



## Replace the crankshaft O-ring (opposite end to flywheel) (L3)

Commercially available tools:

- Bradawl: 8198
- Assembly lever: 9017

Special tools:

- Assembly tool: 142670
- Self-tapping screw
- Washer

### Removal of the crankshaft oil seal

- Remove the torsional vibration damper  
See para. Disassembly and assembly of the torsional vibration damper (L3)
- Using a bradawl, make a hole about 3 mm in diameter in the old crankshaft oil seal.



#### WARNING

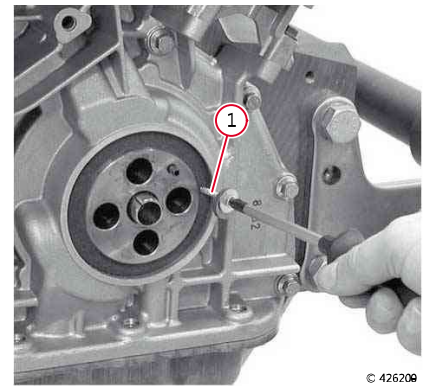
Be careful not to damage the front cover or the crankshaft.



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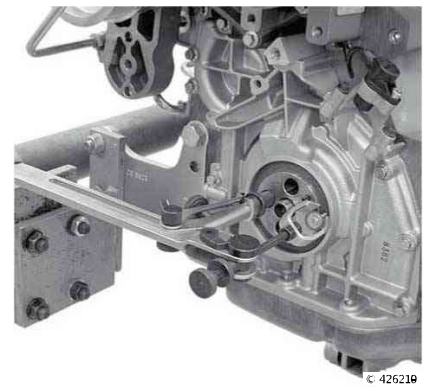
1.
  - Insert a self-tapping screw (1) with washer.



© 426208



2.
  - Extract the crankshaft O-ring using the assembly lever.
  - Carefully examine the crankshaft O-ring sliding surfaces.



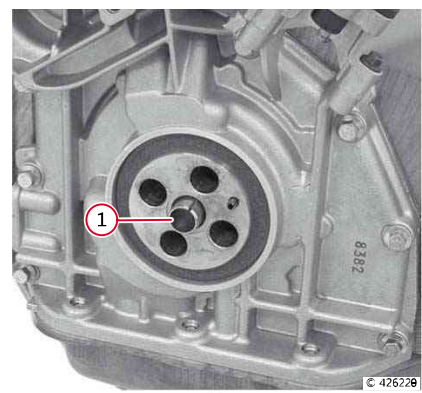
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- 3.

### Assembly of the crankshaft O-ring

- Remove tightening bush (1).



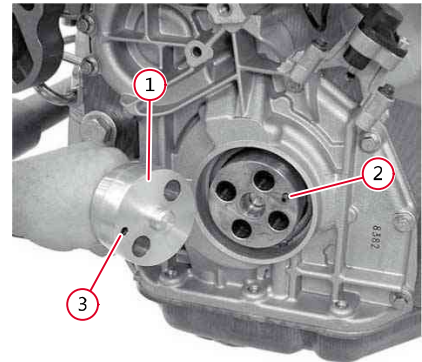
1.

- o Fit guide bush (1).



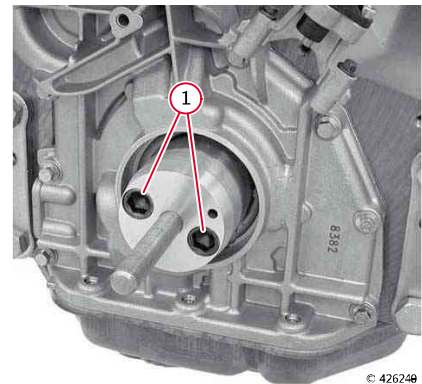
**Note**

Check that locating dowel (2) is aligned with hole (3).



2.

- o Tighten (1) the screws.



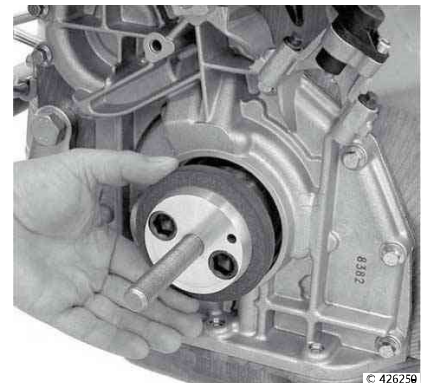
3.

- o Lightly oil the lip of the crankshaft O-ring.
- o Carefully place the crankshaft O-ring on the sliding surface.



**Note**

The seal lip should be facing the engine crankcase.



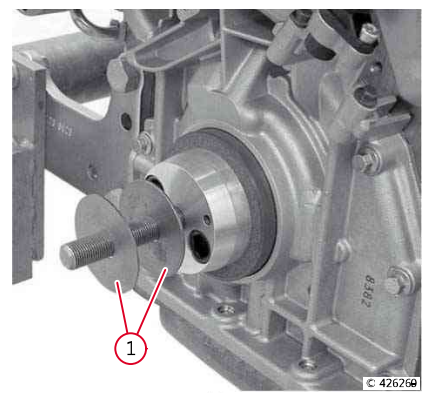
4.

- o Fit spacer (1).

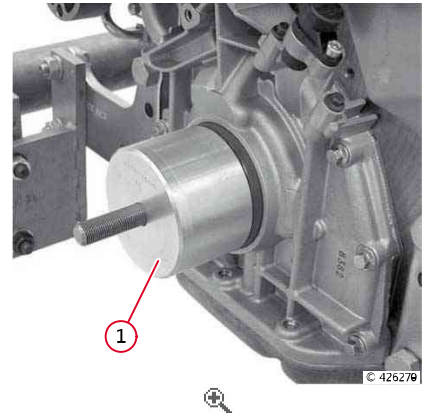


**Note**

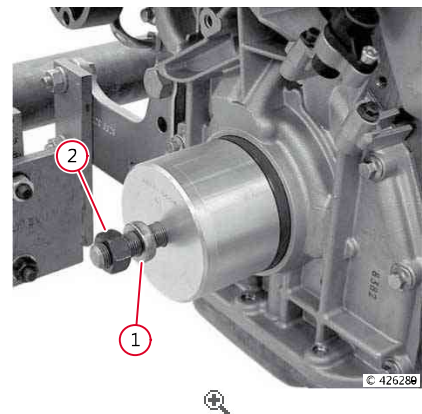
If the crankshaft flange has an entry groove, the O-ring can be installed at three different depths: First assembly = 2 washers, 1st repair - assembly level = 1 washer - 2nd repair - assembly level = 0 washers.



- 5.
- o Fit installation bush (1).
  - o Push the crankshaft O-ring to the support.



- 6.
- o Insert bearing (1).
  - o Screw in nut (2);



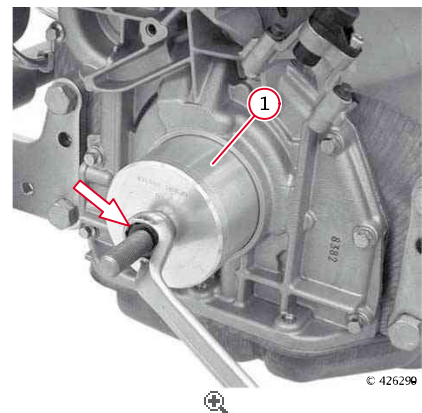
- 7.
- o Screw in the nut until it seats against installation bush (1).



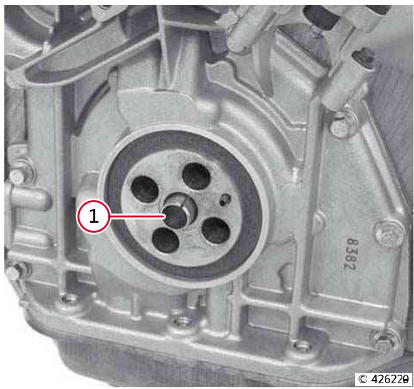
**Note**

The crankshaft oil seal is now installed at the correct depth.

- o Remove the installation tool.



- 8.
- o Insert bush (1) fully.
  - o Fit the torsional vibration damper.  
See para. Disassembly and assembly of the torsional vibration damper (L3).



9.

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## Connecting rod drum check (L3)

Commercially available tools:

- Palmer
- Internal bore meter
- Rotation angle gauge: 8190
- Connecting rod tester

Special tools:

- Dial gauge: 100400

### WARNING



The allocation of the connecting rod drum and flanged bearing cover must be maintained. If the connecting rod drum and the flanged bearing cover are switched when assembled, the connecting rod drum will not be usable! Do not damage the breaking surfaces of the connecting rod drum and flanged bearing cover!

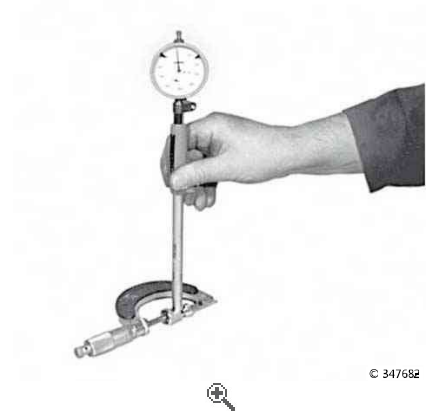


### Note

Connecting rod shank and piston removed.

## Check of the piston pin bush

- Prepare the internal bore meter:
  - Fit the probes for the corresponding measurement interval in an internal bore meter.
  - Fit the dial gauge with a preload of approx. 1 mm in the internal bore meter.
  - Set the bracket measurement screw to 39 mm.
  - Apply the internal bore meter between the test surfaces of the palmer and in the return point of the pointer, bring the dial gauge to "0".

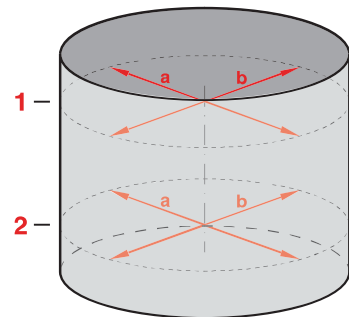


1.



### Note

Measurement diagram of the piston pin bush in points "a" and "b" in surfaces "1" and "2".



2.

- Insert the internal bore meter.
- Apply the internal bore meter to the measurement points required occasionally and read the value measured in the return point of the pointer.  
See para. Test and adjustment data (L3)



### Note

Piston pin bush pressed into place. Measurement points, see diagram.

- o Make a note of the measured value, dimension A.



**Note**

Dimension A is used to determine the piston pin clearance.



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3.

**Check the diameter of the piston pin**

- o Measure the piston pin with the palmer.
- o See para. Test and adjustment data (L3)
- o Make a note of the measured value, dimension B.



**Note**

Dimension B is used to determine the piston pin clearance.



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1.

**Measuring piston ring free play**



**Note**

The clearance of the piston pin results from the difference between the inner diameter of the connecting rod bearing shell (dimension A) and the diameter of the main journal (dimension B).

1.

See para. Test and adjustment data (L3)

**Calculation example:**

|                              |                               |
|------------------------------|-------------------------------|
| Target:                      | Piston pin clearance          |
| Measured value:              | (A) = 40.045 mm               |
|                              | (B) = 40.006 mm               |
| Calculation:                 | Dimension (a) - dimension (b) |
| The results of all this are: | = 0.039 mm                    |

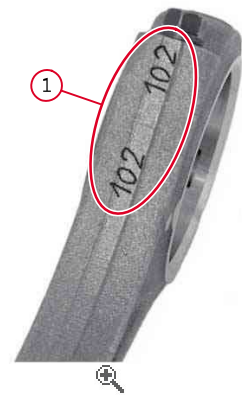
**Check the connecting rod bearing hole**

- o Apply the flanged bearing cover.

**WARNING**



Pay attention to coupling the flanged bearing cover. The numeric marks (1) on the connecting rod drum and on the connecting rod bearing cover must be identical and positioned in front of each other during assembly.



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1.

- o Alternatively tighten the screws with the rotation angle gauge and the box spanner insert.  
See para. Tightening requirements TCD 2012 L04/L06 2V DCR engine



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2.

- o Prepare the internal bore meter:
  - Fit the probes for the corresponding measurement interval in an internal bore meter.
  - Fit the dial gauge with a preload of approx. 1 mm in the internal bore meter.
  - Set the bracket measurement screw to 73 mm.
  - Apply the internal bore meter between the test surfaces of the palmer and in the return point of the pointer, bring the dial gauge to "0".



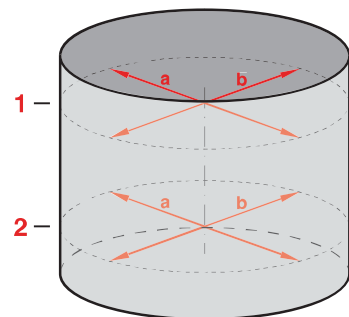
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3.



**Note**


Measurement diagram of the connecting rod bearing hole in points "a" and "b" in surfaces "1" and "2".



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4.

- o Insert the internal bore meter.
- o Apply the internal bore meter to the measurement points required occasionally and read the value measured in the return point of the pointer.  
See para. Test and adjustment data (L3)



**Note**

If the measured values diverse minimally, take additional measurements with new bearing shells.





© 426338

5.
  - Unscrew the screws.
  - Remove the flanged bearing cover.



© 430590

6.

### Check the internal diameter of the connecting rod bearing shells

- Insert the connecting rod bearing shell into the connecting rod drum.



© 426359

1.

#### WARNING



Take care to couple the bearing shells. The anti-twist safety (1) must enter the groove (2). The allocation of the connecting rod drum and flanged bearing cover must be maintained. If the connecting rod drum and the flanged bearing cover are switched when assembled, the connecting rod drum will not be usable! Do not damage the breaking surfaces of the connecting rod drum and flanged bearing cover!

2.

- Insert the connecting rod bearing shell into the relative flanged bearing cover.

#### WARNING



Take care to couple the bearing shells. The anti-twist safety (1) must enter the groove (2).



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3.

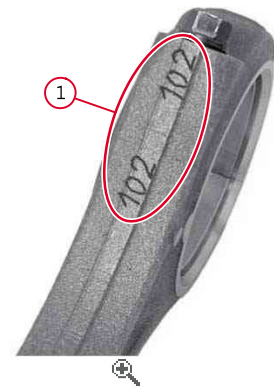


- o Apply the flanged bearing cover.

**WARNING**



The numeric marks (1) on the connecting rod drum and on the connecting rod bearing cover must be identical and positioned in front of each other during assembly.



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4.

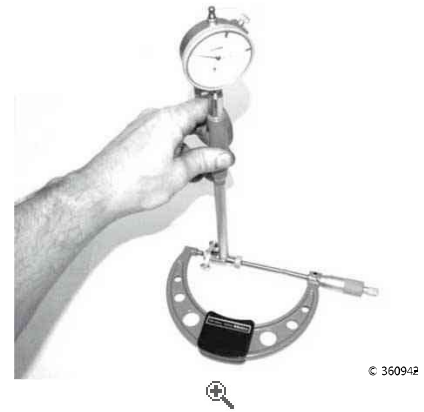
- o Alternatively tighten the screws with the rotation angle gauge and the box spanner insert.  
See para. Tightening requirements TCD 2012 L04/L06 2V DCR engine



© 430120

5.

- o Prepare the internal bore meter:
  - Fit the probes for the corresponding measurement interval in an internal bore meter.
  - Fit the dial gauge with a preload of approx. 1 mm in the internal bore meter.
  - Set the bracket measurement screw to 70 mm.
  - Place a bore gauge between the measurement surfaces of the palmer, and set the gauge to "0" at the maximum dial reading.



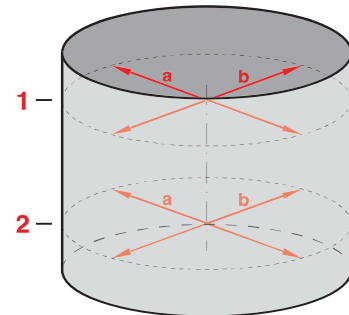
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6.

**Note**



Measurement diagram of the internal diameter of the connecting rod bearing shells in points "a" and "b" in surfaces "1" and "2".



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7.

- o Insert the internal bore meter.



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- 8.
- Apply the internal bore meter to the measurement points required occasionally and read the value measured in the return point of the pointer.  
See para. Test and adjustment data (L3)

**Note**



If the values are within 0.015 mm above the bearing tolerance value, the connecting rod shank may be reused. If the limit is reached, the connecting rod drum must be replaced.

- Insert the measured value, measure (C).

**Note**



The dimension (C) is required to define the connecting rod bearing clearance.

9.

**Measuring big end bearing free play**

**Note**



The clearance of the connecting rod bearing results from the difference between the inner diameter of the connecting rod bearing shell (C) and the diameter of the main journal (D).

1.

See para. Test and adjustment data (L3)

**Calculation example:**

|                              |   |
|------------------------------|---|
| Target:                      | Clearance of the connecting rod bearing |
| Measured value:              | (C) = 70.026 mm                         |
|                              | D = 69.994 mm                           |
| Calculation:                 | Dimension (a) - dimension (b)           |
| The results of all this are: | = 0.032 mm                              |

- Unscrew the screws.
- Remove the flanged bearing cover.



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2.

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