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| **Information for replacing the functional units** |
| **KDI 1903TCR / KDI 1903TCRE5 Workshop manual (Rev. 17.8)** |



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**Translated from the original manual in Italian language**

Data reported in this issue can be modified at any time by KOHLER.

Sommario

[1. TITOLO 1 2](#_Toc495648770)

[1.1. Asdfsdfsdf 2](#_Toc495648771)

[1.2. Asdfsdfsdfggg 2](#_Toc495648772)

# Information for replacing the functional units

## Electronic injector replacement

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| Z_importante.jpg **Important**         * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) . * In the event of the electronic injectors being disassembled (not necessarily replaced) their position with respect to individual cylinders must not be changed when re-assembled. Refer to the reference between each injector and respective cylinder number. * Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000&txts=2.9.8) during disassembly. * Handle the components as described in [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000&txts=2.9.8) . * Replace all seal gaskets after each assembly for all components on which they are provided. * The high pressure pipes must be replaced every time they are disassembled. * Before disassembling the electronic injectors, make sure the new high pressure pipes are available. * If a new (or different) electronic injector is fitted on the engine, the new calibration data must be entered in the ECU through a specific instrument **(** [**ST\_01**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** . * Electronic injectors are not repairable. * This procedure may be performed on one or more electronic injectors.     **NOTE:**   In the event of a leak upon replacement (oil - coolant - fuel - air), do not intervene with the engine running, but stop it and wait for 5/10 minutes before checking and solving the problem. | imm6_01.jpg **Fig 6.1** |
| **6.1.1 Fuel return pipes disassembly (Common Rail/electronic injectors)**     1. Disconnect the connector **C** . | imm6_02.jpg **Fig 6.2** |
| 1. Remove clips **E** from the electronic injector **F** . 2. Disconnect the junction **G** from the electronic injector **F** .       Z_Avvertenza.jpg **Warning**       * After removing the fittings, the clips **E** must automatically return to their initial position; otherwise they must be replaced.  1. Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1088) ***.*** | imm6_03.jpg **Fig 6.3** |
| **6.1.2 High pressure fuel pipes disassembly (Common Rail/electronic injectors)**    Z_Pericolo.jpg **Danger**       * The fuel injection circuit is under high pressure, use safety protections as described in [**Par 3.4.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=199&parent=1000) . * Ensure that the Common Rail is not under pressure by slowly and carefully unscrewing one of the nuts **H** .      1. Undo the nut **H** on the Common Rail **L** and then the nut **M** on the electronic injector **F** and remove the pipe **N** .       Z_importante.jpg **Important**       * In the event that the electronic injectors are disassembled (not necessarily replaced), mark them with the relevant cylinder number from which they originate so as not to confuse them during re-assembly. * Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000&txts=2.9.8) . | imm6_04.jpg **Fig 6.4** |
| **6.1.3 Electronic injectors disassembly**   1. Undo and remove the screw **P** with the washer **R** e and then the bracket **Q** .     Z_importante.jpg **Important**       * Be careful not to damage the gaskets **X** . * Replace rings **X** , if damaged.   2. Pull out the electronic injector **F** . **NOTE:** Should you be unable to remove the electronic injector (acting only on point **BC** ), use an open-ended spanner (Ø 34 mm), by applying small rotations to unblock the component.  3. Seal all injection component unions as illustrated in [**Par. 2.9.8**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000) . 4. Ensure that gasket **S** has remained in the correct position **(Fig. 6.6)** . Otherwise, recover the gasket from inside the electronic injector **T** manifold. | imm6_05.jpg **Fig 6.5**6.6.jpg **Fig 6.6** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/QQZtx2i75AY?rel=0> |
| **6.1.4 Electronic injector assembly**    Z_importante.jpg **Important**       * Always replace and lubricate the gaskets **AA** and **S** of the electronic injectors **F** with fuel, every time they are replaced. * Reposition the electronic injectors (not replaced) by following the references made for disassembly, as indicated in **Par.** **6.1.2.** * If the engine is painted or protected with clear paint, clean the paint off the diesel injector  **F  near to the part in contact with the gasket AB .**      1. Insert the gasket **S** on the electronic injectors **F (Fig. 6.7)** . 2. Insert electronic injector **F** into manifold **T** , being extra careful not to damage gasket **AB** and direct it as indicated in **Fig. 6.7** . | imm6_07.jpg **Fig 6.7** |
| **6.1.5 High pressure fuel pipes assembly**    Z_importante.jpg **Important**       * Always replace the pipes **N** after each assembly. * If the engine is painted or protected with clear paint, replace the fastening screws  **P**  to ensure the gaskets are sealed properly.  1. Position tube **N** in the Common Rail seat of the electronic injector; correct the position of the electronic injector by means of the entrance of the electronic injector unions **F** and Common Rail **L** . 2. Apply the nuts **H** and **M** by hand without tightening them. 3. Position the fastening brace of electronic injectors **Q** on capscrew surface **AD** , insert capscrews **P** in brace **Q** inserting washer **R** . | imm6_08.jpg **Fig 6.8** |
| Z_importante.jpg **Important**       * Ensure that brace **S** is perfectly positioned onto the electronic injector.     4.  Tighten the fixing screws **P** of the electronic injector bracket (tightening torque at **20 Nm** ). 5.  Tighten the nut **M** (tightening torque at **25 Nm** ). 6.  Tighten the nut **H** (tightening torque at **30 Nm** ). | imm6_09.jpg **Fig 6.9** |
| **6.1.6 Fuel return pipes assembly**   1. Check the condition of the gaskets **AE** . | imm6_10.jpg **Fig 6.10** |
| 1. Insert unions **AF** onto electronic injectors **F** and block them with clips **E** . 2. Mount the connectors **C** on the electronic injectors **F** .     Z_Avvertenza.jpg **Warning**       * Slightly move the wiring support to check that the electrical wire of connector **C** is not strained in correspondence with the outlet hole   **AF** . | 6.11.png **Fig 6.11** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/ArOgFV739EU?rel=0> |

## High-pressure fuel injection pump replacement

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| Z_Pericolo.jpg **Danger**       * The fuel injection circuit undergoes high pressure, use safety protections as described in [**Par 3.4.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=199&parent=1000) . * Ensure that the Common Rail is not under pressure by slowly and carefully unscrewing nut **A** .       Z_importante.jpg **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) . * Always replace the high pressure pipes after each disassembly. * Before disassembling the injection pump, make sure the new high-pressure pipe is available. * The injection pump is not repairable. * Should the fuel feeding pump need to be replaced, after assembly, it is necessary to perform the Pump Learning procedure by means of instrument [**ST\_01**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) . * Seal all injection component unions as illustrated in [**Par. 2.9.8.**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000&txts=2.9.8) * To handling components refer to [**Par. 2.17.**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000&txts=2.9.8) * Always replace the gaskets (where are provided) after each disassembly. | imm6_12.jpg **Fig 6.12** |
| **6.2.1 High-pressure fuel line disassembly (from the injection pump to the Common Rail).**   1. Undo the nut **A** . | imm6_13.jpg **Fig 6.13** |
| 1. Undo nut **D** from Common Rail **E** . | imm6_14.jpg **Fig 6.14** |
| 1. Undo the nut **B** on the intake manifold **C** and remove the pipe **F** . | imm6_15.jpg **Fig 6.15** |
| **6.2.2 Timing system carter oil filling flange disassembly**   1. Remove starter motor **(** [**Par. 7.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=136&parent=1000) **)** and assemble special tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **(** [**Par. 7.7 point 2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=140&parent=1000) **)** . 2. Undo the screws **G (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** ,remove the clamp **E** and the flange **H** . | imm6_16.jpg **Fig 6.16** |
| **6.2.3 High-pressure fuel injection pump disassembly**   1. Undo and remove nut **L** fixing the fuel feeding pump control gear **M** .     Z_importante.jpg **Important**       * Be careful that the nut **L** does not fall into the timing cover.  1. Tighten tool [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) on the gear **M** . | imm6_17.jpg **Fig 6.17** |
| Z_importante.jpg **Important**       * Do **NOT** use the cylinder connection pipe **W** as a handle, to prevent damage or fuel leaks. * Before disassembling, carefully read [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000) . * Seal all injection component unions as illustrated in [**Par. 2.9.8.**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=103&parent=1000&txts=2.9.8)  1. Release the clamps **N** on the return pipe **P** and on the fuel inlet pipe **Q** . 2. Disconnect tubes **P** and **Q** from fuel feeding pump **R** . 3. Disconnect connectors **S** and **T** . 4. Loosen the screws **U** . 5. Redo the capscrew of tool [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) to disconnect injection pump **R** from gear **M** . 6. Undo capscrews **U** and extract injection pump **R** with the relevant gasket **V** . 7. Undo and remove the tool [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) . | imm6_18.jpg **Fig 6.18**imm6_19.jpg **Fig 6.19** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/UaZgKyWrP48?rel=0> |
| **6.2.4 High-pressure fuel injection pump assembly**    Z_importante.jpg **Important**       * Before assembling, carefully read [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000) * Always replace the gasket **V** after each assembly. The gasket **V** can only be fitted in one direction. * Remove the tool [**ST\_04**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) from the pump control gear ( **Ref. M** **of Par. 6.2.3** ) if applicable. * Do **NOT** use the cylinder connection pipe W as a handle, to prevent damage or fuel leaks. * Remove the protection caps only when reconnecting the hoses. | imm6_20.jpg **Fig 6.20** |
| 1. Check that the contact surfaces **AA** are free from impurities. 2. Insert the reference key **K** in the seat of the shaft **Z** . 3. Assemble the new gasket **V** on injection pump **R** . Insert injection pump **R** in its housing on crankcase **AA** making key **K** coincide with key seat **AH** of gear **M** . | imm6_21.jpg **Fig 6.21** |
| 1. Fully tighten the nut **L** on the shaft **Z** of the injection pump.       Z_importante.jpg **Important**       * Apply nut **L** by hand, but do not tighten. | imm6_22.jpg **Fig 6.22** |
| Z_importante.jpg **Important**         * It is mandatory to replace the screws **U** or apply a few drops of **Loctite 270** .      1. Clamp the screws **U** on the crankcase **AB** (tightening torque at **25 Nm** ). 2. Clamp the nut **L (Fig. 6.22)** (tightening torque at  **65  Nm** ). | imm6_23.jpg **Fig 6.23** |
| 1. Fit the connector **T** on the sensor **J** . 2. Fit the connector **S** on the sensor **Y** . 3. Remove the protection caps. 4. Fit the pipe **Q** on the fitting **AA** . 5. Fit the pipe **P** on the fitting **AB** . 6. Hook the clamps **N** on the hoses **Q** and **P** . | imm6_24.jpg **Fig 6.24** |
| **6.2.5 High-pressure line assembly (injection pump / Common Rail)**   1. Remove the protection cap. 2. Position the pipe **F** .       Z_importante.jpg **Important**       * Manually tighten the nut **A** . | imm6_25.jpg **Fig 6.25** |
| 1. Manually tighten the nut **D** . 2. Fix clamp **AC** by means of capscrew **B** on intake manifold **C** (tightening torque **10** **Nm -** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). 3. Clamp nut **D** (tightening torque at **30 Nm** ) and **A** (tightening torque at **25 Nm** ) in sequence. | imm6_26.jpg **Fig 6.26** |
| **6.2.6 Timing system carter oil filling flange assembly**    **NOTE:** Always replace the gasket **AE** after each assembly.   1. Position the gasket **AE** in the set on the flange **H** . 2. Fix the flange H on the crankcase **AF** with the screws **AG** (tightening torque at **10 Nm -** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). 3. Fit the clamp **E** on the flange **H** . 4. Disassemble the special tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) and assemble the starter motor (tightening torque **45 Nm** ). | imm6_27.jpg **Fig 6.27** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/o3h6Say9sc4?rel=0> |

## Unit EGR Cooler replacement

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| **6.3.1 Disassembly**    Z_importante.jpg **Important**         * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) . * To handling components refer to [**Par. 2.17.**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1088) * Always replace the gaskets (where are provided) after each disassembly.     **NOTE:** Perform the operations described in [**Par. 5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=120&parent=1000) .     1. Undo the screws **B** of pipe **C** . | imm6_28.jpg **Fig 6.28** |
| 1. Undo screws **D** and **E** . 2. Remove pipe **F** and the relevant metal gaskets. 3. Release the clamps **G** and remove the sleeve **M** . | imm6_29.jpg **Fig 6.29** |
| 1. Undo the screws **H** and remove the EGR Cooler **L** from the sleeve **N** ( [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). 2. Should the passage ducts of the gas exhaust be clogged by soot or carbon, replace EGR Cooler **L** . | imm6_30.jpg **Fig 6.30** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/xGWUnc-V1YY?rel=0> |
| **6.3.2 Assembly**   1. Insert the fitting **U** in the manifold **M** of the EGR valve unit. 2. Fit the EGR Cooler **L** with the screws **H** on the intake manifold **S** (tightening torque at **22 Nm -** [**ST\_05** ***)***](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) 3. Insert the hose **G** on the fitting **V** . 4. Secure the clamps **F** . | imm6_31.jpg **Fig 6.31** |
| 1. Insert the gasket **N** between the hose **B** and the EGR Cooler **L** and fix the screws **A** (tightening torque at **25 Nm** ) | imm6_32.jpg **Fig 6.32** |
| 1. Insert the hose **E** in its housing on the manifold **S** inserting the gasket **R** . 2. Insert the gasket **T** between the hose **E** and the EGR Cooler **L** and fit the screws **C** (tightening torque at **25 Nm** ). 3. Fit the screws **D** (tightening torque at **22 Nm -** [**ST\_05**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ).     **NOTE:** Perform the operations described in [**Par. 10.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=175&parent=1000) . | imm6_33.jpg **Fig 6.33** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/XSTfzyJa-9Q?rel=0> |

## EGR valve replacement

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| **6.4.1 Disassembly**    Z_importante.jpg  **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .   **NOTE:** Perform the operations described in [**Par. 5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=120&parent=1000) .   1. Disconnect the connector **A** from the valve **C** . 2. Undo the screws **B** and remove the EGR valve **C** with the relevant gasket. | imm6_34.jpg **Fig 6.34** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/lZlk78GFzsg?rel=0> |
| **6.4.2 Assembly**    Z_importante.jpg **Important**         * Always replace gasket **D** after each assembly. * The EGR valve is not a serviceable item, and if faulty / worn out, should be replaced with a new one. * Movimentare i componenti come descritto nel [**Par. 2.17**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1000&txts=2.9.8) .      1. Mount the new gasket **D** on the valve **C** . 2. Fit the valve **C** on the flange **E** with screws **B** (tightening torque at **10 Nm** ). | imm6_35.jpg **Fig 6.35** |
| 1. Fit the connector **A** on the valve **C** .     **NOTE:** Perform the operations described in [**Par. 10.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=175&parent=1000) | imm6_36.jpg **Fig 6.36** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/KGHm0dnsQdc?rel=0> |

## Coolant pump replacement

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| **6.5.1 Disassembly  NOTE:** Perform the operations described in [**Par. 5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=120&parent=1000) .    Z_importante.jpg **Important**         * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=283&parent=1136) . * If the engine is fitted with the Poly-V belt, perform the operations described in [**Par. 11.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=178&parent=1000) .  1. Loosen the screws **A** and **B** . 2. Push the alternator **C** in the direction of the arrow **D** and remove the belt **E** . 3. Release clamp **F** and disconnect tube **G** from the coolant pump **N** .   **NOTE** : If union **R** , is disassembled, replace it or alternatively apply **Loctite 2701** on the thread when assembling on pump **G** (tightening torque of **20 Nm** ). | imm6_37.jpg **Fig 6.37**6.38.jpg **Fig 6.38** |
| 1. Release the clamp **M** from the coolant pump **N** . 2. Undo the screws **H** and remove the pump **N** with the relevant gasket **L** . | imm6_39.jpg **Fig 6.39** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/_QESHZf50PU?rel=0> |
| **6.5.2 Assembly**    Z_importante.jpg **Important**         * Always replace the gaskets **L** , after each disassembly. * Always replace the belt **E** after each assembly. * If the engine is fitted with the Poly-V belt, perform the operations described in [**Par. 11.3**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=178&parent=1000) . * To handling components refer to [**Par. 2.17.**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=112&parent=1088) * Always replace the gaskets (where are provided) after each disassembly  1. Fit the coolant pump **N** with the screws **H** interposing the new gasket **L** (tightening torque at **25 Nm** ). | imm6_40.jpg **Fig 6.40** |
| 1. Reinsert the pipe **G** and hook the clamp **F** ( **Fig. 6.38** ). 2. Rehook the clamp **M** on the pump **N** **(Fig. 6.39)** . 3. Push the alternator **C** in the direction of the arrow **D** . 4. Insert the belt **E** on the pulleys **P** . | imm6_41.jpg **Fig 6.41** |
| 1. Pull the alternator **C** in the direction of the arrow **Q** . 2. While tensioning the alternator **C** , first clamp screw **A** (tightening torque at **25 Nm** ) and then screw **B** (tightening torque at **69 Nm [thread M10] - 40 Nm** **[thread M8]** ). 3. Check the tension of the belt **E** with the instrument ( **DENSO BTG-2** ), positioning it in point **P** (the tension must be between **350 and 450 Nm** ). 4. If the tension values do not correspond, tighten screws **A** and **B** , then repeat operations **6, 7** and **8** . | imm6_42.jpg **Fig 6.42** |
| **NOTE:** Click by side to play the procedure. | <https://www.youtube.com/embed/GbvNS15R9SQ?rel=0> |

## Target wheel replacement

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| **6.6.1 Disassembly**    Z_importante.jpg  **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .  1. Position the crankshaft with the 1st cylinder in TDC, reference **A** upwards. 2. Remove the alternator belt following steps **1 and 2 (** [**Par. 6.5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=127&parent=1000) **)** . | imm6_43.jpg **Fig 6.43** |
| 1. Disassemble the starting motor. 2. Mount the tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) in the seat of the starter motor **C** and fit it with the two starter motor fixing screws. | 6.6.jpg **Fig 6.44** |
| 1. Disconnect the connector **L** . 2. Undo the screw **M** and remove the revolution sensor **N** and its respective spacer. | imm6_45.jpg **Fig 6.45** |
| 1. Undo the screw **P** (clockwise) and remove the pulley/targetwheel unit **Q** . | imm6_46.jpg **Fig 6.46** |
| 1. Undo the screws **R** and remove the target wheel **S** with the relevant sound-absorption disk **T** . | imm6_47.jpg **Fig 6.47** |
| **6.6.2 Assembly**   1. Check that the pin **U** is mounted properly on the pulley **V** . 2. Insert the disk **T** on the pulley **V** respecting the reference of the pin **U** . 3. Position the target wheel **S** on the pulley **V** respecting the reference of the pin **U** . 4. Fit the target wheel **S** with the screws **W** (tightening torque **10 Nm** ). 5. Perform the operations described in [**Par. 6.7.7**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=129&parent=1000) and then the operations between point **2 and 9** of [**Par. 6.5.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=127&parent=1000) . | imm6_48.jpg **Fig 6.48** |

## Oil pump replacement

Z_importante.jpg **Important**

* Before proceeding with operations, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .
* The oil pump is not repairable.

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| **6.7.1 Refrigerant pump disassembly**   1. Perform the operations described in [**Par 6.5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=127&parent=1000) .     **6.7.2 Crankshaft and target wheel pulley disassembly**   1. Perform the operations described in [**Par 6.6.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=128&parent=1000) . 2. Disconnect the connector **AE** from the sensor **S** . | imm6_49.jpg **Fig 6.49** |
| **6.7.3 Timing system crankcase disassembly**    Z_importante.jpg **Important**       * Perform the operations described in [**Par. 5.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=121&parent=1000) **.**  1. Make sure that the reference pin **A** is facing upwards. 2. Undo the screw **H (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** and remove the sensor **S** . 3. Undo the screws **B** and remove the timing system crankcase **C** . | imm6_50.jpg **Fig 6.50** |
| **6.7.4 Oil pump disassembly**   1. Undo the screws **D (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** and remove the group pump **E** from the timing system crankcase **C** . 2. Remove the rotors **F** and **G** from the oil pump crankcase **E** . | imm6_51.jpg **Fig 6.51**  imm6_52.jpg  **Fig 6.52** |
| **6.7.5 Oil pump assembly**    **NOTE:** Carry out the checks described in [**Par. 8.7**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=157&parent=1000) prior to assembly.   1. Check that all surfaces in contact between **F, G, H, E and C** are free from impurities - scratches - dents. 2. When assembling, do not use any type of gasket between **E and C** . 3. Thoroughly lubricate the seat of the rotors **H** on the oil pump crankcase **E** and the two rotors **F and G** . 4. Within housing **H** insert the 2 rotors (in sequence) **G and F** , observing the references **BP** as described in figure (or refer to [**Par. 2.10.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=104&parent=1000) ). 5. Check that the 2 pins **L** are inserted properly in the timing system crankcase **C** . 6. Position the oil pump carter **E** using the reference pins **L** . 7. Clamp the oil pump carter **E** with the screws **D** (tightening torque **10 Nm - (** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **)** ). | imm6_53.jpg **Fig 6.53**imm6_54.jpg **Fig 6.54** |
| **6.7.6 Timing system crankcase assembly**    Z_importante.jpg **Important**       * Always replace the oil seal **J** after each assembly. * Always replace the gasket **P** after each assembly.      * To prepare the surface of the **K** plane for the new application of the sealant, it must be cleaned through the use of: - initially **Loctite SF 7200** - subsequently **Loctite SF 7063** Avoid any contact with the **K** plane and be careful not to compromise the cleaning performed.      1. Lubricate the lip of the oil seal **J** . 2. Apply a coating of **Loctite 5188** around **1mm** thick on the surfaces **K** of the crankcase **C** . 3. Make sure that the key **M (Fig. 6.56)** is inserted properly on the crankshaft and that it is facing upwards. 4. Check that the 2 pins **N** are inserted properly in the timing system crankcase **C** . | imm6_55.jpg **Fig 6.55** |
| 1. Lubricate and insert the gasket **P** in the seat of the oil pump **Q** . 2. Tighten the tool [**ST\_10**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) on the crankshaft. 3. Position the crankcase **C** on the base, using the reference pins **N** , inserting the oil pump **Q** on the crankshaft. | imm6_56.jpg **Fig 6.56** |
| 1. Fit the timing system crankcase **C** with the screws **R** observing the indicated clamping sequence (tightening torque at **25 Nm** ). | imm6_57.jpg **Fig 6.57** |
| 1. Assemble sensor **S** by means of capscrew **T** on carter **C** inserting gasket U (tightening torque at **10 Nm** [**ST\_06**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) ). | imm6_58.jpg **Fig 6.58** |
| **6.7.7 Crankshaft and target wheel pulley assembly**   1. Leave the tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) mounted **(** [**Fig. 6.44**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=128&parent=1000) **)** . 2. Check that the pin **A** is mounted properly on the crankshaft **Z** . 3. Position the pulley unit **W** on the crankshaft **Z** respecting the reference with the pin **A** . 4. Apply **Molyslip** grease on the screw thread **Y** . 5. Clamp the pulley unit **W** with the screw **Y** (tightening torque at **360 Nm** ). 6. Remove the special tool [**ST\_34**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=822&parent=1000) **(** [**Fig. 6.44**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=128&parent=1000) **)** . | imm6_59.jpg **Fig 6.59** |
| 1. Mount the bracket **Z** with the screws **AA** (tightening torque at **10 Nm** ). 2. Perform the operations described in [**Par. 9.12**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=168&parent=1000) . 3. Insert the shim **AB** on the sensor **AC** . 4. Clamp the sensor **AC** on the bracket **Z** with the screw **AD** (tightening torque at **10 Nm** ).   **6.7.8 Coolant pump assembly**   1. Perform the operations described in [**Par 6.5.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=127&parent=1088) *.* | imm6_60.jpg **Fig 6.60** |

## Oil pressure valve replacement

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| **6.8.1 Disassembly**    Z_importante.jpg  **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .  1. Undo cap **A** . 2. Remove spring **B** , check its condition and replace it if broken. 3. Remove the valve piston **C** using a magnet. | imm6_61.jpg **Fig 6.61** |
| **6.8.2 Assembly**   1. Lubricate the piston **C** and fully insert it in the seat **E** . 2. Insert the spring **B** in the piston.     **NOTE:** Always replace the gasket **F** after each assembly.     1. Mount the gasket **F** on cap **A** . 2. Clamp the cap **A** on the crankcase **D** (tightening torque at **50 Nm** ). | imm6_62.jpg **Fig 6.62** |

## Oil vapour separator replacement

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| **6.9.1 Disassembly**    Z_importante.jpg  **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .  1. Release the clamp **AA** and remove the pipe **D** . 2. Release the clamps **F** . 3. Remove the clamp **P** cutting it in the point indicated and remove the separator body **C** removing it from the hose **AG** and **G** . | imm6_63.jpg **Fig 6.63** |
| 1. Release the clamp **F** . 2. Remove the pipes **G and AG** . 3. Remove the clamp **J** . 4. Undo the screws **B** . 5. Release the clamp **S** from the sleeve **K** . 6. Pull the flange **H** out of the manifold **K** and remove the relevant gasket, being careful not to bend the pipe **E** . | imm6_64.jpg **Fig 6.64** |
| **6.9.2 Assembly**    Z_Avvertenza.jpg **Warning**       * Always carefully inspect the condition of the tubes, and replace them if there is any doubt regarding their integrity. * Always replace the gasket **M** after each assembly.      1. Check that the contact surface **L** is free from impurities. 2. Position flange **H** inserting hose **K** onto the flange union **H** , being careful not to bend tube **E** . 3. Insert the gasket **M** between the flange **H** and the crankcase **N** . 4. Secure the flange **H** using the screws **B** on the crankcase **N** (tightening torque at **10 Nm** ). 5. Secure the clamp **S** on the manifold **K** . 6. Fit the pipes **G** and **AG** on the flange **H** . 7. Fit the breather body **C** on the pipes **G and** **D** and fit the pipe **G** with the clamps **F** and the pipe **D** with the clamp **AA** . 8. Fit the breather body **C** on the support flange **H** with the new clamp **P** . | imm6_65.jpg **Fig 6.65**Fig._6.66.jpg **Fig 6.66** |

## Oil cooler unit and oil filter replacement

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| **6.10.1 Oil Cooler unit disassembly**    Z_importante.jpg **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) . * Perform the operations described in [**Par 5.1**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=120&parent=1000) **and** [**Par 5.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=121&parent=1000) **.** * Oil Cooler unit **E** is not repairable.  1. Release the clamps **A** . 2. Remove the pipes **B** out of the Oil Cooler unit **E** . | imm6_67.jpg **Fig 6.67** |
| Z_Avvertenza.jpg **Warning**       * Electric/pneumatic screwdrivers are forbidden. * Use a suitable container to recover any residue oil.  1. Unscrew cartridge holder cover **H** by performing three complete turns and wait 1 minute.   **NOTE** : this operation allows to oil contained in the support **E** to flow into the oil sump in the correct way.   1. Unscrew cartridge holder cover **H** and check that the oil in the lub. oil filter support **E** has flowed towards the oil sump. 2. Undo the screws **C and D** and remove the Oil Cooler unit **E** . | imm6_68.jpg **Fig 6.68** |
| 1. Remove the gaskets **F and G** from the Oil Cooler unit **E** . | imm6_69.jpg **Fig 6.69** |
| **6.10.2** **Oil filter cartridge replacement**   1. Remove gaskets **L, M and N** from element holder cover **H** . 2. Remove cartridge **P** from element holder cover **H** . | 2.jpg **Fig 6.70** |
| 1. Lubricate and insert gaskets **L, M and N** in the **L1, M1 and N1** seats of element holder cover **H** . 2. Insert element **P** into element holder cover  **H** . | 3.jpg **Fig 6.71** |
| **6.10.3 Oil Cooler unit assembly**    Z_importante.jpg **Important**       * In the event of assembly of union **U** on crankcase **S** , manual tightening torque with **Loctite 2701** on the thread).      1. Check that the surface **Q** on the support **E** and on the crankcase **S** are free from impurities. 2. Lubricate and insert the gasket **T** on the fitting **U** . 3. Lubricate and insert the gaskets on the support **E** : **F** in seat **F1** ; **G** in seat **G1** . 4. Fit the support **R** with the screws **C and D** (tightening torque at **10** **Nm** ). 5. Insert and tighten the cartridge support **H** on the filter support **E** (tightening torque at **25** **Nm** ). 6. Fit the pipes **B** on the support **E** and secure the pipes **B** with the clamps **A** . | 4.jpg **Fig 6.72**5.jpg **Fig 6.73** |

## Fuel filter replacement

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| **6.11.1 Disassembly**    Z_importante.jpg  **Important**       * Before proceeding with operation, read  [**Par. 3.3.2**](https://iservice.lombardini.it/jsp/Template2/manuale.jsp?id=198&parent=1000) .     Z_Avvertenza.jpg **Warning**       * The fuel filter is not always mounted in the engine. * When disassembling the sensor **E** , use a suitable container to recover the fuel contained in the cartridge **F** .  1. Release the clamps **A** and pull the pipes **B** out of the support **H** . 2. Unscrew the sensor **E** from the cartridge **F** . 3. Unscrew the cartridge **F** from the support **H** . 4. Undo the screws **C** and remove the support **H** . | imm6_74.jpg **Fig 6.74**imm6_75.jpg **Fig 6.75** |
| Z_Avvertenza.jpg **Warning**       * Check that the fuel supply pump filter is present, and replace if necessary.  1. Release the clamp **D** . 2. Demount the hose **E** . 3. Unscrew the filter **G** from the pump **Q** . | CAP_6_Prefiltro_FACET_01.png |
| 1. Screw the new filter **G** onto the pump **Q** (tightening torque **20 Nm** ). 2. Connect the hose **E** to the filter **G** and fasten with the clamp **D** . | CAP_6_Prefiltro_FACET_02.png |
| **6.11.2 Assembly**   1. Clamp the fuel filter support **H** with the screws **C** on the crankcase **M** (tightening torque at **25 Nm** ). 2. Fit the pipes **B** on the support **H** . 3. Secure the pipes **B** with the clamps **A** . | imm6_76.jpg **Fig 6.76** |
| 1. Lubricate the gasket **N** with fuel. 2. Tighten the cartridge **F** on the support **H** (tightening torque at **17 Nm** ). 3. Assemble gasket **J** onto sensor **E** and lubricate with fuel. 4. Tighten the sensor **E** on the cartridge **F** (tightening torque at **5 Nm** ). | imm6_77.jpg **Fig 6.77** |

## Replacement of SCV valve

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| Z_importante.jpg **Important**       * Before starting any replacement operations, make sure the work area is free from dust (part **X** of valve **B** is extremely sensitive to micro-dust). * Pay the utmost attention to cleaning in order to prevent any type of contamination during replacement operations * - Before proceeding with the replacement, clean the outer part of pump **A** thoroughly - Avoid any type of contact with part **X** of the valve during replacement. * Lubricate part **X** of valve **B** with oil spray. * Before starting any replacement operations, make sure that the key on the vehicle’s panel is **OFF** . * Assemble the new valve in the same position as the previous one. | 6.70.jpg  **Fig. 6.78** |
| **6.12.1 Disassembly**    **1 -** Disconnect connector **C** from valve **B** .    **2 -** Loosen screws **D** .    **3 -** Remove valve **B** from pump **A** . | 6.71.jpg  **Fig. 6.79** |
| **6.12.2 Assembly**    **1 -** Insert studs **E** supplied with valve **B** in the fastening holes of pump **A** and insert gasket **F** in the seat of pump **A** .    **2 -** Assemble valve **B** on pump **A** using studs **E** as positioning guides.    **3 -** Remove studs **E** and secure valve **B** with screws **D** (tightening torque of 6 Nm).    **4 -** Fasten valve **B** by means of screws **D** (tightening torque of 10 Nm). | 6.72.jpg  **Fig. 6.80** |
| 6.73.jpg  **Fig. 6.81** | 6.74.jpg  **Fig. 6.82** |

