

Repairing Water Pump

Job No.

20-8

A. OM 636

For the Model OM 636 we have five different water pump versions:

- a) Water pump with grease lubrication, without belt pulley, water pump shaft 15 mm in diameter, 191 mm long, Part No. 136 200 25 01
- b) Water pump with oil bath lubrication, without belt pulley, with pressed-on hub to fix the belt pulley Part No. 181 205 04 10, water pump shaft 15 mm in dia., 139 mm long, Part No. 181 200 12 01
- c) Water pump with oil bath lubrication, with pressed-on short belt pulley, water pump shaft 15 mm in dia., 139 mm long, Part No. 636 200 12 01
- d) Water pump with oil bath lubrication, with pressed-on long belt pulley and with collar for the fixing of the fan, water pump shaft 15 mm in dia., 167 mm long, Part No. 136 200 29 01
- e) Water pump with oil bath lubrication, with pressed-on long belt pulley and with collar for the fixing of the fan, water pump shaft 17 mm in dia., 167 mm long, Part No. 636 200 15 01

The water pump Part No. 636 200 13 01 installed temporarily is replaced by the water pump Part No. 636 200 15 01. The two water pumps are of the same design (see Figure 20-8/14). However, the diameter of the water pump shaft was changed from 15 mm to 17 mm and consequently also the inner diameter of the bearings, sealing rings, belt pulley etc.

The extended cast-in bushing 61 mm long in the belt pulley is the only difference in the water pump Part No. 636 200 13 01 if compared to the water pump Part No. 136 200 29 01 (see Figure 20-8/14). Part No. of the above mentioned belt pulley: 636 200 14 05.

The water pumps, Pos. b and c, are also similar in design, the only difference between the water pumps is the design of the hub or the belt pulley (see Figure 20-8/8 and 20-8/9).

If the water pump is defective, we recommend the installation of a reconditioned pump obtained through our exchange system.

Water Pump

Part Number	installed in the engines of the type
136 200 25 01 (without belt pulley see Fig. 20-8/4)	636. { 915 916 918 931
181 200 12 01 (without belt pulley see Fig. 20-8/9)	636. { 919 930 934 935 636.917- { 022 023 340 370 636.917/ { 28 33
636 200 12 01 (with pressed-on short belt pulley see Fig. 20-8/8)	636. { 912 914 636.917- { 270 636.917/ { 11 16 21 22 and in the engines of the type 636.917/0 of the version: F, G, K and T.
136 200 29 01 (with pressed-on long belt pulley as in Fig. 20-8/14 but with water pump shaft 15 mm in dia., belt pulley with bushing only 46.5 mm long and with spacer 15×20 mm in dia. and 14.5 mm long)	636. { 916 918 931 932** 933** 636.917- { 021 040 190 221 222 223 636.917/ { 2 3 4 5 9 10* 12 14 15 17 636.917/ { 18 19* 20 23 24 25 26 27 30* 31* and in the engines of the type 636.917/0 of the version A*, B*, C*, D*, E*, H, J, L, M, N, O, P, Q, R, S, U, V, W, X, Y and Z. * the water pump 636 200 15 01 must be installed as a replacement ** type 636.932 only up to Engine Serial No. 85 00603 ** type 636.933 only up to Engine Serial No. 85 00316
636 200 15 01 (with pressed-on long belt pulley see Fig. 20-8/14)	636. { 932** 933** 936* 636.917- { 00 090 180 240 251 252 253 260 271 636.917- { 272 280 290 300 310 320 330 350 360 * The water pump is delivered without belt pulley ** The engines of the type 636. { 932 933 are only delivered with the water pump Part No. 636 200 15 01 starting with the Engine Serial No. 95 00001.
The engines of the type 636.917- { 050 and/or /6 120 and/or/13 are delivered ex DB-works without water pump.	

I. Disassembly and Assembly of the Water Pump of the Version a)

The reconditioned or new water pump 136 200 25 01 is delivered without belt pulley. In order to remove the belt pulley unscrew the hex nut and take off the lock plate. Use the pegged wrench 136 589 12 07 to counterhold the flange during the unscrewing of the hex nut (see Figure 20-8/1).



Figure 20-8/1

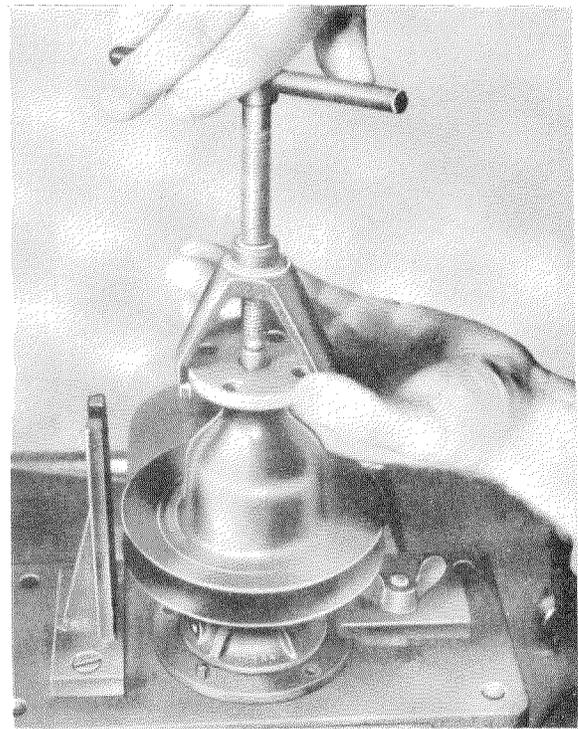


Figure 20-8/2

Then pull off the belt pulley with the Extractor 136 589 06 33 (see Figure 20-8/2).

Disassembly of the Water Pump:

1. Remove the Woodruff key from the water pump shaft.
2. Mount the water pump on the Assembly Fixture 000 589 13 33 and unscrew the threaded ring (11) with the Special

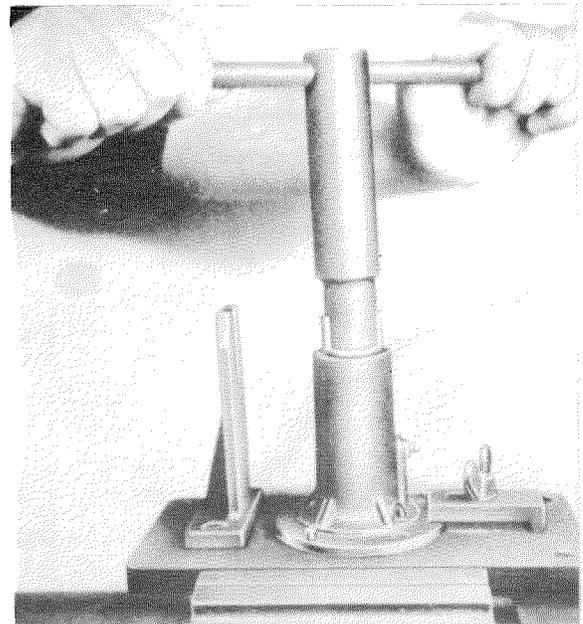


Figure 20-8/3

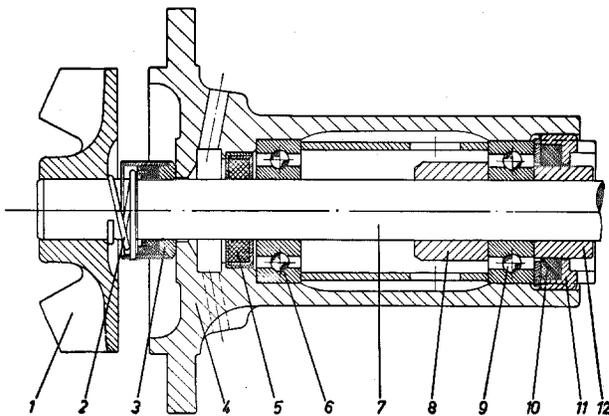


Figure 20-8/4

- | | |
|---|--|
| 1 Impeller | 7 Water pump shaft 15 mm in dia.,
191 mm long |
| 2 Pressure spring | 8 Shrunk-on ring |
| 3 Water pump packing | 9 Annular ball-bearing
15×35×11 mm 6202 DIN 625 |
| 4 Bearing housing | 10 Sealing ring 22×33×5 LO N 255a |
| 5 Sealing ring
15×28 mm in dia.,
6.5 mm wide | 11 Threaded ring |
| 6 Annular ball-bearing
15×35×11 mm
6202 DIN 625 | 12 Spacer Part No. 148 201 00 18 |

Wrench 136 589 11 07 and take it out of the pump housing (see Figure 20-8/3). Then remove the spacer (12), the sealing ring (10) and the sealing plate (Figure 20-8/4).

3. Press the water pump shaft 20 to 25 mm towards the impeller end, so that the shrunk-on ring (8) comes in contact with the annular ball bearing (6) (see Figure 20-8/4).

4. Push back the packing housing with tension spring (2), pull the impeller (1) off the pump shaft with the Extractor 136 589 05 33 and remove the slip ring cage with pressure spring (Figure 20-8/5).
5. Place the bearing housing on a ring and press the shaft downwards out of the housing, complete with annular ball-bearing (9) and sealing ring (10) (see Figure 20-8/4 and 20-8/6).
6. Take out the spacer and extract the annular ball-bearing (6) with the Extractor 000 589 13 33. Then force out the sealing ring (5) with a cranked screwdriver (see Figure 20-8/4).
7. Check the annular ball-bearing and the pump shaft for wear and replace the worn parts, do not recondition these parts. Replace all sealing elements including the slip ring cage and the pressure spring.

Note: The shrunk-on ring (8) on the pump shaft, which serves as a stop, must not be moved.

The contact surface of the bearing housing (4) for the water pump packing (3) must be absolutely smooth and at right angle to the shaft. If necessary, recondition the thrust surface (see Figure 20-8/4).

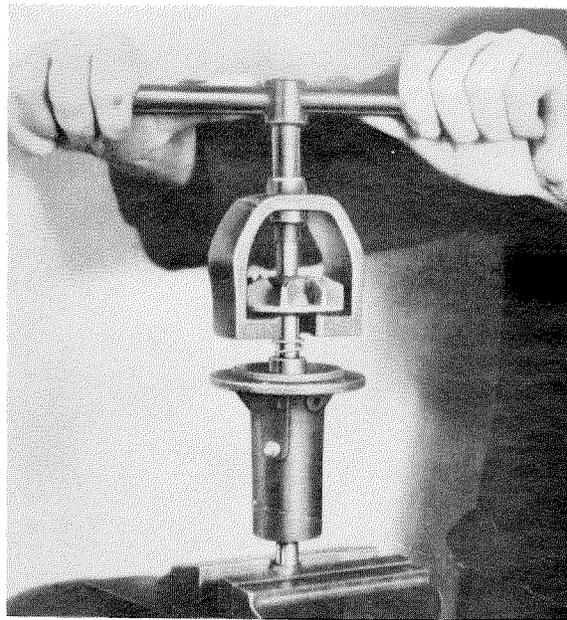


Figure 20-8/5

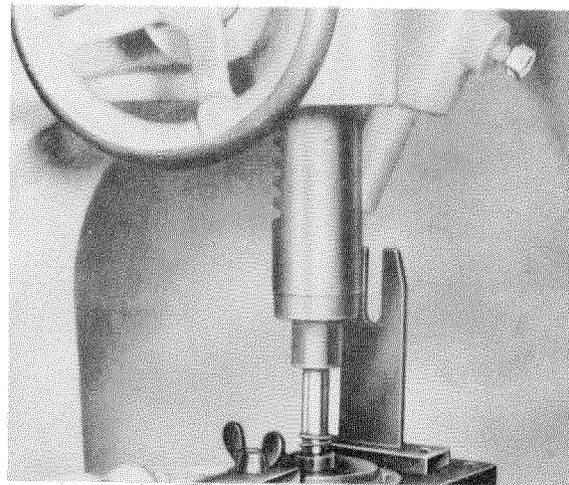


Figure 20-8/6

Testing and Repairing:

Dimensions and Tolerances of the Water Pump Components

(Dimensions in mm)

See Figure 20-8/7	Outer diameter	Diameter of bore	Crush (+) and/or Play (—)
Water pump shaft (7)	$\frac{14.996}{14.990}$	—	—
Thrust ring shrunk on water pump shaft	—	$\frac{14.925}{14.940}$	$\frac{+0.050}{+0.071}$
Impeller (5)	—	$\frac{14.970}{14.979}$	$\frac{+0.011}{+0.026}$
Spacer (15)	—	$\frac{15.050}{15.070}$	$\frac{-0.054}{-0.080}$
Belt pulley (3)	—	$\frac{14.995}{15.006}$	$\frac{+0.001}{-0.016}$

Assembly:

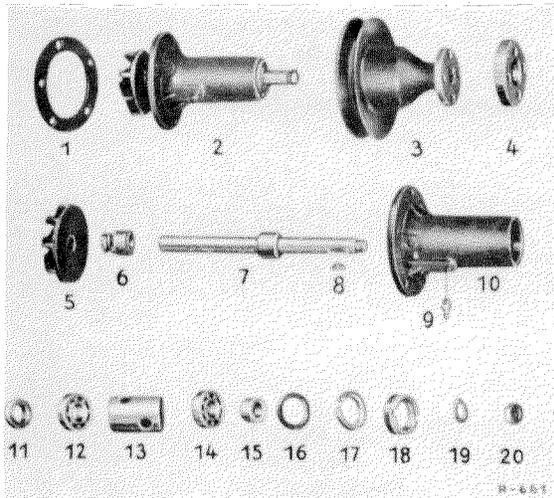


Figure 20-8/7

- 1 Gasket (between the water pump and the cylinder head)
- 2 Water pump Part No. 136 200 25 01
- 3 Belt Pulley Part No. 136 200 04 05
- 4 Spacer 8 mm thick
- 5 Impeller
- 6 Water pump packing
- 7 Water pump shaft with shrunk-on ring
- 8 Woodruff key 4x6.5 DIN 6888
- 9 Pressure grease fitting
- 10 Bearing housing
- 11 Sealing ring
- 12 Annular grooved-bearing 6202 DIN 625
- 13 Spacer sleeve 30x34 mm in dia., 46 mm long
- 14 Annular grooved-bearing 6202 DIN 625
- 15 Spacer
- 16 Sealing ring 24.5x35.5 mm in dia., 1.5 mm thick
- 17 Sealing ring 22x33x5 LO/N 255 a
- 18 Threaded ring
- 19 Lock plate
- 20 Hex nut M 12x1.5 DIN 936-5

8. Screw the pressure grease fitting (9) to the cleaned bearing housing (10).
9. Drive the sealing ring (5) into the bearing housing, so that the open side of the sealing ring casing faces towards the belt pulley (see Figure 20-8/4). This is necessary to prevent formation of burrs during the pressing-in operation.
10. Press the annular grooved-bearing (6) into the bearing housing.
11. On the punch press, place the mounting flange of the water pump housing on a support. Liberally apply ball-bearing grease (approx. 45 g) to the water pump shaft with shrunk-on ring and force in the shaft.

12. Insert the spacer (13) and press in the annular grooved-bearing (14) (see Figure 20-8/7).

Note: The drift to press in or drive in the annular grooved-bearing must be so designed that it will not only press against the outer race but also against the inner race of the annular grooved-bearing.

13. Slip the spacer (15) on the water pump shaft and install the sealing ring (16) in the housing (see Figure 20-8/7).

14. Screw in the threaded ring (11) complete with inserted sealing ring (10) and tighten with the Special Wrench 136 589 11 07 (see Figure 20-8/3 and 20-8/4).

15. Slip the water pump packing (3) on the shaft. Push the tension spring (2) on the shaft with the Assembly Sleeve 136 589 13 39 (see Figure 20-8/4).

16. Insert the Woodruff key (8) in the shaft and slip the belt pulley (3) and the impeller (5) on the shaft (see Figure 20-8/7).

17. Then place the water pump on a press, so that the shaft is freely supported by the belt pulley.

18. Now simultaneously force on belt pulley and impeller, so that the belt pulley is stopped by the spacer (12) and the impeller is flush with the shaft end (see Figure 20-8/4).

Note: After this operation measure the distance between the contact surface of the mounting flange and the outer edge of the impeller. This distance must be 31.5 ± 0.2 mm to make sure that the impeller will not come in contact with the cylinder head.

19. Put the water pump in the assembly fixture 000 589 13 33. Install the lock plate (19) and screw on the hex nut (20) securing the pulley, then tighten with 3 mkg and lock (see Figure 20-8/1 and 20-8/7).

Note: The tightening torque of the fixing nut must be observed, so that the distance between the impeller and the bearing housing will not be changed again.

20. Test the water pump on a test stand or in the engine. There should be no leakage of water or grease.

II. Disassembly and Assembly of the Water Pump Version b) and c)

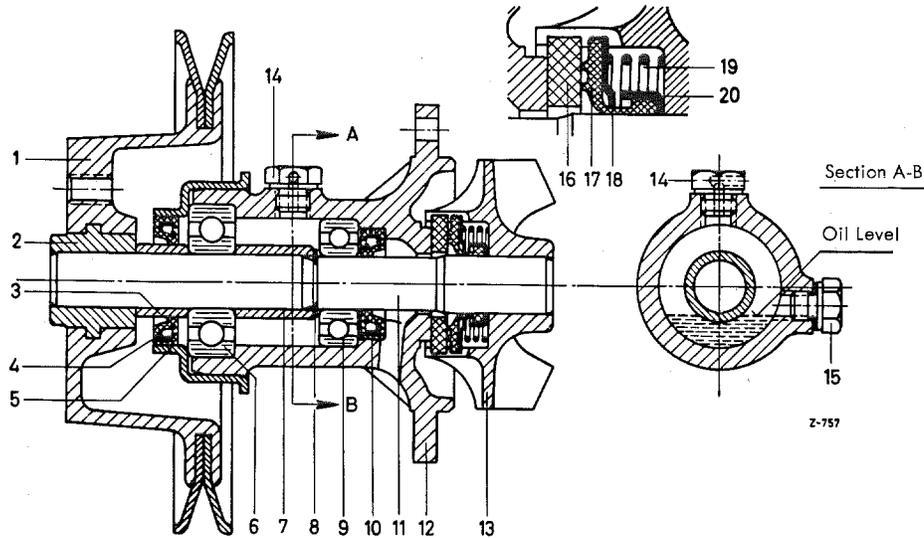


Figure 20-8/8

Water Pump Part No. 636 200 12 01 with pressed-on Belt Pulley

- | | |
|--|--|
| 1 Belt pulley Part No. 636 202 03 11 | 11 Water pump shaft 15 mm in dia., 139 mm long |
| 2 Cast-in bushing | 12 Bearing housing |
| 3 Spacer 15×20 mm in dia., 14.5 mm long | 13 Impeller |
| 4 Sealing ring (oil-seal ring)
20×35 mm in dia., 7 mm wide | 14 Filler plug with vent hole |
| 5 Sealing ring holder | 15 Oil level check plug |
| 6 Annular grooved-bearing 15×42×13 mm 6302 DIN 625 | 16 Slip ring |
| 7 Spacer 15.5×20 mm in dia., 21.5 mm long | 17 Sealing ring Part No. 312 201 03 18 |
| 8 Guard ring 15×1 DIN 471 | 18 Slip ring cage Part No. 312 201 06 58 |
| 9 Annular grooved-bearing 15×35×11 mm 6202 DIN 625 | 19 Pressure spring Part No. 180 993 11 01 |
| 10 Sealing ring (oil-seal ring)
15×30 mm in dia., 7 mm wide | 20 Cover Part No. 312 201 03 59 |

Disassembly:

1. Clamp the water pump in the Assembly Fixture 000 589 13 33 or with the impeller in the vise. Unscrew the fan and pull off the hub or belt pulley (depending on version) with the Extractor 136 589 06 33 or 000 589 17 33 respectively (Figure 20-8/9).
2. Now clamp the bearing housing in the vise and force out the sealing ring holder (5) and the sealing ring (4) with the Fixture 136 589 33 33 (see Figure 20-8/8 and Figure 20-8/10). After that press the sealing ring out of the sealing ring holder.
3. Place the water bearing housing on a ring-shaped support and press out the pump

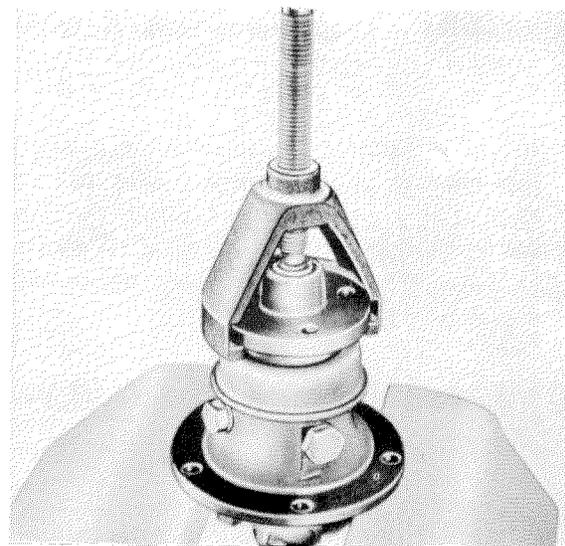


Figure 20-8/9

Water pump Part No. 181 200 12 01 with pressed-on hub Part No. 121 202 00 14 and Extractor 136 589 06 33

shaft complete with impeller. The guard ring (8) will slip off during this operation (see Figure 20-8/8).

4. Drive out towards the front: the annular grooved-bearings (6) and (9), the spacer (7), and the sealing ring (10). Use a suitable drift.
5. Slip off the shaft: the thrust ring (16), the sealing ring (17), the slip ring cage (18), the tension spring (19), and the cover (20) (Figure 20-8/8).



Figure 20-8/10

Testing and Repairing:

Dimensions and Tolerances of the Water Pump Components

(Dimensions in mm)

	Outer diameter	Diameter of bore	Crush (+) and/or Play (—)
Water pump shaft end seating hub or belt pulley	$\frac{14.996}{14.990}$	—	—
Water pump shaft end seating the impeller	$\frac{15.908}{15.897}$	—	—
Impeller	—	$\frac{15.871}{15.899}$	$\frac{+0.037}{+0.008}$
Spacer	—	$\frac{14.977}{14.995}$	$\frac{+0.019}{-0.005}$
Hub and/or belt pulley	—	$\frac{14.964}{14.975}$	$\frac{+0.032}{+0.015}$

6. Clean and check all parts. Check especially the shaft and the annular grooved-bearings for wear.

Note: The sealing rings, the guard ring (8), and the sealing ring (17) with slip ring (16) must always be replaced (see Figure 20-8/8).

If the water pump shaft or the impeller is damaged, it is advisable to replace these two mated parts.

In an emergency the water pump shaft can also be pressed out of the impeller.

7. The thrust surface for the thrust ring at the bearing housing must be absolutely smooth and level, recondition if necessary.
8. Check the vent hole in the oil filler plug by inserting a wire.

Assembly:

9. Thoroughly wash out and blow out the bearing housing.

10. Screw the oil filler plug (14) and the oil level check plug (15) with sealing ring into the housing.
11. If the impeller has been removed from the water pump shaft, then press the water pump shaft (11) into the impeller (13) that the shaft end is flush with the impeller (see Figure 20-8/8).
12. Slip on the shaft (1), the cover (3), the pressure spring (4), the slip ring cage (5), the sealing ring (6), and the slip ring (7), (Figure 20-8/11).

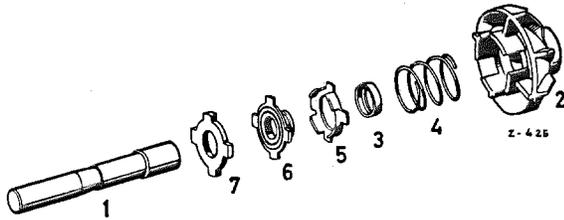


Figure 20-8/11

- 1 Water pump shaft
- 2 Impeller
- 3 Cover
- 4 Pressure spring
- 5 Slip ring cage
- 6 Sealing ring
- 7 Slip ring

13. Use the Assembly Sleeve 187 589 07 39 to press the sealing ring (10) into the housing.

Note: Apply some oil to the outside of the sealing ring and the bore of the housing, so that the sealing rings slide easily during the pressing-in.

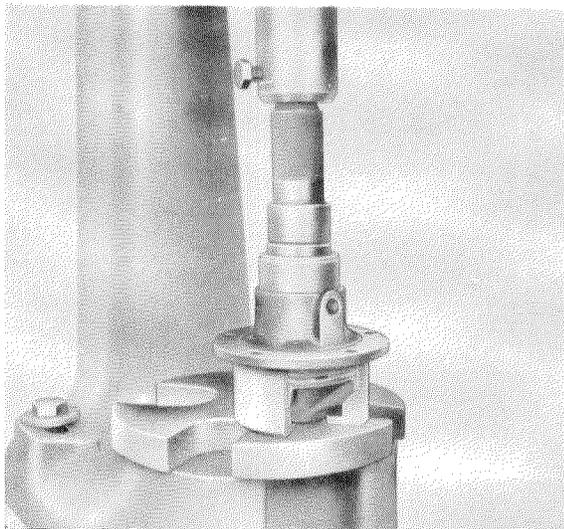


Figure 20-8/12

14. Slide the bearing housing over the shaft. **Caution!** Do not damage the sealing lips of the sealing ring during this operation.
15. Put the annular grooved-bearing (9) on the shaft and press it into the housing with the Assembly Drift 136 589 14 39 (see Figure 20-8/8 and 20-8/12).
16. Insert the guard ring (11) in the groove of the shaft. Install the spacer (12) and fill the bearing housing with 10 grams of Hypoid Oil SAE 90 (Figure 20-8/13).

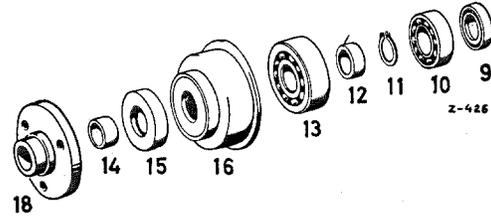


Figure 20-8/13

- 9 Sealing ring (oil-seal ring) 15×30 mm in dia., 7 mm wide
- 10 Annular grooved-bearing 15×35×11 mm 6202 DIN 625
- 11 Guard ring 15×1 mm DIN 471
- 12 Spacer 15.6×20 mm, 21.5 mm long
- 13 Annular grooved-bearing 15×42×13 mm 6302 DIN 625
- 14 Spacer 15×20 mm in dia., 14.5 mm long
- 15 Sealing ring
- 16 Sealing ring holder
- 18 Hub Part No. 121 202 00 14 for belt pulley
Part No. 181 205 04 10

17. Use the Assembly Sleeve 187 589 04 39 to press the annular grooved-bearing (6) into the bearing housing (see Figure 20-8/8).
18. Press the sealing ring (4) into the sealing ring holder (5) and force it on the bearing housing with the Assembly Sleeve 180 589 09 39 (see Figure 20-8/8).
19. Force the spacer (14) on the shaft.
20. Measure the distance between the contact surface of the mounting flange and the outer edge of the impeller. In order to avoid touching of the impeller at the cylinder head this distance must be 31.5 ± 0.2 mm (see Figure 20-8/14).
21. Force the belt pulley and/or hub on the shaft (see Figure 20-8/8 and 20-8/9).
22. Test the water pump on a test stand or while installed in engine. Neither water nor oil should leak out.

Change: Paragraphs marked with "x" were added or changed.

III. Disassembly and Assembly of the Water Pump Version d) and e)

The number and sequence of operations is the same as for the version b and c described in Section II. Different are only the dimensions, e.g. the water pump housing of version b and c is 72.5 mm long and of version d and e 93.5 mm long, etc. Further characteristic features can be seen in Figure 20-8/14 and the respective text below.

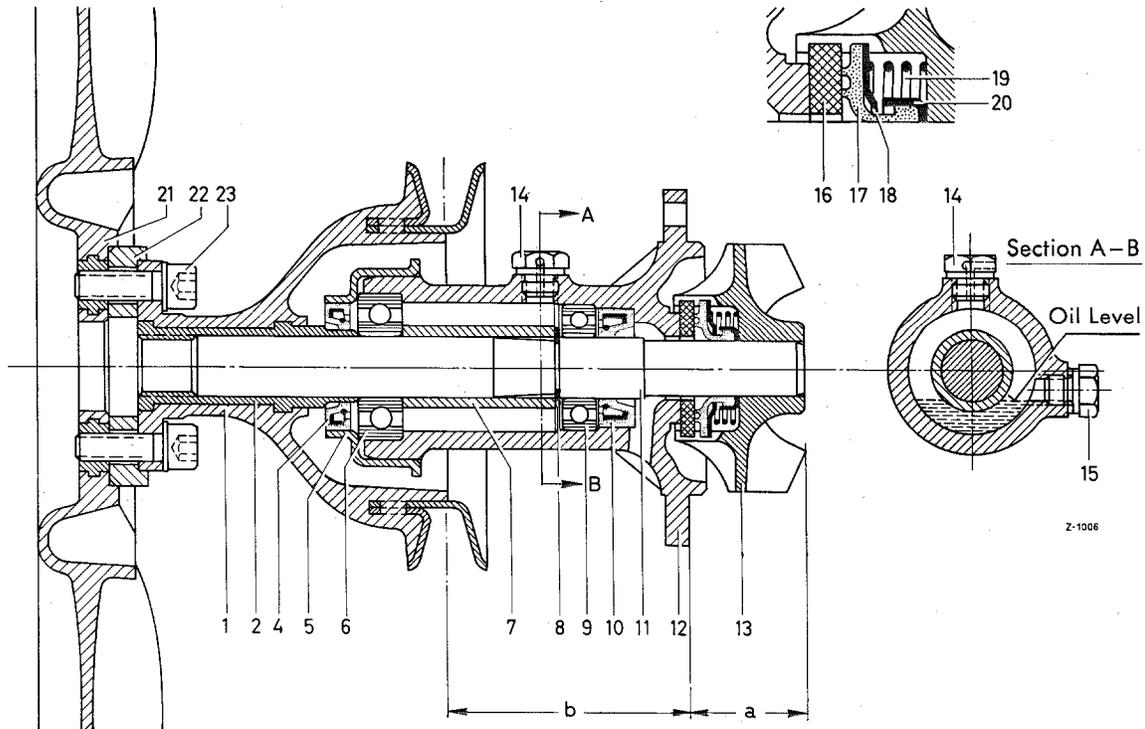


Figure 20-8/14

Water pump Part No. 636 200 15 01 with pressed-on belt pulley 8 mm thick spacer washer and screwed-on fan Part No. 181 200 01 02

Components for the Water Pump Part No. 636 200 15 01

- 1 Belt pulley Part No. 636 200 15 05
 - 2 Bushing cast in pulley, 61 mm long with 17 mm bore
 - 4 Sealing ring (oil-seal ring) 20×35 mm in dia., 7 mm wide
 - 5 Sealing ring holder
 - 6 Annular grooved-bearing 17×40×12 mm 6203 DIN 625
 - 7 Spacer 17.6×22 mm in dia., 41.5 mm long
 - 8 Guard ring 17×1 DIN 471
 - 9 Annular grooved-bearing 17×35×10 mm 6003 DIN 625
 - 10 Sealing ring (oil-seal ring) 17×32 mm in dia., 10 mm wide
 - 11 Water pump shaft 17 mm in dia., 167 mm long
 - 12 Bearing housing 93.5 mm long with 40 mm bore for the annular grooved-bearing (7)
 - 13 Impeller
 - 14 Filler plug with vent hole
 - 15 Oil level check screw with sealing ring A 8×12 DIN 7603
 - 16 Slip ring Part No. 312 201 01 19
 - 17 Sealing ring Part No. 312 201 03 18
 - 18 Slip ring cage Part No. 312 201 06 58
 - 19 Tension spring Part No. 180 993 11 01
 - 20 Cover Part No. 312 201 03 59
 - 21 Fan Part No. 181 200 01 22
 - 22 Spacer ring Part No. 181 205 04 52 (8 mm thick and 66 mm outer dia.)
 - 23 Cylinder screw M 8×28 DIN 912-8 G with lock washer A 8
- a = 31.5 mm
b = 66 mm

Components for the Water Pump Part No. 136 200 29 01

- 1 Belt pulley part No. 136 200 05 05
 - 2 Cast-in bushing in the pulley 46,5 mm long with 15 mm bore, spacer 15×20 mm in dia., 14,5 mm long
 - 4 Sealing ring (oil-seal ring) 20×35 mm in dia., 7 mm wide
 - 5 Sealing ring holder
 - 6 Annular grooved-bearing 15×42×13 mm 6302 DIN 625
 - 7 Spacer 15.6×20 mm in dia., 42,5 mm long
 - 8 Guard ring 15×1 DIN 471
 - 9 Annular grooved-bearing 15×35×11 mm
 - 10 Sealing ring (oil-seal ring) 15×30 mm in dia., 7 mm wide
 - 11 Water pump shaft 15 mm in dia., 167 mm long
 - 12 Pump housing 72.5 mm long with 42 mm bore for the annular grooved-bearing (7)
 - 13 Impeller
 - 14 Filler plug with vent hole
 - 15 Oil level check screw with sealing ring A 8×12 DIN 7603
 - 16 Slip ring Part No. 312 201 01 19
 - 17 Sealing ring Part No. 312 201 03 18
 - 18 Slip ring cage Part No. 312 201 06 58
 - 19 Pressure spring Part No. 180 993 11 01
 - 20 Cover Part No. 312 201 03 59
 - 21 Fan
 - 22 Spacer ring
 - 23 Cylinder screw or hexagon screw
- a = 31.5 mm
b = 66 mm

Note: Fan, spacer ring, and belt pulley are different for the individual type versions.