MAKING MODERN LIVING POSSIBLE

Service Manual
Steering Unit
Type OSPB and OSPC Type ON and CN

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## Revision History

<table>
<thead>
<tr>
<th>Date</th>
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<tr>
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Exploded view OSPB

Exploded view OSPB callouts

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<th>Description</th>
<th>Callout</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Dust Seal Ring</td>
<td>10</td>
<td>Cardan Shaft</td>
</tr>
<tr>
<td>2</td>
<td>Housing + Spool + Sleeve</td>
<td>11</td>
<td>O-ring Seal (3 pcs., 79.4 x 2 mm)</td>
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<tr>
<td>3</td>
<td>Check Valve Ball (∅8.5 mm)</td>
<td>12</td>
<td>Distributor plate</td>
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<tr>
<td>4</td>
<td>Threaded Bushing</td>
<td>13</td>
<td>Gear Wheel Set</td>
</tr>
<tr>
<td>5</td>
<td>Roto-glyd Shaft Seal</td>
<td>14</td>
<td>End Cover Plate</td>
</tr>
<tr>
<td>6</td>
<td>Thrust Bearing Assembly (3 pcs.)</td>
<td>15</td>
<td>Sealing Washer (7 pcs., 8.2 x 15.2 x 1.0)</td>
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<tr>
<td>7</td>
<td>Retainer Ring</td>
<td>16</td>
<td>Pin Bolt Screw</td>
</tr>
<tr>
<td>8</td>
<td>Cross Pin (∅ 6 x 41 mm)</td>
<td>17</td>
<td>Screw (6 pcs.)</td>
</tr>
<tr>
<td>9</td>
<td>Neutral Spring Kit (4, 6 or 8 pcs.)</td>
<td>18</td>
<td>Model/Code Label</td>
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Exploded view

Exploded view OSPC

<table>
<thead>
<tr>
<th>Callout</th>
<th>Description</th>
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<tr>
<td>1</td>
<td>Dust Seal Ring</td>
<td>20</td>
<td>Relief Valve Spring</td>
</tr>
<tr>
<td>2</td>
<td>Housing + Spool + Sleeve</td>
<td>21</td>
<td>O-ring seal (1 pc. ∅14.3 x 2.4mm)</td>
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<tr>
<td>3</td>
<td>Check Valve Ball (∅8.5 mm)</td>
<td>22</td>
<td>Relief Valve Adjustment Screw</td>
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<tr>
<td>4</td>
<td>Threaded Bushing</td>
<td>23</td>
<td>Plastic Plug</td>
</tr>
<tr>
<td>5</td>
<td>Roto-glyd Shaft Seal</td>
<td>24</td>
<td>Shock Valve Seat (2 pcs.)</td>
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<tr>
<td>6</td>
<td>Thrust Bearing Assembly (3 pcs.)</td>
<td>25</td>
<td>O-ring (2 pcs. ∅6 x 1.5mm)</td>
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<tr>
<td>7</td>
<td>Retainer Ring</td>
<td>26</td>
<td>Shock Valve Ball (2 pcs. ∅3/16&quot;)</td>
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<tr>
<td>8</td>
<td>Cross Pin (∅6 x 41 mm)</td>
<td>27</td>
<td>Shock Valve Spring (2 pcs.)</td>
</tr>
<tr>
<td>9</td>
<td>Neutral Spring Kit (4, 6 or 8 pcs.)</td>
<td>28</td>
<td>Shock Valve Adjustment Screw (2 pcs.)</td>
</tr>
<tr>
<td>10</td>
<td>Cardan Shaft</td>
<td>29</td>
<td>O-ring (2 pcs. ∅9 x 1.5mm)</td>
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<tr>
<td>11</td>
<td>O-ring Seal (3 pcs. ∅79.4 x 2 mm)</td>
<td>30</td>
<td>Plastic Plug</td>
</tr>
<tr>
<td>12</td>
<td>Distributor plate</td>
<td>31</td>
<td>Suction Valve Ball (2 pcs. ∅3/16&quot;)</td>
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<tr>
<td>13</td>
<td>Gear Wheel Set</td>
<td>32</td>
<td>Suction Valve Spring (2 pcs.)</td>
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### Exploded view OSPC callouts (continued)

<table>
<thead>
<tr>
<th>Callout</th>
<th>Description</th>
<th>Callout</th>
<th>Description</th>
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<tbody>
<tr>
<td>14</td>
<td>End Cover Plate</td>
<td>33</td>
<td>Suction Valve Retainer Pin</td>
</tr>
<tr>
<td>15</td>
<td>Sealing Washer (7 pcs. 8.2 x 2 x 1.0mm)</td>
<td>34</td>
<td>Gear Wheel Set with Seal Star</td>
</tr>
<tr>
<td>16</td>
<td>Pin Bolt Screw</td>
<td>35</td>
<td>Seal Star O-ring (1 pc.)</td>
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<tr>
<td>17</td>
<td>Screw (6 pcs.)</td>
<td>36</td>
<td>Seal Star PTFE Ring (1 pc.)</td>
</tr>
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<td>18</td>
<td>Model/Code Label</td>
<td>37</td>
<td>Check Valve in the P port</td>
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<tr>
<td>19</td>
<td>Relief Valve Piston</td>
<td></td>
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Dismantling

Tools

Holding tool.
Code number: SJ 150-9000-2

Assembly tool for O-ring and kin-ring / Roto Glyd.
Code number: SJ 150-9000-11.
Code number: SJ: SJ 150N4014-1

Assembly tool for dust seal.
Code number: SJ 150-9000-22
Dismantling

Torque wrench 0 - 70 Nm.
13 mm socket spanner.
2.75 - 5, 6 and 8 mm Allan key.
12 mm screwdriver.
2 mm [0.08 in] screwdriver.
13 mm ring spanner.
Plastic hammer.
Tweezers.

The tools are not available from Danfoss.

Dismantling the pressure relief valve for OSPC

First remove plastic plug (23).

Screw out the adjustment screw (22) using an 8 mm hexagon socket spanner.
Dismantling

Remove the relief valve spring (20).

Remove the piston as shown (19).

The pressure relief valve is now dismantled.
Dismantling

Dismantling the shock valve for OSPC

Prise off the plastic protection plugs (30) from the two shock valves.

Remove pressure adjustment screws (29) using a 5 mm hexagon socket spanner.

Remove the two shock valve springs (27).
Dismantling

Remove the shock valve balls (26).

Removed the shock valve seats with 2.75 mm Allan key (25).

The shock valves are now dismantled.
Dismantling

Place the steering unit in the holding tool.
Remove the 6 screws (17) and the special pin bolt (16) from the end cover plate.

Remove the end cover (14), sideways.

Lift the gearwheel set (13) off the unit.
Remove the two O-rings (11).
Dismantling

Remove the cardan shaft (10).

Remove distributor plate (12).

Screw out the threaded bush (4) retaining the check valve ball (3).
Dismantling

Remove O-rings (11).

OSPB:
Shake out the check valve ball (3) (Ø8.5 mm)

OSPC:
Shake out the check valve ball (3) and suction valve pins (33) and balls (31).

On some pins in the OSPC there are two springs (see page 4, pos. 32).

Place the housing with the ports facing down on the work bench. Ensure that the cross pin (8) in the spool and sleeve set (2) is in the horizontal position. The pin (8) can be observed through the open end of the spool. Press the spool (2) inwards (from the housing mounting face end) and the sleeve (2), ring (7) and bearing assembly (6) will be pushed out of the housing together.
Dismantling

Take the ring (7), bearing races and needle bearing (6) from the spool and sleeve set (2). The outer bearing (6) race can sometimes “stick” in the housing, therefore check that it has come out.

Press out the cross pin (8). Use the special screw from the end cover (16).

Note next point/paragraph!

OSPB CN and OSPC CN

A small mark has been made on both spool and sleeve close to one of the slots for the neutral position springs.

Caution

If the mark is not visible, remember to leave a mark of your own on sleeve and spool before the neutral position springs are dismantled.
Dismantling

Carefully press the spool out of the sleeve.

Press the neutral position springs (9) out of the slot in the spool.

Remove dust seal (1) and Roto Glyd Seal (5) carefully with a screw driver or similar tool.
Dismantling

The steering unit OSPB and OSPC is now completely dismantled.

Cleaning

Clean all parts carefully in Shellsol K or similar cleaner fluid.

Lubrication

Before assembly, lubricate all parts with hydraulic oil.

Inspection and Replacement

Replace all seals and washers.
Check all parts carefully and make any replacements as is necessary.
Assembling of spool and sleeve set

Place the two flat neutral position springs in the slot.
Place the curved springs between the flat ones and press them into place.

Configuration of spring set (9).

Line up the spring set (9).
Assembling

Guide the spool into the sleeve (2), and making sure the centering springs (9) are placed into the slot.

Caution

OSP B CN and OSP C CN

Assemble the spool/sleeve (2) and make sure the marks on spool and sleeve (2) align with each other.

Line up the springs (9) and centre them.
Assembling

Guide the ring (7) down over the sleeve.
The ring should be able to move - free of springs.

Fit the cross pin (8) into the spool/sleeve.

Fit bearing races and needle bearing (6) as shown on the drawing below.

Caution
Assembly pattern for standard bearing
1 Outer bearing race
2 Needlebearing
3 Inner bearing race
4 Spool
5 Sleeve
Assembling

**The inside chamfer on the inner bearing race must face the inner spool.**

**Installation instruction for Roto Glyd Seal**

Place the steering unit housing with the port face down on the work bench. Guide the outer part of the assembly tool into the bore for the spool/sleeve set (2).

Grease Roto Glyd (5) with hydraulic oil and place them on the tool. Ensure that the Roto Glyd seal is placed on the insertion tool as per the photograph.

Hold the outer part of the assembly tool in the bottom of the steering unit housing and guide the inner part of the tool right to the bottom.
Assembling

Press and turn the Roro Glyd seal (5) into position in the housing.

Draw the inner and outer parts of the assembly tool out of the steering unit bore, leaving the guide from the inner part in the bore.

With a light turning movement, guide the spool and sleeve into the bore.

Fit the spool set holding the cross pin (8) horizontal.
Assembling

The spool set will push out the assembly tool guide. The Roto Glyd Seals (5) are now installed.

Assembling

Turn the steering unit until the bore is vertical again. Put the check valve ball (3) into the hole indicated by the arrow.

Screw the threaded bush (4) lightly into the check valve bore. The top of the bush must lie just below the surface of the housing.
Assembling

Place a ball (31) in the two bolt holes indicated by the arrows.

Place the pins (33) in the same two bolt holes.

In some cases a spring (32) has to be fitted on the pin before it is placed in the housing.
Assembling

Grease the o-ring (11) with mineral oil approx. viscosity 500 mm² [SUS] at 20°C [68 °F].

Insert the o-ring in the groove on the housing.

Place the distributor plate (12) so that the channel holes match the holes in the housing.

Guide the cardan shaft (10) down into the bore so that the slot is parallel with the connection flange ports and lines up with the cross pin (8).
Assembling

Grease the two o-rings with mineral oil approx. viscosity 500 mm² [SUS] at 20°C [°F] and place them in the two groves in the gear rim. Fit the gearwheel and rim (13) on the cardan shaft (10).

Caution

Fit the gearwheel (rotor) and cardan shaft so that a tooth base in the rotor is positioned in relation to the shaft slot as shown. Turn the gear rim so that the seven through holes match the holes in the housing.

Place the end cover (14) in position. Ensure that the bar codes and writing are parallel with port face.
Assembling

Fit the special screw (16) with washer (15) and place it in the hole shown.

Fit the six screws (17) with new washers (15) and insert them.

Cross-tighten all the screws (17) and the rolled pin (16) with a torque of 30 +/- 6 N.m [265.5 +/- 53 lbf.in].

The OSPB/C can now be function tested manually.

Place the dust seal ring in the housing.
Assembling

Fit the dust seal ring in the housing using special tool SJ 150-9000-22 (see page 5) and a plastic hammer.

Screw the plastic plugs into the connection ports.

Assembly of the pressure relief valve for OSPC

Install the piston (19) to housing.
Assembling

Install the spring (20) on top of the piston (19).

Screw in the adjustment screw (21) with an 8 mm hexagon socket spanner.
Make the pressure setting on a test panel or the vehicle as required.
Reinsert plastic protection plug (23) to the adjustment screw (21).

Assembly of the shock valves for OSPC

Screw the shock valve seats (24) with a 2.75 mm Allan key into the cavities indicated by the arrows. Torque to 1.5 Nm.
Assembling

Place one ball (26) in each of the shock valve cavities.

Place springs valve cones (27) over the two balls. The copper coated spring applies to a setting range 90-190 bar (1305-2755 psi). The black spring applies to a setting range 180-240 bar (2610-3480 psi).

Screw in the two setting screws (28) using a 5 mm Allan key. Make the pressure setting on a panel description.
Assembling

Insert plastic plug (30) into the 5 mm internal hex.
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