



Replacing the crankshaft O-ring (opposite end to flywheel)

Commercially available tools:

- Bradawl: 8198
- Assembly lever: 9017

Special tools:

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

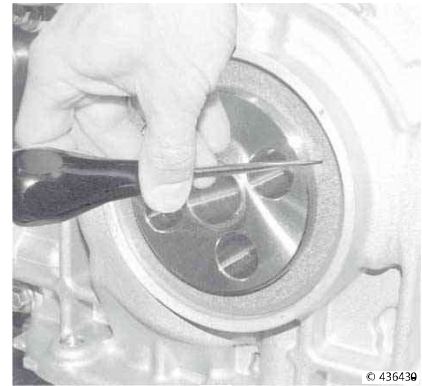
Removal of the crankshaft oil seal

- Remove the V-belt pulley.
[See para. Removing and fitting the V-belt pulley.](#)
- Using a bradawl, make a hole about 3 mm in diameter in the old crankshaft oil seal.



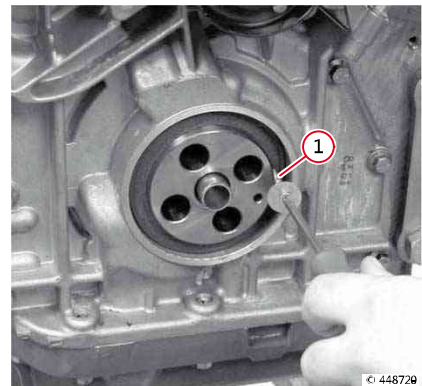
WARNING

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



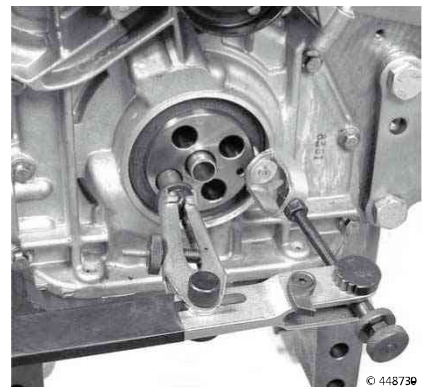
1.

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



2.

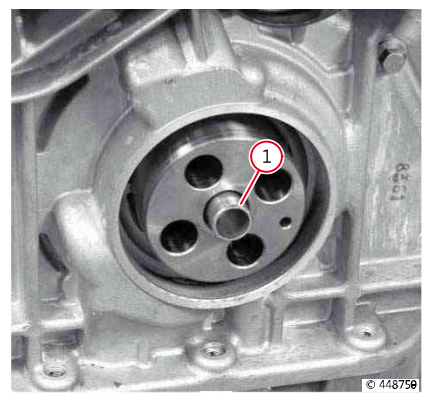
- Extract the crankshaft O-ring using the assembly lever.
- Carefully examine the crankshaft O-ring sliding surfaces.



3.

Assembly of the crankshaft O-ring

- Remove tightening bush (1).



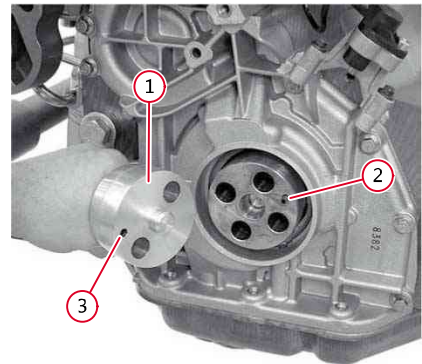
1.

- o Fit guide bush (1).



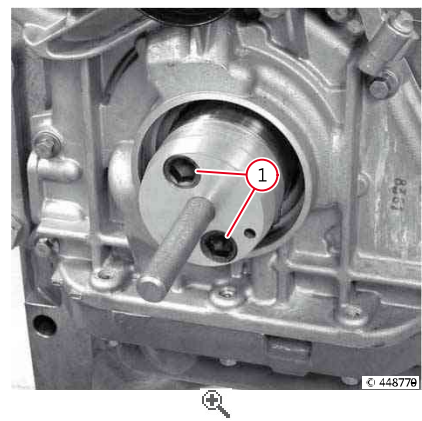
NOTE

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



2.

- o Tighten (1) the screws.



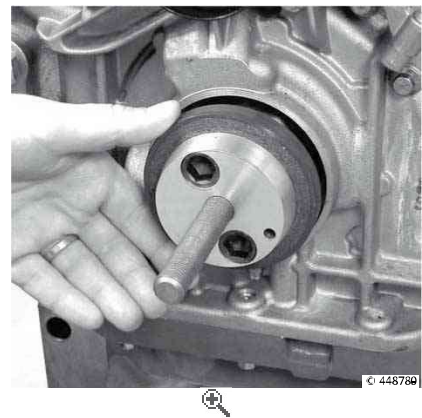
3.

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



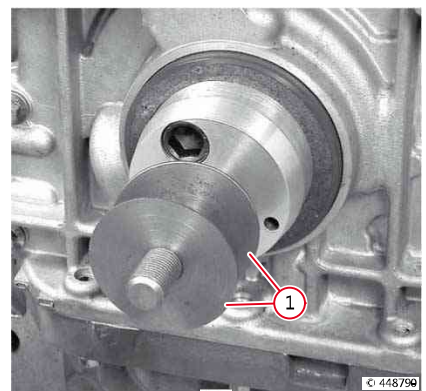
NOTE

The seal lip should be facing the engine crankcase.

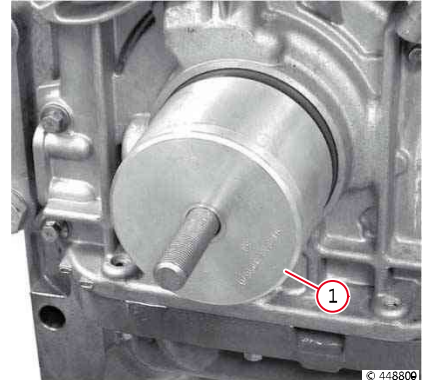


4.

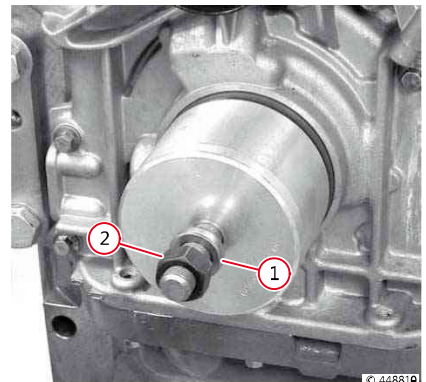
- o Fit spacer (1).
- o Observe the assembly depth of the crankshaft O-ring and select a suitable spacer disc.
 - First installation depth = 2 shims
 - Repair assembly depth = 1 spacer disc
 - Maximum assembly depth = no washers



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



- 6.
- Insert bearing (1).
 - Mutter (2) anschrauben.



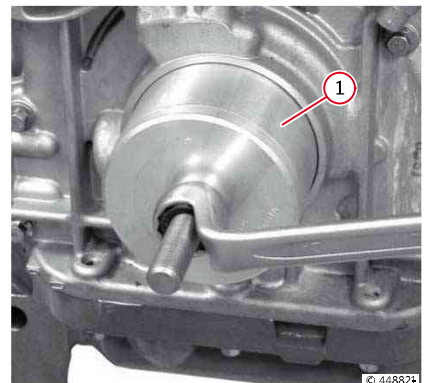
- 7.
- Screw in the nut until it seats against installation bush (1).



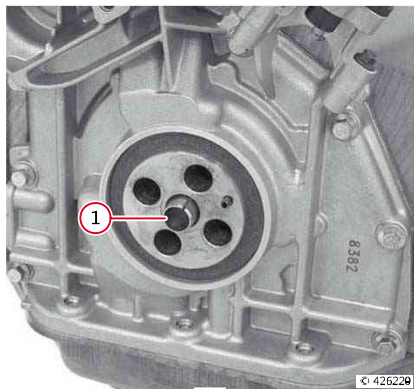
NOTE

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

- Remove the installation tool.



- 8.
- Insert bush (1) fully.
 - Assemble the V-belt pulley.
See para. Removing and fitting the V-belt pulley.



9.

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Check the connecting rod drum

1. Commercially available tools:

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

Special tools:

- o Dial gauge: 100400
- o Disassemble the piston and connecting rod drum.
See para. Disassembly and assembly of the piston and connecting rod drum
- o Disassemble the piston from the connecting rod drum.

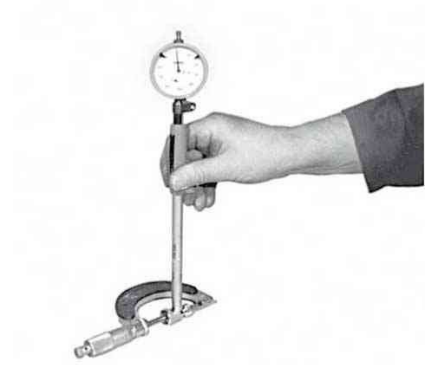


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2.


Check of the piston pin bush

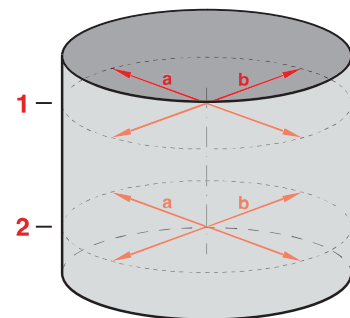
- o Prepare the internal bore meter:
 - Fit the probes for the corresponding measurement interval in an internal bore meter.
 - Fit the dial gauge with a preload of approx. 1 mm in the internal bore meter.
 - Adjust the palmer to 38 mm.
 - Apply the internal bore meter between the test surfaces of the palmer and in the return point of the pointer, bring the dial gauge to "0".



© 347682

1.


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



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2.

- 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: 38,025 (+0,010) mm.

 **NOTE**
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.



© 347702

3.

Check the diameter of the piston pin

- o Measure the piston pin with the palmer: 38 (+0,-0.006) mm.
- o Make a note of the measured value, dimension B.

**NOTE**

Dimension B is used to determine the piston pin clearance.



© 359082

1.

Calculate the piston pin clearance**NOTE**

The piston pin free play is determined by the difference between the inner diameter of the piston pin bearing shell (a) and the diameter of the piston pin (b): 0.025 - 0.041 mm

1.

Calculation example:

Target:	Piston pin clearance
Data:	-
Measured value:	Inner diameter of piston pin bush (a), (a) = 38.025 mm. Diameter of piston pin (b), (b) = 38.000 mm
Calculation:	Measurement (a) - measurement (b), 38.025 mm - 38.000 mm
The results of all this are:	= 0.025 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.

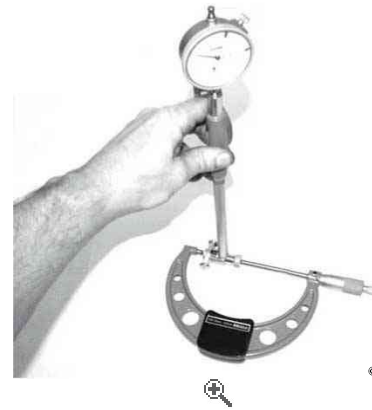
- Alternatively tighten the screws with the rotation angle gauge and the box spanner insert: 30 Nm + 60° + 30°



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2.

- 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.
 - Adjust the palmer to 66 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".



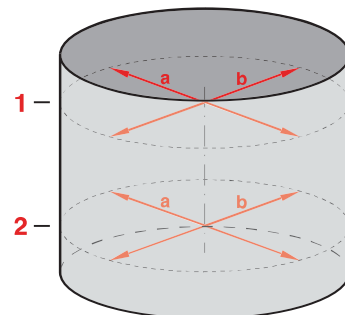
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3.



NOTE

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



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4.

- Insert the internal bore meter.
- Apply the bore gauge to each of the measurement positions indicated and read the maximum value indicated by the dial: 66.6 (+0.019) mm.



NOTE

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



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5.

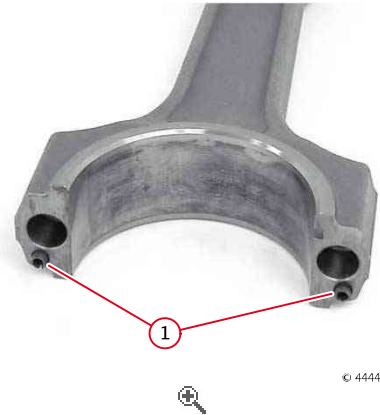
Check the internal diameter of the connecting rod bearing shells

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



NOTE

Check that tightening bush (1) is present.



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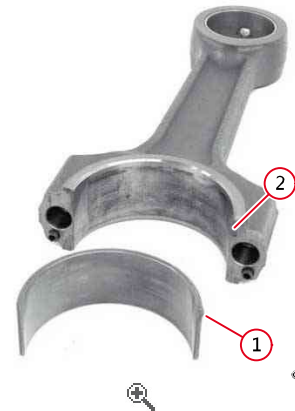
1.

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



WARNING

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



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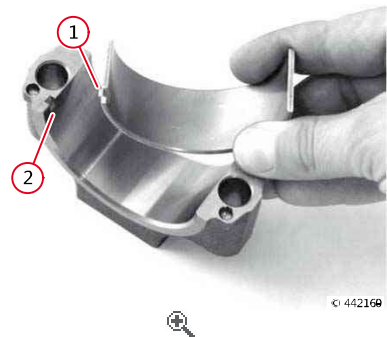
2.

- 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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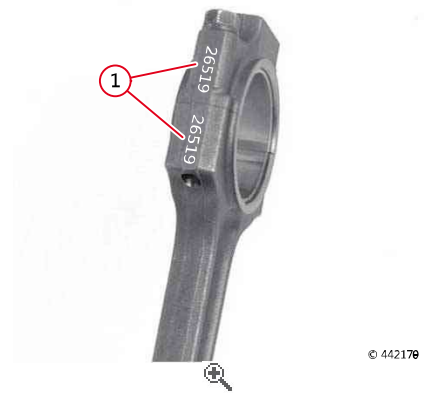
3.

- 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: 30 Nm + 60° + 30°.



© 442189


- 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.
 - Adjust the palmer to 63 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".



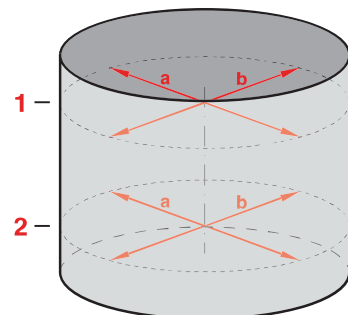
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6.

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.
 - o Apply the internal bore meter to the measurement points required occasionally and read the value measured in the return point of the pointer.

NOTE



See diagram for measurement points: 63.026 - 63.065 mm.

- o Make a note of dimension (a).

**NOTE**

The connecting rod drum wear limit was reached, replace it.

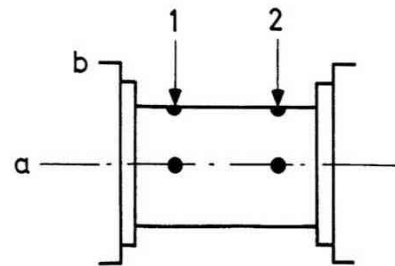


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8.

Check the diameter of the connecting rod pins**NOTE**

Measurement diagram of the main journals on points 1 and 2 in surfaces a and b.



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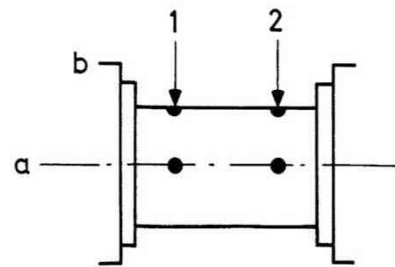
1.

- o Measure the main journal with the palmer: 62.994 (+0,-0.02) mm.
 - Degree of undersizing: 0.25 mm.

**NOTE**

Measurement points, see diagram.

- o Make a note of dimension (b).



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2.

Determine the clearance of the connecting rod bearing**NOTE**

The big end bearing free play is determined by the difference between the inner diameter of the big end bearing shell (a) and the diameter of the crankpin (b): 0.032 - 0.073 mm.

1.

Calculation example:

Target:	Clearance of the connecting rod bearing
Data:	-
Measured value:	Inner diameter of big end bearing shell (a), (a) = 63.026 mm. Diameter of crankpins (b), (b) = 62.992 mm
Calculation:	Dimension (a) - dimension (b)

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