

Instruction Manual

for

Direct-Drive Oil Sealed Rotary Vacuum Pump

Model GLD-136A GLD-201A

Before using the product, be sure to read this manual.

Keep this manual in a place where it can be referred to at any time and look after it carefully.

The contents of this instruction manual are subject to change without prior notice due to improvements in performance and the functions of the product.

ULVAC KIKO,Inc.

0. Introduction

0.1 Before using the vacuum pump

Thank you for purchasing our vacuum pump (hereinafter called "pump"). When you have received the pump, check that the delivered pump is as per your order and that it has not been damaged in transportation, etc.



⚠ Warning ______

In order to use the pump for as long as possible, read this instruction manual thoroughly before performing installation, operation, inspection and maintenance, and sufficiently understand the cautions for safety, the specifications and operation methods of the pump.



No part of this instruction manual may be copied for use by a third party without our permission.

0.2 Safety symbols

In this instruction manual and on warning labels attached to the pump, the following symbols are used so that matters which must be strictly adhered to can be readily understood.

These symbols are divided as shown below.



∕!\ Danger _____

When mishandled, there is an imminent danger of the operator suffering a fatal accident or serious injury.



⚠ Warning _____

When mishandled, there is a possibility of the operator suffering a fatal accident or serious injury.



⚠ Caution _____

When mishandled, there is a possibility of the operator suffering an injury (light or medium injury) or of damage occurring to property.



When mishandled, there is a possibility of the pump being damaged or malfunctioning.

0.3 Cautions for safety



✓!\ Danger _____

When toxic or flammable gases are exhausted from the pump, they may leak not only from the pump outlet but also from the pump unit itself. Take proper measures suitable for the type of gas.



⚠ Danger ______

After the pump has been used for exhausting toxic gasses, not only the pump itself but also vacuum pump oil (hereinafter called "pump oil") get toxic. Keep this in mind when performing the maintenance.



Marning ______

Never allow people other than repair engineers to disassemble or repair the pump. Failure to do so may result in ignition or malfunction, leading to injury or electric shock.



✓!\ Warning _____

Before performing inspection or repair, always turn off the power switch. Failure to do so may result in electric shock or the unexpected start of the pump, leading to injury.



∕!\ Warning

Connect the earth wire correctly. It is recommended that a dedicated earth leakage breaker should be installed. If the earth wire is not connected, there is a possibility of electric shock occurring in the case of a malfunction or electrical leakage.



/ Warning

There is a risk of explosion. Never block the outlet or operate the pump with equipment mounted at the outlet side which blocks the passage of gas. Otherwise, the internal pump pressure increases causing the pump to explode, the oil level gauge to protrude or the motor to be overloaded. This pump is not resistant to pressure. The internal pump pressure is limited

to 0.03 MPa (gauge pressure).



/!\ Warning _______

Do not use the pump in an explosive atmosphere. Failure to do so will result in injury or fire.



⚠ Caution _____

Do not insert fingers or objects into the opening of the motor. Doing so may result in electric shock, injury, or fire.



!\ Caution

Never touch the rotating section of the motor, shaft or coupling while the pump is in operation. Failure to do so will result in injury.



Never place combustible materials around the motor or pump. There is a risk of fire.

Also, do not place objects which block ventilation around the motor. Abnormal heat generation may result in burns or fire.



Do not touch the motor while the pump is in operation or when the pump is still hot immediately after it stops. Touching it will result in burns.



⚠ Caution _____

Arrange wires correctly in accordance with the "Electrical Equipment Technical Standard" and "Wiring Regulations." Incorrect wiring may result in fire.



/!∖ Caution _____

If the pump ceases operation or malfunctions, turn off the power switch immediately to prevent accidents, and ask the company from which you purchased the pump or the manufacturer for inspection and repair.



✓!\ Note

Do not operate the pump without adding pump oil. If it is operated in an oil-less condition, the pump will be damaged.

0.4 Acceptance and storage of the pump

0.4.1 Acceptance of the pump

Although the pump is delivered with great care, check the following after unpacking.

- ① The delivered pump is in accordance with your request.
- 2 The specified accessories (enough pump oil to use the pump once; optional equipment) have been provided.
- ③ No parts have been damaged in transportation.
- 4 Neither screws nor nuts have become loose nor were lost in transportation.

If there are any problems, contact the company from which you purchased the pump or the sales department of the manufacturer.

0.4.2 Environmental conditions for storage, installation and operation

Since this pump is precisely engineered, ensure that the following conditions be satisfied during storage, installation and operation.

- ① Ambient temperature, relative humidity: 7°C ~ 40°C, 85% RH or less
- ② Height above sea level during storage and installation: 1,000 m or less
- 3 Other conditions for storage and operation
 - a) Free from corrosive and explosive gases
 - b) No condensation
 - c) Dust-free environment
 - d) Indoors
 - e) Do not place pumps on top of each other or place a pump on its side.
 - f) Not subject to direct sunlight
 - g) Far from heat sources
 - h) When you keep it for a long period of time, put pump oil into a pump and seal a suction port with a cap.
 - i) Don't keep it, where moisture is attracted.



⚠ Caution _____

Since the pump weighs as much as 20 kg, do not lift or transport it by yourself. Doing so may cause an injury. Perform such work by two people as shown in 3.1 "Installation."



Do not subject the pump to shocks or place the pump on its side. Doing so may damage the pump.



When you keep it, without using a pump for a long period of time, please put pump oil into a pump and seal a suction port. Oil is not put into a pump, but if it is kept where a suction port is opened wide, water absorption may expand vanes of a pump and a pump may stop rotating.



Note _

Please do not leave it, where moisture is sucked. If it is left with moisture sucked, since water absorption expansion of vanes and the corrosion of pump parts will be promoted, a pump may stop rotating.

0.5 Protective device

The pump is equipped with a three-phase 200-240 V (50/60 Hz) and 400/460 (50/60 Hz) motor. This pump is not provided with a protective device. Therefore when connecting the motor to the power source, be sure to connect an overload protector.

The installation of an overload protector is obligatory under the "Electric Equipment Technical Standard" (METI Ordinance No. 61, 1965).

This motor incorporates a temperature sensor (PTO: which opens at 150°C) and leader wires are arranged in the terminal box. Use these wires to take out the signal wire.

For the selection of an overload protector, refer to "3.4 Electric wiring."

The use of another protective device (such as an earth leakage breaker) in addition to the overload protector is recommended.



!\ Caution

- 1) Be sure to use different power cords for the motor and for taking out a temperature sensor signal.
- 2) Apply a voltage of 250 V or less to the wire for taking out the temperature sensor signal. Connect a fast-acting an fuse having a capacity of 250 V, 2.5 V between the relay circuit and temperature sensor.



Use the pump only at the rated voltage. Use at other than the rated voltage will interfere with correct operation of the overload protector, and result in the motor burning out, or fire.

Contents

0. Int	roduction		01
0.1 B	efore using the vacuum pump		01
0.2 S	afety symbols		02
0.3 C	autions for safety		03
0.4 A	cceptance and storage of the pump		05
0.4.	1 Acceptance of the pump		05
0.4.	2 Environmental conditions for storage, i	nstallation and operation $\ensuremath{\cdot\cdot}$	05
0.5 P	rotective device		06
	Safe Operation		
1.1 H	azards peculiar to the pump and safety mea	sures · · · · · · · · · · · · · · · · · · ·	1
1.1.	1 <u>A</u> Danger Leakage of hazardous gases	and substances	1
1.1.	2 \Lambda Warning Electric shock		1
1.1.	3 \Lambda Warning Explosion		2
1.1.	4 🛕 Caution High temperature		
1.2 M	laterial Safety Data Sheet (MSDS)		2
2. Out	line of the Pump		3
2.1 S	pecification		3
2.2 D	imensional drawing		4
3. Ins	tallation		6
	nstallation		6
	ubrication		
	acuum piping		8
	lectric wiring		9
	luctuation in the power voltage and freque	ency·····	10
4. Ope	ration		12
•	autions for operation		12
	tart of operation		13
	topping the operation		13
	peration in cold climates		
	ackflow preventer		
	as ballast valve		
	nstallation of the oil mist trap (Option)		16
	estriction on operation when the oil mist		16

5. Pump Performance	
5.1 Ultimate pressure	17
5.2 Pumping speed	17
5.3 Power requirement	17
6. Maintenance, Installation and Repair	19
6.1 Maintenance	19
6.2 Periodic inspection	19
6.3 Replacement of the pump oil	21
6.4 Replacement of the coupling spider	23
6.5 Trouble check list	24
7. Disposal	26
8. Warranty	26
9. Main Components Replaced during Overhaul	27
9.1 Main replaceable components list	27
9.2 Disassembly drawing	28
Material Safety Data Sheet (MSDS)	
Pump Usage Check Sheet (Use this sheet for requ	uesting an overhaul.)
Contact address of sales and service department	ts

Figures and Tables

Fig. 1	Dimensional drawing of GLD-136A oil sealed r	otary vacuum pump ·····	4
Fig. 2	Dimensional drawing of GLD-201A oil sealed r	otary vacuum pump ·····	5
Fig. 3	Transportation method of the oil sealed rota	ry vacuum pump	6
Fig. 4	Lubrication of the oil sealed rotary vacuum	pump · · · · · · · · · · · · · · · · · · ·	7
Fig. 5	Basic piping diagram to the vacuum chamber		8
Fig. 6	Terminal box internal wiring diagram		9
Fig. 7	Electric wiring diagram		9
Fig. 8	Change region of the voltage and frequency		10
Fig. 9	Pumping speed curve		18
Fig. 10	Replacement of the coupling spider	2	23
Fig. 11	Disassembly drawing of GLD-136A/201A oil sea	led rotary vacuum pump ··· 2	28
			_
	Electric capacity of the motor overload prot		
Table 3	Specification of the temperature sensor (PTO $$	1) 1	10
Table 4	Periodic inspection table	2	20
Table 5	Trouble check list	2	24
Table 6	Main replaceable parts list	2	27
Attached	table: Material Safety Data Sheet for Vacuu	m Pump Oil SMR-100	

1. For Safe Operation

1.1 Hazards peculiar to the pump and safety measures

Before operating or inspecting the pump, read this section carefully to fully understand potential hazards and prevention methods.

1.1.1 **A** Danger Leakage of hazardous gases and substances

Cause		Prevention method and measures
Leakage of toxic and flammable gases	\Rightarrow	Dilute hazardous gases to a safe concentration before they enter the pump inlet.
Injury due to touching toxic pump oil in the pump or harmful substances attached to the pump during inspection or disposal	\Rightarrow	 Wear protective equipment suitable for toxic substances when carrying out inspection. Before overhauling and disposing of the pump, ask a waste disposal specialist to make it safe. Ask an authorized waste disposal specialist to carry out disposal.

1.1.2 **A** Warning Electric shock

Cause	Prevention method and measures
The energized part of the	⇒ ① When connecting electric wires, always turn off the
motor was touched.	power and be sure to connect the earth wire.
	② When inspecting and transferring the pump, always turn
	off the power.
	3 Never insert hands, fingers, or thin objects through the
	motor opening.

1.1.3 Marning Explosion

-	٦.			
(୍ଦର	11	ıs	6

Prevention method and measures

The pressure in the pump increased causing the pump to explode.

⇒ The maximum internal pump pressure is 0.03 MPa (gauge pressure).

Measure the pressure at the outlet side and, if the pressure is 0.03 MPa or more (gauge pressure), remove objects which block the passage of gas from the outlet side. When an oil mist trap is adopted, replace or clean it so that it will not block the passage of gas.

1.1.4 ^ Caution High temperature

Cause

Prevention method and measures

High temperatures caused burns.

 \Rightarrow ① The pump reaches a high temperature during operation. Pump main unit during non-load operation $\rightarrow 32 \sim 65^{\circ}$ C Motor during non-load operation $\rightarrow 22 \sim 55^{\circ}$ C Pump main unit during high-load operation \rightarrow 52 ~ 85°C Motor during high-load operation \rightarrow 32 ~ 65°C (High-load operation: Operation at a pressure of 1kPa ~ 13kPa)

② Since the surface temperature is hot, touching the surface accidentally may result in burns. Never touch the pump during operation. When carrying out inspection, wait until the pump has cooled down completely after it stops.

1.2 Material safety data sheet (MSDS)

The attached "Material Safety Data Sheet (MSDS)" shows chemical materials which may be used or touched when operating the pump. Read the MSDS carefully in order to understand the harmful properties of these materials.

Contact us before using chemical materials (vacuum pump oil) other than those mentioned in this instruction manual.



Caution

MSDS is submitted as reference information to ensure safe handling of hazardous and harmful materials. Personnel handling the pump oil should be aware that proper measures must be taken depending on the conditions of use as their responsibility. Keep in mind that the MSDS itself is not a warranty for safety.

2. Outline of the Pump

2.1 Specification

This oil sealed rotary vacuum pump is a rotary vane pump (hereinafter called Gaede type pump) in which the pump is directly driven by the motor. Since the pump is small, light, and quite simply constructed, it is easily maintained and repaired.

Table 1 Specification

Model		Unit	GLD-	·136A	GLD-	·201A
		Oiiit	50 Hz	60 Hz	50 Hz	60 Hz
Ty	уре			Rotary van	e (2 vanes)	
Pumpir	ng speed	L/min	136	162	200	240
Ultimate	G.V. close	Do	6.7×10 ⁻²		10-2	
pressure	G.V. open	Pa		6	.7	
	Type		3-phase, 400	OW, 4 poles,	3-phase, 550	0W, 4 poles,
Motor	Type		fully-closed		fully-closed external fan	
Wiotoi	Voltage	V	200-240/	200-240/	200-240/	200-240/
	voltage	V	380-415	380-460	380-415	380-460
			2.60 (200 V)	2.30 (200 V)	3.40 (200 V)	3.00 (200 V)
			2.60 (220 V)	2.20 (220 V)	3.60 (220 V)	3.20 (220 V)
			2.80 (230 V)	2.20 (230 V)	4.00 (230 V)	3.20 (230 V)
Full-loa	d current	Α	3.00 (240 V)	2.30 (240 V)	4.20 (240 V)	3.20 (240 V)
1 411-104	d current	Λ	1.50 (380 V)	1.30 (380 V)	2.10 (380 V)	1.80 (380 V)
			1.60 (400 V)	1.30 (400 V)	2.30 (400 V)	1.80 (400 V)
			1.70 (415 V)	1.35 (440 V)	2.40 (415 V)	1.90 (440 V)
				1.40 (460 V)		2.10 (460 V)
			1440 (200 V)	1730 (200 V)	1440 (200 V)	1730 (200 V)
			1450 (220 V)	1740 (220 V)	1450 (220 V)	1740 (220 V)
			1460 (230 V)	1750 (230 V)	1460 (230 V)	1750 (230 V)
ъ	1		1460 (240 V)	1760 (240 V)	1460 (240 V)	1750 (240 V)
Revo	lution	r/min	1450 (380 V)	1740 (380 V)	1450 (380 V)	1740 (380 V)
			1460 (400 V)	1750 (400 V)	1460 (400 V)	1750 (400 V)
			1460 (415 V)	1760 (440 V)	1460 (415 V)	1760 (440 V)
			- 100 (110 1)	1760 (460 V)		1760 (460 V)
0.1	Standard oil			SMR	R-100	, ,
Oil	Oil amount	mL	1,000		1,100	
We	ight	kg	2	4	2	8
Ambient t	emperature	$^{\circ}$	7 ~ 40	0 (If the oil ter	nperature is 7°C	or less,
	range		O)		may be difficult	
Noise level		dB (A)			r less	
Inlet pipe	e diameter	mm	KF-25 (NW-25)			
	. size	mm	$170(W) \times 488(L) \times 240(H)$ $170(W) \times 516(L) \times 240(H)$		$5(L) \times 240(H)$	

- Note 1: The ultimate pressure values in the above table are indicated by a McLeod gauge. A Pirani gauge shows values approximately one magnitude higher than those shown by the McLeod gauge.
- Note 2: Vacuum pump oils have different steam pressures, viscosities, and oil properties depending on the type. Always use the oil sealed rotary vacuum pump oil specified by us. The use of other oils will affect the pump's performance.
 - Specified oil: SMR-100
- Note 3: "G.V." is an abbreviation for gas ballast valve.
- Note 4: The motor voltage is switched between 200V and 400V by changing the wire connection in the terminal box.

2.2 Dimensional drawing

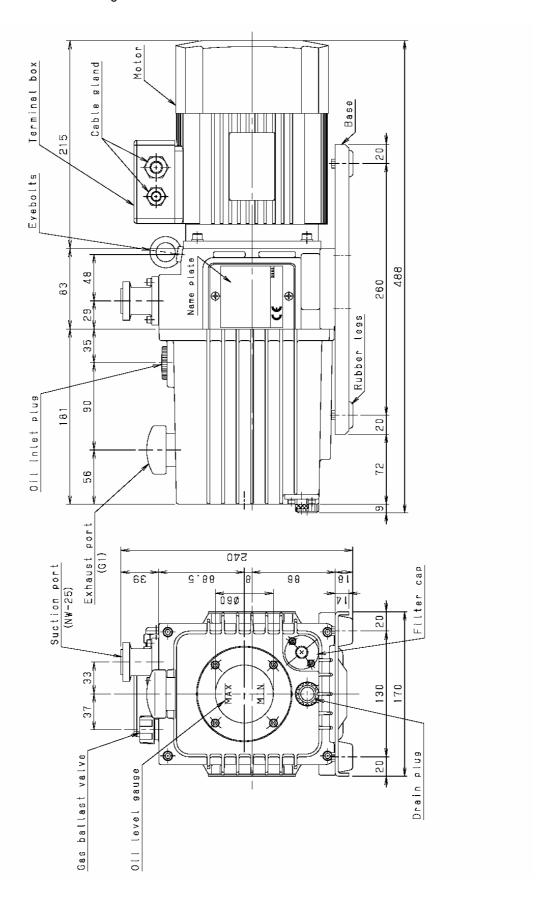


Fig. 1 Dimensional drawing of GLD-136A oil sealed rotary vacuum pump

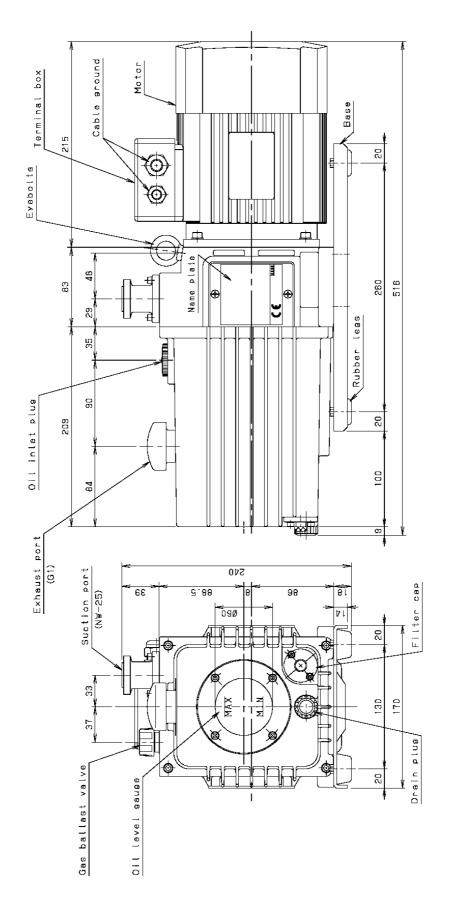


Fig. 2 Dimensional drawing of GLD-201A oil sealed rotary vacuum pump

3. Installation

3.1 Installation

The pump should be installed on a level surface in a location with minimal dust, dirt and humidity and be arranged with consideration given to ease of installation, removal, inspection and cleaning.

Particular attention should be paid to the ambient temperature when building the pump into equipment. Use a rubber vibration isolator to separate the pump from other equipment and to isolate the pump from the vibrations of other equipment. See "0.4.2 Environmental conditions for installation, storage and operation" for details.



Fig. 3 Transportation method of the oil sealed rotary vacuum pump



Caution

Since the pump weighs as much as 20 kg, do not lift or transport it by yourself. Doing so may cause an injury. Always carry out work with two people as shown in Fig. 3.



If the pump is operated whilst it is tilted, placed on its side or upside-down, the pump will be damaged. Install the pump level with the inlet facing up as shown in Fig. 1.2.

3.2 Lubrication

Remove the lubrication plug from the lubrication port, and add the pump oil which has been delivered together with the pump or the pump oil specified by us (SMR-100) up to the range marked with the red line on the oil level gauge. When making the first lubrication, add oil near to the upper oil level limit shown on the oil level gauge. After lubrication, mount the lubrication plug to the pump (see Fig. 4).

Always keep the oil level of the pump within the oil limit range shown on the oil level gauge during operation. If the amount of oil is incorrect, the performance of the pump will deteriorate resulting in the malfunctioning of the pump. When the amount of oil has reduced and the oil level has reached an area below the lower red line which shows the lower limit on the oil level gauge such that the level cannot be seen, the ultimate pressure increases and exhausting sound may not cease.

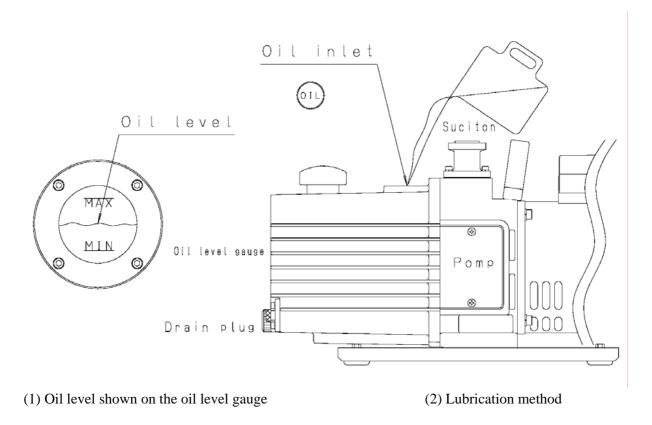


Fig. 4 Lubrication of the oil sealed rotary vacuum pump



⚠ Caution _____

Wear protective equipment such as rubber gloves and safety goggles.

Be sure to read the attached "Material Safety Data Sheet" before adding oil. If the oil accidentally comes into contact with your hands or enters your eyes, take proper measures in accordance with the section "First-aid treatment" shown in "Material Safety Data Sheet."



Use only oils specified by us. If other oils are used, the pump performance will deteriorate or its life will be shortened.

3.3 Vacuum piping

(1) Before connecting the pipe to the pump, clean the inner walls of the vacuum chamber, piping and vacuum valve to completely eliminate moisture, fine particles, dust, dirt and rust.



If fine particles, dust or dirt, etc are evacuated, the pump may malfunction. If moisture is evacuated, not only does the ultimate pressure increase but also the inside of the pump becomes rusty causing the pump to malfunction.

(2) Mount vacuum valve (A) and leak valve (B) between the vacuum chamber and pump as shown in Fig. 5.

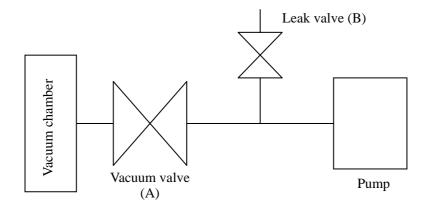


Fig. 5 Basic piping diagram to the vacuum chamber

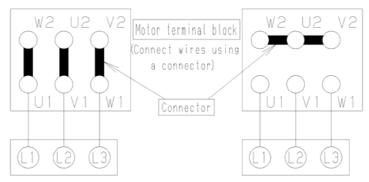
(3) Use a KF-25 (NW-25) flange for the connection to the inlet pipe.



The wire mesh in the inlet pipe has been adopted to prevent foreign matter from entering the pump. Do not remove the wire mesh.

3.4 Electric wiring

- (1) The pump rotates in the clockwise direction as seen from the front of the pump (level gauge side).
- (2) When wiring, open the terminal box of the motor and connect the wires as shown in Figs. 6 and 7.
- (3) Use a power cord having a diameter of ϕ 1.5mm.
- (4) If wires are connected as shown in Figs. 6 and 7, the pump rotates clockwise as seen from the front of the pump (level gauge side). If the pump rotates in the opposite direction, turn off the power immediately, exchange the wires connected to the U-phase and V-phase, rotate the pump again and check that the pump rotates in the correct direction.
- (5) In order to prevent the motor from burning due to an overcurrent, install an overload protector (Table 2) for the electric wiring.
- (6) The screw of the earth terminal at the motor side is provided with an "earth mark" in the terminal box.
- (7) Use power cords of the same diameter for the motor and earth.
- (8) This motor incorporates a temperature sensor (PTO: which opens at 150°C) and leader wires are arranged in the terminal box. Use these wires to take out the signal wire. Connect the temperature sensor (PTO) as shown in Fig. 7. The specifications of the temperature sensor are shown in Table 3.
- (9) The larger cable gland is for wires having a diameter of ϕ 8 to ϕ 13, and the smaller one is for wires having a diameter of ϕ 5 to ϕ 8. Use a cable gland that is suitable for the size of the power cord to be used.



3-phase, 200V power source 3-phase, 400V power source Fig. 6 Terminal box internal wiring diagram

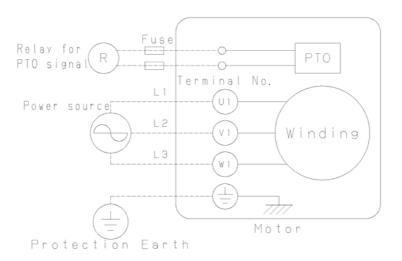


Fig. 7 Electric wiring diagram

Table 2 Electric capacity of the motor overload protector

Motor output (W)	Set value for thermal relay of electromagnetic switch (A)	Motor breaker (A)
400	Rated current of the motor (Marked on the motor nameplate.)	Rated current of the motor (Marked on the motor nameplate.)
550	Rated current of the motor (Marked on the motor nameplate.)	Rated current of the motor (Marked on the motor nameplate.)

Table 3 Specification of the temperature sensor (PTO)

Type	Operating Principle	Operating Curve	Cut-off(A)
Normally closed thermostat PTO	Bimetallic strip, indirectly heated, with normally closed (N/C) contact		2.5A at 250V with cos 0.4

N.R.T.: Nominal running temperature of the PTO

3.5 Fluctuations in the power voltage and frequency

Standard: Rotation electricity machine general rules

JIS C 4034-1:1999, JEC-2137-2000

To the voltage change and frequency change in Domain A, in main rated values, it operates continuously, and can be used practically convenient, and to the voltage change and frequency change in Domain B, it shall operate with main rated values and shall be used practically convenient.

However, operation with "it is convenient and safe is maintained on "practical use, it means not resulting in the grade which shortens a life remarkably, and the characteristic, a temperature rise, etc. do not apply correspondingly in the state of rating. Moreover, main rating shows rated torque $(N \cdot m)$.

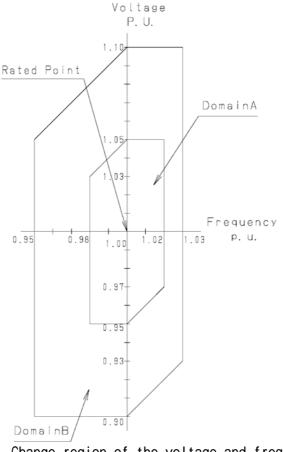


Fig. 8 Change region of the voltage and frequency



⚠ Warning ______

Before connecting wires, turn off the power switch. Never perform wiring with the power supplied as an electric shock will occur. Connect the earth wire correctly. Failure to do so may result in electric shock if a failure or earth leakage occurs. Installation of a dedicated earth leakage breaker is also recommended.



Caution _____

Perform electric wiring correctly in accordance with the "Electric Equipment Technical Standard" and "Internal Wiring Regulation." Incorrect wiring will result in fire.



∕!\ Caution

Install an overload protector suitable for the capacity of the motor. If an overload protector is not installed, or if an overload protector that is unsuitable for the motor capacity is installed, the motor will be damaged leading to fire.



Caution

- 1) Be sure to use different power cords for the motor and for taking out a temperature sensor signal.
- 2) Apply a voltage of 250 V or less to the wire for taking out the temperature sensor signal. Connect a fast-acting an fuse having a capacity of 250 V, 2.5 V between the relay circuit and temperature sensor.

4. Operation

4.1 Cautions for operation



/!\ Warning -

There is a risk of explosion. Never block the outlet or operate the pump with equipment mounted at the outlet side which blocks the passage of gas. Otherwise, the pump internal pressure increases causing the pump to explode, the oil level gauge to protrude or the motor to be overloaded.

This pump is not resistant to pressure. The internal pump pressure is limited to 0.03 MPa (gauge pressure).



In the process of manufacturing semiconductors, pump oil may deteriorate over a very short period of time. It is recommended that the pump oil should be replaced within 10 days after starting use of the pump, and the replacement frequency of the pump oil should be decided based on the contamination level of the pump oil.

If the pump evacuate a lot of moisture, replace the oil frequently. If the pump is used with gas which contains a lot of moisture, water absorption expands the vanes of the pump, the lubricity of the pump oil deteriorates and corrosion of the pump s components advance, causing the pump to malfunction.

If chemicals including acid has been evacuated, the pump may become rusty while it is not being operated (i.e. overnight), making operation impossible. If such chemicals are evacuated, replace the pump oil immediately.

Solvents which deteriorate the lubricity of the pump oil will cause scoring, etc. If such a solvent is evacuated, replace the oil.

If operation is performed continuously at a high evacuation pressure of 10 kPa or more, a large amount of pump oil is consumed, causing a shortage of oil and insufficient lubrication of the pump. If such a condition continues, components will rapidly wear and become scored. Avoid continuous operation at a high evacuation pressure as much as possible and, without fail, add pump oil.

Do not block the flow of air to the motor fan as the temperature of the motor and pump will increase.

4.2 Start of operation

To start operation, close leak valve (B), open vacuum valve (A) to the inlet port, and turn on the power switch. Then the pump starts beings to exhaust (see Fig. 5).



Caution _

The motor and pump become hot (temperature increase under non-load operation: 25 , temperature increase under high-load operation: 45) during operation of the pump. There is a risk of burns. Never touch the motor or pump during operation.

If operation is performed at high pressure, oil mist is generated at the exhaust side. Install an oil mist trap or connect a duct to discharge the oil mist outside the room. Or, install a ventilator.



When the pump does not rotate correctly, take the following measures.

- a) Check the amount of oil, and adjust if necessary.
- b) In an environment where the ambient temperature is low, if the pump is left unused for a long time (three days or longer), the pump oil enters the cylinder. (This phenomena cannot be avoided even if the pump pressure is released to atmospheric pressure after last using the pump.) If the pump is restarted in this condition, an overload is applied to the pump and the overload protector may actuate. In such a case, turn the pump on and off several times in short intervals.



The oil temperature in the pump increases to 32 ~ 85 if operation continues for several hours. If the oil temperature exceeds this range, there is a possibility of the pump malfunctioning. Check the pump or contact us.

4.3 Stopping the operation

To stop operation, close vacuum valve (A), open leak valve (B) quickly, and turn the power switch off (see Fig. 5).

Please close a leak valve (B) and seal a suction side as much as possible, after making a suction side into atmospheric pressure.



Caution

The motor and pump become hot (temperature increase under non-load operation: 25 , temperature increase under high-load operation: 45) during operation. There is a risk of burns. Never touch the motor or pump until they have cooled down completely after the pump is stopped.

4.4 Operation in cold climates

When using the pump in winter, in cold climates, or outdoors, it is sometimes difficult to start the pump. This is an overload phenomenon resulting from the increase in the viscosity of the pump oil. To start the pump in such conditions, warm up the pump oil, or turn the pump on and off several times in short intervals.

When the pump stops after rotating for a few seconds, open leak valve (B) and continuous operation may become possible. After the pump has warmed up, close leak valve (B) and return to ordinary operation.

4.5 Backflow preventer

A backflow preventer is incorporated into the pump to prevent the oil from flowing back while the pump is stopped.

The backflow preventer actuates in the case of an emergency including power failure. So, after the pump is stopped due to a power failure, follow the procedures mentioned in "4.3 Stopping the operation" to stop the operation.



To stop the pump, always close vacuum valve (A) and then open leak valve (B). If this procedure is neglected, the pump oil fills the cylinder, making restart difficult or causing damage to the pump. The pump oil also may flow back to the vacuum chamber side.

If vacuum valve (A) is not closed, air may leak into the device side through the pump increasing the pressure.

4.6 Gas ballast valve

The pump is equipped with a gas ballast valve in order to evacuate vapor and condensable gases such as solvent vapor.

Evacuated condensable gas that liquefies in the compression and pressurization processes of the pump is mixed with the pump oil and starts circulating through the pump together with the oil. In such a case, the same effect as when oil of a high steam pressure is used is produced, and the ultimate pressure of the pump increases. Moreover, the lubricity of oil deteriorates and the service life of the shaft seal is shortened.

If air or dry nitrogen enters through the gas ballast valve just before the compression and pressurization processes of the pump, condensable gas will not liquefy and will be exhausted together with air through the outlet valve. When the gas ballast valve is used, the "gas ballast effect" increases as the pump temperature becomes high. So, before evacuating condensable gas, perform operation for approximately 20 minutes with the gas ballast open, and after the pump temperature reaches approximately $50 \sim 65^{\circ}$ C, open vacuum valve (A) and continue operation. If the temperature is low, a satisfactory "gas ballast effect" is not achieved.

If the gas ballast valve is left open when condensable gas is not evacuated, not only does the pump oil scatter and power is lost, but also the ultimate pressure increases. Furthermore, since the gas ballast valve's capacity to process condensable gas is limited, condensable gas remains in the pump oil when a lot of condensable gas is exhausted or when condensable gas (air and gas containing small amounts of moisture and other vapor which make the oil dirty) is exhausted without opening the gas ballast valve. In such a case, perform non-load operation with vacuum valve (A) closed and the gas ballast valve open. Then the oil temperature increases and the pump oil is purified due to the effect of the gas ballast valve. Continue non-load operation with the gas ballast valve closed until the specified pressure is reached. If the pump oil is not cleaned even a long time, replace the pump oil.



Caution ______

The vacuum pump becomes hot (temperature increase under non-load operation: , temperature increase under high-load operation: 45 operation. Do not touch any section other than the valve while the gas ballast valve is in operation.

When starting operation, be sure to close the gas ballast valve.



If the gas ballast valve is left open without condensable gas being exhausted, the pump oil scatters, power is lost, or the ultimate pressure increases. Close the gas ballast valve when condensable gas is not exhausted.

4.7 Installation of the oil mist trap (Option)

An oil mist trap can be installed in order to remove oil mist from the pump. As such an oil mist trap, models OMT-200A and OMI-200 are available. Remove the standard outlet pipe from the outlet port of the pump and install an oil mist trap instead. The oil mist trap not only prevents oil mist generation but also reduces exhaust noise by half.

For details, refer to the instruction manual for the oil mist trap.

4.8 Restriction on operation when the oil mist trap is installed

When using the oil mist trap, there are some restrictions on operation. When the filter is clogged,

The internal pump pressure is limited to 0.03 MPa (gauge pressure). When the pressure measured at the outlet side has reached 0.03 MPa (gauge pressure), replace the oil mist trap filter.



Marning ______

Be sure to observe the restrictions on operation when the oil mist trap is installed. There is a risk of explosion. When the filter is clogged, replace

5. Pump Performance

5.1 Ultimate pressure

The term "ultimate pressure" as employed in the catalogue and in this manual is defined as "the minimum pressure obtained by the pump without the introduction of gas from the pump inlet (i.e. the non-load condition)." For this pump, measurement is performed using the specified pump oil with only a Pirani vacuum gauge installed at the pump inlet port.

Note that the Pirani gauge shows values approximately five to ten times higher than those shown by the McLeod gauge. This is because condensable gas components (mainly moisture) included in the measured air are removed when the McLeod gauge is used.

Also, the actual ultimate pressure of the vacuum device becomes higher than that noted in the catalogue for the following reasons.

- 1 The vacuum gauge is installed at a distance from the pump, and the steam and a variety of gases are generated by water droplets and rust on the inside walls of the pump and piping.
- ② Gasifying of volatile components which have dissolved in the pump oil. (Deterioration of pump oil)
- 3 Existence of a gas supply source including vacuum leakage in the vacuum path.

5.2 Pumping speed

The pumping speed of the pump depends on the type and pressure of the gas to be evacuated. The pumping speed usually reaches the maximum at a high pressure range, and it gradually decreases as the pressure reduces.

The nominal pumping speed of this pump is the maximum pumping speed when dry air is evacuated. Fig. 9 shows the relationship between the evacuation pressure and pumping speed.

5.3 Power requirement

The power required to operate the pump is the total of the power required to overcome the rotational resistance of the pump (mechanical work) and the power required to compress the air (compression work), and reaches a maximum at an inlet evacuation pressure of around 2.7×10^4 to 4×10^4 Pa. If the inlet evacuation pressure has reduced to 13.3 Pa or less, the compression work is considerably reduced and more power is consumed in mechanical work.

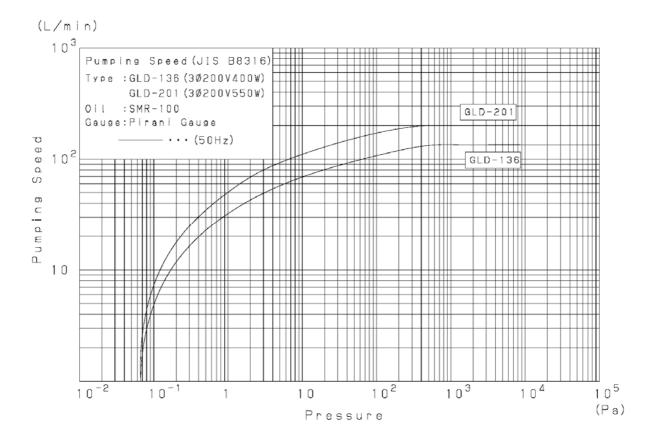


Fig. 9 Pumping speed curve

6. Maintenance, Inspection and Repair

6.1 Maintenance

Check the following during operation at least once every three days.

- (1) Amount of pump oil (To be within the range shown with red lines on the oil level gauge)
- (2) Discoloration of the pump oil
- (3) Abnormal sound
- (4) Problem with the motor current value
- (5) Oil leak from the oil seal

If there is any problem, take proper measures in accordance with "6.5 Trouble check list."

6.2 Periodic inspection

The items to be checked should be changed as necessary depending on the environment where the pump is used. However, always check the following in order to prevent a malfunction and to lengthen the service life of the pump.



Caution

Turn off the power before starting inspection and do not turn it on while inspection is in progress. Doing so will result in injury.

The pump is very hot immediately after it is stopped. Wait for a while until the pump has cooled down completely and then start inspection. There is a risk of burns.

1) Periodic replacement of the pump oil

The pump oil deteriorates with operation. Check the viscosity and level of contamination of the pump oil with the oil level gauge, and replace the pump oil in good time. If the pump oil is replaced periodically, the deterioration of the pump oil is minimized and the service life of the pump is lengthened.

If operation is continued with a lot of moisture mixed with the pump oil, the ultimate pressure will not reach the standard value, the movement at the section where the mechanical friction is generated becomes slow, and the pump finally becomes damaged. Replace the pump oil in accordance with "6.3 Replacement of the pump oil."

Table 4 Periodic inspection table

Frequency	Item	Details	Measures
Once/3	Oil	Amount	Refill the oil.
days		Color (Reddish brown, dark blown, and cloudy white are not good.)	Replace the oil.
	Sound	Abnormal sound	Check nuts and bolts for
	Vibration	Abnormal vibration	looseness. If not clear, contact us.
	Current value	Difference from the rated value	Check the cause of an overload. If not clear, contact us.
Once/week	Surface temperature	Surface temperature (The temperature higher than the room temperature by 50°C or more is abnormal.)	Check the cause of an overload. If not clear, contact us.
	Oil leakage	Oil leakage from the shaft seal section and plugs.	Replace seals, or contact us.
Once/3,000 operation	Evacuation wire mesh	Clogged with dust	Clean the wire mesh.
hours or once/6 months	Oil	Even if no problem is recognized, be sure to replace the oil.	Replace the oil.
Once/year	Spider	Damage or fracture	Replace the spider.

2) Inspection of the amount of pump oil

Refill the pump oil so that the pump oil level is kept within the range of the red lines showing the upper and lower limits on the oil level gauge during operation.

3) Inspection of oil leakage

When oil leaks from the shaft seal section or drain plug seal section, repair is required. Our specified O-rings and seals are always available from the service departments shown at the back of this manual. When necessary, contact them.

4) Inspection of evacuation wire mesh

If the wire mesh is clogged with dust included in the evacuated gas, the pump's efficiency may deteriorate.

5) Inspection of abnormal sounds and vibration

Check the nuts and bolts for looseness.

6) Inspection of the coupling spider

Check the spider of the coupling which connects the main pump unit and motor of the pump for damage. If cracks or fractures are found on the spider, replace it in accordance with "6.4 Replacement of the coupling spider."

7) Inspection of the oil mist trap

When using the oil mist trap in replacement of the standard outlet pipe, pay attention to the clogging of the filter in the oil mist trap. If the clogging advances, evacuated gas cannot be exhausted any longer, which causes the oil gauge to protrude and oil leakage from the shaft seal section or drain plug seal section. The maximum internal pump pressure is 0.03 MPa (gauge pressure).

When the pump is operated continuously for a long time or when the pump is extremely contaminated with evacuated gas, overhaul is required. Contact the nearest sales or service department among those listed at the back of this manual.



When requesting the manufacturer s service department to overhaul the pump, always write the type of the vacuumed gas on the "Pump Usage Check Sheet" attached at the back of this manual and submit it. Note that if toxic gases are exhausted, both the pump itself and pump oil will become contaminated. Please be sufficiently aware that use with some gases will preclude overhaul.

6.3 Replacement of the pump oil

The pressure of the vacuum device may increase due to the deterioration of the pump oil. In such a case, close the inlet port of the pump and check that the specified ultimate pressure has been reached. If not, replace the pump oil. If substances having a high vapor pressure (such as moisture or solvents) are mixed with the pump oil, or if sludge is accumulated at the bottom of the pump, the ultimate pressure cannot be reached with only one replacement and the pump oil must be replaced several times. The deterioration of the pump oil is caused not only by the contamination due to evacuated gas but also by the changes in the properties of the pump oil itself (depending on the operation time). Periodic replacement in accordance with Table 4 showing an oil replacement guide is recommended.



/! Danger _____

Keep in mind that if the pump is used for exhausting toxic gas, both the main pump unit and pump oil will become contaminated.



Caution

Wear protective equipment such as rubber gloves and safety goggles.

Be sure to read the attached "Material Data Sheet" before adding oil. If the oil accidentally comes into contact with your hands or enters your eyes, take proper measures in accordance with the section "First-aid treatment" shown in "Material Safety Data Sheet."



∕! Note _

Use only oils specified by us. If other oils are used, the pump performance will deteriorate or its life will shorten.

- < Pump oil replacement procedure >
- (1) Release the pump inlet pipe to the atmosphere and operate the pump for five seconds. The oil remaining in the pump is discharged efficiently.
- (2) Remove the outlet pipe and drain plug to discharge the pump oil.
- (3) Mount the drain plug, and add the required amount of the new specified pump oil through the lubrication port (see Fig. 4).
- (4) If the pump oil is contaminated extremely, add new pump oil and perform operation for a while (several minutes) to clean the pump. Repeat this a few times.
- (5) After replacing with the new pump oil, operate the pump and when the pump has become warm, check the ultimate pressure.
- (6) If the pump oil is so dirty that oil sludge accumulates at the bottom of the pump, the specified ultimate pressure even after the pump oil is replaced. In such a case, overhaul the pump.

6.4 Replacement of the coupling spider

A rubber spider is used at the section connecting the pump main unit and the motor. It is recommended that this spider be periodically inspected once a year or so. If the corner is chipped or cracked, replace it. If the pump is started and stopped hundreds of times a day, increase the inspection frequency.

To take out the spider, remove the four bolts which fix the motor to the pump main unit, and remove the motor. Then the coupling can be removed and the spider taken out. After inspecting the spider, mount the spider to either of the two coupling, and adjust the position so that both claws of the couplings are engaged with each other as shown in Fig. 10.

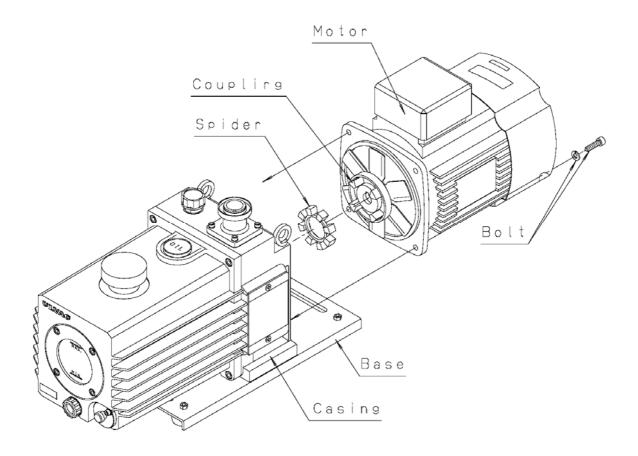


Fig. 10 Replacement of the coupling spider

Connect the concave section (female) of the pump unit with the convex section (male) of the motor, push the motor into the pump so that both connecting surfaces come completely into contact with each other, and fix the motor with bolts.

6.5 Trouble check list

Table 5 Trouble check list

	- Table 3 110abi		
Problem	Cause	Measures	Reference
The pump does not rotate.	①The pump is not connected to the power supply.	①Connect the pump to the power supply.	3.4
	②The power switch is not turned on.	②Turn on the power switch.	4.2
	③ Problem with power supply voltage	③ Set the power supply voltage to within $\pm 10\%$ of the rated voltage.	3.5
	① The overload protector has actuated.	④ Press the reset button.	
	⑤The motor malfunctions.	⑤ Replace the motor.	
	⑥Low ambient temperature has increased the oil viscosity.	⑥ Increase the ambient temperature to 7°C or more.	4.4
	The entrance of foreign matter into the pump caused the rotor to burn out.	Overhaul (replace the cylinder and rotor).	6.2
	Moisture or solvents were sucked in, forming rust inside the pump.	® Overhaul (replace the cylinder and rotor).	6.2
		Overhaul (clean the pump inside and remove reaction products).	
	Water absorption expands the vanes.	(10)Overhaul (replace the vanes)	
	① Components inside the pump have burnt out.	①Overhaul (replace the damaged components).	
The pump's rotation is	① Problem with power supply voltage	① Set the power supply voltage to within $\pm 10\%$ of the rated voltage.	3.5
unstable.	②Defective wiring to the pump	②Perform wiring to the pump again.	3.4
	③Low ambient temperature has increased the oil viscosity.	③Increase the ambient temperature to 7°C or more.	4.4
	④ Foreign matter has entered the pump.	① Disassemble and clean the pump to eliminate foreign matter.	
The pressure does not	① The pump is too small for the volume of the vacuum chamber.	① Select another pump.	5.2
decrease.	②The pressure measurement method is not correct.	② Measure the pressure correctly.	5.1
	③The vacuum gauge is not suitable.	3 Measure with a calibrated vacuum gauge suitable for the pressure range.	
	① The pipe connected to the inlet port is small, or the piping distance is long.	① Use pipes having a diameter larger than the inlet port diameter, or reduce the distance from the vacuum chamber.	5.1
	⑤The wire mesh at the inlet port is clogged.	⑤Remove the piping from the upper section of the inlet port, and clean the wire mesh.	6.2

Problem	Cause	Measures	Reference
The pressure does not	⑥The specified amount of oil has not been added.	⑥ Add the specified amount of oil.	3.2
decrease.	The oil has deteriorated.	⑦Replace the oil.	6.3
	Our specified oil is not being used.	Overhaul the pump and replace with oil specified by us	6.3
	① Oil does not circulate, or the oil hole of the cover is clogged.	① Overhaul and clean the oil hole.	6.5
Abnormal sound is	① Problem with power supply voltage	① Set the power supply voltage to within $\pm 10\%$ of the rated voltage.	3.5
generated.	②The motor malfunctions.	②Replace the motor.	
	③ Foreign matter has entered the pump.	③Eliminate the foreign matter and overhaul the pump.	
	(4) The specified amount of oil has not been added.	(4) Add the specified amount of oil.	3.2
	⑤The coupling spider malfunctions.	⑤ Replace the coupling spider.	6.4
	⑥ Oil does not circulate, or the oil hole of the cover is clogged.	⑥ Overhaul and clean the oil hole.	6.5
	7 Components inside the pump have burnt out.	Overhaul (replace the damaged components).	
Pump surfaces are extremely hot (50 °C or more higher than the room temperature)	①Continuous operation at high evacuation pressure	① If continuous operation is performed at a high evacuation pressure, the pump surface temperature reaches 80°C. However, this is not a serious problem.	
	②The specified amount of oil has not been added. (If the oil amount is not sufficient, the cooling effect of the pump will be reduced.)	②Add the specified amount of oil.	3.2
	③The temperature of the evacuated gas is high.	③ Mount cooling equipment such as a gas cooler at the inlet side.	
	④ Oil does not circulate, or the oil hole of the cover is clogged.	④ Overhaul and clean the oil hole.	6.5
A lot of oil splashes out	①The pump is been filled in excess of the specified amount.	① Discharge the oil until it reduces to the specified amount.	3.2
from the outlet port.	②Continuous operation is performed at a high evacuation pressure.	②Install an oil mist trap at the outlet side.	4.7
The oil leaks outside the pump.	① Deterioration of the O-ring and the oil seal of the case and cover	①Check and replace the O-ring and oil seal.	6.2

7. Disposal

Follow state law and local government regulations for disposal of the pump.



Caution _

When a harmful toxic gas has been exhausted, ask a specialist for waste disposal. Not only the pump itself but also the pump oil become toxic.

For the disposal of pump oil, follow the instructions given under "Cautions for disposal" in "Material Safety Data Sheet."

8. Warranty

- (1) The warranty for this pump is valid for a period of one year after shipment from the factory.
- (2) Malfunctions which occur during the period of the warranty will be repaired free of charge provided that the pump is used under the correct service conditions shown below:
 - a) Ambient temperature and humidity: $7 \sim 40^{\circ}\text{C}$, 85% RH or less
 - b) Type and temperature of the exhausted gas: Dry air or dry nitrogen, $7 \sim 40^{\circ}\text{C}$
 - c) Operation in accordance with the instruction manual
- (3) Even during the warranty period, the following are not included within the scope of free of charge repairs.
 - a) Malfunctions due to acts of God such as natural disasters and fire.
 - b) Malfunctions due to the pump being used in specific atmospheric conditions including damage from salt water and pollution
 - c) Malfunctions due to the conditions of service not conforming to those described in the operation manual (specification, maintenance and inspection).
 - d) Malfunctions due to modification or repair by personnel other than those employed by the manufacturer or service companies
 - e) Replacement of consumables.
 - f) Malfunctions which occur under conditions of service which are judged to be unsuitable for this vacuum pump by the technical personnel of the manufacture

This warranty applies to the oil sealed rotary vacuum pump itself and does not cover losses due to malfunctions in the pump.

The scope of our warranty and responsibility for products are limited to the repair and replacement of components.

A guarantee is effective only in Japan.

9. Main Components Replaced during Overhaul

9.1 Main replaceable components list

Table 6 Main replaceable components list

Location		No.	Cord No.	Product name	Standard size	Material	Q'ty
Coupling All types		1	00099167	Spider (Tsukiboshi)	Mark II, for M63	NBR	Q ty
Oil seal	An types	2	00093010	Oil seal	(NOK) HTC17-40-9	NBR	1
housing	All types	3	00092050		(NOK) S-45	NBR	1
nousing		4	00092035	E	(NOK) S-10	NBR	1
		5	00092040	O-ring	(NOK) S-30	NBR	1
Casing	All types	6	00092040	O-ring	JIS B 2401 P-12	NBR	1
Cusing		7	00092241	O-ring	JIS B 2401 P-35	NBR	1
		8	00092521	O-ring	JIS B 2401 V-175	NBR	1
Inlet pipe	All types	9	12950061	Inlet filter	$\phi 2.2 \times t1.0$	SUS	1
		10	00092623		JIS B 8365 N-28	NBR	1
		11	00092023	Oil seal	(NOK) SC17-30-7	NBR	1
1st intermediate cover		12	00092040	O-ring	(NOK) S-30	NBR	1
	All types	13	00092068	O-ring	(NOK) S-70	NBR	1
		14	00092405	O-ring	JIS B 2401 G-55	NBR	1
	All types	15	13090061	Vane spring 136 5 pieces 201 7 pieces	φ 26×31	SUS	_
Rotor	136	16		1st vane	45×30×t6	B-452	2
	201	17		1st vane	73×30×t6	B-452	2
	All types	18		2nd vane	20×30×t6	B-452	2
Cylinder	All types	19	00092024	O-ring	(NOK) S-16	NBR	1
		20	00092068	O-ring	(NOK) S-70	NBR	2
		21	12140061	Outlet valve 136 2 pieces 201 4 pieces	ϕ 13× ϕ 9.5×9	FPM	
		22	11990061	Outlet valve spring 136 2 pieces 201 4 pieces	φ 10×20	SUS	_
2nd	All types	23	00093118	Oil seal	(NOK) SC17-30-7	NBR	1
intermediate cover		24	00092024	O-ring	(NOK) S-16	NBR	1
		25	00092068	O-ring	(NOK) S-70	NBR	1
Side cover	All types	26	00093116	Oil seal	(NOK) SC15-30-7	NBR	1
		27	00092018	O-ring	(NOK) S-12	NBR	1
		28	11740061	Check valve	$\phi 4 \times \phi 8 \times 5$	FPM	2
		29	11790066	Check valve spring	φ 5×9	SUS	2
Front cover	All types	30	12740062	Oil level gauge	ϕ 70×t7	Glass	1
		31	12740061	Level gauge gasket	ϕ 60× ϕ 70×t1	#6500	1
		32	00092217	O-ring	JIS B 2401 P-12	NBR	1
		33	00092028	O-ring	(NOK) S-20	NBR	1
		34	00092701	O-ring	(NOK) JAS03056	NBR	1

Note 1: Screws are all metric screws conforming to the ISO standard.

Note 2: For the relationship between components, see the assembly drawing.

9.2 Disassembly drawing

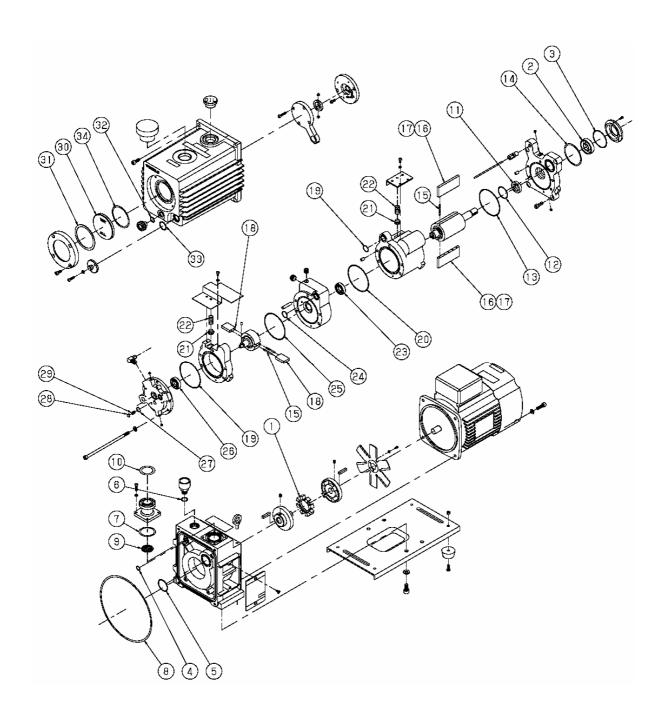


Fig. 11 Disassembly drawing of GLD-136A/201A oil sealed rotary vacuum pump

(Attached paper) Material Safety Data Sheet (MSDS)

The chemical material, which is applied or possible to contact when operating this pump are described. Read this manual carefully to understand characteristics of the chemical material (vacuum pump oil) which is described on MSDS sheet. When applying other vacuum pump oils besides the description in this manual, contact your local ULVAC SINKU-KIKO Co., LTD Sales and Service Center.



CAUTION

MSDS presents the reference information of hazardous chemical material to keep safety precautions. When handling the pump oil, it is necessary to take proper and practical treatments which are adapted handling the oil. After understanding the above mention, these treatments must be done. Therefore, MSDS is a not safety warranty.

Attached Table Material Safety Data Sheet Vacuum Pump Oil SMR-100

Section - Hazardous Ing	redients/ Identity I	Information				
Hazardous Components Other Limits						
(Specific Chemical Identity; Common Name(S)) OSHA PEL ACGIH TLV Recommended %(optional)						
*Mineral oil(Highly-refined oil) n/e n/e n/e 100%						
(*Hazardous Components) (n/e = not established)						
Section - Physical/ Chemical Characteristics						
Boiling Point (/ mmHg) 165 /0.1mmHg Specific Gravity (H ₂ O=1)						
	165 /13Pa			0.88(15/4)		
Vapor Pressure (mmHg/)	1.0 × 10 ⁻⁴ mmHg/50	Pour Point	()			
	1.3 × 10 ⁻² /50			-15.0 max.		
Vapor Density (Air=1)	apor Density (Air=1)		Evaporation Rate			
	>1	(Butyl Acetate=	1)	<1		
Solubility in Water						
	Negligible					
Appearance and Odor						
	Light yellow, viscous liquid with slight oily odor					
Section - Fire and Explosion Hazard Data						
Flash Point(Method Used)	()	Flammable Limit	s	LEL UEL		
	200min. (COC)			1.0%		
Extinguishing Media						
Dry chemical, CO ₂ , Foam						

Special Fire Fi	ghting Procedures	_			
	Fire fig	nter	s or others exposed to produ	ucts of combustion should	
	wear pro	tect	ive clothing including se	If-containing breathing	
	apparatu	S.			
Usual Fire and	Explosion Hazard				
	None				
Section - Rea	ctivity Data	_	1		
Stability	Unstable		Condition to Avoid		
	Stable	×	High temperature exce	eeding 100 in storing	
Incompatibility	(Materials to Avoi	d)	Strong oxidizing	agents.	
Hazardous Decom	position or Byprodu	cts	none		
Hazardous	May occur		Condition to Avoid.		
Polymerization					
	Will not occur	×	High temperature exce	eeding 100 in storing	
Section - Hea	Ith Hazard Data		1		
Route(s) of Ent	ry: Inhalati	on?	Skin?	Ingestion?	
	No		Yes(Slightly)	Unlikely	
Health Hazards(Acute and Chronic)				
	Acute Or	al T	oxicity; No information		
	Skin irr	itat	ion ; Mildly irritating	g	
	Eye irri	tati	on ; Mildly irritating	g	
Carcinogen city: NTP ?			IARC Monographs?	OSHA Regulated?	
	Not list	ed	Group 3	Not regulated	
Signs and Sympt	oms of Exposure				
	None nor	mall	y encountered.		
Medical Conditi	ons Generally Aggra	vate	d by Exposure		
	Unknown				
Emergency First	Aid Procedures				
Skin	Skin : Wash with mild soap and water. If irritation persists, seek medical attention.				
Eye		- AVA	es with plenty of water for	at least 15 minutes. If	
Lye	•	-	get medical attention.	at reast is minutes. If	
Inhalation	: Remove to outsid				
Ingestion					
Trigostron	. Do not madec vo		ng. det medrear attention	•	

Section - Precautions for Safe Handling and use

Steps to Be Taken in Case Material is Released or Spilled

Eliminate ignition sources.

Remove free liquid into an empty container. Use suitable absorbents for the un-recovered fluid.

In case of a large amount of leak or spill, lead the flow of the liquid to a safety place by means of banking with sand or any other appropriate materials. Then recover it.

Waste Disposal Method

Dispose the waste according to federal, state and local regulations.

Precautions to Be Taken in Handling and Storing

Use with adequate ventilation.

Wear safety gloves and glasses.

Store indoors and close tightly with cap.

Keep the storage temperature in the range from 0 to 40.

Keep away from heat, open flame, sparks and other possible ignition sources.

Prevent accumulation of static electricity.

Keep away from halogens, strong acids, alkaline agents and oxidizing agents, and do not store the product in the same place.

Other Precautions

Avoid contact with eyes, skin and clothing.

Section - Control Measures

Respiratory Protection (Specific Type)

	Not normally re	equired.		
Ventilation	Local Exhaust	Local Exhaust		
	Not normally re	Not normally required.		
	Mechanical (General)		Other	
	Recommended.		None	
Protective Gloves		Eye Protection		
	Rubber		Goggles	
04han Duataat:	Clothing or Fauinment			

Other Protective Clothing or Equipment

None

Work/ Hygienic Practices

Wash hands thoroughly after handling.

DOC No.:0063-01-001

Declaration of Conformity

We

Company: ULVAC KIKO,Inc.

Address: 2-7-19 Shinyokohama, Kouhoku-ku, Kanagawa (ZIP Code:222-0033) Japan

declare under our sole responsibility that the products:

Product Name: Oil Sealed Rotary Vacuum Pump

Model No.: GLD-136A

To which this declaration relates in conformity with the following Harmonized standards of normative documents:

Harmonized standards

EN 50082-1:1992,

EN 55014:1993,

EN 61000-4-5/1995(power line: class 4)

EN 1012-2/1996

following the provisions of EMC Directive(89/336/EEC) at amended by 92/31/EEC.

following the provisions of Machinery Directive 98/37/EC.

Subject products are manufactured and tested according to appropriate quality control procedures.

Date: 2 April, 2001

Signature: Nobuyoshi Murata

Nobuyoshi Murata

Manager of Technical Development Center

DOC No.:0063-03-001

Declaration of Conformity

We

Company: ULVAC KIKO, Inc.

Address: 2-7-19 Shinyokohama, Kouhoku-ku, Kanagawa (ZIP Code:222-0033) Japan

declare under our sole responsibility that the products:

Product Name: Oil Sealed Rotary Vacuum Pump

Model No.: GLD-201A

To which this declaration relates in conformity with the following Harmonized standards of normative documents:

Harmonized standards

EN 50082-1:1992. EN 55014:1993.

EN 61000-4-5/1995(power line: class 4)

EN 1012-2/1996

following the provisions of EMC Directive(89/336/EEC) at amended by 92/31/EEC.

following the provisions of Machinery Directive 98/37/EC.

Subject products are manufactured and tested according to appropriate quality control procedures.

Date : 2 April, 2001

Signature : <u>Nabuyoshi Murato</u> Nobuyoshi Murata

Manager of Technical Development Center

Pump Usage Check Sheet (For operation manual)

(Use this sheet for request for an overhaul.)

Enter the following information required for safety purposes by the repair technician, and send it together with the pump to be repaired.

\'\'\'\'\'\ <u></u>					
Person in charge:					
Telephone:	Extension:				
Reasons for requesting repair (Select from be Malfunction	elow.)	Operation problems			
Gases evacuated with pump (1) Toxic gases Yes No (2) Type and name of gases					
Duration of use <u>Approx.</u> hours 24 hr continuous operation	Intermittent operation				
Other					
•	<u> </u>				
	Person in charge: Telephone: Company from which pump was purchase Person in charge: Telephone: Model: Reasons for requesting repair (Select from be Malfunction Condition Abnormal noises P Other Periodic checks and repairs Other Gases evacuated with pump (1) Toxic gases Yes No (2) Type and name of gases Duration of use Approx. hours 24 hr continuous operation Other Details of request Repair estimate please. Repair immediately if the estimate is with	Reasons for requesting repair (Select from below.) Malfunction Condition Abnormal noises Pressure problems Other Periodic checks and repairs Other Gases evacuated with pump (1) Toxic gases Yes No (2) Type and name of gases Duration of use Approx. hours 24 hr continuous operation Intermittent operation Other Details of request			

Copy this sheet for use as required.

Your request for repair and inspection may be refused if this sheet is not included with the pump.

< ULVAC KIKO,Inc. >

Head office, sales division 2-7-19 Shin-yokohama, Kohoku-ku, Yokohama City, Kanagawa 222-8522 (3F Tenko Bldg. 50)

Tel: +81-45-474-2011 Fax: +81-45-474-2010

ULVAC

Inspection Certificate

Product: Oil sealed rotary vacuum pump

Model: GLD-136A GLD-201A

Inspected by: