



INSTRUCTION MANUAL

Diaphragm-type Dry Vacuum Pump

(For integration)

Model

D A P — 9 D — D C 2 4

D A P — 1 8 S — D C 2 4

(According to CE, UKCA, TUV, cTUVus)

Request to Users

Please read this manual thoroughly to ensure safe and effective use of the equipment.

Keep this manual in a safe place.

Due to periodic improvements in performance, the equipment described in this manual is subject to changes in dimensions and specifications without prior notice.

ULVAC KIKO,Inc.



Declaration of Conformity



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
2014/30/EU	EMC 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 : DAP-9D-DC24,DAP-18S-DC24

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
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31.Mar, 2023
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Makoto Uchimura
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We, Company:ULVAC KIKO,Inc.

of Address:291-7 Chausbaru 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:

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

Electromagnetic Compatibility Regulations 2016
(S.I. 2016 No. 1091, 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)

declare under our sole responsibility that the product,

Type of Product : Diaphragm Type Dry Vacuum Pump

Model Name : DAP-9D-DC24,DAP-18S-DC24

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

BS EN 1012-2:1996+A1:2009

Compressors and vacuum pumps – Safety requirements, Part2. Vacuum pumps

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Contents

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

Before Using the Equipment	0 1
Checks When Opening Packaging.....	0 2
Using the Pump Safety	0 3
• Safety Symbols.....	0 3
• Cautions for Safety in Use.....	0 4
1.Product Outline	1
1.1 Purpose of Use and Prohibitions.....	1
1.2 Specifications	1
1.3 Thermal Protector	1
2.Dimensions	2
3.Installation and Storage	4
3.1 Cautions for Installation and Storage	4
3.2 Environmental Conditions for Installation, Storage, and Operation	4
3.3 Location.....	4
3.4 Electric wiring.....	4
3.5 Fluctuations in the power voltage.....	5
3.6 Checking Operation After Installation.....	5
3.7 Piping	6
3.8 Storage.....	6
4.Cautions for Operation	6
4.1 Cautions for Operation.....	6
4.2 Starting in Cold Weather.....	6
5.Pump Performance	7
5.1 Pressure Achieved.....	7
5.2 Evacuation Rate	7
5.3 Power Requirements	7
6.Maintenance, Inspection, and Repair	8
6.1 Cautions for Maintenance, Inspection, and Repair.....	8
6.2 Maintenance	8
6.3 Regular Inspections	8
6.4 Replacing and Cleaning Consumables	1 0
1) Diaphragm Replacement	1 0
2) Head Gasket Replacement	1 0
3) Suction/Exhaust Valve Replacement	1 0
6.5 Troubleshooting List	1 2
7.In Conclusion	1 3
• Warranty.....	1 3
• Usage Status Check Sheet	
• Product information, service bases, and contact information	

Figures and Tables

Fig.2.1 DAP-9D-DC24 Dimensions	2
Fig.2.2 DAP-18S-DC24 Dimensions	3
Fig.3.1 Change region of the voltage and frequency	5
Fig.3.2 Example of Piping Used When Evacuating a Vessel.....	6
Table 1.1 Product Specifications	1
Table 6.1 Consumables List.....	9
Table 6.2 Locations for Maintenance and Inspection	9
Table 6.3 Troubleshooting List.....	1 2

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

No part of this manual may be copied for use by a third party without the express permission of the manufacturer.

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 ----- x1

- (3) Is the pump damaged in any way?
- (4) Are any external screws loose? Are any components missing?

Contact your agent or the sales division of the manufacturer if there are any problems with 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 symbols 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 Temperature

The surface of some parts of the part reach temperature of more than 60°C during operation. Do not touch. It may lead to burns.

• 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) Not be used with toxic gases. 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 pump is freely ventilated to prevent overheating which may result in fire or burns.
- (4) This product is suitable for use in industrial areas. In residential areas this product may cause radio interference in which case the user(or Installer of the final product) may be required to take adequate measures.
Information for Electromagnetic compatibility (EMC)
Compliance standard
[Emission] EN 61000-6-4:2007+A1:2011
[Immunity] EN 61000-6-2:2005

Power Supply

- (5) Set up the overcurrent protective device(ex. Circuit breaker(3A)) for power supply. And always turn off the overcurrent protective device before checking or repairing the pump. Failure to do so may result in the pump suddenly starting and causing injury.
- (6) Ensure that the relevant wiring is in accordance with technical standards for electrical equipment and wiring regulations. Incorrect wiring may result in fire.
- (7) Use the pump only at the rated voltage. Use at other than the rated voltage may result in the motor burning out, or fire.
- (8) Do not damage, modify, pull the lead wire, or place objects on it. Damage to the lead wire may result in fire.
- (9) Lead wire must be routed and protected so that damage to conductor insulation cannot result from contact with any rough, sharp edge, or moving part. And lead wire must be avoided from the mechanical stress.
- (10)The power supply must use the SELV power supply or Limited Current Circuits. SELV and Limited current circuits are defined by IEC/EN60950-1.
- (11)Do not pull the lead wire to disconnect from the power source, as it may cause breakage resulting in leakage, and fire.
- (12)Do not touch the lead wire with wet hands .

Warning

Power Supply

- (13) Due to the safety function on the driver board, this pump automatically stop when it detects overloading or locked state. For better safety, make sure that the machinery, on which the pump is mounted, is also equipped with some kind of safety device to automatically disconnect the power when it detects overloading or locked state.
- (14) The DC24V power supply must be supply from device which pump is built in.

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) 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

- (17) Always turn off the DC 24V power supply of the pump before maintenance or the 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 when replacing diaphragms and valves.

Caution

Installation

- (1) 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.
- (2) The fine clearances used in this pump require that the following conditions be satisfied during storage, installation, and operation.
 - 1. Ambient temperature of 0~40°C and maximum relative humidity of 85% during operation.
 - 2. Other conditions for storage and operation.
 - a) Level floor of sufficient strength.
 - b) No condensation
 - c) Dust-free environment
 - d) Location with no oil smoke or oil droplets.
 - e) Location with no splashes or not submerged in water.
 - f) Environment free of corrosive or explosive gas.
 - g) Not subject to direct sunlight.
 - h) No danger of fire.
 - i) Maximum ambient temperature of 40°C during assembly of pump.
 - j) Instead of installing the vacuum pump directly onto a base, always place a vibration absorption rubber mat between the pump and the base.
 - k) Well ventilated

Caution

Operation

- (3) Touching rotating components (e.g. motor, main shaft, axial joints, cooling fan) while the pump is in operation may result in injury.
- (4) 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.
- (5) Do not insert fingers or objects into, or peer into, the inlet or outlet during operation.
- (6) If vapors are emitted in abundance during operation, place a steam trap as a countermeasure. Make sure that no condensate water penetrates the vacuum pump, as it may cause malfunction.
- (7) Do not give a fan cover part a shock. If you give a shock, stop driving promptly, and confirm that a fan cover and a fan do not have damage. When a fan cover runs in a damaged state, you may result in injury.

Maintenance and Repair

- (8) If the pump ceases operation, turn power OFF immediately to prevent accidents, and contact your dealer or the manufacturer for inspection and repair.
- (9) 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.

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) When carry a pump, do not have a fan cover. A fan cover may be damaged.

Applications

- (4) This pump is not designed to be corrosion-proof. Use it only with clean air at normal temperature, or with gases of equivalent characteristics.
- (5) This pump is designed solely for vacuum extraction. Operation for long periods at near-atmospheric pressures may result in a malfunction.
- (6) 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.
- (7) Entry of gases containing dust and particles may prevent normal operation of the pump.

Operation

- (8) Use the pump within an ambient temperature range of 40°C. Use at high ambient temperatures will dramatically reduce the life of the pump.
- (9) Back pressure at the outlet while the pump is starting may overload the motor.

Maintenance and Repair

- (10) 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.

Observe the following prohibitions to ensure normal operation of the pump.

Prohibitions

Warning

- (1) This pump employs only vacuum operation, and must not be pressurized.
- (2) Do not re-sell, repair, or modify this pump without the approval of the manufacturer.

Note

- (3) This pump is not designed to be corrosion-proof. Use it only with clean air at normal temperature, or gases of equivalent characteristics.
- (4) Do not attempt to discharge gases containing particles, dust, water, or corrosive gases.
- (5) Do not operate the pump for long periods at near-atmospheric pressure.

1.2 Specifications

Table 1.1 Product Specifications

Model	D A P - 9 D - D C 2 4	D A P - 1 8 S - D C 2 4
Motor	1 4 W, 4 P	
Input Voltage	D C 2 4 V (±10%)	
Rated current (A)	1 . 3	1 . 4
Speed (rpm)	1 7 0 0	
Discharge rate (L/minute)	9 . 0	1 8 . 0
Ult.P.(kPa)	6 . 6 5	2 4 . 0
Noise level (dB(A))	5 5 or less (Ultimate pressure at 1m.)	
Inlet and outlet	R c 1 / 8	
Weight (kg)	1 . 7 5	
Air temperature (°C)	0 ~ 4 0	
Dimensions (mm)	8 3 . 5 (W) × 1 6 5 (L) × 1 2 3 . 8 (H)	
Pollution Degree	2	
IP Class	1 0	
Installation features	For integration	

1.3 Thermal Protector

- 1) This vacuum pump has a safety function, which cuts off output of pump within 2 seconds of its stoppage due to malfunction or overloading.
- 2) This vacuum pump has a safety function for overcurrent, which automatically turns off the pump upon detecting current higher than 3 A.
- 3) When the safety function operates, turn power OFF immediately to prevent accidents. And contact your dealer or the manufacturer for inspection and repair.

2. Dimensions

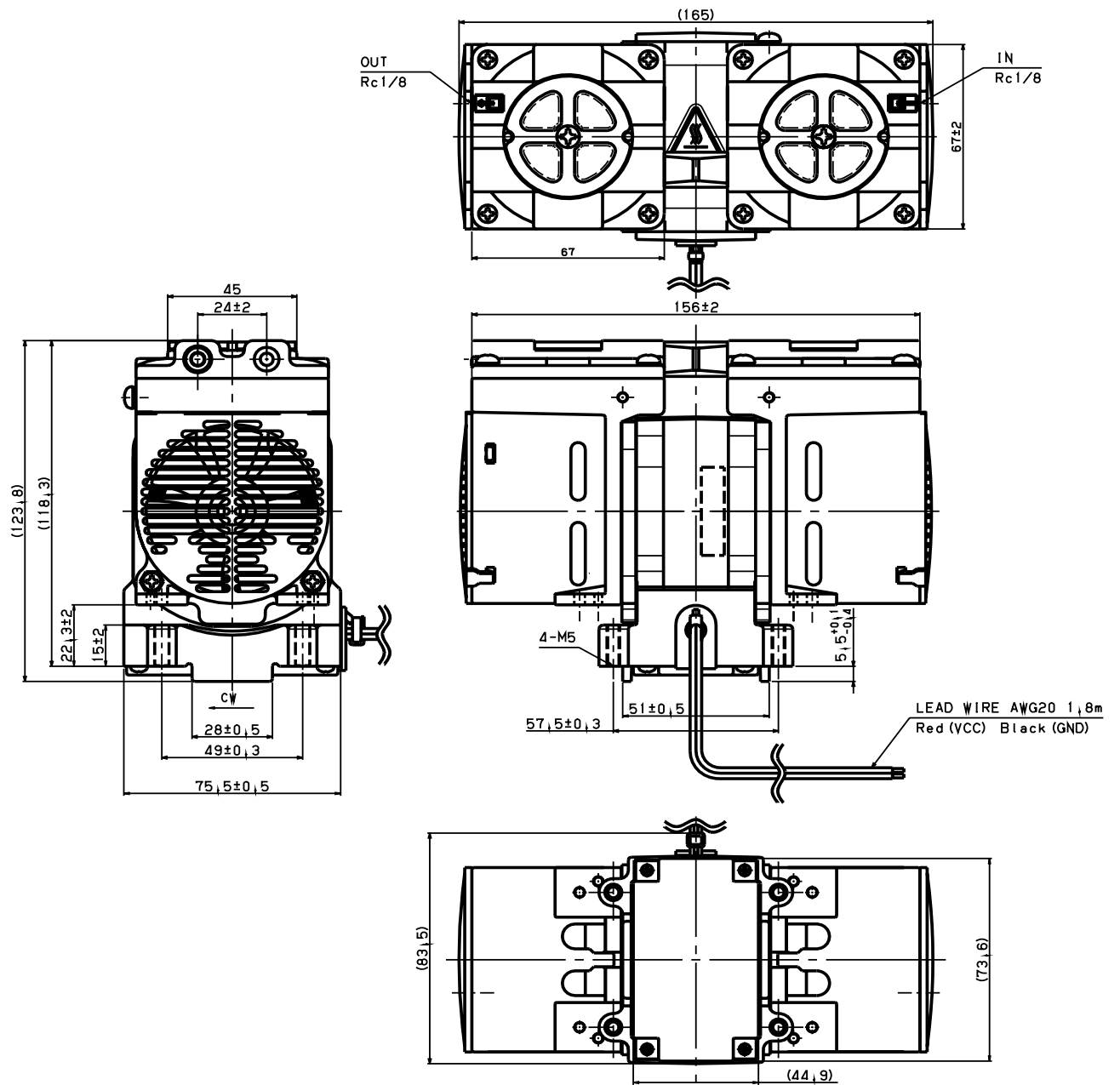


Fig.2.1 DAP-9D-DC24 Dimensions

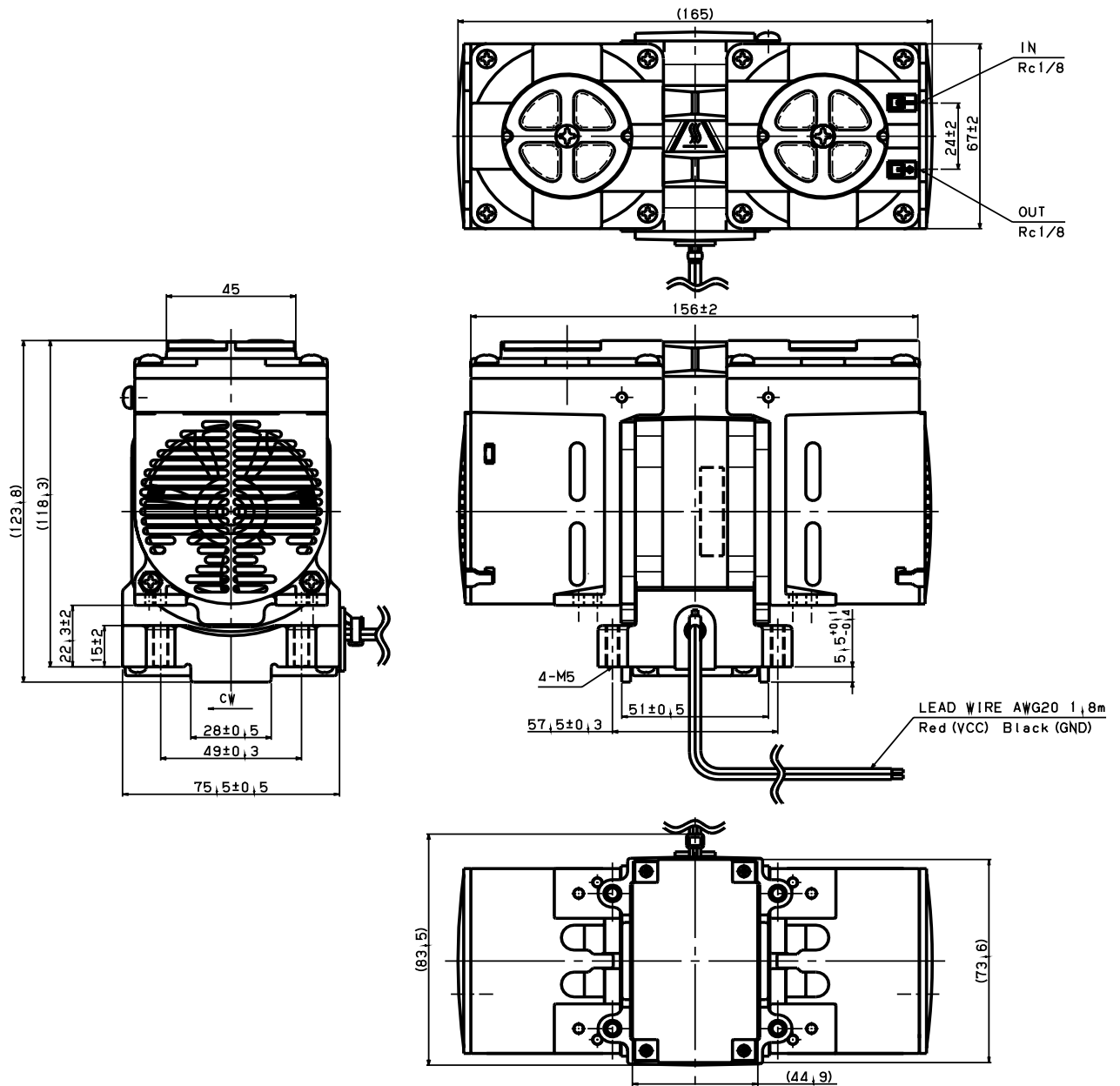





Fig.2.2 DAP-18S-DC24 Dimensions

3. Installation and Storage

3.1 Cautions for Installation and Storage

 Warning	See Warning (1)(2)(3)(4)(6)(7)(8)(9)(10) (12) (13), P04 to P05
 Caution	See Caution (1)(2), P05
 Note	See Note (1)(2)(3), 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 0~40°C and maximum relative humidity of 85% during operation.
2. Other conditions (during storage and operation).
 - a) Level floor of sufficient strength.
 - b) No condensation
 - c) Dust-free environment
 - d) Location with no oil smoke or oil droplets.
 - e) Location with no splashes or not submerged in water.
 - f) Environment free of corrosive or explosive gas.
 - g) Not subject to direct sunlight.
 - h) No danger of fire.
 - i) Maximum ambient temperature of 40°C during assembly of pump.
 - j) Instead of installing the vacuum pump directly onto a base, always place a vibration absorption rubber mat between the pump and the base.
 - k) Well ventilated

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.

And secure the space of the pump and the wall (or other equipment) by 50mm or more.

See 3.2 Environmental Conditions for Installation, Storage, and Operation for details.

3.4 Electric wiring

- 1) Wiring construction should be done subject to the laws of each area this pump is used.
- 2) Lead wire must be routed and protected so that damage to conductor insulation cannot result from contact with any rough, sharp edge, or moving part. And lead wire must be avoided from the mechanical stress.
- 3) When installing the switch into circuit, install into plus line side.

3.5 Fluctuations in the power voltage

Standard: General rules for rotating electrical machines

IEC 60034-1:2004

To the voltage change in Domain A, in main rated values, it operates continuously, and can be used practically convenient, and to the voltage 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).

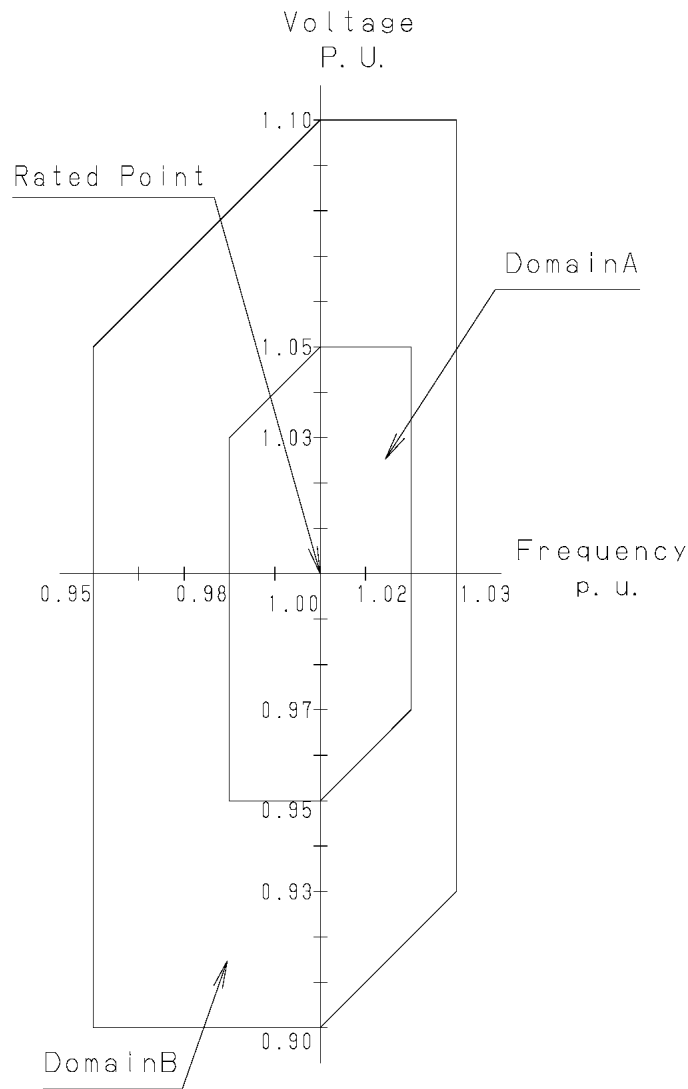


Fig. 3.1 Change region of the voltage and frequency
(It applies only to the voltage)

3.6 Checking Operation After Installation

- 1) Make sure that power is turned "OFF" before connecting the power cord to a power source that meets the voltage requirement for motor.

Caution: Always use a power cord that meets the voltage and current requirements.

- 2) Turn "ON" the power to check that the vacuum pump is working.
- 3) After the pump has been checked, turn "OFF" the power.

3.7 Piping

- 1) Install piping carefully to prevent leaks.
- 2) Make sure to fix the suction/exhaust tube to the suction/exhaust outlet at the torque of 6 N·m. If it is tightened at a higher torque, the suction/exhaust outlet may get damaged.
- 3) Ensure that piping connected to the outlet does not cause back pressure. 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). Also, please use a leak valve to prevent start-up failure due to vacuum start.

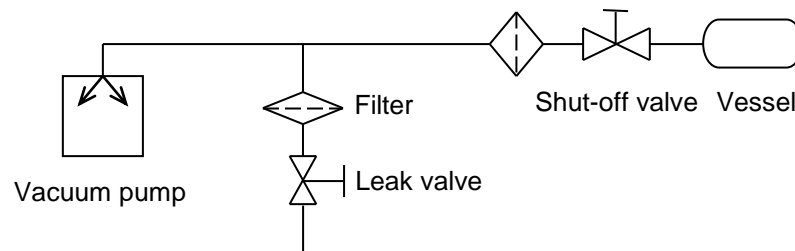






Fig.3.2 Example of Piping Used When Evacuating a Vessel

3.8 Storage

Always store in a dry place.

4. Cautions for Operation

4.1 Cautions for Operation

 Danger	See Danger (1)(2), P04
 Warning	See Warning (7)(15)(16), P04 to P05
 Caution	See Caution (3)(4)(5)(6), P06
 Note	See Note (4)(5)(6)(7)(8)(9), P07

4.2 Starting in Cold Weather

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

Make sure to use it in within the operating temperature range.

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 . Note that the indicator values for pressure may differ between types of vacuum gauges. Pressure achieved in practice, occasionally becomes 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 rate of evacuation for the pump varies with the type of gas entering the inlet, and its pressure. 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.

5.3 Power Requirements

The power required to drive the pump is the total of the work required to overcome the rotational resistance of the pump (mechanical work), and the work required to compress the air (compression work), and is at a maximum at an inlet pressure of $4 \times 10^4 \sim 6 \times 10^4$ Pa. At pressures below this range the compression work is considerably reduced and power is expended in mechanical work.

6. Maintenance, Inspection, and Repair

6.1. Cautions for Maintenance, Inspection, and Repair

 Danger	See Danger (3), P04
 Warning	See Warning (5)(17) (18)(19), P04 to P05
 Caution	See Caution (8)(9), P06
 Note	See Note (10), 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) Diaphragm Replacement
- 2) Head Gasket Replacement
- 3) Suction/Exhaust Valve Replacement

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 10000 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.

<Consumables List>

Table 6.1 Consumables List

Components	Quantity	Material	Average life
Diaphragms	2	Synthetic rubber (EPDM)	10000 h
Valves	4	Synthetic rubber (FPM)	10000 h
Head gaskets	2	Synthetic rubber (EPDM)	10000 h
Bearings	1 set	———	10000 h

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.

See [Sales, Service agency, and the where to make contact] of the end of instruction manual.

<Replacement and Cleaning Guide>

Diaphragms : Replace if deformed, hard, or cracked.

Valves : Replace if deformed, hard, or cracked.

Head Gaskets : Replace if hard, cracked, or stretched.

Bearings : Request manufacturer for repair if abnormal noises, or abnormal motor vibration, is noted.

<Locations for Maintenance and Inspection>

Table 6.2 Locations for Maintenance and Inspection

Period of operation	Inspection item	Inspection details	Method of inspection
10000 hours	Diaphragms	Deformed, hard, or cracked	Visual inspection
	Valves	Deformed, hard, or cracked	Visual inspection
	Head Gaskets	Stretched, hard, or cracked	Visual inspection
	Bearings	Abnormal noises	Listen

6.4 Replacing and Cleaning Consumables



Caution

See Caution (9), P06

- ① 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.
- ② Use a dust mask and gloves when replacing diaphragms and valves to prevent ingestion of fine particles in the air produced by wear of components.
- ③ Always use gloves to prevent injury when replacing diaphragms.

Use the following tools, and refer to the figure, when replacing cleaning components. Contact the manufacturer's service division for this work if the necessary tools are not available.

• Tools

1. Phillips head (+) screwdriver
 2. Torque screwdriver (+) With tightening torque between 1.2 to 1.3 N·m
 3. Torque screwdriver (+) With tightening torque between 4.0 to 4.5 N·m
 4. Torque screwdriver (Tri-wing) With tightening torque between 0.25 to 0.30 N·m
 5. Anti-loosening agent for screws Replacing diaphragm : Loctite 242 or Loctite 243
Replacing valve : Loctite 262 or Loctite 263
 6. Solvent : For cleaning. Use a solvent such as ethylalcohol which has no effect on rubber components.
 7. Paper towels etc : Used for wiping grease and dirt.
 8. Dust Mask and Gloves
- ※ Use tool Nos. 6 and 7 to wipe areas contaminated while replacing components.

1) Diaphragm Replacement

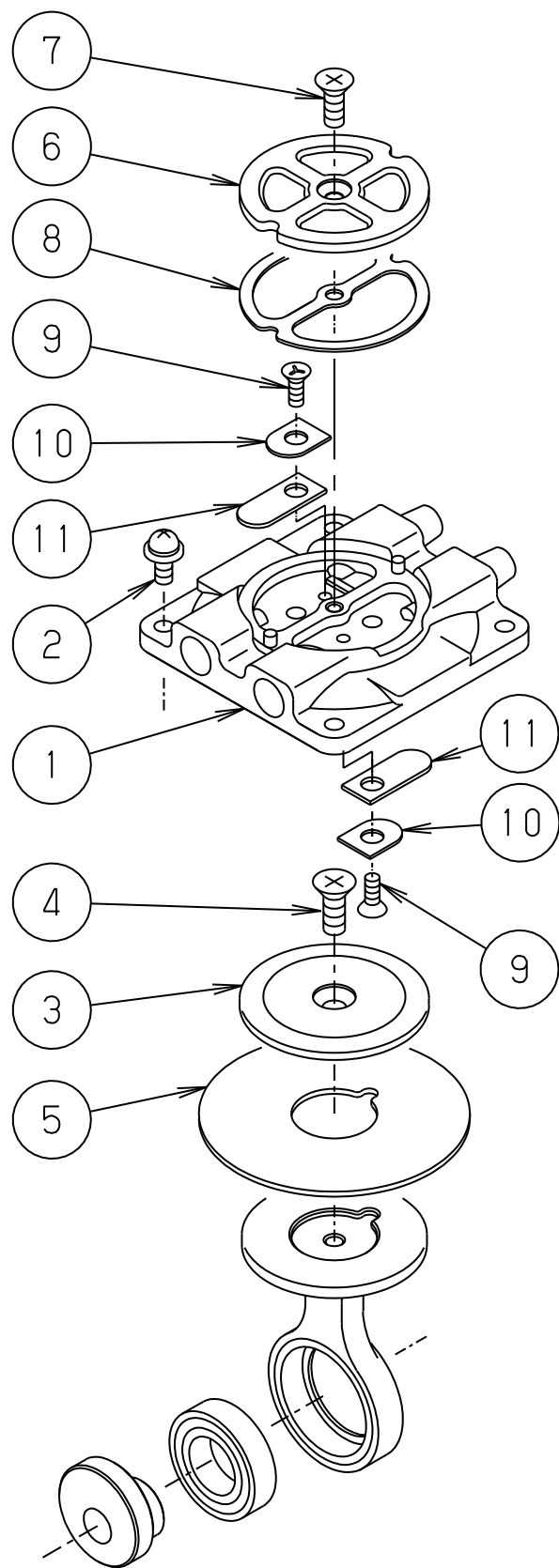
Remove the pan head Phillips screws (M4X12 (with SW)) ② at four locations on the pump head ①.
Remove the pump head ① before removing the pan-head Phillips screw (M5X12) ④ at one location on the diaphragm retaining board ③.
Replace two diaphragms ⑤, one each for the two pump heads ①.
To assemble, apply a small quantity of anti-loosening agent (Loctite 242 or 243) on 3 to 4 ridges of the pan-head Phillips screw (M5X12) ④, and then tighten it within the torque range of 4.0 to 4.5 N·m.

2) Head Gasket Replacement

Remove the pan head Phillips screw (M4X6) ⑦ at one location on the head cover ⑥.
Replace the black head gasket ⑧ under the head cover ⑥ with a new one.
There are a total of two head gaskets ⑧, one each for the two pump heads ①.
To assemble, first place the head gasket ⑧ and then the head cover ⑥ on the pump head ①, of the pan head Phillips screw (M4X6) ⑦, and then tighten it within the torque range of 1.2 to 1.3 N·m.

3) Suction/Exhaust Valve Replacement

First remove the pan head Phillips screw (M4X6) ⑦ at one location on the head cover ⑥ before removing the head gasket ⑧. Remove the pan head Phillips screws (M4X12 (with SW)) ② at four locations on the pump head ①.
Remove the tri-wing screw (M3X4) ⑨ and the valve retainer ⑩ on both sides of the pump head ①, and replace the suction/exhaust valve ⑪. There are a total of four suction/exhaust valves ⑪, two each for the two pump heads ①.
To assemble, apply a small quantity of anti-loosening agent (Loctite 262 or 263) to the tri-wing screw (M3x4) ⑨, and then tighten it within the torque range of 0.25 to 0.30 N·m.



6.5 Troubleshooting List

Table 6.3 Troubleshooting List

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



<https://showcase.ulvac.co.jp/ja/>

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