

# Heater Replacement Procedure

Oil Diffusion Pump

Model

**ULK-04A**

**ULK-06A**

Components Division,  
ULVAC, Inc.

<http://www.ulvac.co.jp/>

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## **Preface**

We thank you very much for purchasing our product.

This manual describes the rules of the description of this pump heater replacement procedure and information for carrying out replacement according to this manual.

Read this manual first.

- Worker's requirements
- Before replacement of the heater
- Names of components of the pump

## **Worker's requirements**

This pump may be disassembled, reassembled and installed only by a person experienced in disassembly and reassembly of high vacuum pumps.

If you are not experienced in disassembly and reassembly of high vacuum pumps, contact your local ULVAC service station.

## **Before replacement of the heater**

Disassembly of a pump used for exhausting toxic gas or active gas can be dangerous. If a pump was used for exhausting such type of gas, seal it completely simultaneously with removing the pump from the system and request a professional for disassembly and cleaning.

Before starting heater replacement, prepare necessary parts and tools (refer to the list of tools to use, list of major parts and list of replacement parts). Also replace gaskets, which are subject to aging and may be easily damaged during disassembly.

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## 1. Parts used

### 1.1. Table of Major Parts

No.	Description	Quantity	Check
1	Heater	1 pc.	<input type="checkbox"/>
2.1	Boiler cover (top)	1 pc.	<input type="checkbox"/>
2.2	Boiler cover (bottom)	1 pc.	<input type="checkbox"/>
3	Reflector	1 pc.	<input type="checkbox"/>
4	Heater (terminal) cover	1 pc.	<input type="checkbox"/>
5	Glass wool tube 10mm-dia. × 60mm long (for heater terminal)	2 pcs.	<input type="checkbox"/>
6	Heater lead	2 pcs.	<input type="checkbox"/>
7	Heat-transfer-cement	ULK-04A: 30 g ULK-06A: 60 g	<input type="checkbox"/>

### 1.2. Table of Replacement Parts

No.	Description	Quantity	Check
1	Heater (Note)	1 pc.	<input type="checkbox"/>
2	Glass wool tube 10mm-dia. × 60mm long (for heater terminal)	2 pcs.	<input type="checkbox"/>
3	Heat-transfer-cement	ULK-04A: 30 g ULK-06A: 60 g	<input type="checkbox"/>

Note : Use a heater with the wattage and voltage inscribed on the rating plate.

1.3. Bolts used

No.	Description	Quantity	Check
<b>For fixing heater (SUS304)</b>			
1	Hexagon nut M6(JIS Class 3)	1 pc.	<input type="checkbox"/>
2	Board washer	1 pc.	<input type="checkbox"/>
<b>For fixing reflector (SUS304)</b>			
3	Hexagon nut M6(JIS Class 3)	1 pc	<input type="checkbox"/>
<b>For heater terminal (SUS304)</b>			
4	Hexagon nut M3	2 pcs.	<input type="checkbox"/>
5	Spring washer M3	2 pcs.	<input type="checkbox"/>
6	Hexagon nut M3	4 pcs.	<input type="checkbox"/>
<b>For fixing the boiler cover (SUS304)</b>			
7	Hexagon nut M6	1 pc.	<input type="checkbox"/>
8	Plain washer M6	1 pc.	<input type="checkbox"/>
<b>For fixing heater terminal cover</b>			
9	Hexagon nut M4	2 pcs	<input type="checkbox"/>
10	Spring washer M4	2 pcs.	<input type="checkbox"/>
11	Hexagon nut M4	2 pcs.	<input type="checkbox"/>

1.4. Miscellaneous

No.	Description	Quantity or size		Check
		ULK-04A	ULK-06A	
1	Working fluid ULVOIL D-11 or D-31	150 cc	350 cc	<input type="checkbox"/>
2	Intake port gasket (NBR or FPM)	40mm × 5mm × 3 mm	55mm × 5mm × 3 mm	<input type="checkbox"/>
3	Exhaust port gasket (NBR or FPM)	V-40	V-55	<input type="checkbox"/>
4	Molybdenum disulfide (Dow Corning MOLKOT,etc)	Appropriate amount		<input type="checkbox"/>

**2. Tools to use**

**2.1. Table of Working Tools**

No.	Photo	Description	No.	Photo	Description
1		Torque wrench 10 N·m	7		Box screwdriver or Spanner (M3)
2		Spanner 10: 2 pcs. 5 : 1 pc.	8		Protective gloves
3		Philips screwdriver	9		Box 10 mm
4		Shockless hammer	10		Spatula
5		Scraper	11		Pliers (or cutting pliers)
6		Wire brush			

### 3. Removing the Heater

Power Supply wiring <Dismantling>



**WARNING**

- Be sure to cut off the electricity before starting install or dismantling operation.

Coolant piping <Dismantling>



**WARNING**

- Should you remove the Coolant joint immediately after having stopped the Pump, there is a risk that the coolant remained inside the Pump comes to a boil and jets out. Keep flowing the Coolant as far as the Pump temperature cools down.

- The Pump is and remains very hot during and while after having stopped operation. You have a risk of getting burned if a part of the body touched it.

Keep flowing the Coolant as far as the Pump temperature cools down.

- Use a flow meter (HWFM: for example Flow sight) applicable to visually check the Coolant supply source that no water is flowing.

Intake port and exhaust port piping<Dismantling>



**WARNING**

- Take off the piping following the Install Manual of the system.
- Make airtight completely the Pump exhaust outlet with a blank flange.

Transfer



**WARNING**

- You have a risk of giving damage to your back as the load larger than safety standard shall be required to transfer the product.
- Be sure to use the loading machinery (such as mobile crane) to lift up the Pump or load it on the pallet and fix it with Jack and run the Pallet truck for its transfer.

- (1) Move the pump to a place suited to working.
- (2) Before removing the heater, make sure on a surface thermometer or the like that the working fluid temperature has lowered to near ambient temperature.
- (3) Drain working fluid and remove the jet.  
For the disassembly and reassembly of the jet, refer to the instruction manual.
- (4) Protect the flange surface with a sealing flange or the like so that the intake port and exhaust port are not damaged when the pump is turned upside down.
- (5) Turn the pump upside down to set the boiler cover side in the up position.
- (6) Remove all connecting terminals of the heater connection in the terminal box.
- (7) Remove the heater terminal cover to remove the heater lead.
- (8) Remove the boiler cover fixing nuts to remove the boiler cover.
- (9) Remove the reflector fixing nuts to remove the reflector.
- (10) Remove the heater fixing nut to remove the heater.  
If the heater and the pump are fixed with heat-transfer-cement, lightly strike the heater with a shockless hammer.
- (11) Wear protective gloves and remove the heat-transfer-cement from the heater installation surface on the pump side using a scraper or wire brush.

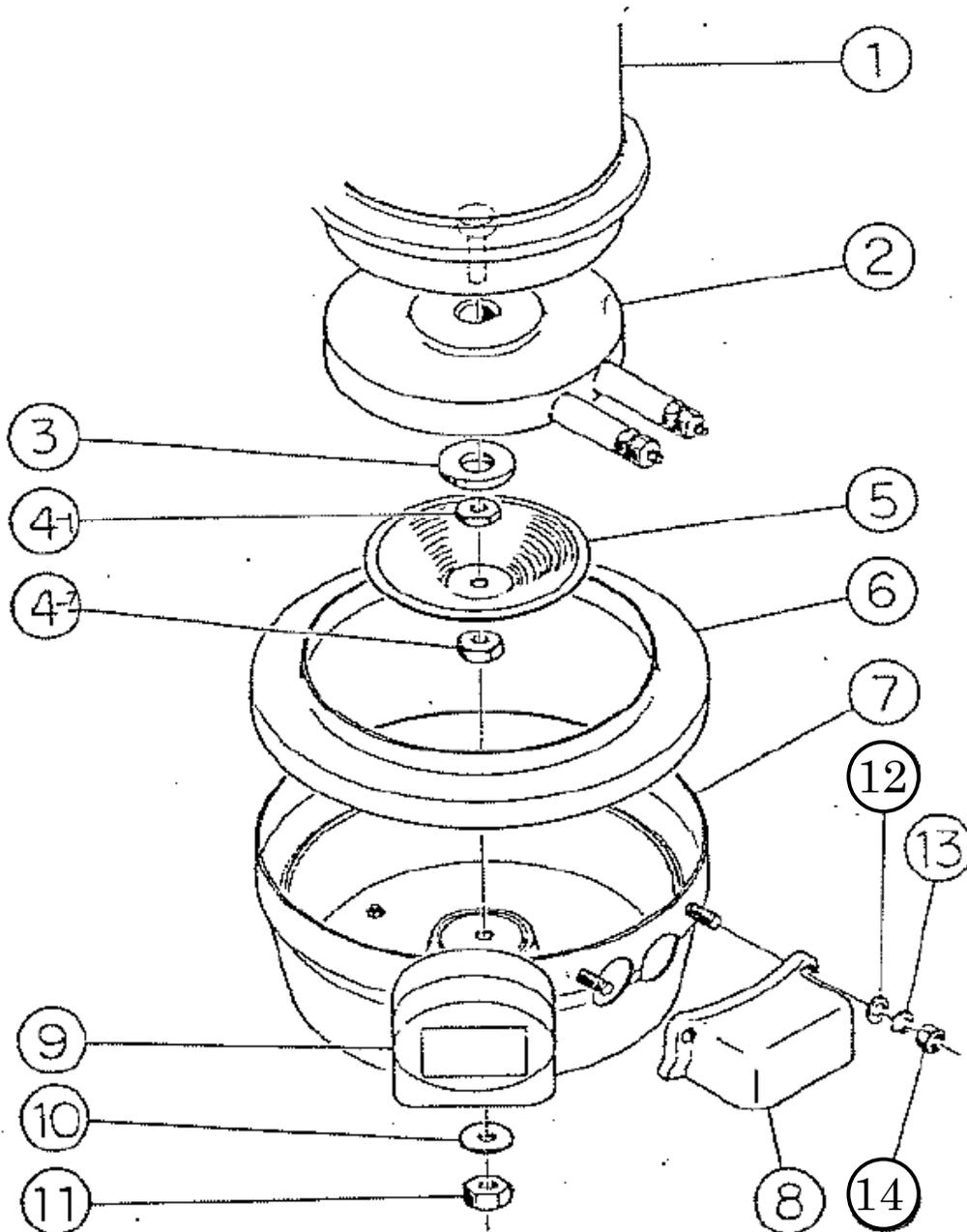


This completes removal of the heater.

#### 4. Installing the Heater

Disassemble the heater in decreasing order of the numbers in the figure below.

For reassembly, reverse the order.



(1) Apply Molybdenum disulfide to the heater fixing screw area before installation.



(2) Apply a uniform coat of heat-transfer-cement (item 7 of Table in 1.1.) to the bottom of the pump case.



(3) Position the cooling water inlet port and the heater terminal fixed in the same direction and install the heater, as shown in the Photo.



Working fluid	ULK-04A		ULK-06A	
	ULVOIL D-11	200V	550W	200V
220V		550W	220V	900W
ULVOIL D-31	200V	730W	200V	1200W
	220V	730W	220V	1200W

(4) Fix the seat plate and M6 hexagon nut (JIS Class 3), tighten it with hand until the nut stops and then tighten it with a torque wrench (tightening torque 10 N·m)



(5) Install the reflector (1) in position and tighten it with an M6 hexagonal nut (JIS Class 3).



(6) Remove extra cement after allowing it to dry so that it does not stick to the pump case.



(7) Install the boiler cover in position. (M6 hexagonal nut and plain washer)



(8) Check and adjust the clearances between the heater terminal fixed position and the heater cover.

\* Reference clearance : 5 mm or more



(9) Fix the heater lead using an M3 hexagonal nut, plain washer and spring washer. Retighten the M3 nut.



(10) Install the heater leads in parallel with each other, as shown in the photo.

\* Heater lead size 2.0 SQ



(11) Install the heater cover.



This completes heater replacement.

Before actuating the pump, assemble the jet. (refer to the instruction manual for the assembling procedure) and apply working fluid.