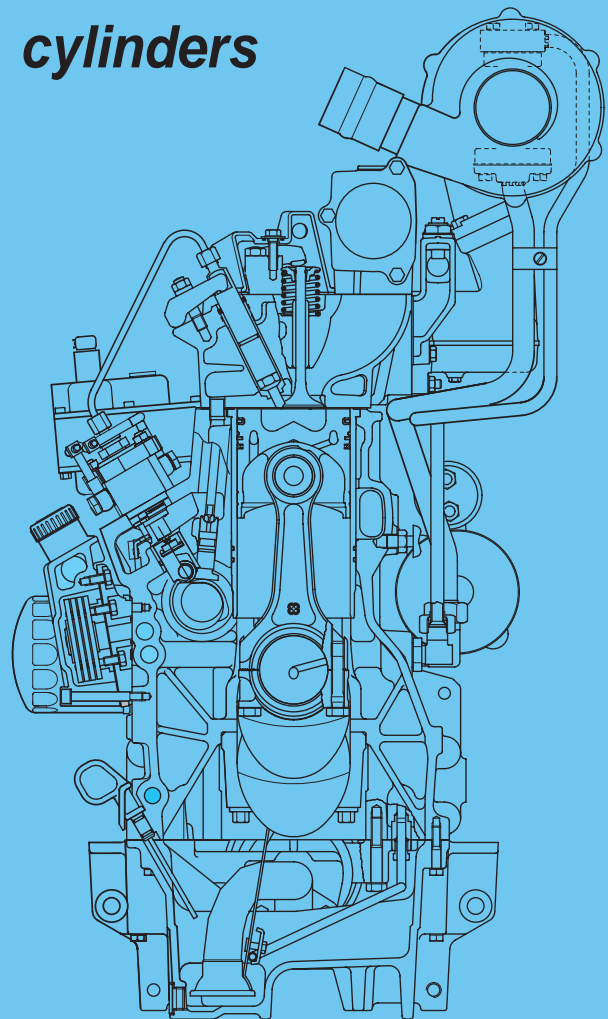
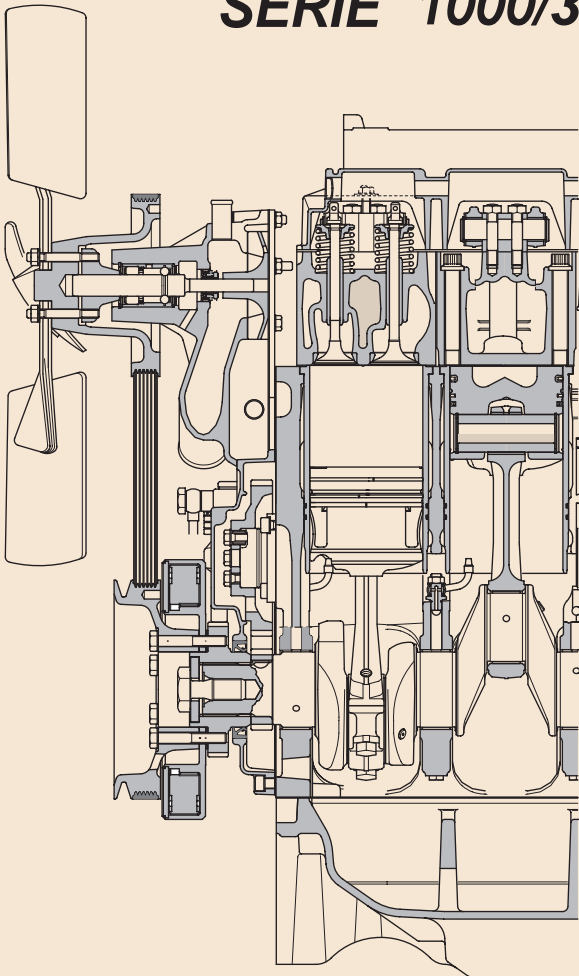




SAME DEUTZ-FAHR
ITALIA S.p.A:

ENGINE **EURO 2**

SERIE 1000/3-4-6 cylinders



WORKSHOP MANUAL

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IMPORTANT PRELIMINARY INFORMATION...


⚠ For reasons of clarity, the illustrations in this manual show the engine and its components with safety guards and covers removed, and do not contain any specific indications regarding the safety precautions to be taken; in addition to normal safety precautions and good working practices, it is important to observe the general rules given here below.

- During disassembly and assembly operations, observe all the safety and accident prevention measures prescribed by EEC Directives; in particular, do not use improvised or worn tools, wear fuel and oil resistant gloves, do not allow any spilt oil or grease to remain on the floor - clean it up straight away, wear suitable clothing, shoes with non-slip soles, etc.
- If splashed with oil or fuel, change your clothing and wash thoroughly any contaminated parts of the body.
- Dispose of all lubricants, fuel, gaskets, oil seals and any other items considered as special waste in a proper manner in accordance with the applicable regulations.
- The disassembly, assembly and inspection operations described in this manual refer to engines that have been removed from the vehicle and/or industrial assembly and mounted on a suitable engine stand.
- Before fixing the engine to the stand, ensure that all apertures (intake, exhaust, turbocharger, air compressor, fuel and oil filler holes, etc.) are covered and clean the engine thoroughly. Use steam or pressurized hot water for general cleaning and then paraffin or degreasing agents to remove any particularly stubborn dirt. After cleaning, dry the engine with a low-pressure air jet (2-3 bar) and protect all machined parts with a thin film of lubricant or anti-corrosion product.
- Before fixing the engine to the stand, remove all accessories that could prevent fixing to the stand and those which would be impossible to remove once the engine is mounted on the stand (flexible coupling, starter motor, flywheel, flywheel cover, fan, rear oil seal).
- The disassembly and assembly operations described in this manual refer to a 4-cylinder engine; except for the specific shape and dimensions of a few external parts (e.g., rocker covers, inlet and exhaust manifolds, fans, etc.) and the presence of certain internal assemblies (e.g. harmonic balancer), the instructions given apply to all versions. Any differences regarding calibration data or parts are indicated with the notes «For versions with..... cylinders only» or «W - WT - WTI versions».
- The engine type codes indicate:
 - W =water cooled
 - T = turbocharger
 - I = Intercooler
 - N° = engine version
- Before disassembly of engines for overhaul of the injection pump, injectors or cams, first determine the basic technical data (engine type, serial number, injection pump type, injector type, static injection advance angle) by following the procedures indicated in the first pages of this manual and referring to the section «TECHNICAL DATA AND DIMENSIONS».


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HOW TO CONSULT THE MANUAL

1. Removal and refitting of assembled units


- (1) For the removal or refitting of assembled units, the sequence of operations and the methods to be applied are described in the removal procedure; if the refitting sequence of operations is the exact reverse of the removal procedure, it is not described.
- (2) All special techniques that apply only to the refitting procedure are indicated by the symbol ; this same symbol appears at the end of each major step in the removal procedure to indicate the parts for which special techniques are to be applied during refitting.


E.g.: **REMOVAL OF UNIT:**..... Operation heading

 : Safety rules to be observed when carrying out the procedure described

1 - Remove part (1): Step of the procedure

★: Technique or important information regarding the removal operation.

2 - Disconnect (2).....  : Indicates the existence of special information regarding refitting of the component in question.


 ℓ: Recover oil, liquid or fuel and the quantity to be recovered

E.g.: **REFITTING UNIT:** Operation heading

- Refitting is the reverse of removal

 : Technique to be applied during refitting


★: Technique or important information regarding the refitting operation

•  ℓ: Filling with oil or liquid with quantity

2. List of special tools

- (1) For details regarding the type, code numbers and quantity of all the tools (T1, T2, etc.) specified in the operating procedures, see the heading «SPECIAL TOOLS».

3. Tightening torques

- 1 - In the operating procedures, the symbol  denotes a specific tightening torque that has been determined experimentally and that must be adhered to.
- 2 - If the symbol does not appear, the torque values to be used are those indicated in the table in Section 00 of this manual.

HOW TO USE AND UPDATE THE MANUAL

1. UPDATING THE MANUAL

All additions, corrections or amendments to the manual will be sent to the Authorised Service Centres. Before starting any repair or overhaul operations, check that you have the most recent updates as these may contain supplementary data not present in previous issues.

2. INSERTING UPDATES

1- **Check** the number of the page and insert it in the appropriate section of the manual following the consecutive order of the page numbers.

2 - **Supplementary pages:** indicated with a hyphen (-) and consecutive number after the page number. Example:

5
 5-1 } Supplementary page
 5-2 }
 6

NOTE. The contents of supplementary pages are structured so that there is no overlap with existing pages.





3 - **Updated pages:** indicated by a consecutive number in a circle; this symbol appears below the page number. Example:





5
 5-1 – Existing page
 5-1 – Update page
 ①
 5-2 – Existing page

NOTE. All supplementary and updated pages are indicated in the manual page list; a revised page list is sent with each update and supersedes the previous list.

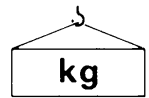
3. SYMBOLS USED IN THE MANUAL

For greater clarity, important information pertaining to operator safety and to critical stages in the working procedures is highlighted by the symbols shown in the following table.


Symbol	Meaning	Notes
	Safety	Safety rules to be applied during operation.
		Operation requiring special safety measures due to internal pressure.
	Warning	Operations requiring special technical or other precautions to ensure compliance with standard values.
	Weight	Weight of main assemblies. Choose lifting ropes/slings carefully; supports required, etc.

Symbol	Meaning	Notes
	Coating	Parts must be coated with adhesive, lubricant, etc.
	Oil, water	Points at which oil, water or fuel must be added and quantity required.
	Drain	Points from which oil, water or fuel must be drained with quantity.
	Tightening torques	Parts requiring special tightening torque during refitting or assembly.

LIFTING INSTRUCTIONS










! Components weighing over 25 kg or of significant size must be supported and removed using suitable lifting equipment with wire rope or polyester slings.

In the paragraphs regarding removal and refitting operations, the weight of the component or assembly to be lifted is indicated with the symbol 

WIRE ROPES - SLINGS

- Use wire ropes or polyester slings of suitable capacity for the parts to be lifted, referring to the following tables:

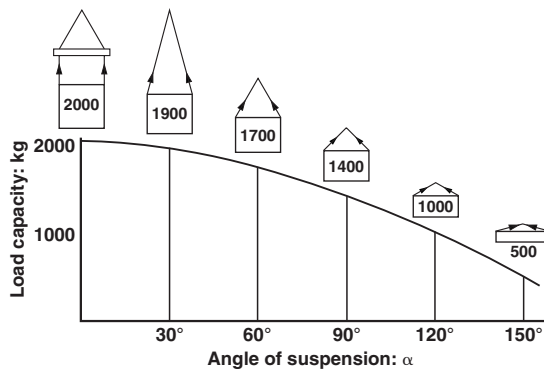
WIRE ROPES (standard twisted «S» or «Z» type)				POLYESTER SLINGS (eye-and-eye - simple loop)				
Ø rope mm	Capacity (kg)			Width (mm)	Capacity (kg)			
								
8	650	620	500	25	500	400	860	700
10	1000	1740	1420	50	1000	800	1730	1410
12	1450	2500	2050	62	1250	1000	2160	1760
14	2000	3460	2820	75	1400	1120	2420	1980
16	2600	4500	3670	100	2000	1600	3460	2820
18	3300	5710	4660	150	2500	2000	4330	3530

NOTE. Lifting capacities are calculated with a safety coefficient.

- The lifting hook should be attached to the central part of the rope or sling; if the hook is attached near the ends of the rope/sling, this could cause the load to slip during lifting.
- Never lift a heavy load using a single rope; always use two or more symmetrically arranged ropes.

! Suspension of a load from a single rope could cause the load to start rotating and consequently cause the rope strands to untwist or the load to slip; this could lead to serious injury.

- Never lift a heavy load when the two branches of the ropes form a wide angle. The permitted load (kg) decreases in inverse proportion to the angle of suspension; the table below indicates how the permitted load varies according to the angle of suspension for two Ø 10 mm ropes each with a load capacity of 1000 kg.



STANDARD TIGHTENING TORQUES FOR NUTS AND BOLTS

STANDARD TIGHTENING TORQUES FOR NUTS AND BOLTS



! The tightening torques for certain specific components and special tightening methods are indicated in the relative assembly paragraphs.

★ The tightening torques indicated below refer to bolts and nuts assembled without lubrication and, where applicable, with anaerobic threadlocking compound.

The values apply to tightening on steel or cast iron components; for soft materials such as aluminium, copper, plastic, sheet metal or panels, the indicated tightening torques must be reduced by 50%.

BOLT SIZE		BOLT CLASS					
		8.8		10.9		12.9	
		Nm	lb.ft.	Nm	lb.ft.	Nm	lb.ft.
COARSE THREAD	M6x1	8.0–8.8	5.9–6.5	11.8–13.0	8.7–9.6	13.8–15.2	10.2–11.2
	M8x1.25	19.4–21.4	14.3–15.8	28.5–31.5	21.0–23.2	33.3–36.9	24.5–27.2
	M10x1.5	38.4–42.4	28.3–31.2	56.4–62.4	41.6–46.0	67.4–74.4	49.7–54.8
	M12x1.75	66.5–73.5	49.0–54.2	96.9–107	71.4–78.9	115–128	84.8–94.3
	M14x2	106–117	78.1–86.2	156–172	115.0–126.8	184–204	135.6–150.3
	M16x2	164–182	120.9–134.1	241–267	117.6–196.8	282–312	207.8–229.9
	M18x2.5	228–252	168.0–185.7	334–370	246.2–272.7	391–432	288.2–318.4
	M20x2.5	321–355	236.6–261.6	472–522	347.9–384.7	553–611	407.6–450.3
	M22x2.5	441–487	325.0–358.9	647–715	476.8–527.0	751–830	553.5–611.7
	M24x3	553–611	407.6–450.3	812–898	598.4–661.8	950–1050	700.2–773.9
M27x3	816–902	601.4–664.8	1198–1324	882.9–975.8	1419–1569	1045.8–1156.4	

FINE THREAD	M8x1	20.8–23.0	15.3–17.0	30.6–33.8	22.6–24.9	35.8–39.6	26.4–29.2
	M10x1.25	40.6–44.8	29.9–33.0	59.7–65.9	44.0–48.6	71.2–78.6	52.5–57.9
	M12x1.25	72.2–79.8	53.2–58.8	106–118	78.1–87.0	126–140	92.9–103.2
	M12x1.5	69.4–76.7	51.1–56.5	102–112	75.2–82.5	121–134	89.2–98.8
	M14x1.5	114–126	84.0–92.9	168–186	123.8–137.1	199–220	146.7–162.1
	M16x1.5	175–194	129–143	257–285	189.4–210.0	301–333	221.8–245.4
	M18x1.5	256–282	188.7–207.8	375–415	276.4–305.9	439–485	323.5–357.4
	M20x1.5	355–393	261.6–289.6	523–578	385.5–426.0	611–676	450.3–498.2
	M22x1.5	482–532	355.2–392.1	708–782	521.8–576.3	821–908	605.1–669.2
	M24x2	602–666	443.7–490.8	884–978	651.5–720.8	1035–1143	762.8–842.4