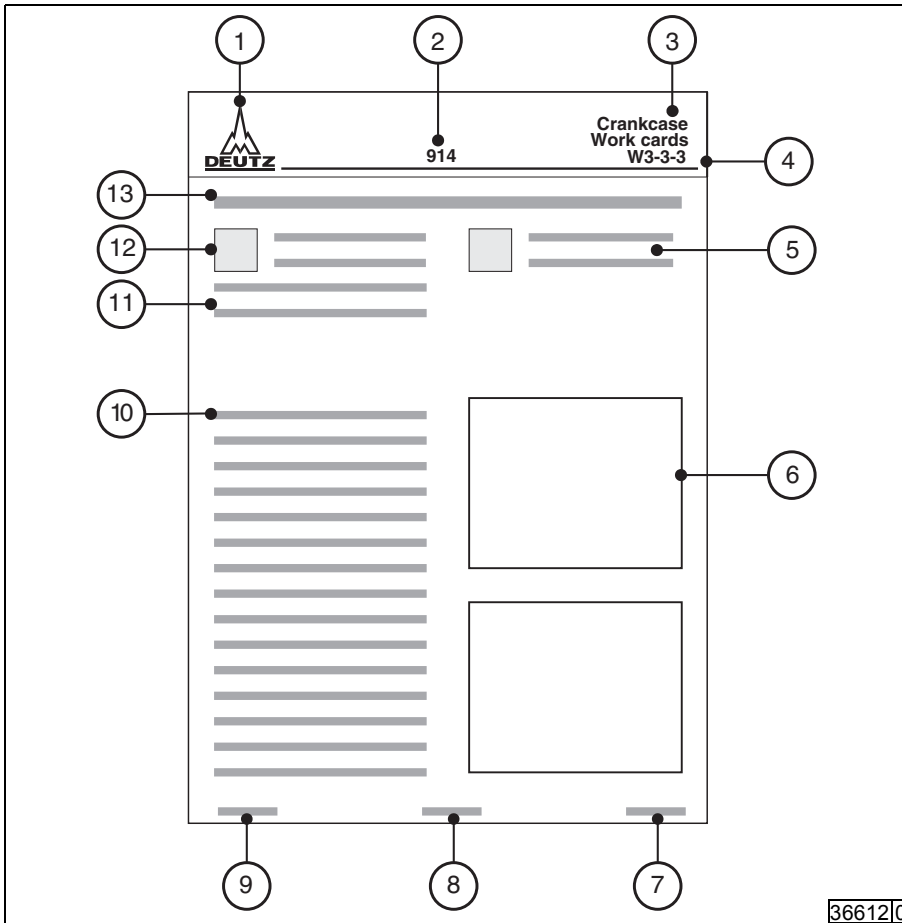


Fig. 2 Layout of work cards

- 1 DEUTZ, issuer of the servicing documentation
- 2 Engine type (e.g. 914)
- 3 Maintenance group
- 4 Work card number
- 5 Reference to other work cards, regulations etc.
- 6 Explanatory graphics
- 7 Page number
- 8 DEUTZ internal part number of the work card and technical categorisation number
- 9 Date the work card was issued
- 10 Sequence of work
- 11 Safety references and general notes
- 12 Tools, auxiliary aids and spare parts required
- 13 Title of the work card










Note

Should you have further questions on a work card, please always quote the engine type (2), the number of the work card (4), the page number (7), the date of issue (9) or alternatively the DEUTZ internal part number (8).

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1.5 Key to symbols

| | | | | |
|---|---|--|---|---|
|  | <p>Caution, important note</p> | |  | <p>Note e.g. cylinder head has been dismantled</p> |
|  | <p>Auxiliary aids e.g. lifting gear, adhesive</p> | |  | <p>Always renew when reassembling e.g. gaskets</p> |
|  | <p>Tools e.g. dial gauge 100 400</p> | |  | <p>References e.g. work card nr. W x-y-z</p> |
| | | |  | <p>See technical specifications line reference, e.g. 67</p> |

Technical Data

| 000 | General engine data | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|---|--|------------|------------|------------|---------------|---------------|-----------------|
| 001 | Engine weight according to DIN 70020-A approx. kg | 277 | 307 | 380 | 430 | 320 | 350 | 485/510 |
| 002 | Total engine volume cm ³ | 3.236 | 4.314 | 5.393 | 6.472 | 3.236 | 4.314 | 6.472 |
| 003 | Bore mm | 102 | | | | | | |
| 004 | Stroke mm | 132 | | | | | | |
| 005 | Direction of rotation | When facing flywheel counter-clockwise | | | | | | |
| 006 | Rated speed max. min ⁻¹ | 2.500 to 2.800 | | | | | | |
| 007 | Minimum idle speed min ⁻¹ | 650 to 700 | | | | | | |
| 008 | Working cycle | Four-stroke diesel | | | | | | |
| 009 | Combustion system | Direct injection | | | | | | |



2

| 010 | General engine data | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|---|------------------------|------------|---------------|-----------------|---------------|---------------|-----------------|
| 010 | Compression ratio | 20 | | | | 18 | | |
| 011 | Compression pressure MPa (bar) | 20 to 30 (20 to 30) | | | | | | |
| 012 | Firing order | 1-2-3 | 1-3-4-2 | 1-2-4- 5-3 | 1-5-3- 6-2-4 | 1-2-3 | 1-3-4-2 | 1-5-3- 6-2-4 |
| 020 | Dimensions of engine including standard adapter housing (normal) | | | | | | | |
| 021 | Maximum length mm | | | | 1.012 | | | 1.012 |
| 022 | Maximum width mm | | | | 739 | | | 739 |
| 023 | Maximum height mm | | | | 1.176 | | | 1.176 |

| 040 | General engine data | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|--|--|------------|------------|------------|---------------|---------------|-----------------|
| 040 | Lube oil pressure at low idling at 650 rpm ⁻¹ . without engine-oil heating. temperature approx. 120°C Oil SAE 15W/40m minimum MPa / (bar) | 0.4 | | | | 0.5 | | |
| 041 | Opening pressure of pressurestat MPa (bar) Lube oil pump: 40 + 60 liter / min. 70 + 80 liter / min. | 5.5 to 6.5 (5.5 to 6.5) 5.0 to 6.0 (5.0 to 6.0) | | | | | | |
| 045 | V-belt tension First-time assembly N | 450 + 20 | | | | | | |
| 046 | V-belt tension Check after running 15 min under load N | 300 + 20 | | | | | | |
| 047 | V-belt tension if re-used N | 300 + 20 | | | | | | |
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| 100 | Injection system | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|---|---|------------|------------|------------|---------------|---------------|-----------------|
| 110 | Injection pump | Motorpal | | | | | | |
| 111 | Make type | PPM10Pi ... | | | | | | |
| 112 | Minimum pressure which must be attained at approx. 5 KW revolutions MPa (bar) | 300 (300) | | | | | | |
| 113 | Test pressure for checking the tightness of pressure P-degree (dynamic) MPa (bar) | The pressure may drop from 150 to min. 140 after 1 min. | | | | | | |
| 120 | Governor | Motorpal | | | | | | |
| 121 | Make type | RV3M350/1150-3864 | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

| 130 | Injection system | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|---|------------------------|------------|------------|------------|---------------|---------------|-----------------|
| 130 | Injector | Bosch | | | | | | |
| 131 | Injector type | DLLA 146 ... | | | | | | |
| | | | | | | | | |
| 133 | Injector opening pressure target value MPa (bar) | 200 + 10 (200 + 10) | | | | | | |
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2

| 140 | Injection system | F3L 914 | F4L 914 | F5L 914 | F6L 914 | BF3L 914/T | BF4L 914/T | BF6L 914 C/T |
|-----|---|------------|------------|------------|------------|---------------|---------------|-----------------|
| 140 | Commencement of delivery | 2) | | | | | | |
| 141 | Static. without injection timing mechanism | 0% | | | | | | |
| 142 | Static. with injection timing mechanism | 6% | | | | | | |
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2) Engine output, speed and commencement of delivery are stamped on the engine nameplate.