

## **Instruction Manual**

## for

## **Direct-Drive Oil Sealed Rotary Vacuum Pump**

## Model

## **GLD-040**

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.

# **EC Declaration of Conformity**

We, ULVAC KIKO,Inc.

of 291-7 Chausubaru, Saito-city, Miyazaki, 881-0037. Japan

In accordance with the following Directive:

2006/42/EC Machinery Directive

declare under our sole responsibility that the product,

Type of Product	:	Oil Sealed Rotary Vacuum Pump	
Model Name	:	GLD-040,GLD-136A,GLD-137AA,	
		GLD-201A,GLD-202AA,GLD-280A,	
		GLD-136C,GLD-137CC,GLD-201B,	
		GLD-202BB, GLD-280B	

to which this declaration related is in conformity with the following standards:

EN 1012-2:1996+A1:2009 Compressors and vacuum pumps – Safety requirements, Part2. Vacuum pumps IEC/EN 61010-1:2010 Safety requirement for electrical equipment for measurement, control and laboratory use - Part 1: General requirement IEC/EN 60034-1:2010 Rotating electrical machines

following the provisions of

The person stated below will keep the following technical documentation:

- operating and maintenance instructions
- technical drawings
- · description of measures designed to ensure conformity
- other technical documentation, e.g. quality assurance measures for design and production

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## 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.

# \Lambda 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.

# ∧ Note \_\_\_\_\_

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.

# \Lambda 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.

# \_ ⚠️ Note \_\_\_\_\_

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

\_\_\_\_\_

# 丢

The Inlet port of the pump

The exhaust port of the pump

# \_\_ **A** Danger \_\_\_\_\_ This pump is for dry air or the dry nitrogen suck only.

## 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.

# \land Warning \_\_\_\_\_

Connect the earth wire correctly. It is set up 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.

# \Lambda 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).

# Marning

It gets an electric shock touching the motor energizing part. Please work after pulling out the power plug without fail when wires electricity is connected, it checks, and it transfers it.

# Marning \_\_\_\_\_

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

# 🕂 Warning —

When shipping from the factory, the motor is set for 100-120V class. Do not operate with 200-240V power supply voltage. In order to operate with 200-240V class, the changeover switch in the terminal box must be changed into 200-240V class as shown in fig. 3.4 "Electric wiring."

# A 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.

# ▲ Caution \_\_\_\_\_

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.

# ▲ Caution \_\_\_\_\_

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.

# A 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:  $7^{\circ}C \sim 40^{\circ}C$ , 85% RH or less
- ② Height above sea level during storage and installation: 1,000 m or less
- ③ Minimum required distances from the wall, 100mm
- ④ 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 inlet port with a cap.
  - i) Don't keep it, where moisture is attracted.

# ▲ Caution

Since the pump weighs as much as 16 kg, do not lift or transport it by yourself. Doing so may cause an injury. Please wear safety shoes at the time of work. Perform such work by two people as shown in 3.1 "Installation."

# ⚠ Note \_\_\_\_\_

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

# ⚠ Note \_\_\_\_\_

For indoors use only.

### 0.5 Protective device

The pump is equipped with a single-phase 100-120 V (50/60 Hz) and 200-240 V (50/60 Hz) motor.

This motor has a total of two overload protectors built in: one is of automatic reset type and the other of manual reset type.

The automatic reset type thermal protector is intended to protect the motor when the pump is locked. For details, refer to "4.6 Automatic Reset Type Thermal Protector." The manual reset type thermal protector is intended to protect the auxiliary coil.

For details, refer to "4.7 Manual Reset Type Thermal Protector."

End-user has to make provisions for the installation of the over current protection of the power circuit.

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

# ▲ Caution \_\_\_\_\_

The automatic reset type thermal protector, one of the overload protectors in this motor, will automatically reset itself after it has functioned.

This motor houses an automatic returning thermal protector, which may be activated in case of trouble. The motor will restart automatically when the temperature goes down to 78  $\pm$  5°C.

If the thermal protector is activated, pulled out the power plug immediately for safety reason.

# ▲ Note \_\_\_\_\_

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.

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Warranty Safety Data Sheet (SDS) Pump Usage Check Sheet (Use this sheet for requesting an overhaul.) Sales and Service Centers

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Attached table: Safety Data Sheet for Vacuum Pump Oil R-2

### 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.

The pump is not to be used with toxic of flammable gases.

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

Cause	Prevention method and measures
Injury due to touching toxic	$\Rightarrow$ ① Before overhauling and disposing of the pump, ask a
pump oil in the pump or	waste disposal specialist to make it safe.
harmful substances attached	② Ask an authorized waste disposal specialist to carry out
to the pump during	disposal.
inspection or disposal	

## 1.1.2 $\bigstar$ Warning Electric shock

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

## Caution

Do not expose any part of the human body to vacuum.

## 1.1.3 **Marning Explosion**

Cause		Prevention method and measures	
The pressure in the pump	$\Rightarrow$	The maximum internal pump pressure is 0.03 MPa (gauge	
increased causing the pump		pressure).	
to explode.	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 $\bigwedge$ Caution High temperature

Cause	Prevention method and measures	
High temperatures caused	$\Rightarrow$ ① The pump reaches a high temperature during operation.	
burns.	Pump main unit during non-load operation $\rightarrow 22 \sim 55^{\circ}$ C	
	Motor during non-load operation $\rightarrow 22 \sim 55^{\circ}C$	
	Pump main unit during high-load operation $\rightarrow 32 \sim 65^{\circ}C$	
	Motor during high-load operation $\rightarrow 32 \sim 65^{\circ}C$	
	(High-load operation: Operation at a pressure of 1kPa ~ 13kPa)	
	② If you use the pump in a high ambient temperature and	
	have a high gas throughput, the temperature of the	
	pump-boby may exceed 70°Cand you must fit suitable	
	guards to prevent contact with hot surfaces.	
	$\bigcirc$ 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	
	for 10 minutes until the pump has cooled down completely	
	after it stops.	

### 1.2 Safety Data Sheet (SDS)

The attached "Safety Data Sheet (SDS)" shows chemical materials which may be used or touched when operating the pump. Read the SDS 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.

# A Caution

SDS 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 SDS 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.

Model		Unit	GLD-040		
			50 Hz	60 Hz	
Туре			Rotary vane (2 vanes)		
Pumpii	ng speed	L/min	40	48	
Ultimate	G.V. close	D.	6.7  imes	10-1	
pressure	G.V. open	Pa	6	.7	
	Tyme		1-phase, 200W, 4 poles,		
Motor	Туре		fully-closed	external fan	
WIOTOI	Voltago	V	100-120/	100-120/	
	voltage	v	200-240	200-240	
			4.20 (100 V)	3.60 (100 V)	
			4.40 (110 V)	3.40 (110 V)	
			4.60 (115 V)	3.40 (115 V)	
Ev11 100	danmant	•	5.05 (120 V)	3.60 (120 V)	
Full-loa	u current	A	2.10 (200 V)	1.80 (200 V)	
			2.20 (220 V)	1.70 (220 V)	
			2.30 (230 V)	1.70 (230 V)	
			2.60 (240 V)	1.80 (240 V)	
			1440 (100 V)	1740 (100 V)	
			1450 (110 V)	1750 (110 V)	
			1460 (115 V)	1750 (115 V)	
D.		, <b>.</b>	1460(120  V)	1760 (120 V)	
Revo	olution	r/min	1440(200  V)	1740 (200 V)	
			1450(220  V)	1750(220  V)	
			1460(220V)	1750(230  V)	
			1460(240  V)	1760 (240 V)	
0.11	Standard oil		R-2		
Oil	Oil amount	mL	550~800		
Weight		kg	16		
Ambient temperature		°C	$7 \sim 40$ (If the oil temp	perature is lower than 7 °C.	
range		C	operation start-up may be difficult.)		
Installation features			Indoor		
Noise level		dB (A)	55 or less		
Inlet port diameter		-	KF-25 (NW-25)		
Max. size		mm	$150(W) \times 427(L) \times 227.5(H)$		
Leak rate		$Pa \cdot m^3/sec$	1×10 <sup>-6</sup>		

Table 1	Specification
---------	---------------

Note 1: The ultimate pressure values in the above table are indicated by a Pirani 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: R-2
- Note 3: "G.V." is an abbreviation for gas ballast valve.
- Note 4: The motor voltage is switched between 100-120V and 200-240V by the changeover switch in the terminal box.

## 2.2 Dimensional drawing



Fig. 1 Dimensional drawing of GLD-040 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.





# ▲ Caution

Since the pump weighs as much as 16 kg, do not lift or transport it by yourself. Doing so may cause an injury. Always carry out work with two people when transporting a pump, wear safety shoes as shown in Fig. 2.

# ▲ Caution

Minimum required distances from the wall, 100mm.

# ▲ Note \_\_\_\_\_

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.

### 3.2 Lubrication

Remove the oil inlet plug from the oil inlet port, and add the pump oil which has been delivered together with the pump or the pump oil specified by us (R-2) up to the range marked with the 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 oil inlet plug to the pump (see Fig. 3).

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 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.



(1) Oil level shown on the oil level gauge (2) Lubrication method Fig. 3 Lubrication of the oil sealed rotary vacuum pump

## **A** Caution

- ① Wear protective equipment such as rubber gloves and safety goggles.
- (2) Be sure to read the attached "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 "Safety Data Sheet."

# A Note

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.

# \_ ⚠️ Note \_

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. 4.



Fig. 4 Basic piping diagram to the vacuum chamber

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

# A Note -

The wire mesh in the inlet port 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 Fig. 5.
- (3) Please select the power supply cord with a suitable plug to the power-supply voltage, and connect wires by using pressure wear terminal (#250) with the insulation coating as shown in Fig 6.
- (4) Convert the voltage, 100-120V class or 200-240V class by pressing the intended voltage side of the changeover switch in the terminal box. When shipping from the factory, the motor is set for 100-120V class.(Fig 7.)
- (5) An overload protector (auto reset thermal protector) is incorporated.
- (6) End-user has to make provisions for the installation of the over current protection of the power circuit.
- (7) The screw of the earth terminal at the motor side is provided with an "earth mark" in the terminal box.

# \Lambda Warning \_\_\_\_\_

If the pump is directly (and permanently) connected to the host equipment then the end-user has to provide adequate disconnection device.

# 🕂 Note

### GROUNDING INSTRUCTIONS

In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This pump is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances. If power code is not equipped (option) then appropriate grounding shall be provided upon installation.

# ⚠ Warning

Improper installation of the grounding plug is able to result in a risk of electric shock. When repair or replacement of the cord or plug is required, do not connect the grounding wire to either flat blade terminal. The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire.

# Marning

When shipping from the factory, the motor is set for 100-120V class. Do not operate with 200-240V power supply voltage. In order to operate with 200-240V class, the changeover switch in the terminal box must be changed into 200-240V class as shown in fig.7.

# \land Note

Check with a qualified electrician or serviceman when the grounding instructions are not completely understood, or when in doubt as to whether the product is properly grounded. Do not modify the plug provided; if it does not fit the outlet, have the proper outlet installed by a qualified electrician.

# \land Note

This pump must be connected to a grounded, metallic, permanent wiring system, or an equipment-grounding terminal or lead on the product.







Fig. 6 Method of wiring for power supply switch





1-phase, 100-120V power source 1-phase, 200-240V power source Fig. 7 Changeover switch in the terminal box

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 ( $N \cdot m$ ).





# \Lambda Warning \_

Before connecting wires, pulled out the power plug. 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.

# A 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.

### 4. Operation

4.1 Cautions for operation

## \land 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).

# ▲ Note

- (1) 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.
- ② 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.
- ③ 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.
- ④ Solvents which deteriorate the lubricity of the pump oil will cause scoring, etc. If such a solvent is evacuated, replace the oil.
- (5) 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.
- (6) 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. 4).

# A Caution

- ① The motor and pump become hot (temperature increase under non-load operation: 15K, temperature increase under high-load operation: 50K) during operation of the pump. There is a risk of burns. Never touch the motor or pump during operation.
- 2 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.

# \Lambda Note

When the pump does not rotate correctly, take the following measures. ① Check the amount of oil, and adjust if necessary.

② Long term (more than 3 days) If the pump is stopped and placed, there is a possibility that pump oil intrudes into the cylinder. (It is the same even if putting the interior of the pump at the atmospheric pressure state at the time of the previous stop.) When the ambient temperature is low, when restarting the pump in this state, the thermal protector operates due to overload You must to do something before you go on.

## A Note

The oil temperature in the pump increases to  $40 \sim 60 \,^{\circ}$ C 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. 4).

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: 15K, temperature increase under high-load operation: 50K) 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.

# A Note

- 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.
- ② If vacuum valve (A) is not closed, air may leak into the device side through the pump increasing the pressure.

### 4.6 Autonatic reset type Thermal protector

Auto reset thermal protector is incorporated in the motor in order to interrupt the power circuit of the motor and prevent damage to the motor when an over current flows through the motor due to a stop in rotation or overload resulting from the pump malfunctioning during operation.

а	ble 2 Characteristics	s of the thermal prote
	Operation temperature	120±5°C
	Reset temperature	78±5°C

Table 2Characteristics of the thermal protector

When the thermal protector has been actuated, turn off the switch and contact us.

The motor is very hot when the thermal protector has actuated. Never touch it with your hand. When the cause of the malfunction has been eliminated, check that the motor has cooled down, and restart operation (see "6.5 Trouble check list").

## ▲ Caution \_\_\_\_\_

The pump's surface becomes hot (temperature increase under non-load operation: 15K, temperature increase under high-load operation: 50K). There is a risk of burns. Do not touch the motor or the main unit of the pump after the pump has stopped until it cools down completely.

### 4.7 Manual Reset Type Thermal Protector

A manual reset type thermal protector is built in this motor. Should voltage drop when starting up the pump, the motor will not make an acceleration torque as required. Consequently, it will induce a repetitive operation of opening/closing the contacts in the relay that cuts conductivity off the auxiliary coil (chattering). Before a heated main coil causes the automatic reset type thermal protector to operate, the relay will chatter, getting an overcurrent to continue flowing in the auxiliary coil. As a result, the auxiliary coil only will overheat, being eventually burnt out. In order to protect the auxiliary coil against a possible burnout due to the relay chattering, the manual reset type thermal protector is built in the terminal box. (Refer to Figures 9 and 10.) The manual reset type thermal protector would operate to protect the auxiliary coil against a possible burnout due to relay chattering. Nevertheless, chattering may have caused the relay to fail, throwing it into an improper operation.

Should the manual reset type thermal protector be reset under such condition as referred to above, an electric current will continue flowing in the auxiliary coil when the motor is subsequently started up. This might lead to a burnout of the auxiliary coil.

Once the manual reset type thermal protector has operated, do not proceed to resetting but turn off the pump switch, first of all. Then, make contact with us and return the pump to us.



Figure. 9 Interior of Terminal Box, GLD-040





Time usually At operation Figure. 10 Manual Reset Type Thermal Protector

# A Warning

Once the manual reset type thermal protector has functioned, please return the pump to us. Should the motor be started up after resetting the thermal protector, a large current may continue flowing in the auxiliary coil, probably leading to its burnout. Never reset the manual reset type thermal protector.

#### 4.8 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  $55^{\circ}$ 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: 15K, temperature increase under high-load operation: 50K) during 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.

# ▲ Note

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.

### 4.9 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 OMS-050 and OMT-050A are available. Remove the standard exhaust port from the exhaust 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.

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

4.10 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, replace it.

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.

# A Warning \_\_\_\_\_

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 it.

### 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. 11 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  $2.7 \times 10^4$  to  $4 \times 10^4$  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. 11 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 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

- Pulled out the power plug or turn off the disconnecting device before starting inspection and do not turn it on while inspection is in progress. Doing so will result in injury.
- ② The pump is very hot immediately after it is stopped. Wait for 10 minutes 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."

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.	

Table 3Periodic inspection table

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 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.

- 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 exhaust port, 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.

## \Lambda Danger \_\_\_\_\_

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 3 showing an oil replacement guide is recommended.

# \Lambda Danger \_\_\_\_\_

Keep in mind that if the pump was used in accordance with its exhausting toxic gas, both the pump unit and pump oil might become contaminated.

# ▲ Caution

① Wear protective equipment such as rubber gloves and safety goggles.

\_\_\_\_\_

② Be sure to read the attached "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 "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 port to the atmosphere and operate the pump for five seconds. The oil remaining in the pump is discharged efficiently.
- (2) Remove the exhaust port 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 oil inlet port (see Fig. 3).
- (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. 12.



Fig. 12 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

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
	<sup>(2)</sup> The power switch is not turned on.	②Turn on the power switch.	4.2
	③Problem with power supply voltage	③ Set the power supply voltage to within $\pm 10\%$ of the rated voltage.	3.5
	(4) The Automatic reset type thermal protector is in operation.	(4) Wait till the temperature goes down to $78 \pm 5^{\circ}$ C.	4.6
	<sup>(5)</sup> The manual reset type thermal protector is in operation.	(5) Do not reset the manual reset type thermal protector but promptly turn off the pump switch. And return the pump.	4.7
	<sup>(6)</sup> The motor malfunctions.	<sup>(6)</sup> Replace the motor.	
	⑦Low ambient temperature has increased the oil viscosity.	$\widehat{\mathcal{T}}$ Increase the ambient temperature to $7^{\circ}$ C or more.	4.4
	<sup>®</sup> The entrance of foreign matter into the pump caused the rotor to burn out.	8 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
	(1) Reaction product accumulated in the pump when the pump stops after exhausting reactive gas.	10 Overhaul (clean the pump inside and remove reaction products).	
	1 Water absorption expands the vanes.	Dverhaul (replace the vanes)	
The pump's rotation is	①Problem 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.	(3) Increase the ambient temperature to $7^{\circ}$ C or more.	4.4
	(4) The manual reset type thermal protector is in operation.	(4) Do not reset the manual reset type thermal protector but promptly turn off the pump switch. And return the pump.	4.7
The pressure does not	①The pump is too small for the volume of the vacuum chamber.	①Select another pump.	5.2
decrease.	<sup>(2)</sup> The pressure measurement method is not correct.	<sup>(2)</sup> Measure the pressure correctly.	5.1
	③The vacuum gauge is not suitable.	<sup>3</sup> Measure with a calibrated vacuum gauge suitable for the pressure range.	
	(4) The pipe connected to the inlet port is small, or the piping distance is long.	④ Use pipes having a diameter larger than the inlet port diameter, or reduce the distance from the vacuum chamber.	5.1
	<sup>(5)</sup> The wire mesh at the inlet port is clogged.	<sup>(5)</sup> Remove the piping from the upper section of the inlet port, and clean the wire mesh.	6.2

Table 4 Trouble check list

Problem	Cause	Measures	Reference
The pressure does not	<sup>(6)</sup> The specified amount of oil has not been added.	<sup>(6)</sup> Add the specified amount of oil.	3.2
decrease.	$\bigcirc$ The oil has deteriorated.	⑦ Replace the oil.	6.3
	8 Leakage occurs from the pipe connected to the pump.	8 Locate the leakage with a leakage detector and stop the leakage.	
	<sup>(9)</sup> 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.	(11) Overhaul and clean the oil hole.	6.2
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.	2 The motor malfunctions.	<sup>(2)</sup> Replace the motor.	
	③Foreign 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
	<sup>5</sup> The coupling spider malfunctions.	<sup>5</sup> Replace the coupling spider.	6.4
	<sup>(6)</sup> Oil does not circulate, or the oil hole of the cover is clogged.	6 Overhaul and clean the oil hole.	6.2
	⑦ Components inside the pump have burnt out.	⑦ 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	<ol> <li>If continuous operation is performed at a high evacuation pressure, the pump surface temperature reaches 80°C. However, this is not a serious problem.</li> </ol>	
	② The 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
	③ The temperature of the evacuated gas is high.	<sup>(3)</sup> 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.	0 Overhaul and clean the oil hole.	6.2
A lot of oil splashes out	① The pump is been filled in excess of the specified amount.	①Discharge the oil until it reduces to the specified amount.	3.2
from the exhaust port.	② Continuous operation is performed at a high evacuation pressure.	②Install an oil mist trap at the outlet side.	4.8
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.



8. Maintenance parts 8.1 Maintenance parts list

Product name	No.	Parts name	Q'ty
	15	Outlet valve	2
	16	Outlet valve spring	2
	18	Check valve	2
	19	Check valve spring	2
	41	Oil seal_HTC-11-25-7	1
	42	Oil seal _SC-12-25-7	1
	43	Oil seal _VC-12-22-4	1
	44	Oil seal _VC-10-20-4	1
	45	O-ring_S-3	2
	46	O-ring_S-5	1
GLD-040	47	O-ring_S-12	2
Maintenance kit A	48	O-ring_S-20	1
	49	O-ring_S-29	1
	50	O-ring_S-46	1
	51	O-ring_S-55	1
	52	O-ring_P-10	1
	53	O-ring_P-12	1
	54	O-ring_P-24	1
	55	O-ring_G-55	1
	56	O-ring_V-150	1
	57	O-ring_N-28	1
	91	O-ring_P-20	1
	4	1st vane	2
	5	Vane spring	6
GLD-040 Maintenance kit B	8	2nd vane	2
Manuchance Kit D	33	Spider	1
	89	Middle pin	3

Table 5GLD-040 Maintenance parts list

Note : For the relationship between components, see the disassembly drawing.

## 8.2 Disassembly drawing



Fig. 13 Disassembly drawing of GLD-040 oil sealed rotary vacuum pump

## <u>Warranty</u>

- (1) The warranty for this pump (this equipment) extends for a period of one year from the date of shipment.
- (2) Any malfunctions or defects which occur under normal usage conditions during the warranty period will be repaired free of charge.

Note, the warranty stated here is an individual warranty covering the pump. In addition, the scope of the warranty coverage concerning repairs is limited to the repair and/or replacement of parts.

Normal usage conditions refer to the following:

- a) Ambient temperature and humidity during operation: 7 40°C, below 85% RH
- b) Operation in accordance with the user manual
- (3) Repair fees will incur during the warranty period for the following cases:
  - a) Malfunctions due to a natural disaster or fire.
  - b) Malfunctions caused by special atmospheric conditions, such as salt damage, inflammable gas, corrosive gas, radiation or pollution.
  - c) Malfunctions caused by usage conditions that differ from those stated in the user manual (performance specifications, maintenance and inspection, etc.).
  - d) Malfunctions caused by modifications or repairs carried out by a party other than the manufacturer, or by a service company not approved by the manufacturer.
  - e) Malfunctions caused by noise (electric disturbance).
  - f) Malfunctions that occur when not using a rated power supply.
  - g) Malfunctions that occur when there is an abnormal rise in internal pressure due to the pump exhaust outlet being blocked during operation, etc.
  - h) Malfunctions that occur, when the pump is damaged as a result of being dropped or falling, etc.
  - i) Malfunctions which are determined by the manufacturer's technical personnel to be caused by conditions that do not comply with the usage conditions for this vacuum pump.
  - j) Malfunctions due to the replacement of consumables.
- (4) Disclaimer
  - a) We shall not be liable for any malfunctions of our products caused by the customer, regardless if the malfunction does not fall within the warranty period, nor shall we be liable for any loss of opportunity for the customer's clients or for compensation for any damages to other products, labor costs, production loss, transportation expenses and other related work.
  - b) We shall not be liable for any claims and patent infringements, including secondary damages, filed a claim by a third party against the customer.

## SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

## **ULVOIL R-2**

1.3

		19-Mar-2018
		12001-2-05-5
<b>SECTION 1: Identification</b>	n of the substance/mixture and of th	ne company/undertaking
1.1 Product identifier		
Trade name	: ULVOIL R-2	

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture	: Lubricant
Recommended restrictions on use	: None known.
Details of the supplier of th	e safety data sheet
Company	: ULVAC KIKO,Inc
Address	: 291-7,Chausubaru,Saito-city,Miyazaki,Japan

Telephone	: +81-983-42-1411
Telefax	: +81-983-42-1422

#### 1.4 Emergency telephone number

Ulvac KIKO, Inc: +81-983-42-1411

#### **SECTION 2: Hazards identification**

#### 2.1 Classification of the substance or mixture

#### Classification (REGULATION (EC) No 1272/2008)

Aspiration hazard, Category 1

H304: May be fatal if swallowed and enters airways.

### 2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms				
Signal word	:	Danger		
Hazard statements	:	H304	N a	
Precautionary statements	:	<b>Response:</b> P301 + P310	I	

May be fatal if swallowed and enters airways.

IF SWALLOWED: Immediately call a POISON CENTER/doctor.

P331Do NOT induce vomiting.Storage:P405P405Store locked up.Disposal:Dispose of contents/ c

Dispose of contents/ container to an approved waste disposal plant.

Hazardous components which must be listed on the label: Dec-1-ene, oligomers, hydrogenated

#### 2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

### **SECTION 3: Composition/information on ingredients**

#### 3.2 Mixtures

#### Hazardous components

Chemical name	CAS-No.	Classification	Concentration
	EC-No.		(% w/w)
	Registration number		
Dec-1-ene, oligomers,	68037-01-4	Asp. Tox. 1; H304	>= 90 - <= 100
hydrogenated	500-183-1		

#### No hazardous ingredients

-	< 1
	-

For explanation of abbreviations see section 16.

### **SECTION 4: First aid measures**

#### 4.1 Description of first aid measures

General advice	: No hazards which require special first aid measures.
If inhaled	<ul> <li>Move to fresh air in case of accidental inhalation of dust or fumes from overheating or combustion.</li> <li>If symptoms persist, call a physician.</li> </ul>
In case of skin contact	: Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water.
In case of eye contact	<ul> <li>Flush eyes with water as a precaution.</li> <li>Remove contact lenses.</li> <li>Protect unharmed eye.</li> <li>Keep eye wide open while rinsing.</li> </ul>
If swallowed	: Clean mouth with water and drink afterwards plenty of water. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person.

#### 4.2 Most important symptoms and effects, both acute and delayed

Risks : May be fatal if s	swallowed and enters airways.
---------------------------	-------------------------------

4.3 Indication of any immediate r	nedical attention and special treatment needed
Treatment	: The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.
SECTION 5: Firefighting meas	sures
5.1 Extinguishing media	
Suitable extinguishing media	: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
5.2 Special hazards arising from	the substance or mixture
Hazardous combustion products	: No hazardous combustion products are known
5.3 Advice for firefighters	
Special protective equipment for firefighters	: In the event of fire, wear self-contained breathing apparatus.
Further information	: Standard procedure for chemical fires.
SECTION 6: Accidental releas	e measures
6.1 Personal precautions, protec	tive equipment and emergency procedures
6.2 Environmental precautions	
Environmental precautions	: No special environmental precautions required.
6.3 Methods and material for cor	itainment and cleaning up
Methods for cleaning up	: Wipe up with absorbent material (e.g. cloth, fleece). Keep in suitable, closed containers for disposal.
6.4 Reference to other sections	
For personal protection see se	ection 8., For disposal considerations see section 13.
SECTION 7: Handling and sto	rage
7.1 Precautions for safe handling	3
Advice on safe handling	: For personal protection see section 8. No special handling advice required.
Advice on protection against fire and explosion	: Normal measures for preventive fire protection.
Hygiene measures	: General industrial hygiene practice.
7.2 Conditions for safe storage, i	including any incompatibilities
Advice on common storage	: No special restrictions on storage with other products.
7.3 Specific end use(s)	
Specific use(s)	: Consult the technical guidelines for the use of this substance/mixture.

## SECTION 8: Exposure controls/personal protection

## 8.1 Control parameters

Contains no substances with occupational exposure limit values.

#### 8.2 Exposure controls

Personal protective equipme	nt	
Eye protection	:	Safety glasses
Hand protection		
Glove thickness	:	>= 0.3 mm
Remarks	:	For prolonged or repeated contact use protective gloves.
Skin and body protection	:	Protective suit
Respiratory protection	:	No personal respiratory protective equipment normally required.

### **SECTION 9: Physical and chemical properties**

### 9.1 Information on basic physical and chemical properties

Appearance	:	transparent
Physical state	:	liquid
Colour	:	colourless
Odour	:	slight
Odour Threshold	:	No data available
рН	:	No data available
Freezing point	:	No data available
Melting point	:	No data available
Drop point	:	No data available
Pour point	:	< -50 °C
Boiling point	:	No data available
Flash point	:	230 °C Method: Cleveland open cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	0.8205 g/cm3 (15 °C)

Solubility(ies) Water solubility	: insoluble
Partition coefficient: n- octanol/water	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity Viscosity, kinematic	: 18.70 mm2/s (40 °C)
Oxidizing properties 9.2 Other information	: No data available

No data available

### **SECTION 10: Stability and reactivity**

#### 10.1 Reactivity

Stable under recommended storage conditions.

#### 10.2 Chemical stability

No decomposition if stored and applied as directed.

#### 10.3 Possibility of hazardous reactions

Hazardous reactions : No hazards to be specially mentioned.

#### 10.4 Conditions to avoid

Conditions to avoid : No data available

#### 10.5 Incompatible materials

Materials to avoid : Strong bases

#### 10.6 Hazardous decomposition products

No hazardous decomposition products are known.

#### **SECTION 11: Toxicological information**

#### 11.1 Information on toxicological effects

#### Acute toxicity

Not classified based on available information.

#### Skin corrosion/irritation

Not classified based on available information.

#### Product:

Remarks: According to the classification criteria of the European Union, the product is not considered as being a skin irritant.

#### Serious eye damage/eye irritation

Not classified based on available information.

#### Product:

Remarks: According to the classification criteria of the European Union, the product is not considered as being an eye irritant.

#### Respiratory or skin sensitisation

Skin sensitisation: Not classified based on available information. Respiratory sensitisation: Not classified based on available information.

#### Product:

Remarks: No data available

#### Germ cell mutagenicity

Not classified based on available information.

#### Carcinogenicity

Not classified based on available information.

#### **Reproductive toxicity**

Not classified based on available information.

#### STOT - single exposure

Not classified based on available information.

#### STOT - repeated exposure

Not classified based on available information.

#### Aspiration toxicity

May be fatal if swallowed and enters airways.

#### **Further information**

Product: Remarks: No data available

#### **SECTION 12: Ecological information**

#### 12.1 Toxicity

No data available

#### 12.2 Persistence and degradability

No data available

#### 12.3 Bioaccumulative potential

No data available

## 12.4 Mobility in soil

No data available

#### 12.5 Results of PBT and vPvB assessment

#### Product:

Assessment

: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher..

#### 12.6 Other adverse effects

### Product:

Additional ecological	:	There is no data available for this product.
information		

#### **SECTION 13: Disposal considerations**

#### 13.1 Waste treatment methods

Product	: Offer surplus and non-recyclable solutions to a licensed disposal company.
Contaminated packaging	: Empty remaining contents. Empty containers should be taken to an approved waste handling site for recycling or disposal.

#### **SECTION 14: Transport information**

#### 14.1 UN number

Not regulated as a dangerous good

#### 14.2 UN proper shipping name

Not regulated as a dangerous good

#### 14.3 Transport hazard class(es)

Not regulated as a dangerous good

#### 14.4 Packing group

Not regulated as a dangerous good

#### 14.5 Environmental hazards

Not regulated as a dangerous good

#### 14.6 Special precautions for user

Remarks

: Not classified as dangerous in the meaning of transport regulations.

### **14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable for product as supplied.

#### **SECTION 15: Regulatory information**

# 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	: Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	: Not applicable
Regulation (EC) No 850/2004 on persistent organic pollutants	: Not applicable
Seveso II - Directive 2003/105/EC amending Council Dir	rective 96/82/EC on the

Seveso II - Directive 2003/105/EC amending Council Directive 96/82/EC on the control of majoraccident hazards involving dangerous substances Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances. Not applicable

#### The components of this product are reported in the following inventories:

ENCS : Listed

TSCA	: Listed
EINECS	: Listed
REACH	: For further information, please contact
DSL	: Listed
AICS	: Listed
KECI	: Listed
PICCS	: Listed
IECSC	: Listed
TCSI	: Listed
NZIoC	: Listed

#### 15.2 Chemical safety assessment

A Chemical Safety Assessment is not required for this substance.

#### **SECTION 16: Other information**

#### Full text of H-Statements

H304

: May be fatal if swallowed and enters airways.

#### Full text of other abbreviations

Asp. Tox. : Aspiration hazard

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System: GLP - Good Laboratory Practice: IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO -International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO -International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development: OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID -Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

#### Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

GB / EN

### Usage Status Check Sheet (for use in Instruction Manual)

\* For the purpose of safety control of repair personnel, fill in within the heavy line frame and attach the sheet to the item of which repair is requested.

\* In case this sheet were not attached or filled in, your request of repair and service may not be accepted.

\* In accordance with the Private Information Protection Law, the provided information will be used only for determining the cause of failure and whether detoxifying washing should be conducted. It will never be provided to any third person.

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Model Name:	Manufacture	r's Serial No.:
1. Inhaled Gas * Please	be sure to fill in.	
(1) Whether there is harmfu	Il effect on human bodies	Yes No (Sing your name below.)
2) Whether there is unusua	al smell	Yes No
(3) Type and Name of Gas:		
* Industrial Safety and	Health Law designates pa	articular substances as the materials to be
notified.		
2. Usage Status		
Operation Method: Approx.	() hours per day, () y	years and ( ) months
Continuous Operation	Intermittent Operation	1
Jsage:		
2 Epiluro Statua - Universi		
	al NUISE DADNORME	
	akaye Other Sympto	IIIS
1 Detail of Regulate - De		ar Chocks
	pair (Overnaur) 🛛 🗠 Regula	
b. Others:		
Company Name:	Personnel in c	charge:
Address:		
Tel:	Fax:	E-mail:
Agent Name;	Personnel in	charge:
Address:		
ſel:	Fax:	
In case you do not have a	iny direct transaction with ι	us, please be sure to fill in the agent name.
6. Confirmation		
The gas and substance u	sed in this pump or unit	is harmless to human bodies, or it is not
contaminated by any substa	ance harmful to human boo	dies.
	(	
Signea	(seal)	
In order to avoid a trouble	during transportation, please	evacuate oil from any oil pump before shipping.
You are requested to ship the	package to our Service Divisior	n (CS Center). (See the attached list of addresses.)