ULVAC

No. 21585-2-01-8

Original instructions

DIAPHRAGM-TYPE DRY VACUUM PUMP

INSTRUCTION MANUAL

MODEL

DAT-50DA, DAT-100SA

Prior to use

For safe and efficient use of this pump, please read this manual carefully before operation.

After reading the manual, keep it in your file for future reference.

Specifications in this manual are subject to change without notice due to future improvement.

ULVAC KIKO. Inc.

ULVAC

CE Declaration of Conformity CE

We, Company:ULVAC KIKO,Inc.

of Address:291-7 Chausubaru Saito-city,Miyazaki (ZIP Cord:881-0037) Japan.

This declaration is issued under the sole responsibility of the manufacturer.
In accordance with the following Directive:

2006/42/EC	Machinery Directive
2011/65/EU+(EU)2015/863	RoHS Directive

declare under our sole responsibility that the product,

Type of Product	:	**Diaphragm Type Dry Vacuum Pump**
Model Name	:	**DAT-50DA, DAT-100SA**

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+A1:2019
Safety requirement for electrical equipment for measurement, control and laboratory use
Part1.General requirement

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

Person authorized to compile the technical file:

(Name and address) Chris Goebel
ULVAC GmbH
Klausnerring 4 85551 Kirchheim b. München, Germany

05.Apr, 2023
Miyazaki , Japan
(date & place)

Makoto Uchimura
Development manager Makoto Uchimura
(name, function, signature)

ULVAC

Declaration of Conformity

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of Address:291-7 Chausubaru Saito-city,Miyazaki (ZIP Cord:881-0037) Japan.

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In accordance with the following Directive:

Supply of Machinery (Safety) Regulations 2008
(S.I. 2008 No. 1597, as amended by S.I. 2019 No. 696)

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032)

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Type of Product	:	**Diaphragm Type Dry Vacuum Pump**
Model Name	:	**DAT-50DA, DAT-100SA**

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Contents

Pages with a shaded background are those, which contain items related to safety.

Figures and Tables

Before Using the Equipment

Thank you for purchasing this product. Your custom is very much appreciated.
This pump is designed solely for vacuum discharge, and may malfunction or cause accidents if not handled appropriately. Read the manual thoroughly, and pay due attention to inspections, maintenance, and safety.

Personnel Handling the Equipment

Only persons who have read this manual thoroughly, and have sufficient understanding of safety, pump specifications, and method of operation, may operate this pump.

Read the Manual Thoroughly

Read the manual thoroughly in order to use the equipment correctly. Read the section on Safe Use particularly closely.

Keep This Manual in a Safe Place

After reading this manual, be sure to keep it in a safe place, which is readily accessible to others needing to use it.

Copying This Manual Is Prohibited

Statutory Requirements for Disposal

Follow all statutory and local authority regulations when disposing of this pump.

Safety During Repair

Please provide a full description of the circumstances of use (particularly the use of dangerous materials) for the safety of repair personnel when requesting the manufacturer for repairs to the pump. Your request for repair of may be refused if these circumstances are unclear.

Checks When Opening Packaging

Check the following after opening the packaging.

(1) Is the product as you requested?

(2) Are the accessories and necessary parts included?
Standard accessories
- User's manual ---------- ×1
- Inlet and outlet caps (fitted to inlet and outlet) ---------- ×2 (DAT-50DA)
  ---------- ×3 (DAT-100SA)

(3) Is the pump damaged in any way?

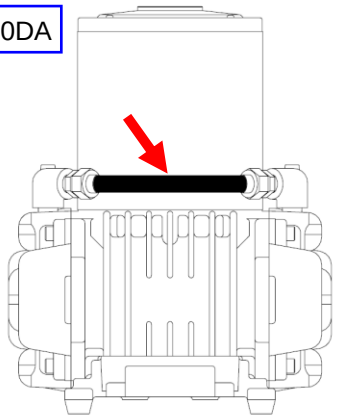
(4) Are any external screws or inlet and outlet pipes loose? Are any components missing?

Contact your agent or the sales division of the manufacturer if there are any problems with the pump.

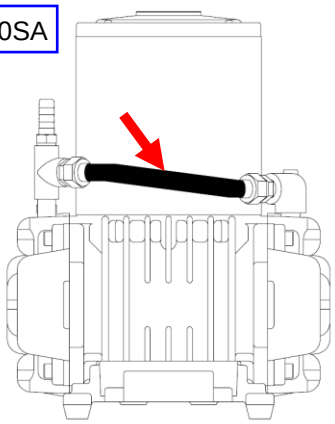
⚠ Note

1. Ensure that the tube on the side of the pump is not gripped or bent when removing the pump from the packaging. Holding the pump by this tube may damage it, thus reducing pump performance.

DAT-50DA



DAT-100SA



2. Always remove the vent plug before using the pump.
3. Fit an inlet filter if there is a possibility of foreign matter or dust particles entering the pump.
4. Use ventilation holes, and fit a cooling fan, to reduce the temperature in the vicinity of the pump. Ensure that a space of at least 100mm is available on all sides of the pump.

Using the Pump Safety

To ensure that the pump is handled correctly, read this section thoroughly before use.
This manual and the warning labels on the pump include safety icons as an aid to understanding safety requirements.These safety icons warn the operator and others of possible dangers and damage and should always be followed.

- Safety symbols

The meanings of the safety symbols are as follows.

Danger

Incorrect handling of the equipment is very likely to result in death or serious injury to the operator.

Warning

Incorrect handling of the equipment may result in death or serious injury to the operator.

Caution

Incorrect handling of the equipment may result in light or medium injuries to the operator or damage to the equipment.

Note

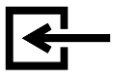
Incorrect handling of the equipment may result in damage to the equipment and hinder its correct operation.

High Temperatures

Some components reach surface temperatures in excess of 60ºC during pump operation. Burns may result if these components are touched during operation.

Electric Shock

To prevent electric shock, always shut-off the primary power supply before working on electrical wiring, or engaging in any electrical work.



The Inlet pipe of the pump

The Outlet pipe of the pump

Cautions for Safety in Use

⚠ Danger

Applications

(1) This pump is not designed to be explosion-proof, and should therefore not be used to discharge explosive gases.
(2) In addition to discharge of gas via the outlet, gas may also leak from other parts of the pump, and it should therefore not be used with toxic gases. If toxic gas is discharged for any reason it is important to note that the interior of the pump will be contaminated by the gas, requiring appropriate caution during maintenance.

Maintenance and Repair

(3) When requesting the manufacturer's service division to dismantle and repair the pump, always note the gas which the pump has been used with on the Usage Status Check Sheet. Note that if it has been used to discharge toxic gas for any reason it will be contaminated. Please be aware that use with some gases will preclude dismantling and repair.

⚠ Warning

Installation

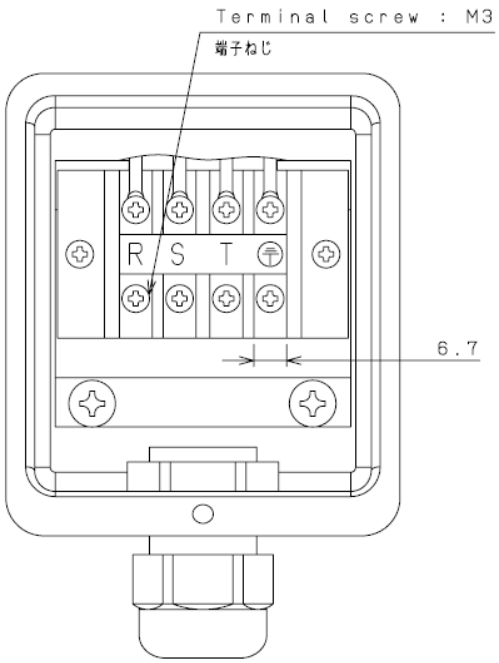
(1) Do not use the pump in an explosive atmosphere. Such use may result in injury and fire.
(2) Ensure that there are no inflammable materials such as solvents in the vicinity when using the pump.
(3) Ensure that the motor is freely ventilated to prevent overheating which may result in fire or burns.

Power Supply

(4) Always remove the power cord from the terminal before checking or repairing the pump. Failure to do so may result in electric shock, or the pump suddenly starting and causing injury.
(5) Ensure that the relevant wiring is in accordance with technical standards for electrical equipment and wiring regulations. Incorrect wiring may result in fire.
(6) Always remove the power cord from the terminal before electric wiring. Connecting wiring with the power on may result in electric shock.
(7) Always ensure that the pump is correctly earthed. A dedicated earth leakage breaker is recommended. Failure to earth the pump correctly may result in electric shock if a fault or earth leakage occurs.
(8) Use the pump only at the rated voltage. Use at other than the rated voltage may interfere with operation of the overload protection device, and this may result in the motor burning out, or fire.
(9) Do not damage, modify, pull the power cord, or place objects on it. Damage to the cord may result in electric shock or fire.

⚠ Warning

Power Supply



(10)When attaching the main power cord to the pump, please use the power cord which meets the rated voltage and current, pursuant to the provision.
4-Core-cable(Size of the wire lead: 1.0mm² or larger, 300V or more, 10A or more, 100℃ or higher, one earth cable included)
Ensure that one of the core wires is used as an earth wire. Firmly attach the 6 - 12mm diameter Cable gland compatible cable fitted with the appropriate terminals (M3 terminal block screws) to a terminal block.
Tighten the cap of the cable gland by max 2.5N·m.
Failure to follow these requirements may result in electric shock.
Wiring and ground construction should be done subject to your local law and the safety requirements.
The wire with insulation having an outer surface that is green with or without yellow stripes is the grounding wire.

(11)Switch off the main power supply, before disconnecting the power wire from the pump. Failure to do so may result in electric shock.

(12)Touching the power cord with wet hands may result in electric shock.

(13)Touching electrical wiring etc while inserting the power cord may result in electric shock.

(14)The electric motor fitted to this pump incorporates a thermal protector; however it is not guaranteed to be open when it eventually fails at some time. For safety reasons therefore, it is necessary to fit an overload (over current), protection device and an earth leakage breaker.

Operation

(15)This pump is not designed to be explosion-proof. When using the pump, ensure that there are no inflammable materials such as solvents, or explosive gases, in the vicinity. Use under such conditions may result in injury or fire.

(16)Inserting fingers or objects into the motor inlet may result in electric shock, injury, or fire.

(17)Operating the pump with the discharge outlet blocked, or with a device which prevents passage of gas to the discharge outlet, may result in rupture of the pump. The internal pressure of the pump rises and the pump body may rupture and the motor become overloaded.
This pump is not designed to be pressure-resistant. The internal pressure of the pump is limited to 0.03 MPa (gauge pressure).

Maintenance and Repair

(18)The pump should be dismantled or repaired only by a repair technician trained by the manufacturer.

(19)To prevent ingestion of microscopic particles resulting from wear of components, use a dust mask and gloves during repair work.

⚠ Caution

Installation

(1) The fine clearances used in this pump require that the following conditions be satisfied during storage, installation, and operation.
   1. Ambient temperature of 7~40°C and maximum relative humidity of 85% during operation.
   2. Equal to or less than meters above the sea level 1000m storage and operation.
   3. Other conditions for storage and operation.
      a) Level floor of sufficient strength.
      b) No condensation
      c) Dust-free environment
      d) Well ventilated
      e) Environment free of corrosive or explosive gas.
      f) Not subject to direct sunlight.
      g) No danger of fire.
      h) Maximum ambient temperature of 40°C during assembly of pump.
      i) Free of soot and oil.
      j) Free of splashing or flooding.
      k) Keep it indoor ventilated.
      l) When installing the pump, avoid mounting a vacuum pump directly on the base. Employ anti-vibration rubber between the base and the vacuum pump.

(2) To prevent back injury, always use both hands to lift pumps.
(3) Microscopic particles resulting from wear of components are discharged from the outlet and contaminate the room. If necessary, connect a pipe from the discharge outlet to the outside of the building.

Operation

(4) Do not use in applications involving organ transplants, or contact with body fluids or living tissue.
(5) Touching rotating components (e.g. motor, main shaft, axial joints) while the pump is in operation may result in injury.
(6) The overload protector operates when the pump becomes excessively hot. Touching it in this condition may result in burns.
(7) Touching the motor while the pump is in operation or while it is still hot immediately after having been switched off may result in burns.
(8) Do not insert fingers or objects into, or peer into, the inlet or outlet during operation.
(9) Ensure that the customer installs a trap if steam is generated. Ensure that condensate does not enter the vacuum pump. A malfunction may result if condensate enters the pump.

Maintenance and Repair

(10) Dispose in accordance with legislation for disposal and cleaning of waste products, handle as industrial waste, and do not incinerate.
(11) If the pump ceases operation, turn power OFF immediately to prevent accidents, remove the power cord from the terminal, and contact your dealer or the manufacturer for inspection and repair.
(12) Leave the pump for at least 30 minutes until it has cooled, and begin operation again. Touching the pump immediately after it has stopped may result in burns.
(13) As the pump is not protected against entry of water, it is not guaranteed against splashing or flooding.

⚠ Note

Installation

(1) The pump may malfunction if it is subjected to shocks or tipped over on its side.
(2) Do not place objects on, or stand on, the pump. A malfunction may result if the pump is handled in this manner.
(3) Float the pump from the system using a rubber shock absorber; install the pump so that vibration is not transmitted to the system.
(4) By removing the fixed rubber legs, do not install the pump directly to the system. There would be a case that the pump casing is deformed and a load occurs to the motor bearing.

Applications

(5) This pump is not designed to be corrosion-proof. Use it only with clean air at normal temperature, or with gases of equivalent characteristics.
(6) Do not use the pump for pressurization (Do not use the pump with a pressurized air supply).
(7) Ingestion of liquids into the pump will result in damage and prevent proper operation. Ingestion of rubbish and dust in the air entering the pump will interfere with its proper function. If the air is likely to contain rubbish or dust, a filter should be fitted to the inlet to protect the pump.

Operation

(8) Ensure that the pump is used within an ambient temperature range of 7 - 40°C.
Use at high temperatures will dramatically reduce the life of the pump.
(9) Back pressure at the outlet while the pump is starting may overload the motor.
(10) The thermal protector operates when the pump reaches a very high temperature. Touching the pump in this condition may result in burns.

Maintenance and Repair

(11) The fine clearances used in this pump require skill in its assembly. If a repair technician is unavailable, replacement of all consumables should be left to the manufacturer’s service division.

1. Product Outline

1.1 Purpose of Use and Prohibitions

This product is a dry vacuum pump which employs reciprocating motion of a rubber diaphragm for vacuum discharge. This pump is used only with dry air or dry nitrogen as an inert gas.
Observe the following prohibitions to ensure normal operation of the pump.

＜Prohibitions＞	
⚠ **Danger**	(1) Not used with toxic gases.
⚠ **Warning**	(2) This pump employs only vacuum operation, and must not be pressurized. (3) Do not re-sell, repair, or modify this pump without the approval of the manufacturer.
⚠ **Note**	(4) This pump is not designed to be corrosion-proof. Use it only with clean air at normal temperature, or gases of equivalent characteristics. (5) Ensure that the gas entering the pump does not contain rubbish, dust, or water (except steam). (6) Do not operate the pump for long periods at near-atmospheric pressure.

1.2 Specifications

Table 1 Product Specifications

Model		DAT-50DA	DAT-100SA
Pumping Speed (L/min)	50Hz	50	100
	60Hz	55	110
Ultimate Pressure (kPa)		3.3	15.0
Motor		3ϕ, 200-220V, 150W,4P	
Rated Current (A)		0.79/0.73（50/60Hz）	
Revolution (min^{-1})		1420/1680（50/60Hz）	
Weight (kg)		12	
Suction/Exhaust Pipe		O.D. ϕ 12 × I.D. ϕ 8 (R 1 / 4)	
Operating Ambient Temperature (℃)		7 ～ 40	
Outside Dimensions(W × L × H) (mm)		214 × 232 × 290	
Installation features		Indoor use only and device built-in use only	

1.3 Thermal Protector

1) This pump is fitted with an automatic reset thermal protector for overload protection.
This device shuts off the motor power supply circuit automatically to prevent burn-out if the motor temperature rises due to a pump fault which prevents rotation, or if load becomes excessive.
Operating temperature : 120±5℃
2) It is recommended that additional protective devices (eg. earth leakage breaker, motor breaker) be fitted.

⚠ **Warning**	See Warning (8),(14) P04, 05
⚠ **Caution**	See Caution (6), P06

2. Dimensions

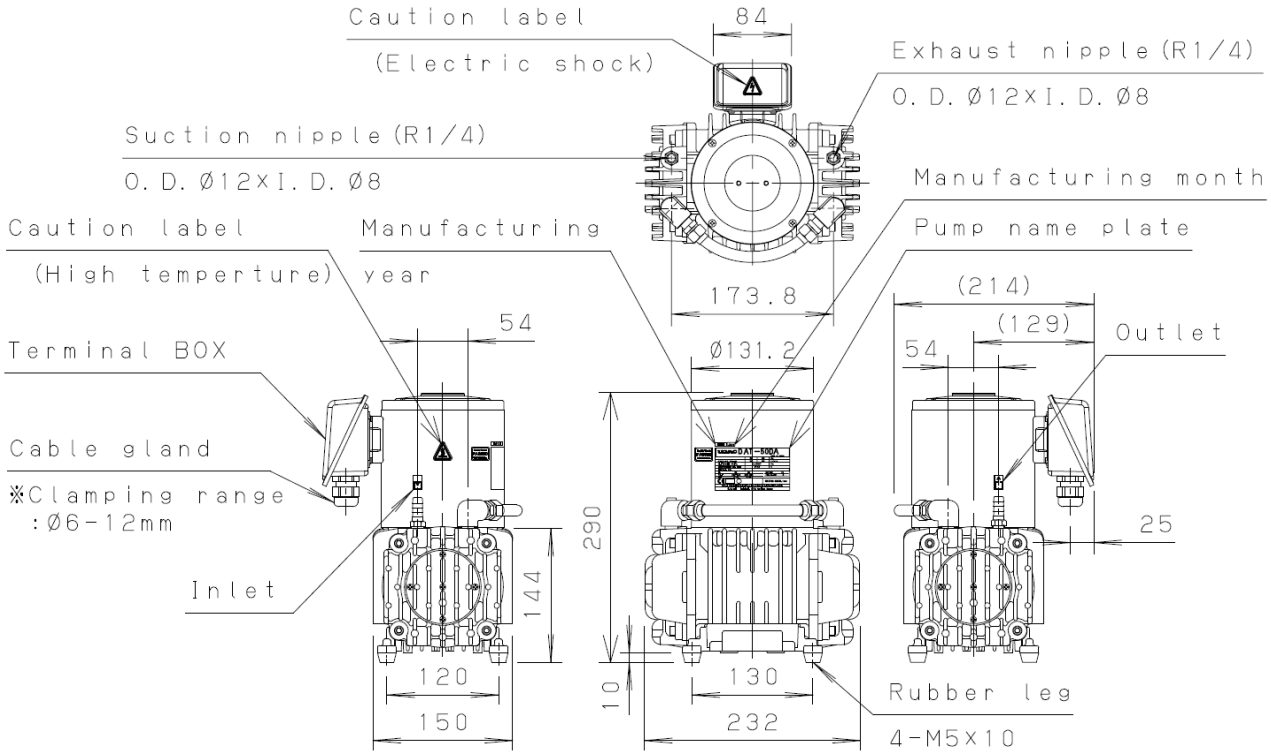


Fig.2-1 DAT-50DA Dimensions

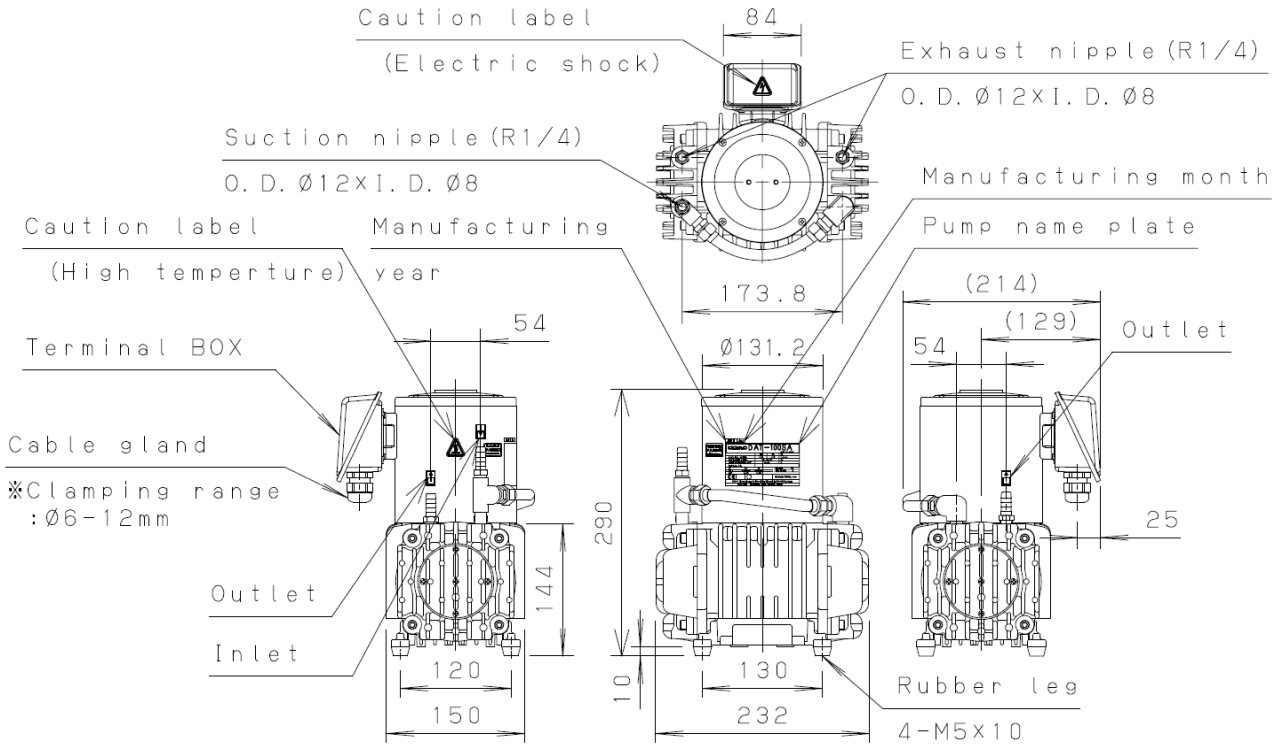


Fig.2-2 DAT-100SA Dimensions

3. Installation and Storage

3.1 Cautions for Installation and Storage

⚠ **Warning**	See Warning (1)(2)(3)(5)(7)(9)(10)(11)(12)(13)(15), P04,05
⚠ **Caution**	See Caution (1)(2)(3), P06
⚠ **Note**	See Note (1)(2)(3)(4), P07

3.2 Environmental Conditions for Installation, Storage, and Operation

The fine clearances used in this pump require that the following conditions be satisfied during storage, installation, and operation.

1. Ambient temperature of 7~40°C and maximum relative humidity of 85% during operation.
2. Equal to or less than meters above the sea level 1000m storage and operation.
3. Other conditions for storage and operation.
   a) Level floor of sufficient strength.
   b) No condensation
   c) Dust-free environment
   d) Well ventilated
   e) Environment free of corrosive or explosive gas.
   f) Not subject to direct sunlight.
   g) No danger of fire.
   h) Maximum ambient temperature of 40°C during assembly of pump.
   i) Free of soot and oil.
   j) Free of splashing or flooding.
   k) Keep it indoor ventilated.
   l) When installing the pump, avoid mounting a vacuum pump directly on the base. Employ anti-vibration rubber between the base and the vacuum pump.

3.3 Location

The pump should be installed level in a location with minimal dust and humidity. This location should be selected in consideration of ease of installation and removal, inspection, and cleaning.
Particular attention should be paid to ambient temperature when fitting the pump to equipment. Use anti-vibration rubbers to isolate the pump from vibrations in the equipment. See 3.2 Environmental Conditions for Installation, Storage, and Operation for details.

3-4 Electric Wiring

(1) The wire diameter of power cord must be 1.0mm^2 or more.
R(U) : Black, S(V) : White, T(W) : Red
(2) We recommend end-user to equip protection device such as earth leakage breaker motor breaker on electric wiring to prevent from motor burnout which may occur by over current.
(3) This pump must be connected to a grounded lead on the grounded terminal of the product.
(4) The electric wire which will be connected to the earth must be a green colored insulating coating wire, with or without yellow stripes. Its wire diameter must be 1.0mm^2 or more.
Notice: Before operating wire connection, be sure to remove the power cord.

3.5 Fluctuations in the power voltage and frequency

Standard: General rules for rotating electrical machines

IEC 60034-1:2004

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･m).

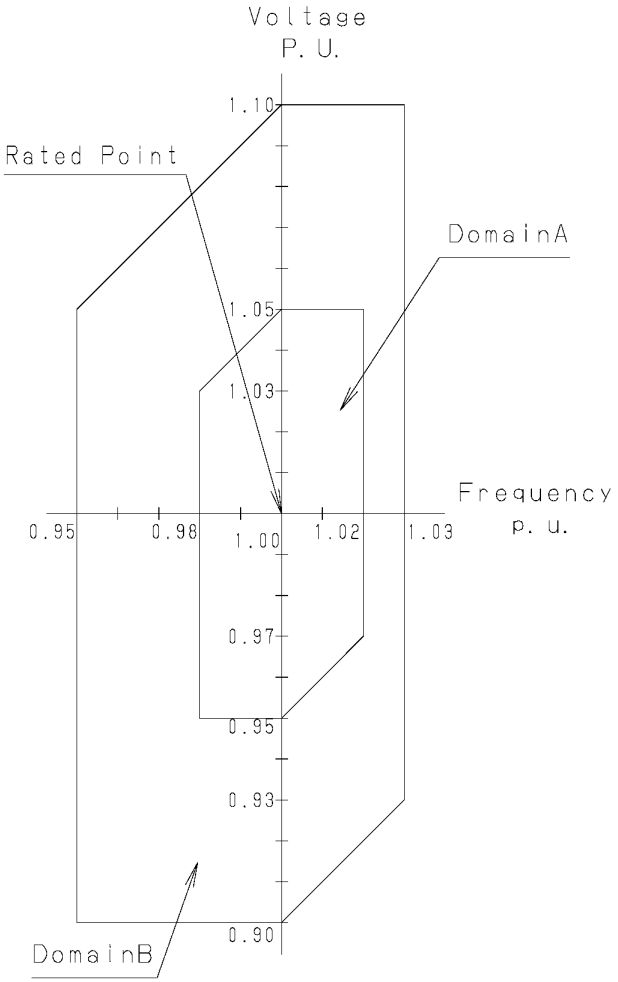


Fig. 3-1 Change region of the voltage and frequency

3.6 Checking Operation After Installation

1) Remove the rubber caps from the inlet and outlet.
2) Switch off the main power supply, before connecting the power wire from the pump.
   Note: Ensure that the power cord is sufficient for the rated voltage and current.
3) Turn the switch ON and check that gas is being drawn into the inlet.
4) When this check is complete, turn the power switch OFF to stop the pump.

3.7 Piping

1) Install piping carefully to prevent leaks.
2) Piping connected to the inlet should be at least 10 mm inside diameter.
3) Maximum back pressure is 0.03 MPa (gauge pressure).
4) In case of selecting the inlet pipe and exhaust pipe that are not from our products, please select the exhaust pipe that has same or larger inner diameter length with the inlet pipe.
5) When evacuating a vessel, ensure that a shut-off valve is placed between the pump inlet pipe and the vessel (see Fig.3-2).

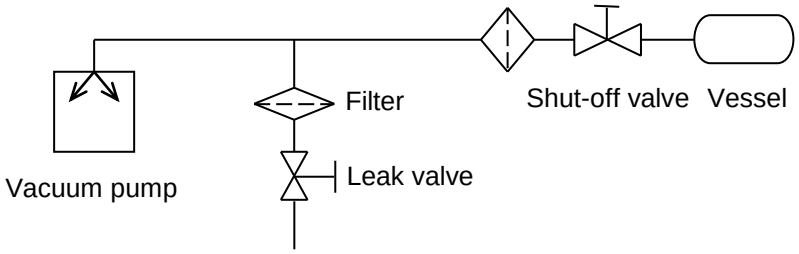


Fig.3-2 Example of Piping Used When Evacuating a Vessel

3.8 Storage

Turn the power off, remove the terminal, place the rubber caps over the inlet and outlet, and store the pump in an area of low humidity.
If the pump is stored without being operated for a long period of time, there is a possibility that it will interfere with operation due to the deterioration of the bearings and the formation of rust.
When operating the pump after long-term storage, perform jogging (repeatedly turn the power on and off three times at intervals of several seconds) to eliminate uneven grease in the bearings.
If any abnormality is found in the pump after long-term storage, please contact our service department for inspection.

4. Cautions for Operation

4.1 Cautions for Operation

⚠ **Danger**	See Danger (1)(2), P04
⚠ **Warning**	See Warning (8)(15)(16)(17), P04,05
⚠ **Caution**	See Caution (4)(5)(6)(7)(8), P06
⚠ **Note**	See Note (3)(4)(5)(6)(7)(8)(9)(10)(11), P07

Consult the manufacturer if the pump is to be used in a special application.

4.2 Operation of the Thermal Protector

1) When the thermal protector operates, switch the power OFF, remove the power cord from the outlet, and contact the manufacturer. Note that the pump will be very hot and should not be touched.
2) The pump operates automatically when temperature drops. Shut-off the power supply, and determine the cause of operation of the thermal protector.
3) Once the cause of the fault has been removed, wait until the motor cools and restart operation.

Automatic reset thermal protector : 120±5℃

⚠ Caution	See Caution (6), P06

4.3 Starting in Cold Weather

Cold weather will increase the viscosity of bearing grease and harden diaphragms, resulting in the pump being difficult to start. Follow the procedure below in such conditions.

1) Turn the switch ON/OFF 2~3 times with the inlet open to atmosphere until the pump starts. If the pump still does not start, raise the ambient temperature to beyond 7°C.
2) With the inlet open to atmosphere, run the pump for a few minutes to warm it.
3) Commence normal operation once the pump has warmed.

5. Pump Performance

5.1 Pressure Achieved

The term “pressure achieved” as employed in the catalogue and in this manual is defined as “the minimum pressure obtained by the pump without introduction of gas from the pump inlet (i.e. the no-load condition)”.

Note that the indicator values for pressure may differ between types of vacuum gauges.

The pressure achieved in practice is higher than that noted in the catalogue for the following reasons.

(1) The fact that the vacuum gauge is mounted a distance from the pump, the steam generated by water droplets and rust etc on the inside walls of the pump and piping, and a variety of gases present in the system result in increased pressure.
(2) Leaks into the vacuum system introduce other gases, resulting in increased pressure.

5.2 Evacuation Rate

The maximum rate of evacuation is reached when air is introduced, and decreases slightly as pressure is reduced.

The resistance of the piping system increases with small bore piping which extends over long distances, and this reduces the rate of evacuation.

The declared rate of evacuation for this pump is the maximum value achieved with dry air.

6. Maintenance, Inspection, and Repair

6.1. Cautions for Maintenance, Inspection, and Repair

⚠ **Danger**	See Danger (3), P04
⚠ **Warning**	See Warning (4)(18)(19), P04,05
⚠ **Caution**	See Caution (10)(11)(12)(13), P06
⚠ **Note**	See Note (11), P07

Maintenance and repair by the customer's repair technician is limited to the following procedures. Do not undertake other repairs, or make modifications other than the standard options supplied by the manufacturer.

1) Replacing diaphragms
2) Replacing air filters
3) Replacing head gaskets
4) Replacing suction / exhaust valves

6.2 Maintenance

The following checks are required at least once every three days during operation.

(1) Check for abnormal noises.
(2) Check for abnormal heating of the pump.
(3) Check that gas is discharged normally.

If a problem is found, take the measures described in 6.5 Troubleshooting List.

6.3 Regular Inspections

Inspect consumables after the first 6000 hours of operation, and replace and clean in accordance with the Replacement and Cleaning Guide on the following page. Refer to 6.4 Replacing and Cleaning Consumables for procedures.
Request replacement by the manufacturer's service division if a repair technician is not available.

Table.2 Consumables List

Components	Quantity	Material	Average life
Diaphragms	2	Synthetic rubber (EPDM) (Option NBR)	6,000～8,000hr
Air filters	2 [4]	Urethane	6,000～8,000hr
Head gaskets	2	Synthetic rubber (EPDM) (Option NBR)	6,000～8,000hr
Suction / Exhaust valves	4 [6]	SUS	6,000～8,000hr
Bearing	1set	—	15,000hr

[ ] : For DAT-100SA

Note that the average life for a component varies with the conditions of use.
Always follow 4.1 Cautions for Operation, and remember that life is extended by running the pump at minimal load (running the pump at minimal load is operation at the achieved pressure (inlet closed)).
Bearings are replaced by the manufacturer's service division.

<Replacement Guide>

Replace or clean components if performance is reduced or the following symptoms become apparent.

Table.3 Locations for Maintenance and Inspection

Period of operation	Inspection item	Replacement guidelines	Method of inspection
6,000 hours	Diaphragms	Deformation, crack, hardening	Visual inspection
	Air filters	Dirt, clogged, hardening	Visual inspection
	Head gaskets	Damage, leak	Visual inspection
	Suction / Exhaust valves	Deformation, crack	Visual inspection
	Bearing	Abnormal noises	Listen

6.4 Replacing and Cleaning Consumables

⚠ **Warning**	See Warning (19), P05
⚠ **Caution**	See Caution (11)(12), P06

※ The pump becomes very hot after operation. After stopping the pump, leave it for 30 minutes to cool, and replace and clean components only after it has cooled to a safe temperature.

※ Always put on dust mask and gloves before replacing diaphragms and valves. Any fine particles produced by mechanical wearing may become airborne causing a health risk if inhaled.

※ Always use gloves to prevent injury when replacing diaphragms.

Prepare the following tools and refer to drawing when working replacement. When having difficulty in preparing the tools, ask Ulvac Service Section.

- Tools
  1. Hexagonal wrenches : 5mm
  2. Philips screwdriver : No.2
  3. LOCTITE® agent : 242

- Tightening torque
  - Pump head ① : 13N･m（M6 ②）
  - Pump head cover ⑥ : 2N･m（M4 ⑦）
  - Diaphragm keep plate ③ : 5N･m（M5 ④）
  - Suction/exhaust valve ⑪ : 0.8N･m（M3 ⑩）

Caution: Before replacing consumable parts, be sure to turn OFF the power.

1) Replacing diaphragms

Remove the four hexagon socket head cap screws (M6×22) ② and the pump head ① should be removed. Remove the pump head and four cross-recessed countersunk head screws (M5×12) ④, and remove the diaphragm keep plate ③. Replace a total of two diaphragms ⑤, one piece each for one pump head with new ones.

Before re-assembling the diaphragm, apply a thin coat of locking agent (Locktite® 242 or the like) to the cross-recessed countersunk head screws (M5×12) ④.

2) Replacing air filters

Remove the five cross-recessed head machine screws (M4×12) ⑦, and remove the head cover ⑥.

Open piece each of gray air filter ⑨ is located in the head gasket ⑧ for one head total two [four]. Remove and replace them with new ones. [DAT-100SA has two filters at the first stages and second stages]

[ ] is DAT-100SA

3) Replacing head gaskets

Remove the five cross-recessed head machine screws (M4×12) ⑦, and remove the head cover ⑥.

Open piece each of black head gasket ⑧ is located in the head cover for one head (total two). Remove and replace them with new ones.

4) Replacing suction /exhaust valves

Remove the five cross-recessed head machine screws (M4×12) ⑦, remove the head cover ⑥ and remove the head gasket ⑧ and the air filter ⑨ should be removed.

Then remove the four hexagon socket head cap screws (M6×22) ②, and remove the pump head ①.

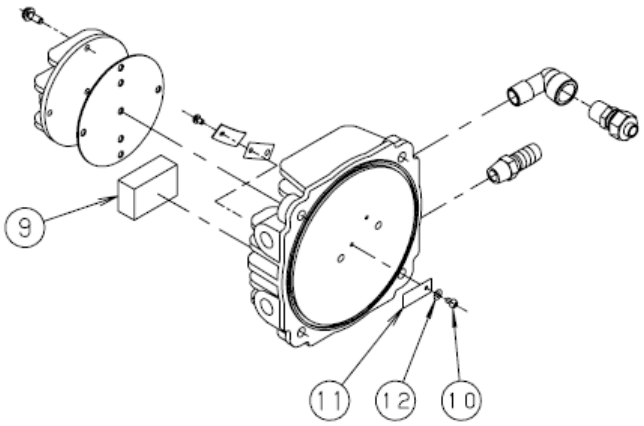
Remove a cross-recessed head machine screws (M3×5) ⑩, remove pump head both sides and replace the intake/exhaust valve ⑪, and replace with a new one.

Before reassembling the intake/exhaust valve, apply a thin coat of locking agent (Locktite® 242 or the like) to the machine screws (M3×5) ⑩.

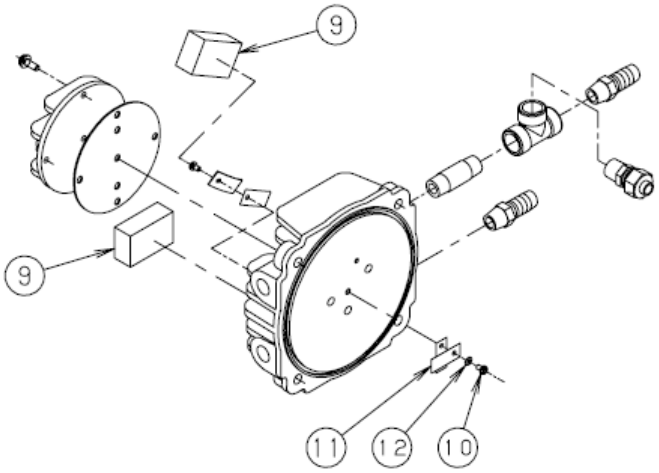
Fix the plain washer ⑫ to intake side and fix the exaust valve guard ⑬ to exhaust side.

The plain washer ⑫ places as its round corner touches intake/exhaust valve.

Similarly replace the intake/exhaust valve one side.



DAT-50D



DAT-100S

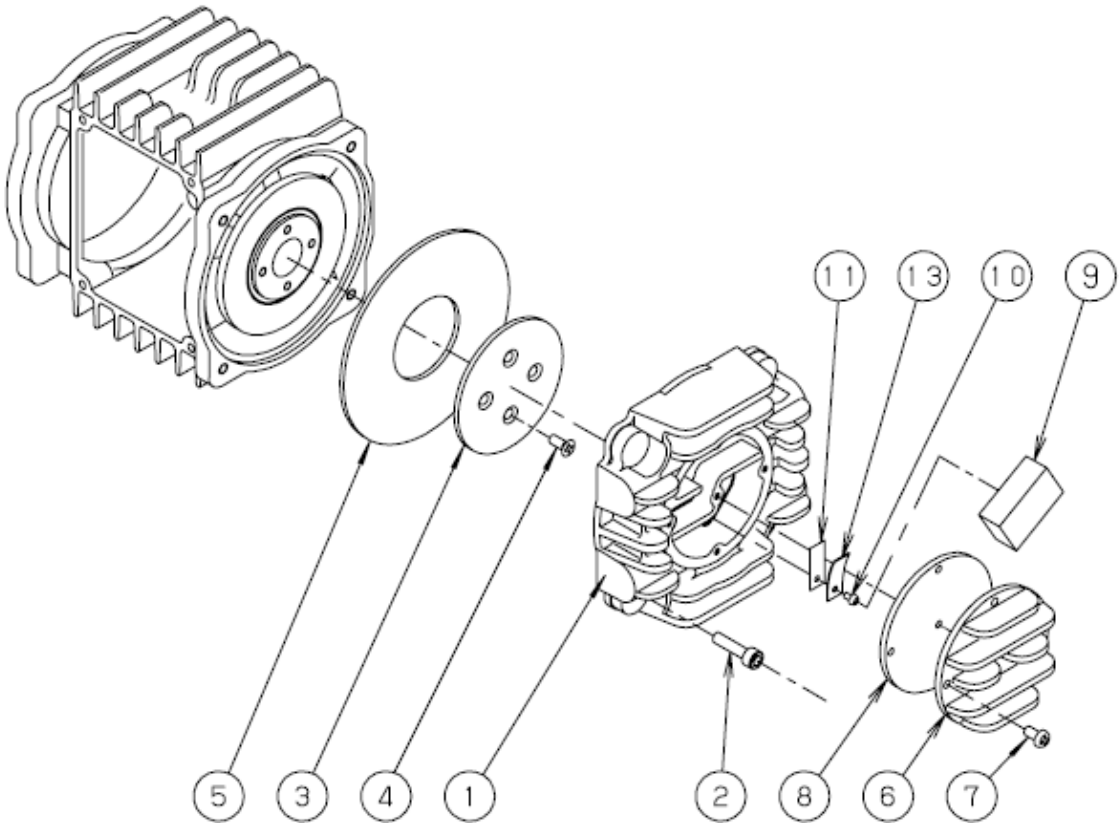


Fig.6-1 Disassembly drawing of consumable

6.5 Troubleshooting List

Table.4 Troubleshooting List

Problem	Causes	Solutions	Reference
Problems with starting and rotation of pump	(1) Not connected to power supply.	(1) Connect power supply.	
	(2) Switch is OFF.	(2) Set switch to 0N.	
	(3) Problem with power supply voltage.	(3) Ensure that voltage variation is within +/-10%.	
	(4) Problem with pump wiring.	(4) Rewire the pump. Contact the manufacturer.	3-4.
	(5) The breaker has operated.	(5) Investigate the reasons for operation.	
	(6) The thermal protector has operated.	(6) Switch power OFF, and eliminate the cause of operation of the thermal protector. Contact the manufacturer.	4-2.
	(7) Low ambient temperature.	(7) Ensure that ambient temperature is 0~40 °C.	4-3.
	(8) Low voltage.	(8) Adjust the power supply voltage, and check the power supply cable.	
	(9) Fault in power supply.	(9) Replace or repair.	
	(10) Problem with power supply switch.	(10) Replace or repair.	
	(11) Broken wire in power cord.	(11) Replace or repair.	
	(12) Problem with motor.	(12) Replace or repair.	
	(13) Damaged condenser, or connection problem.	(13) Replace or repair.	
	(14) Locked connecting rod.	(14) Disassemble pump head and check interior.	
	(15) Problem with bearings.	(15) Replace or repair.	6-4.
	(16) The air filter is blocked.	(16) Clean and replace.	
	(17) Miscellaneous damage to pump components.	(17) Disassemble and repair (replace damaged components).	6-4.
Pressure does not diminish.	(1) Pump is too small for capacity of vacuum vessel.	(1) Select another pump.	
	(2) Pressure measurement is incorrect.	(2) Measure the pressure correctly.	5-1.
	(3) Vacuum gauge is unsuitable.	(3) Measure with a calibrated vacuum gauge suitable for the pressure range.	5-1.
	(4) The inlet piping is too small in diameter, or too long.	(4) Connect piping of an inside diameter greater than the inlet diameter, or reduce the distance between the pump and vacuum vessel.	5-1.
	(5) Low voltage	(5) Adjust the voltage, and check the power supply cable.	
	(6) Ambient temperature unsuitable.	(6) Ensure that ambient temperature is 0~40 °C.	
	(7) Leaks in inlet piping.	(7) Clean and replace.	
	(8) Leaks from piping or connections.	(8) Check for leaks in piping, check diameter and length of piping, and repair.	
	(9) Foreign matter inside pump.	(9) Remove foreign matter, disassemble and clean, and replace components.	
	(10) Foreign matter inside pump.	(10) Disassemble and repair (replace valves and diaphragm etc).	6-4.
	(11) Damage to motor	(11) Replace or repair.	
	(12) Damage to valves	(12) Replace.	6-4.
	(13) Damage to diaphragm.	(13) Replace.	6-4.
	(14) Miscellaneous damage to pump components.	(14) Disassemble and repair (replace damaged components).	
Pump surfaces are abnormally hot (more than room temperature + 30 °C)	(1) Continuous operation with high pressure gas.	(1) Do not run the pump continuously at near-atmospheric pressure.	
	(2) High temperature gas.	(2) Fit cooling equipment (eg. gas cooler) to the inlet.	
	(3) Problem with power supply voltage.	(3) Ensure that voltage variation is within +/-10%.	
	(4) Motor has seized.	(4) See the section on problems with pump rotation.	

7. In Conclusion

Please contact the manufacturer's sales division if you have any questions.

Warranty

(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.

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.

Model Name: _____ Manufacturer's Serial No.:_____

1. Inhaled Gas * Please be sure to fill in.

(1) Whether there is harmful effect on human bodies Yes No (Sing your name below.)

(2) Whether there is unusual smell Yes No

(3) Type and Name of Gas: _____

* Industrial Safety and Health Law designates particular substances as the materials to be notified.

2. Usage Status

Operation Method: Approx. ( ) hours per day, ( ) years and ( ) months

□Continuous Operation □Intermittent Operation

Usage: _____

3. Failure Status □Unusual Noise □Abnormal Pressure □Abnormal Actuation □Oil Leakage

Other Symptoms: _____

4. Detail of Request □Repair (Overhaul) □Regular Checks

5. Others: _____

Company Name: Personnel in charge:

Address:

Tel: Fax: E-mail:

Agent Name; Personnel in charge:

Address:

Tel: Fax:

* In case you do not have any direct transaction with us, please be sure to fill in the agent name.

6. Confirmation

The gas and substance used in this pump or unit is harmless to human bodies, or it is not contaminated by any substance harmful to human bodies.

Signed_____(seal) Date: _____

* Please send the parcel to our Service Division. (See attached contact information.)
* In order to avoid a trouble during transportation, please evacuate oil from any oil pump before shipping.

アルバック機工株式会社
https://ulvac-kiko.com

製品情報・サービス拠点・お問い合わせはこちらから

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