

Oil Diffusion Ejector Pump

Original Instructions

Instruction Manual

Model PBL-Series PBL-02, PBL-04, PBL-06, PBL-10, PBL-14, PBL-20



Before using the pump, be sure to read this manual. Afterwards, keep this manual at hand for immediate reference.

Components Division, ULVAC, Inc.

www.ulvac.co.jp



Before Using This Pump

Thank you for purchasing the oil diffusion ejector pump PBL series (hereafter, "this pump") made by ULVAC (hereinafter, "we").

To ensure safety, upon receiving the pump, confirm that it matches the details of your order and has not been damaged in transit or for another reason.

This instruction manual (hereinafter, "this document") describes appropriate handling and maintenance procedures to safely use this pump and to maximize its performance. Read this document in advance to properly use this pump.

Install and operate this pump according to the safety-related laws and regulations (such as fire prevention laws and electrical wiring regulations) in your country or region. To this end, you must first attend a publicly recognized general safety training (including on electrical and loading safety topics) in your country or region. Never handle this pump without first undergoing safety training. The operator must attend such training. The operator must have expertise, skills, and certifications related to electricity, machinery, loading, vacuum usage, and other fields.

This pump has been designed to conform to the rules in place when this document was created. Conformity is not guaranteed because the applicable standards may change in the future.

Performance and safety may not be ensured if equipment connected to this pump does not conform to the same rules or if the pump is altered. In such cases, we cannot guarantee (take responsibility for) performance or safety. Product alterations made by the customer are not covered by the warranty, and we cannot take responsibility for them.

Before installing or removing this pump, separate all energy sources (including power and cooling water) from the product.

None of this pump's parts may continue to be used permanently while maintaining the performance upon delivery. Performance inevitably degrades after a certain amount of time elapses, thus increasing the likelihood of product problems even in assumed common usage scenarios. We ask that our customers perform preventive maintenance to avoid problems in accordance with their usage scenarios.

By performing preventive maintenance measures, you can lower the probability of problems with this pump due to parts failures caused by parts becoming worn out as well as the probability of other risks, such as downtime caused by pump problems, fire, or effects on other processes.

From the viewpoint of preventive maintenance, we also ask our customers to prepare maintenance and inspection plans and to replace parts and perform overhauls according to such plans.

If you have any questions about handling or other matters, please contact our nearest sales office or dealer.

Safety Indications

Signal words and symbol marks are in the warning indications contained in this document and on the

product so that the user can understand the matters to be observed. Their meanings are as follows.

Meanings of signal words

Terms that indicate a safe warning level are called signal wards.

▲ Danger	Indicates an imminent possibility that incorrect handling may lead to the user's death or serious injury.
Warning	Indicates a possibility that incorrect handling may lead to the user's death or serious injury.
Caution	Indicates a possibility that incorrect handling may lead to the user suffering a medium-level injury.
Notice	Indicates important information not related to human injury.

Meanings of symbol marks

	Indicates potential risks related to human injury.
4	Indicates potential risks related to electrical shock.
<u>sss</u>	Indicates potential risks related to high temperature.
\bigcirc	Indicates what you must not do.
	Indicates what you must do.
	Indicates that the operator must wear protective gloves.
	Indicates that the operator must wear protective goggles.
(39	Indicates that the operator must read the instruction manual.

Warning Label Types and Display Positions

Attach warning labels to the warning locations on this pump. Before operating this pump, be sure to confirm the warning contents.



Parts with this warning label have a risk of electrical shock. Turn off the primary power supply before starting wiring or maintenance.



Because it becomes very hot, do not touch any section during operation or for some time after operation is stopped. Touching it may cause burns.



Before use, read through the instruction manual and fully understand its contents.

Warning label display positions

PBL-02



Fig.1 Warning label attachment position (PBL-02)

PBL-04



Fig.2 Warning label attachment position (PBL-04)

PBL-06



Fig.3 Warning label attachment position (PBL-06)

PBL-10



Fig.4 Warning label attachment position (PBL-10)

PBL-14



Fig.5 Warning label attachment position(PBL-14)





Fig.6 Warning label attachment position (PBL-20)

Warranty Terms

Although this pump undergoes our stringent internal inspection before shipment, if there are any failures attributable to us such as a manufacturing defect during shipping, contact our nearest sales office or dealer. We will repair or replace it free of charge_o

Warranty target

Oil diffusion ejector pimp PBL series (PBL-02, PBL-04, PBL-06, PBL-10, PBL-14, PBL-20)

Warranty period

- (a) Transactions in Japan: One year from the shipment date.
- (b) Direct export transaction: One year from the B/L date.

Warranty scope

The warranty applies only to this pump. If a failure or accident occurs during air or nitrogen exhaust due to our design or a manufacturing defect, we will repair the pump free of charge if within one year of delivery.

Disclaimer

The warranty does not cover the product failures listed below or those due to one of the following causes; we will charge for such repairs even during the warranty period.

- Failures or defects caused by exhaust of gas or a substance other than air or nitrogen
- Failures or defects caused by consumables
- When the power voltage or frequency of the power supply used differs from what was specified at the time of order
- Failures or defects caused by natural disasters such as fires, floods, earthquakes, or lightning, or force majeure such as war
- Failures or defects caused by handling errors or incorrect usage
- When the product has been altered, disassembled, or repaired without our permission
- Failures or defects caused by use in an abnormal environment (including strong electromagnetic fields, radioactive environments, high temperatures, high humidity, flammable gas atmospheres, corrosive gas atmospheres, and dust)
- Failures or defects due to noise
- Secondary damage incurred by the customer caused by product defects or claims from third parties that we have infringed on patents
- When our engineer determines that the failure or defect occurred because the pump's usage requirements were not satisfied
- Products for which the warranty period has elapsed

∎Response

center.

(a) Transactions in Japan:

We will send a substitute product, or repair the product returned to us or our nearest ULVAC TECHNO office.

If on-site action is required, contact our nearest sales office or dealer separately.

(b) Direct export transactions:We will send a substitute product, or repair the product returned to us or our nearest service

The customer must bear the cost of shipping the returned product.

Miscellaneous (warranty terms)

- (a) If there are any individual contracts, memoranda on the specifications, or other agreements in addition to this document, handling will conform to their contents.
- (b) Before exporting this pump from Japan, contact us and perform the necessary procedures according to the provisions of export-related laws such as the Foreign Exchange and Foreign Trade Law.
- (c) If you have any questions about this pump or want to consult with us regarding it, confirm the model and manufacturing number and then contact our nearest sales office or dealer. https://www.ulvac.co.jp/support_info/
- (d) Note that this document's contents are subject to change without notice.

About This Document

- To ensure this pump remains usable for a long time, before installing, operating, inspecting, or maintaining it, be sure to read this document and fully understand the safety notes as well as the pump's specifications and operating procedures.
- Note that the specifications, prices, and other contents in this document are subject to change without notice for improvement or other reasons. Changes are released as a revision that updates the document number listed on the top-right corner of the instruction manual's cover.
- Be sure to give this document to the end user who uses the product.
- Copying this instruction manual in whole or in part for third parties without our permission is strictly prohibited.
- This document is intended for users whose native language is Japanese. If users whose native language is not Japanese perform work related to this pump, thoroughly provide safety training and handling instructions under your own responsibility.

Target Models

This document applies to PBL-02, PBL-04, PBL-06, PBL-10, PBL-14, and PBL-20.

Contents

Before Using This Pump · · · · · · · · · · · · · · · · · · ·	I
Safety Indications · · · · · · · · · · · · · · · · · · ·	ii
Meanings of signal words ·······i	i
Meanings of symbol marks · · · · · · · · · · · · · · · · · · ·	ii
Warning Label Types and Display Positions ······ii	ii
Warning Label Display Positions ······	v
Warranty Terms	/i
Warranty Target ····································	/i
Warranty Period ······	/i
Warranty Scope ····································	/i
Disclaimer ·····	/i
Response ····································	/ii
Miscellaneous (warranty terms) ······	iii
About This Document ····································	iii
Target Models	iii
1. To Ensure Safe Use ····· 1	1
1.1 Handling of This Pump ·····	1
1.2 Acceptance, Transport, and Storage	2
1.2.1 Acceptance	2
1.2.2 Transport	2
1.2.3 Storage	3
1.3 Installation and Operation	3
1.4 Disposal	4
1.5 Protective device	4
1.6 Risks and Safety Measures Specific to This pump	4
1.6.1 Vacuum pumping and exhaust of hazardous gases or substances	4
1.6.2 Transport of heavy objects	5
1.6.3 Electrical shock	5
1.6.4 High temperature	5
1.6.5 Ruptures	5
1.6.6 Leakage of hot cooling water	6
1.7 Safety Data Sheet	6
2. Product Overview	7
2.1 Features	7
2.2 Performance Curves	7
2.3 Part Names	8

3. Installation	10
3.1 Before Installation	. 10
3.1.1 Division of roles from shipment to startup	10
3.1.2 Storage environment requirements	11
3.1.3 Environment requirements for installation and operation	11
3.2 Unpacking	. 12
3.2.1 Notes on unpacking	. 12
3.2.2 Confirmation after unpacking	. 12
3.3 Transport	13
3.3.1 How to hoist this pump using a crane	13
3.3.2 How to transport this pump via pallet truck	14
3.4 Installation and Piping	. 14
3.4.1 Preparations before installation	14
3.4.2 Piping for the pump inlet	14
3.5 Cooling water piping	. 15
3.6 Power Wiring	. 17
3.7 Pump fluid installation	. 20
3.8 Vacuum test	. 20
4. Operation	. 21
4.1 Precautions for operation	. 21
4.2 Preparation for operation	23
4.3 Leak test	. 24
4.4 How to Stop the Pump	. 24
5. Maintenance and Inspections	. 24
5.1 Regular Inspections	. 24
5.2 Renew of heater	24
5.3 Exchange the fluid	. 26
6. Troubleshooting	. 27
7. Specifications	28
7.1 Performance Specifications	28
7.2 Dimensional Drawings	29
Appendix	
Replacement Parts	

- (1) Heater list
- (2) Oil value list
- (3) Packing list

Certificate of Contamination

1. To Ensure Safe Use

This chapter describes how to reduce risks as well as which dangerous behaviors must be avoided for each work item.

1.1 Handling of This Pump

If you need an overhaul or repair or if you have a problem, contact our nearest service center.

Danger	This pump can exhaust inert gas (air, nitrogen, or argon). If the pump exhausts other gas (toxic, combustible, corrosive, or explosive gas, or gas that increases the susceptibility of substances), such gas may leak from the pump's main unit or ignite or explode inside the pump. Therefore, do not use this pump to exhaust such gases.
Danger	Install this pump in a ventilated room indoors. If nitrogen or argon leaks, the lack of oxygen may cause suffocation.
Danger	Before installing or removing this pump, separate all energy sources (including power and cooling water) from it.
Danger	If this pump sucks in toxic gas, both the pump's main unit and the lubricant will become toxic. Keep this in mind during maintenance.
Notice	Install an appropriate filter, separator, and trap so that this pump does not suck in liquid or solid particles.

- This pump has been designed to conform to the rules in place when this document was created. Conformity is not guaranteed because the applicable standards may change in the future.
- Performance and safety may not be ensured if equipment connected to this pump does not conform to the same rules or if the pump is altered. In such cases, we cannot guarantee (take responsibility for) performance or safety.
- Do not handle this pump if you have not undergone publicly recognized general safety training (including on electrical and loading safety) in your country. The operator must attend such training.

Install and operate this pump according to the safety-related laws and regulations (such as fire prevention laws and electrical wiring regulations) in your country.

 If you do not inform us of the details of hazardous substances you have used or that the pump exhausted a substance that is difficult to detoxify, we may refuse to maintain or otherwise handle the pump. When requesting overhaul, maintenance, repair, or other work, fill out the Declaration of Contamination attached to this document and submit it to the service center. • Before exporting this pump from Japan, it must undergo screening according to the Foreign Exchange and Foreign Trade Law as well as government ordinances, ministerial ordinances, notices, and other orders based on said law. Contact our nearest sales office or dealer.

[List of sales offices]

https://www.ulvac.co.jp/support_info/sales_office/

1.2 Acceptance, Transport, and Storage

1.2.1 Acceptance

Danger	Never get under this pump. The pump may fall or topple if a forcible operation is performed or if the equipment is not sufficiently maintained. Never get under this pump.
Marning	Ask a specialist company to perform disassembly. This pump comes packaged in a wooden crate, cardboard box, or other material. Ask a specialist company to perform disassembly. Workers may cut their hands on nails or wooden chips during work. Instruct those who disassemble the pump to wear leather gloves and to use an appropriate bar or other disassembly tool.
Warning	Use a crane or other cargo-handling equipment. When taking this pump out of the package or lifting it, instruct workers to lift it while holding the eyebolts on the upper part using a crane or other cargo-handling equipment and to transport it. Before using the eyebolts, confirm that there are no abnormalities.
Warning	Certified persons must perform loading work and operate the cargo-handling machine. Never perform loading work or operate the cargo-handling machine if you do not have the appropriate certifications.
Notice	After unpacking, check for any missing items or damage. Check for any missing items, damage, part abnormalities, or other problems after unpacking. It you find any defects, do not install the pump.

1.2.2 Transport



For transport, use cargo-handling equipment or a pallet truck.

To transport this pump, a load higher than the safety standards is required. Therefore, manually transporting it may cause lower back pain or injury. For transport, hang this pump with cargo-handling equipment (such as a mobile crane) or fix it on a pallet and then transport it by pallet truck.

1.2.3 Storage

Notice
0

Respect the environment requirements.

This pump is a machine with a precise clearance. Confirm that the storage location satisfies the requirements listed in "3.1.2 Storage environment requirements."

1.3 Installation and Operation

Danger	Before installing or removing this pump, separate all energy sources (including power and cooling water) from it.
Warning	This pump is not designed for pressurization. It explodes when you pressurize it, and a piece might be scattered. Only at the time of operating, prevent you from pressurizing it at any time.
Caution	Don't fix the pump base. It becomes the high temperature during pump operating, and heat is prolonged, and a pump does it. Please do not fix both inlet and pump footstool and pump base. Excessive power depends on a pump by a heat spread and might be damaged.
Notice	Do not apply shock to this pump or put in at an incline, position it sideways, or stand it up or reverse it. Doing so will degrade the pump's operation. Install this pump so that it is level.
Notice	Operate the pump after the main unit's temperature reaches the operable ambient temperature. When this pump has been stored outside the operable ambient temperature range, operate it after the main unit's temperature has returned to the operable ambient temperature.
Notice	Install this pump's main unit so that it is level. After moving this pump to the installation location, adjust the four adjusters within the range of 0 to 10 mm, and install this pump's main unit so that it is level. If you operate this pump on the casters, vibrations will travel to the floor. Alternately, this pump may travel by itself and collide with the surrounding equipment.
Notice	Respect the environment requirements. This pump is a machine with a precise clearance. Confirm that the installation location satisfies the requirements in "3.1.3 Environment requirements for installation and operation."

1.4 Disposal



Ask a waste disposal specialist to dispose of this pump if you have used it to exhaust harmful gas that may endanger human health.

Ask a waste disposal specialist to dispose of this pump if you have used it to exhaust harmful gas that may endanger human health.

Dispose of this pump according to the laws and ordinances issued by your local government.

Particularly if you have used this pump to exhaust harmful gas, ask a waste disposal specialist to dispose of this pump.

The customer must incur any disposal-related costs.

1.5 Protective device



Be sure to install an earth leakage circuit breaker.

If no earth leakage circuit breaker is installed, then equipment burnout, fire, or electrical shock may occur.

This pump is not equipped with a power interrupter and leak detector.

When selecting a ground-fault interrupter, refer to "3.6 Wiring."

1.6 Risks and Safety Measures Specific to This Pump

1.6.1 Vacuum pumping and exhaust of hazardous gases or substances

	<u>Do not use this pump to exhaust toxic, combustible, corrosive, or explosive</u>
Danger	gas, or gas that increases the susceptibility of substances. It is very dangerous to exhaust toxic, combustible, corrosive or explosive gas, or gas that increases the susceptibility of substances. It is very dangerous if this pump sucks in such gas because ignition or an explosion may occur due to residue gas or product; this may occur during operation or even after operation stops. Do not exhaust gas that has these characteristics.
Danger	Wear protective equipment. During work such as inspections, wear protective equipment suitable for handling the toxic substance to be used.
Marning	Ask a waste disposal specialist to dispose of this pump. To dispose of this pump, ask a waste disposal specialist authorized by the government.
Marning	To detoxify this pump, ask a specialist. To detoxify this pump before overhaul or disposal, ask a waste disposal specialist.

1.6.2 Transport of heavy objects Image: Image:

1.6.3 Electrical shock

A Danger	Before connecting the power, turn off the primary power supply.
Danger	Before inspection or relocation, turn off the primary power supply.
Warning	Be sure to connect the ground terminal. A certified electrical worker must embed grounding or connect the ground line. Incomplete grounding incurs the risk of electrical shock.

1.6.4 High temperature

Warning	Do not touch the pump's main unit, motor, or piping during operation. Do not touch the pump's main unit, motor, or piping during operation because they are very hot. Failure to observe this instruction may lead to burns.
Marning	Wait until the pump temperature drops. The pump is hot immediately after operation stops. Wait a while until the pump temperature drops and then perform inspection. Failure to observe this instruction may lead to burns.

1.6.5 Ruptures



1.6.6 Leakage of hot cooling water

	If you inadvertently operate this pump without flowing water, stop the pump immediately and keep away from it.
	If you inadvertently operate this pump without flowing water, stop the pump immediately and keep away from it. Hot steam may blast out of the pump's cooling water port.
Marning	Install an interlock on the cooling water pathway. If you operate this pump without flowing cooling water, hot steam may blast out of the pump's cooling water port.
Marning	<u>Wait until the pump temperature drops.</u> After stopping this pump and confirming that the pump temperature has dropped, remove and inspect the pump.

1.7 Safety Data Sheet

Warning	Carefully read the safety data sheet. Obtain and carefully read the safety data sheet (SDS) before using this pump. If lubricant adheres to the skin or enters the eyes, follow the first aid procedure described on the SDS.
Notice	Use the specified lubricant. Use of a non-specified lubricant will affect the pump's performance and service life as well as void the pump's warranty coverage.

Do not use a chemical substance (lubricant) not specified in this document.

|--|

The SDS describes the chemical substances that may be used or touched to operate this pump. To understand the characteristics of hazards, carefully read the SDS. Obtain the latest version of the SDS from our nearest sales office or dealer.

The SDS provides reference information to ensure safe handling of dangerous or hazardous chemical substances.

Anyone handling lubricant must always obtain the latest SDS and understand that measures suitable for the actual handling and other situations in question must be taken under their own responsibility by referring to the SDS before using the lubricant. The SDS itself does not guarantee safety

2. Product Overview

The exhaust principles of the oil diffusion vacuum pump are as follows.

Diffusion pumps use a high speed jet of vapor to direct gas molecules in the pump throat down into the bottom of the pump and out the exhaust.

The diffusion ejector pumps are designed to operate with the ULVOIL B-6 diffusion ejector pump oil. It is metal pump and make up the pump body, jets, heater and baffle.

2.1 Features

6 models are available PBL-02, PBL-04, PBL-06, PBL-10, PBL-14, PBL-20. This series has maximum pumping speed at 10⁻¹ Pa range, where pumping speed of oil rotary pump or mechanical booster pump decreases.



2.2 Performance Curves

Fig 7. Performance curves

2.3 Part Names



PBL-06



















3. Installation

3.1 Before Installation

3.1.1 Division of roles from shipment to startup

This pump is provided on the assumption that we are in charge of the stages from packing through shipment (transport), while the customer is in charge of the stages from cargo reception through startup. However, the customer may fully or partly transport, unpack, or install this pump depending on the pump's terms and conditions.



Notice	The above work from shipment to startup may not apply in your case. Check the pump's specifications document. If you have any questions, please contact us

3.1.2 Storage environment requirements

When storing this pump (prior to installation) in a warehouse or lobby, or when you will not be using it for a long time, store it so that the following requirements are satisfied.

Ambient temperature	-20°C to 60°C (no freezing)		
Ambient humidity	95% RH or less (no condensation)		
Altitude	Altitude of 1,000 m or lower		
Vibration resistance	Vibration acceleration of 0.5 G (114 dB) or lower		
	No dust.		
	The room must be ventilated.		
	Do not stack these pumps, position this pump sideways, or stand it up.		
	Do not apply shock to this pump.		
Other requirements	Do not expose this pump to direct sunlight.		
	Keep this pump away from heat sources.		
	Securely fix this pump in place in case an earthquake occurs.		
	Be sure to release the water in the cooling water piping before storage. In low temperatures (0°C or less), parts may be damaged by frozen water.		
	Do not incline this pump by 10° or more.		

3.1.3 Environment requirements for installation and operation

This pump is a machine with a precise clearance.

Confirm that the following requirements are satisfied during installation and operation.

Ambient temperature	10 to 40°C
Ambient humidity	95% RH or less (no condensation)
Altitude	Altitude of 1,000 m or lower
	There is no corrosive or explosive gas.
	No dust.
	The room must be ventilated.
	Do not stack these pumps, position this pump sideways, or stand it up.
Other requirements	Do not apply shock to this pump.
	Do not expose this pump to direct sunlight.
	Keep this pump away from heat sources.
	Install the pump so that it is level.
	Do not incline this pump by 10° or more.

3.2 Unpacking

This pump is protected with stretch film, a buffer, or other materials and is packaged in a wooden crate or cardboard box upon shipment.

If this pump has been packaged in a wooden crate, ask a specialist to disassemble the crate.

Provide the following notes and instructions to the company you ask to perform unpacking.

3.2.1 Notes on unpacking

Danger	Never get under this pump. The pump may fall or topple if a forcible operation is performed or if the equipment is not sufficiently maintained.
Marning	<u>Never perform loading work or operate the cargo-handling machine if you do not have the appropriate certifications.</u>
Warning	Use cargo-handling equipment to lift this pump. When taking this pump out of the package or lifting it, instruct workers to lift it while holding the eyebolts on the upper part using a crane or other cargo-handling equipment and to transport it.
Warning	Do not incline this pump by 10 or more. Doing so may cause this pump to topple or otherwise move, causing injury or damage.
Caution	If this pump has been packaged in a wooden crate, wear leather gloves and use an appropriate disassembly tool. Workers may cut their hands on nails or wooden chips during work. Instruct those who disassemble the pump to wear leather gloves and to use an appropriate bar or other disassembly tool.

3.2.2 Confirmation after unpacking

After unpacking, confirm that this product matches your order and has not been damaged in transit or for another reason.

If you notify us of a packing problem after starting use, we may charge for a repair.

Although we ship with the greatest care, after unpacking, confirm the following to ensure safety.

- The details of your order match the actual product.
- Accessories (instruction manual and optional parts) have been included.
- No parts were damaged in transit.
- No screws, nuts, or other parts have come loose in transit. No parts have been removed.

If you find a problem, contact our sales department or specified agent.

Product name	Specifications	Qty.	Remarks
Pump fluid	ULVOIL B-6 PBL-02:0.1L、PBL-04:0.6L	1	Attached to PBL-02 and PBL-04 (PBL-06, PBL-10, PBL-14 and PBL-20 e filled up with.)
Heat Shrink Tubing	SUMITUBE FZ	1	Attached to only PBL-04
Instruction Manual	Japanese and English	1	

Table1 List standard accessories

3.3 Transport

Marning	Do not incline this pump by 10 or more. Otherwise, this pump may topple, causing injury or damage.
Marning	For transport, use cargo-handling equipment (e.g., a mobile crane) or a pallet truck. The pump's weight is as follows. PBL-02 : 6 kg, PBL-04 : 17 kg, PBL-06 : 86 kg, PBL-10 : 198 kg, PBL-14 : 313 kg, PBL-20 : 495 kg To transport this pump, a load higher than the safety standards is required. Therefore, manually transporting it may cause lower back pain or injury.
Marning	Wear safety shoes Be sure to wear safety shoes before transferring this pump.

3.3.1 How to hoist this pump using a crane



Never get under this pump.

When hoisting this pump, it may fall or topple if a forcible operation is performed or if the equipment is not sufficiently maintained. Never get under this pump.

Use a crane or other cargo-handling equipment.

When taking this pump out of the package or lifting it, instruct workers to lift it while holding the eyebolts on the upper part using a crane or other cargo-handling equipment and to transport it. Before using the eyebolts, confirm that there are no abnormalities.

3.3.2 How to transport this pump via pallet truck



Always use a pallet when transporting via a pallet truck.

Do not transport this pump by pallet truck without placing it on a pallet. Otherwise, this pump may topple, causing injury or damage.

3.4 Installation / Piping

- 3.4.1 Preparations before installation
 - 1) Inlet port and exhaust port of this pump closes the cover so that a dust, garbage is not contained, and there is it. At first, remove the cover, and, please confirm whether the main body of pump, nozzle system, an inlet port do not have abnormality.
 - 2) Please raise an O ring or corner gasket of vent baffle flange at inlet port and an exhaust port.
 - 3) Please confirm whether there is a wound in the seal surface.
 - 4) When you don't use a pump immediately, please attach the cover to Inlet port and exhaust port.

3.4.2 Inlet piping



Don't fix the pump base.

It becomes the high temperature during pump operating, and heat is prolonged, and a pump does it. Please do not fix both inlet and pump footstool and pump base.

Excessive power depends on a pump by a heat spread and might be damaged.

- 1) Raise an inlet port and a corner gasket setting to an exhaust flange or an O ring and it is light and wipes it with the cloth which you got wet with a solvent such as the alcohol, and, please take the dirt attaching to the surface.
- 2) Wipe a gasket ditch and the flange side of the flange with clean cloth. Set a corner gasket or an O ring at the predetermined position.
- 3) Fasten an inlet port flange with bolts. The bolts tightens it by appropriate torque at the opposite angle sequentially.
- 4) Fasten the exhaust port flange with bolts.
- 5) Connect bellows to the exhaust port.

3.5 Cooling water piping

Please lay pipes in each connection port using an adapted coupling.

Notice	<u>Use an appropriate joint.</u> This pump's cooling water port is Rc3/8. Connect the cooling water piping to it using an appropriate joint. Do not confuse the cooling water inlet with the cooling water outlet.
Notice	Points to observe when using cooling water piping Observe the following items related to cooling water and piping.

• Be sure to flow the necessary amount of cooling water.

We recommend installing a flowmeter in the cooling water system and installing an interlock so that the pump will be stopped if the amount of water drops below the specified value.

• When stopping operation of the pump in winter, release any water inside the pump.

Otherwise, when stopping operation in winter, the pump may be damaged by water that freezes in the cooling water piping. When stopping operation, release the water inside the pump by, for example, blowing compressed air into the cooling water port.

• We recommend using water that contains few impurities (e.g., industrial water; refer to the table below).

We recommend using water that contains few impurities as cooling water for this pump (e.g., refer to Table 9 [Reference] Standard Quality of Industrial Water in Japan).

Depending on water quality, water stains from calcium carbonate or other substance may accumulate inside the pump's cooling water system, reducing the amount of cooling water. In addition, chlorine ions may corrode the inner wall, causing cooling water to leak.

If using pure water, metal may elute, causing cooling water to leak. Note in advance that in such cases, we may charge for repair.

Turbidity	pН	Alkalinity	Hardness	Evaporation residue	Chlorine ions	Iron	Manganese
20 mg/L or less	6.5 to 8.0	75 mg/L or less	120 mg/L or less	250 mg/L or less	80 mg/L or less	0.3 mg/L or less	0.2 mg/L or less

Table 2 [Reference]Standard Quality of Industrial Water in Japan

Established by the Japan Industrial Water Association (Industrial Water Quality Standards Establishment Committee).

Do not install electrical equipment or wiring underneath this pump or on the floor around it.

This pump is designed not to leak water under the specified conditions. It has undergone a water leakage test. However, if this pump is used under abnormal conditions that deviate from the specifications (e.g., an abnormal rise in water pressure), water may leak. In such a case, water will continue to leak until water supply from the equipment is stopped. Do not install electrical equipment or wiring underneath this pump or on the floor around it.

We recommend placing a water leakage sensor below this pump or on the floor around it so that the power will be shut off if the water leakage sensor activates.

• Install a flowmeter (e.g., flow sight) on the cooling water supply source.

To check the flow, install a flowmeter that can be used to visually recognize that cooling water is flowing (e.g., flow sight) on the cooling water supply source of the equipment or other device.

• When using multiple pumps, connect their cooling water piping in parallel.

When using multiple pumps, connect their cooling water piping in parallel. If such piping is connected in series, cooling capacity will be insufficient, causing a failure.

• Use a filter or other tool to filter water that has many impurities.

When using that has with many impurities, including water stains or iron, use a filter or other tool to filter it during the stage prior to use.

• Ensure a sufficient flow rate.

If you continue to operate the pump with a cooling water flow rate below the specified value, a failure may occur.

Ensure the specified flow rate.

If the supply source and drainage port are far away from each other or if the piping has a difference in height (the drainage port is raised above the pump), it may not be possible to ensure a sufficient flow rate. In this case, ensure the flow rate by changing the piping layout, replacing the piping with larger piping, or increasing the supply pressure within the specification range.

Use piping that has appropriate water pressure resistance and heat resistance.

In the cooling water system, use joints and piping that have a water pressure resistance of at least 0.9 MPa and heat resistance of at least 70°C.

The pump uses Cu piping as cooling water piping. Note in advance that we will change for repair of problems caused by piping blockage or decreased cooling efficiency due to separation or accumulation of impurities (water stains, microorganisms, metal powder, or metal ions).

Specifications of the junction area

Table 3 Specifications of the junction area

	PBL-02	PBL-04	PBL-06
Water ports	Rc1/8"	Rc1/4"	Rc3/8"×2
(size × number of	PBL-10	PBL-14	PBL-20
systems)			Rc1/2"×3
	RC1/2 ×2	RC1/2 ×3	Inside port Rc3/8"

Compatible piping

Joints and piping that have water pressure resistance of at least 0.9 MPa

The heat resistance must be at least 70°C.

Table 4Piping specifications

Cooling water	Supply pressure (MPa)	≦ 0.5		
	Differential pressure at ports (MPa)	0.1		
		PBL-02	PBL-04	PBL-06
	Flow rate (L/min)	> 1.5	> 5.0	> 8.0
		PBL-10	PBL-14	PBL-20
		> 12	> 18	> 25
	Supply water temperature (°C)	19 to 25	(no conden	sation)

3.6 Power wiring

Danger	Wiring work must be performed by certified workers.
Danger	Before performing wiring work, turn off the primary side power supply. Never perform wiring work while applying voltage.
Warning	Be sure to connect the ground terminal. Incomplete grounding may cause electrical shock.
Warning	Use only with the rated voltage. Otherwise, the earth leakage circuit breaker will not operate normally, which may cause burnout or a fire.
Marning	<u>Conform to all laws and regulations.</u> Install and operate this pump according to the safety-related laws and regulations (such as fire prevention laws and electrical wiring regulations) in your country or region.
Marning	Fix the cable in place or provide it with a cover. Fix the cable in place so that it does not directly contact the pump, or provide it with a cover (cable rack).
<u>A</u> Warning	Provide an earth leakage circuit breaker. An earth leakage breaker protects equipment and wiring in the event of a short circuit and provides overload protection. In addition, it also prevents electrical shocks and protects against ground faults, which can trigger electrical leakage fires. If an earth leakage breaker is not attached, or if the attached earth leakage breaker is not attached, may result.

- Use wire compatible with your local safety codes (e.g. UL, TUV compatible). In addition, use a heat-resistant wire (LKGB, KGB) by all means.
- With reference to a Table 5, prepare for power supply capacity to the power supply specifications of this pump.

Table 5 Power requirement								
	PBL-02	PBL-04	PBL-04 PBL-06 PBL-10 PBL-14			PBL-20		
Power requirement (kW)	200V (1 Ph)			200V (3 Ph)				
	0.44	1.8	4.0	8.0	11	18		

Connect power wire at the terminal of the pump. The connection terminal part becomes the double nut. When you tighten a nut, I fix the nut of the root side with spanners, and, please tighten it.



Fig 8 Connection terminal



<u>There is not the slack or confirms the nut of the connection terminal part regularly.</u> Please confirm whether the nut of the terminal part does not have the slack regularly. When there is the slack, of a terminal, the wiring might be damaged by a fire.

※ Important notice : wiring of PBL-04

After having wired the primary side of the plug-type cord inlet like fig. 9, please coat the connection of PBL-04 in a thermal contraction tube.







Heat-shrinkable tubing SUMITUBE FZ $\phi 40$ L=65, Black SUMITOMO ELECTRIC FINE POLYMER, INC.

Fig 9 PBL-04 Primary side of the plug type cord

3.7 Pump fluid installation

It is attached to PBL-02 and PBL-04 fluid.

As for PBL-06, PBL-10, PBL-14 and PBL-20, fluid is in the pump. Please confirm that fluid is contained by the fluid level gauge.

A Warning	Do not use the fluorine oil.
	Please never use the fluorine-based oil. Fluorine oil disintegrates, and a poisonous gas might be generated that the oil diffuser pump oil is a high temperature and operates.
Marning	Use of a non-specified lubricant. Use of a non-specified lubricant will affect the pump's performance and service life as well as void the pump's warranty coverage. In addition, It is in danger of the life of the pump becoming short, the damage of the pump and the explosion.
Caution	Wear protective equipment. During work such as inspections, wear protective equipment suitable for handling the toxic substance to be used. Obtain and carefully read the SDS before using this pump. If lubricant adheres to the skin or enters the eyes, follow the first aid procedure described on the SDS.
Notice	Fill up with fluid by all means.
0	A heater is snapped when you feed it without filling up with fluid it, and a boiler is damaged.
Notice	Don't use the pump mixing oil more than two kinds.

3.8 Vacuum Test

After having attached the pump to a equipment, please confirm whether connection does not have deficiency before supplying a power supply.

Operate roughing pump next, and pressure reaches near the ultimate pressure of the roughing pump, or, please confirm it.

When do not reach to about the ultimate pressure, there is big leak or confirms it, and, please revise it.

4. Operation

4.1 Precautions for operation

	Only suction for inert gases.
Daliger	This pump is designed to exhaust only inert gases (air, nitrogen, or argon). It cannot be used to exhaust other gases (toxic, combustible, corrosive, or explosive gas, or
\bigcirc	gas that increases the susceptibility of substances) because such gas may leak from the pump's main unit or ignite or explode inside the pump.
🛕 Danger	Do not suction toxic gases with this pump.
\bigcirc	If this pump sucks in toxic gas, both the pump's main unit and the lubricant will become toxic. Keep this in mind during maintenance.
▲ Danger	<u>Do not absorb air just after during the operating and a stop at current opportunity.</u>
Marning	Do not use this pump in areas where a hazardous atmosphere may form. Do not use this pump in areas where a hazardous atmosphere may be formed by an explosive gas. Otherwise, injury or fire may occur.
	Do not block the exhaust outlet port.
	Do not operate this pump with equipment attached to the exhaust outlet port side that blocks the exhaust outlet port or disturbs the flow of gases. Such operation may cause the pump's internal pressure to rise, causing the casing or
\bigcirc	level gauge to rupture, oil leakage, or motor overload. This pump does not have a pressure-resistant structure. The pump's guaranteed withstand pressure is 0.03 MPaG (0.3 kg/cm ² G) (gauge reading).
	Do not put a thing to less than 1m around the pump.
	In operation, the main body of pump and boiler part becomes the high temperature very much. When less than 1m includes a thing from current opportunity, there might be a burn by the abnormal overheat, the fire.
Warning	During operation, do not touch the pump's main body or piping.
\mathbf{O}	During operation, do not touch the pump's main body or piping during operation because they reach extremely high temperatures. Touching it may lead to burns.
	Confirm that the values are open
0	If the piping located behind the exhaust outlet port has valves, confirm that such valves are open.
Notice	Be sure to feed cooling water to this pump during operation.
0	Be sure to feed cooling water to this pump during operation. One hour or more, to feed cooling water to this pump after a stop by all means.

We recommend using water that contains few impurities (e.g., industrial water; refer to the table below).

We recommend using water that contains few impurities as cooling water for this pump (e.g., refer to Table 9 [Reference] Standard Quality of Industrial Water in Japan).

Depending on water quality, water stains from calcium carbonate or other substance may accumulate inside the pump's cooling water system, reducing the amount of cooling water. In addition, chlorine ions may corrode the inner wall, causing cooling water to leak.

If using pure water, metal may elute, causing cooling water to leak. Note in advance that in such cases, we may charge for repair.

[Reference]Standard Quality of Industrial Water in Japan

Turbidity	pН	Alkalinity	Hardness	Evaporation residue	Chlorine ions	Iron	Manganese
20 mg/L or less	6.5 to 8.0	75 mg/L or less	120 mg/L or less	250 mg/L or less	80 mg/L or less	0.3 mg/L or less	0.2 mg/L or less

Established by the Japan Industrial Water Association (Industrial Water Quality Standards Establishment Committee)



Notice

<u>Perform warming-up operation for approximately 60 minutes (recommended)</u> <u>after starting.</u>

We recommend performing warming-up operation for approximately 60 minutes after starting so that the pump can fully exert its vacuum pumping performance.



Do not suction acids or other chemicals.

If the pump suctions acids or other chemicals, it may become out of order.

4.2 How to operation

FIG. 10 shows a use example of general oil diffusion ejector pump. The operation of this case, please reach as follows.

- (1) Close the valve 1 and valve 2, and please exhaust oil diffusion ejector pump to 13-1.3 Pa in the oil rotary vacuum pump.
- (2) Open the cooling water valve and confirm that no cooling water leaks, and regulate flow rate.
- (3) Turn on the power supply at the heater. Close a valve if you set water-cooled baffle, an L-N2 trap, a valve in the upper air inlet of the pump and drain a coolant into water cooling baffle, and, please inject liquid nitrogen to an L-N2 trap.
- (4) After having closed valve 3, open valve 2, and, please exhaust bell glass to 13-1.3 Pa.
- (5) Close valve 2, and open valve 3, valve 1, and, please perform exhaust by oil diffusion ejector pump.



Fig 10 Vacuum system using the oil diffusion ejector pump

4.3 Leak Test the system

After you have installed the pump, leak test the system and seal any leaks found.

The level of leak tightness required will depend on the application of the system. You must leak test the system to ensure the integrity of the system and its vacuum seal.

4.4 How to Stop the Pump

(1) Close the valve 1. As for valve 2 shut, valve 3 are open then.

(2) Switch off the heater of the pump.

(3) Because the rank oil continues jetting it for 20 to 30 minutes after having off the heater, please keep the same state.

(4) Close valve 3 about from 30 to 60 later and stop an oil rotary vacuum pump.

(5) Leak the oil rotary vacuum pump side at a leak valve.

(6) Stop the cooling water.



One hour or more, please continue draining a coolant after a pump stop by all means.

5. Maintenance and Inspections

5.1 Regular inspections

Maintenance and the check depend on use frequency and the application of this pump. More frequent maintenance may be required if the pump has been used to process corrosive or abrasive gases and vapors. If necessary, adjust the maintenance plan according to your experience.

- Check the pump fluid level
- Inspect the pump fluid
- Clean the cooling pipe
- Clean the pump
- Renew a heater
- Check the heater terminal nuts

5.2 Renew of heater

The heater of diffusion ejector pump are three kinds and it is pipe heater, wire heater and cartridge heater. If any trouble is caused from the heater, the heater assembly is easily removed from the pump and the heater is easily cleaned or replaced. This procedure will be done as follows:

Notice



Do not damage the seal surface.

The handling, be careful not to damage it to the aspect per gasket of the flange part and a gasket in particular.



Please confirm that the temperature of the pump reaches room temperature.

- 5.2.1 In case of pipe heater (PBL-06, PBL-10, PBL-14, PBL-20)
 - 1) Put off the switch for heater.
 - 2) After cooled, drain the oil.
 - 3) Take off the terminal cover.
 - 4) Disconnect the electrical wiring.
 - 5) Take off bolts and take out the heaters.
 - 6) Wipe the flange, the heater and such as ethanol and dry them by blowing clean dry air. Change to the new Cu-gasket. Put on the new heater.
 - 7) Fit up new heater, and to be use Cu-gasket, carefully tie mutually and slowly.
 - 8) Connect the electric wiring.
 - 9) Pour into the oil.
- 5.2.2 In case of the nichrome wire heater. (PBL-04)
 - 1) Put off the switch for heater.
 - 2) After cooled, take off the connections between the heater assembly and pump housing, but remove the heater assembly.
 - 3) Disconnect the electrical wiring.
 - 4) Take off the heating element (nichrome wire) out of the heater assembly.
 - 5) Put in new heating element.
 - 6) Connect the electrical wiring.
 - 7) Attach the pump housing the heater assembly.
- 5.2.3 In case of the cartridge heater (PBL-02)
 - 1) Put off the switch for heater.
 - 2) After cooled, take off the connections between the heater casing.
 - 3) Put off the screw of the heater, exchange the heater.
 - 4) Fix the heater, put on the heater casing.
 - 5) Connect the heater wiring at the terminal.



In the case of AC200V, a power supply, please connect the conducting wire of the heater and the connection to the terminal tandemly. Also, in the case of AC100V, please connect it in parallel.(In case of PBL-02.)

5.3 Exchange the fluid

If the pump fails to give satisfactory performance on a leak tight system, inspect the condition of the pump fluid. Use the following procedure.

- ① Allow the pump to cool and open it to atmospheric pressure.
- ② Disconnect the pump from the electrical supplies and detach it from your vacuum system.
- ③ You are careful not to hit a nozzle of the inside and pull it out.
- PBL-02, PBL-04: The fluid drain from the pump. (PBL-06, PBL-10, PBL-14, PBL-20: Remove the drain-plug and allow the fluid to drain from the pump.
- (5) Wash the pump inside and a nozzle with solvents such as the alcohol well.
- 6 After washing, you dry a solvent enough.
- After having assembled it again, you exhaust it with a roughing pump and remove impurities such as a solvent, the water.
- (8) Allow the pump atmospheric pressure after the above-mentioned operation again, and a quota pours fluid.

Danger	If this pump sucks in toxic gas, both the pump's main unit and the lubricant will become toxic. Keep this in mind during maintenance.
<u>Warning</u>	Ask a waste disposal specialist to dispose of this pump if you have used it to exhaust harmful gas that may endanger human health. Ask a waste disposal specialist to dispose of this pump if you have used it to exhaust harmful gas that may endanger human health.
Warning	Wear protective equipment, such as rubber gloves, proactive goggle and so on. Should the oil touched to your hand are entered in your eye, immediately follow the emergency treatment described on the SDS Obtain and carefully read the safety data sheet (SDS) before using this pump. If lubricant adheres to the skin or enters the eyes, follow the first aid procedure described on the safety data sheet.

6. Troubleshooting

Symptom	Check	Action
	Is there a leak in the system?	Check and rectify.
	Is the pump fluid level too low?	Check and rectify.
	Is the switch of the heater not turned on? Is the heater snapped? Is the heater input low?	Check and rectify.
Poor ultimate pressure	Is the pump fluid too dark?	Inspect the pump fluid and replace if necessary.
	Is the cooling water supply not sufficient?	Check and rectify.
	Is the backing pressure high?	Check for a leak in the backing pipeline, poor rotary pump performance, terminal breakdown of the pump fluid.
	Is the pump fluid level too high?	Check and rectify.
	Is the pump fluid outgassing?	Inspect the pump fluid and replace if necessary.
Inlet pressure surges	Is there a leak in the system?	Check and rectify.
fillet pressure surges	Are the O-ring seals excessively lubricated?	Check and rectify.
	Is the backing pressure high?	Check for a leak in the backing pipeline, poor rotary pump performance.

7. Specifications

7.1 Technical Data

Model	PBL-02	PBL-04	PBL-06	PBL-10	PBL-14	PBL-20
Pumping speed (I/s)	80	200	500	1800	4000	7000
Ultimate pressure (Pa)			2.7 >	< 10 ⁻²		
Max. permissible				0		
forevacuum pressure (Pa)			4	0		
Lubricant			ULVC	IL B-6		
Pump fluid filling (L)	0.1	0.6	7.5	18	36	90
Ambient temperature (°C)			10 t	o 40		
Mains connection 50/60 Hz (V)		200 ~ 1 Ph			200 ~ 3 Ph	
Heating power (kW)	0.44	1.8	4	8	11	18
Leater time	Cartridge	Nichrome				
	heater	wire heater	Pipe neater			
Inlet port	VG50	VG100	VG150	VG250	VG350	VG500
Outlet port	3/4B	VG40	VG50	VC80	VG100	VC200
	Hose nozzle	V040	V050	000	VG100	V 0200
Oil level gauge	-	-	dipstick	dipstick	dipstick	dipstick
Weight (kg)	6	17	86	198	313	495
				PKS-070		
	VD201				PMB1200D	PMB-040C +
		PKS-016	PKS-030	(PMB600D +	+ PKS-030	PKS-070
Recommended backing pump	VD30C			PKS-030)		
		VS1501	VS2401		PMB1200D	(PMB2400D
	PVD-360			(PMB600D +	+ VS1501	+ PKS-070)
				VS1501)		



Fig. 11 Dimensional drawing for the PBL series

Model		PBL-02	PBL-04	PBL-06
	Outer diameter	φ120	φ185	φ235
Inlet port	Inner diameter	φ56.5	φ108	φ160
(mm)	Bolt hole	4×φ10,BCφ100	8-φ12,BCφ160	8-φ12,BCφ210
	Gasket groove	φ80×φ70×3	φ130×φ120×3	φ185×175×3
Outlet port	Outer diameter		φ105	φ120
	Inner diameter	Hose nozzle 20A(3/4B)	φ41.6	φ52.9
(mm)	Bolt hole		4-φ10,BCφ85	4-φ10,BCφ100
	Gasket groove		φ65×φ55×3	φ80×φ70×3
Height	A (mm)	463	524	973
Distance	B (mm)	100	150	200
between the port	C (mm)	70	112	152
Cooling water port (size × number of system)		Rc1/8"	Rc1/4"	Rc3/8"×2

Model		PBL-10	PBL-14	PBL-20	
Inlet port	Outer diameter	φ350	φ450	φ625	
	Inner diameter	φ260	φ356	φ508	
(mm)	Bolt hole	12-φ15,BCφ320	12-φ15,BCφ420	16-φ19,BCφ585	
	Gasket groove	φ291×φ275×4.5	φ396×φ380×4.5	φ554×φ530×7	
	Outer diameter	φ160	φ185	φ300	
Outlet port	Inner diameter	φ80.7	φ105.3	φ205	
(mm)	Bolt hole	4-φ12,BCφ135	8-φ12,BCφ160	8-φ15,BCφ270	
	Gasket groove	φ110×φ100×3	φ130×φ120×3	φ241×φ225×4.5	
Height	A (mm)	1321	1687	2320	
Distance	B (mm)	300	340	510	
between the port	between the C (mm)		548	420	
Cooling	water port			Rc1/2"×3	
(size × number of system)		Rc1/2"×2	Rc1/2"×3	Inside cooling Rc3/8" water port	

(Fig11 Dimensional drawing for the PBL series Appended chart)

Appendix

Major replacement Parts

(1) Heater list

Table 6	Heater List
Table 6	Heater Lis

Model	Qty.		Specific	Shape	
PBL-02	1	200V	0V 1φ 0.44 kW		Cartridge
PBL-04	1	200V	1φ	1.8 kW	Nichrome wire heater
PBL-06	2	200V	3φ	2.0 kW	Pipe heater
PBL-10	2	200V	3φ	4.0 kW	Pipe heater
PBL-14	2	200V	3φ	5.5 kW	Pipe heater
PBL-20	3	200V	3φ	6.0 kW	Pipe heater

(2) Lubricant list

Table 7 Lubricant list

Model	Qty.(L)	Pump fluid
PBL-02	0.1	
PBL-04	0.6	
PBL-06	7.5	
PBL-10	18	ULVUIL B-6
PBL-14	36	
PBL-20	90	

(3) Gasket List

Table 8 Gasket list

Model	Part name	Material	Qty.	Shape	Dimension	Standard No.
PBL-02	Inlet gasket	NBR	1		φ70×φ80×5t	
PBL-04	Baffle gasket	NBR	1		φ120×φ130×5t	
	Inlet gasket	NBR	1		φ120×φ130×5t	
	Outlet gasket	NBR	1		φ55×φ65×5t	·
	Baffle gasket	NBR	1		φ175×φ185×5t	
	Inlet gasket	NBR	1		φ175×φ185×5t	
	Outlet gasket	NBR	1		φ70×φ80×5t	
PBL-06	Oil filling port gasket	FKM	1	\bigcirc	-	JIS 2401 P18
	Drain gasket	Cu	1		φ24.5×φ15.5×0.5t	
	Heater flange gasket	Cu	2		φ70×φ60×0.2t	
	Baffle gasket	NBR	1		φ275×φ291×8t	
	Inlet gasket	NBR	1		φ275×φ291×8t	·
	Outlet gasket	NBR	1		φ100×φ110×5t	
PBL-10	Oil filling port gasket	FKM	1	\bigcirc	-	JIS 2401 P18
	Drain gasket	Cu	1		φ24.5×φ15.5×0.5t	
	Heater flange gasket	Cu	2		φ95×φ85×0.2t	
	Baffle gasket	NBR	1		φ380×φ396×8t	
	Inlet gasket	NBR	1		φ380×φ396×8t	
	Outlet gasket	NBR	1		φ120×φ130×5t	
PBL-14	Oil filling port gasket	FKM	1	\bigcirc	-	JIS 2401 P18
	Drain gasket	Cu	1		φ24.5×φ15.5×0.5t	
	Heater flange gasket	Cu	2		φ95×φ85×0.2t	
	Baffle gasket	NBR	1	\bigcirc	-	JIS 2401 V530
PBL-20	Inlet gasket	NBR	1	\bigcirc	-	JIS 2401 V530
	Outlet gasket	NBR	1	\bigcirc	-	JIS 2401 V225
	Oil filling port gasket	FKM	1	\bigcirc	-	JIS 2401 P18
	Drain gasket	Cu	1		φ24.5×φ15.5×0.5t	
	Heater flange gasket	Cu	3		φ95×φ85×0.2t	
	Exhaust divergence pipe gasket	NBR	1	\bigcirc	-	JIS 2401 V40
	Inside cooling valve gasket	Si	2		φ25×φ17×4t	
	Inside cooling pipe flange gasket	NBR	1		φ70×φ80×5t	



Form: A003S1268-04

ULVAC Components / Certificate of Decontamination

This is a certificate of decontamination for repair and inspection request of ULVAC Components. All material must be certified as decontaminated and this certificate must be submitted to your closest local ULVAC service center or sales office prior to shipment.

Please consult with your closest local ULVAC service center or sales office if our components are used with toxic gases or contaminated with reactive products or substances produced by reaction.

Product model: Model: Serial No.: Application: Remarks:

Contaminant (Check an applicable box.)

 \Box I guarantee that above returned item(s) is not contaminated with harmful substances.

 \Box Above returned item(s) is contaminated with the following harmful substances.

	Name of contaminant (molecular formula)	Characteristics
1		
2		
3		
4		
5		

To: ULVAC, Inc Attn:

	Date:	/ /	(YYYY/MM/DD)
Your company			
Division			
Contact			
Phone			
Fax			
E-mail			

Please pack returned item(s) carefully before shipment. Any accident occurred during transportation to us caused by contaminant is under your responsibility. It is also to be understood that ULVAC may decline to repair returned item(s) depending on the type of contaminant and degree of contamination, and return it to you.

To be filled in by ULVAC Request for MSDS: Yes/No	Received by	
ULVAC job No.		



This mark is applied to the electronic information product sold in the People's Republic of China. The figure at the center of the mark is the validity date of environmental protection. This product does not influence the environment, the human body and the property during the period reckoning the manufacturing date as long as the caution for safe use regarding the products are observed. *The environmental protection validity date is not the product warranty period.

Table1. Making format for names and contents of hazardous substances or elements

Name of parts	Hazardous substances or elements					
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
Body	0	0	0	0	0	0
Panel	0	0	0	0	0	0
Base	0	0	0	0	0	0
Electrical Parts	0	0	0	0	0	0

O: indicating that content of the hazardous substance or element in all homogeneous materials of the part does not exceed the requirements for concentration limits specified by SJ/T11363-2006.

×: indicating that content of the hazardous substance or element in, at least one kind of, homogeneous materials of the part exceeds the requirements for concentration limits specified by SJ/T11363-2006. Producer may further explain the technical excuse to the items marked with "X" perspecific conditions here.

ULVAC 株式会社アルバック http://www.ulvac.co.jp/ サービス拠点一覧 http://www.ulvac.co.jp/support_info/service/ 販売拠点一覧 http://www.ulvac.co.jp/support_info/sales_office/ 株式会社アルバック 規格品事業部 〒253-8543 神奈川県茅ケ崎市萩園2500 TEL:0467-89-2261 アルバック販売株式会社 本社 (東京) 〒108-0075 ulvac . co . jp 東京都港区港南 2-3-1 3 TEL:03-5769-5511 アルバック販売株式会社 大阪支店 〒532-0003 大阪府大阪市淀川区宮原 3-3-3 1 TEL:06-6397-2286 ULVAC ,Inc. http://www.ulvac.co.jp/en/ Service Centers http://www.ulvac.co.jp/en/support/service-center// Sales Offices http://www.ulvac.co.jp/en/support/sales-offices/ ULVAC, Inc, Components Division 2500 Hagisono, Chigasaki, Kanagawa, 253-8543, Japan TEL: +81-467-89-2261 ulvac.co.jp/en