



Instruction Manual

High Vacuum Diaphragm Type Dry Vacuum Pump

DTU-20x

(X: A=100V, B=115V, C=200V, D=220V, E=230V)

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 |
| 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 | : DTU-20A, DTU-20B, DTU-20C |
| | DTU-20D, DTU-20E |

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)

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:

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)

declare under our sole responsibility that the product,

Type of Product : Diaphragm Type Dry Vacuum Pump

Model Name : DTU-20A, DTU-20B, DTU-20C
DTU-20D, DTU-20E

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

BS 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

(name, function, signature)

Makoto Uchimura

CONTENTS

| | |
|--|----|
| Before Using the Equipment | 01 |
| Checks When Opening Packaging | 02 |
| Using the Pump Safely | 03 |
| • Safety icons | 03 |
| • Cautions for Safety in Use | 04 |
| 1. Outline of Equipment | 1 |
| 1-1. Intended Use and Prohibitions of Equipment | 1 |
| 1-2. Equipment Specifications..... | 1 |
| 1-3. Protector (thermal protector)..... | 2 |
| 1-4. Gas Ballast Valve (important) | 2 |
| 2. Appearance | 3 |
| 3. Installation / Storage | 4 |
| 3-1. Precautions in Installation / Storage | 4 |
| 3-2 Installation / Storage and Ambient Condition during Operation | 4 |
| 3-3 Installation location..... | 4 |
| 3-4 Electric wiring..... | 5 |
| 3-5 Fluctuations in the power voltage and frequency | 5 |
| 3-6 Piping | 6 |
| 3-7 Storage..... | 6 |
| 4. Caution in Operation | 7 |
| 4-1 Caution in Operation..... | 7 |
| 4-2 When Thermal Protector Operated | 7 |
| 4-3 Starting in Cold Ambient..... | 8 |
| 5. Pump Performance..... | 9 |
| 5-1 Ultimate pressure..... | 9 |
| 5-2 Exhaust velocity..... | 9 |
| 5-3 Power Required..... | 9 |
| 6. Maintenance Inspection Repair | 10 |
| 6-1 Caution in Maintenance/Inspection/Repair | 10 |
| 6-2 Maintenance | 10 |
| 6-3 Periodic Inspection | 11 |
| 6-4 Replacement of Consumable Parts..... | 12 |
| 1) Replacement of diaphragm valves. It is recommended to replace all sheets at the same time..... | 13 |
| 2) Replacement of bearing | 16 |
| 6-5 Trouble Check List | 17 |

| | |
|---|-------|
| 7. In Conclusion..... | 19 |
| • Warranty..... | 19 |
| Disposal Parts Material Table Exploded view..... | 20.21 |
| • Usage Status Check Sheet (For Instruction Manual) | |
| (Please use when requesting overhaul) | |
| • Product information, service bases, and contact information | |

Drawing List

| | |
|--|----|
| Fig. 2 -1 DTU-20 Appearance | 3 |
| Fig. 3 -1 Change region of the voltage and frequency | 5 |
| Fig. 3 -2 Piping Example for Evacuation of Container..... | 6 |
| Table 1 -1 Equipment Specifications..... | 1 |
| Table 6 -1 Consumable Parts List | 11 |
| Table 6 -2 Inspection Positions and Guideline of Parts Replacement | 12 |
| Table 6 -3 Trouble Check List | 17 |

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 ----- x 1
- Inlet and outlet caps (fitted to inlet and outlet) ----- x 2

- (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

Customers purchasing the DTU-20

Do not hold or push the tube at the top of the pump while removing it from the packaging.

Damage to the tube may affect performance of the pump.

Using the Pump Safely

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 icons**

The meanings of the safety icons 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.



CAUTION TO HEAT

Temperature of some part of pump surface rises higher than 60°C (140 degF) when operated.
Do not touch the pump during operation.
There is a risk of burn.



CAUTION TO ELECTRIC SHOCK

Never fail to turn OFF the Power Supply of the pump when conducting the work related to electric wiring or electric parts.
There is a risk of electric shock.

• Cautions for Safety in Use



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 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.

Leakage rate

- (4) The amount of the leakage of this pump is recorded. Use it in consideration of the leak rate. The helium gas is used for the Leak examination. Leakage rate: 2.6×10^{-4} Pa·m³/sec
- ※ : The measurement of the amount of Leak rate the inside of the pump a vacuum and is a measurement of the amount of penetration of the helium gas.
- (5) The amount inspection of leaks (Flux inspection by the side of an exhaust gas by attainment pressure) 0.03L/min

Suck gas

- (6) The pump is not designed to prevent leakage of harmful/poisonous/toxic gas.
- (7) In case it is used with toxic/corrosive gases proper safety measures shall be implemented by the end user of which adequacy needs to be evaluated upon installation. These measures may include employment of safety ducting system, leakage detection system etc. depending on a comprehensive risk assessment
- (8) The vacuum vessel that enters the gas that influences the harmful gas or the human body like the noxious fume and the environment is exhausted in the vacuum with this pump. There is causing the poisoning accident and the fatal accident at that time when the vehicle exhaust emission of the pump is indoors opened. Please do the following countermeasure and use the pump safely.

Suck gas [corrosive gases]

- (9) It is necessary to connect the vehicle exhaust emission of the pump with a special ventilation duct or exclusion device. And, do not discharge the vehicle exhaust emission indoors.
- (10) Please confirm the thing that doesn't leak to the piping of the pump inhalation side and the exhalation side.
- (11) It is necessary to install the gas leakage detector for the suck gas on the device. When the leakage is detected, it is necessary to do the setting that intercepts the gas inflow to the pump.
- (12) Please exchange the consumable parts to prevent the leakage from the pump every 5000 hours. (The bearing is excluded.)
- (13) Please take shelter at once when the gas leaks by any chance due to the breakdown of the pump. And, please ventilate the air in the room enough. Moreover, please enter the room of the device after wearing the hazard mask when you confirm the device. Do not detach the hazard mask until safety is confirmed.

Suck gas [flammable gases]

- (14) The mixed gas within the range of the explosion prohibits exhausting.
- (15) It is necessary to connect the vehicle exhaust emission of the pump with a special ventilation duct or combustion device. And, do not discharge the vehicle exhaust emission indoors.
- (16) Please confirm the thing that doesn't leak to the piping of the pump inhalation side and the exhalation side.
It is necessary to install the gas leakage detector for the suck gas on the device. When the leakage is detected, it is necessary to do the setting that intercepts the gas inflow to the pump. Please exchange the consumable parts to prevent the leakage from the pump every 5000 hours. (The bearing is excluded.)

Danger

- (17) Please take shelter at once when the gas leaks by any chance due to the breakdown of the pump. And, please ventilate the air in the room enough. Moreover, please enter the room of the device after wearing the hazard mask when you confirm the device. Do not detach the hazard mask until safety is confirmed.

Suck gas [explosive gases]

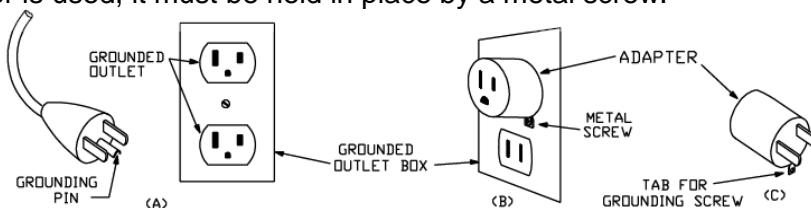
- (18) No explosive gases in side the pump.

Suck gas [Poisonous gases]

- (19) It is necessary to connect the vehicle exhaust emission of the pump with a special ventilation duct or exclusion device. And, do not discharge the vehicle exhaust emission indoors.
- (20) Please confirm the thing that doesn't leak to the piping of the pump inhalation side and the exhalation side.
- (21) It is necessary to install the gas leakage detector for the suck gas on the device. When the leakage is detected, it is necessary to do the setting that intercepts the gas inflow to the pump.
- (22) Please exchange the consumable parts to prevent the leakage from the pump every 5000 hours. (The bearing is excluded.)
- (23) Please take shelter at once when the gas leaks by any chance due to the breakdown of the pump. And, please ventilate the air in the room enough. Moreover, please enter the room of the device after wearing the hazard mask when you confirm the device. Do not detach the hazard mask until safety is confirmed.

Grounding Instructions [Plug]

- (24) This product must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. If the product 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.
- (25) Improper installation of the grounding plug can result in a risk of electric shock. If repair or replacement of the cord or plug is necessary, 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.
- (26) 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.
- (27) DTU-20B is for use on a nominal 115_V circuit, and has a grounding plug similar to the plug illustrated in sketch A in figure. A temporary adapter similar to the adapter illustrated in sketches B and C may be used to connect this plug to a 2_pole receptacle as shown in sketch B when a properly grounded outlet (sketch A) is installed by a qualified electrician. The temporary adapter shall be used only until a properly grounded outlet (sketch A) is installed by a qualified electrician. The green colored rigid ear, lug, or similar part extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box cover. Whenever the adapter is used, it must be held in place by a metal screw.



Quotation from UL1450

Grounding Instructions [Field Wiring]

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

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.
Open the distance from the shield to the ventilation entrance part for the fan by 3.5cm or more when you set it up.

Power Supply

- (4) Always remove the power cord from the wall socket 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) Remove the power cord from the wall socket before connecting any 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) This pump has thermal protector. But it is detect of temperature only. Overcurrent protection shall be installed at the final installation.
- (9) Use the pump only at the rated voltage. Use at other than the rated voltage will interfere with operation of the overload protection device, and this may result in the motor burning out, or fire.
- (10) Do not damage, modify, pull the power cord, or place objects on it. Damage to the cord may result in electric shock or fire.
- (11) Always fully insert the power cord into the socket. Partial insertion may result in electric shock.
- (12) Remove the cord from the socket while holding the plug. Failure to do so may result in electric shock.
- (13) Touching the power cord with wet hands may result in electric shock.
- (14) Touching electrical wiring etc while inserting the power plug may result in electric shock.

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. The internal pressure of the pump rises 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).
- (18) Do not use it for the human body.
And do not use in applications involving organ transplants, or contact with body fluids or living tissue.

Maintenance and Repair

- (19) The pump should be dismantled or repaired only by a repair technician trained by the manufacturer.
- (20) 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 5°C to 40°C in temperature, Lower than 85% (relative humidity) in humidity.
 2. Other conditions for storage and operation.
 - a) Level floor of sufficient strength.
 - b) No condensation
 - c) Dust-free environment
 - d) For indoor use only.
 - e) Well ventilated.
 - f) No explosive gas.
 - g) No direct sun rays.
 - h) No danger of fire.
- (2) To prevent back injuries, always use at least both hands when lifting and moving the pump.
- (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.
- (4) Install the main disconnection (suitable plug or switch/circuit breaker) device for safety.

Operation

- (5) Touching rotating components (eg motor, main shaft, axial joints, cooling fan) 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.

Maintenance and Repair

- (9) Dispose in accordance with legislation for disposal and cleaning of waste products, handle as industrial waste, and do not incinerate. **Toxic fluorine gas is generated by incineration of fluorine-based plastics.**
- (10) If the pump ceases operation, turn power OFF (set switch to O) immediately to prevent accidents, remove the power cord from the wall outlet, and contact your dealer or the manufacturer for inspection and repair.
- (11) 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 hold or push the tube at the top of the pump (see below). Damage to the tube may affect performance of the pump.

Applications

- (3) This pump is not designed to be corrosion-proof. Use it only with clean air at normal temperature, or with gases of equivalent characteristics.
- (4) This pump is designed for general corrosion resistance, however it is not resistant to molten alkali metals such as molten sodium, to fluorine at high temperatures, and to some oxides of fluorine.
- (5) Corrosion-resistant plastic is used in the external covering of the DTU-20, however it is not resistant to all chemicals.
Ensure that the following chemicals do not come in contact with the pump. Any chemical, including the following, which comes into contact with the pump should be wiped off immediately.
 - Strong acid • Acetone • Ethyl ether • Ethyl acetate • Animal fats

Installation

- (6) Ingestion of liquids or compressed and gases into the pump will result in damage and prevent proper operation.
- (7) 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.
- (8) Ducting should always be fitted to the pump outlet if toxic corrosive gases, or steam, enters the pump.

Operation

- (9) Use the pump within an ambient temperature range of 40°C. Use at high ambient temperatures will dramatically reduce the life of the pump.
- (10) Back pressure at the outlet while the pump is starting may overload the motor.
- (11) The thermal protection relay operates when the pump reaches a very high temperature. Touching the pump in this condition may result in burns.
- (12) To maintain the performance of the pump, always ensure that it is cleaned internally after use. Clean by ingesting clean air for 3~5 minutes under no-load conditions.

Maintenance and Repair

- (13) 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. Outline of Equipment

1-1. Intended Use and Prohibitions of Equipment

This diaphragm type dry vacuum pump performs evacuation by reciprocating motion of rubber membrane (diaphragm).

PTFE (corrosion resistance resin) used for parts exposing to gas obtained superior corrosion resistance.

Please take note of the following prohibitions to use Equipment correctly.

| <Prohibitions> | |
|---|---|
|  WARNING | (1) This pump is for evacuation only. Never use for pressurization. (2) Do not do resale, repair, and remodeling that we agreed on. |
|  CAUTION | (3) Although this pump is designed for corrosion resistance specifications, corrosion resistance may not be shown exceptionally for strong acid (for example: metallic sodium), fluorine under a high temperature, and certain fluorine compound due to erosive action. (4) Although corrosion resistance resin for external packaging of DTU-20 partly, there are chemicals that erode the corrosion resistance. Prevent splashing the following chemicals on the pump. It is recommended to wipe off chemicals attached regardless description in the followings. Acetone · Ethyl ether · Ethyl acetate · Flora and fauna oil, etc. (5) Never absorb the gas that mixed dust, dust, moisture (except steam). (6) Do not operate long time in environment near the atmospheric pressure. |

1-2. Equipment Specifications



Table 1 –1 Equipment Specifications

| Model Name | | DTU-20x (X: A=100V, B=115V, C=200V, D=220V, E=230V) | | | |
|-------------------------------|------|---|---|---------------------------|--|
| Exhaust velocity | 50Hz | 20L/min | | | |
| | 60Hz | 23L/min | | | |
| Ultimate pressure | | 200Pa | | | |
| Motor | | 1φ,AC (±10%) | | | |
| | | 80W, 4 P, condenser driven, w/thermal protector (auto reset type) | | | |
| Rated current (A) | A | 100V 1.46/1.46(50Hz/60Hz) | D | 220V 0.70/0.72(50Hz/60Hz) | |
| | B | 115V 1.30/1.30(50Hz/60Hz) | E | 230V 0.67/0.68(50Hz/60Hz) | |
| | C | 200V 0.77/0.74(50Hz/60Hz) | | | |
| Rotating speed (min-1) | A | 100V 1320/1610 | D | 220V 1310/1610 | |
| | B | 115V 1295/1605 | E | 230V 1310/1610 | |
| | C | 200V 1315/1615 | | | |
| Inlet-exhaust pipe | | O.D.Φ10X I.D.Φ6(Rc1/8) | | | |
| Weight | | 7.5kg | | | |
| Operating ambient temperature | | 5~40°C | | | |
| External dimensions | | 161mm(W)327×mm(L)×217mm(H) | | | |
| Noise※ | | 52 dB(A) | | | |
| Over Voltage Category | | II | | | |
| Pollution Degree | | 2 | | | |

※ : The noise value is a value in which suction and the exhaust are put out and measured outside the measurement room.

1-3. Protector (thermal protector)

This pump is fitted with an automatic reset thermal protection relay 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.



| | |
|---|---------------------------------|
|  WARNING | See "Warning" (8) (9) on P. 06. |
|  CAUTION | See "Caution" (6) on P. 07. |

1-4. Gas Ballast Valve (important)

Standard equipment of this pump includes a gas ballast valve. This valve is effective when absorbing condensable gas such as steam or solvent vapor. There are cases that ultimate pressure of the pump becomes high after the condensable gas was absorbed as the condensable gas is changed to liquid state and remains in the pump chamber.

When air is inhaling from the gas ballast valve just before of the compression process of the pump, the condensable gas shall be exhausted with air via an exhaust valve without changing to the liquid state. However, the condensable gas remains in the pump chamber if large quantity of condensable gas is exhausted or after having exhausted condensable gas without opening a gas ballast valve because of a limit in throughput capacity of condensable gas by the gas ballast valve

Confirm whether hazardous, explosive compound is generated or not before using the gas ballast valve.

| | |
|---|---|
|  Warning | Temperature of the vacuum pump rises when operated. Do not touch the location other than the valve when the gas ballast valve is operating. Start operation after closing the gas ballast valve always. When the gas ballast valve is used, it is generally considered that the absorbed medium reacts in the pump and exhaust vent. On that occasion, using equipment or facilities shall be damaged and there are risk of personal injury and human life. |
|  Note | In case the gas ballast valve is left open when condensable gas is not exhausting, power loss or rise of ultimate pressure shall be resulted. Close the gas ballast valve when condensable gas is not exhausting. |

2. Appearance

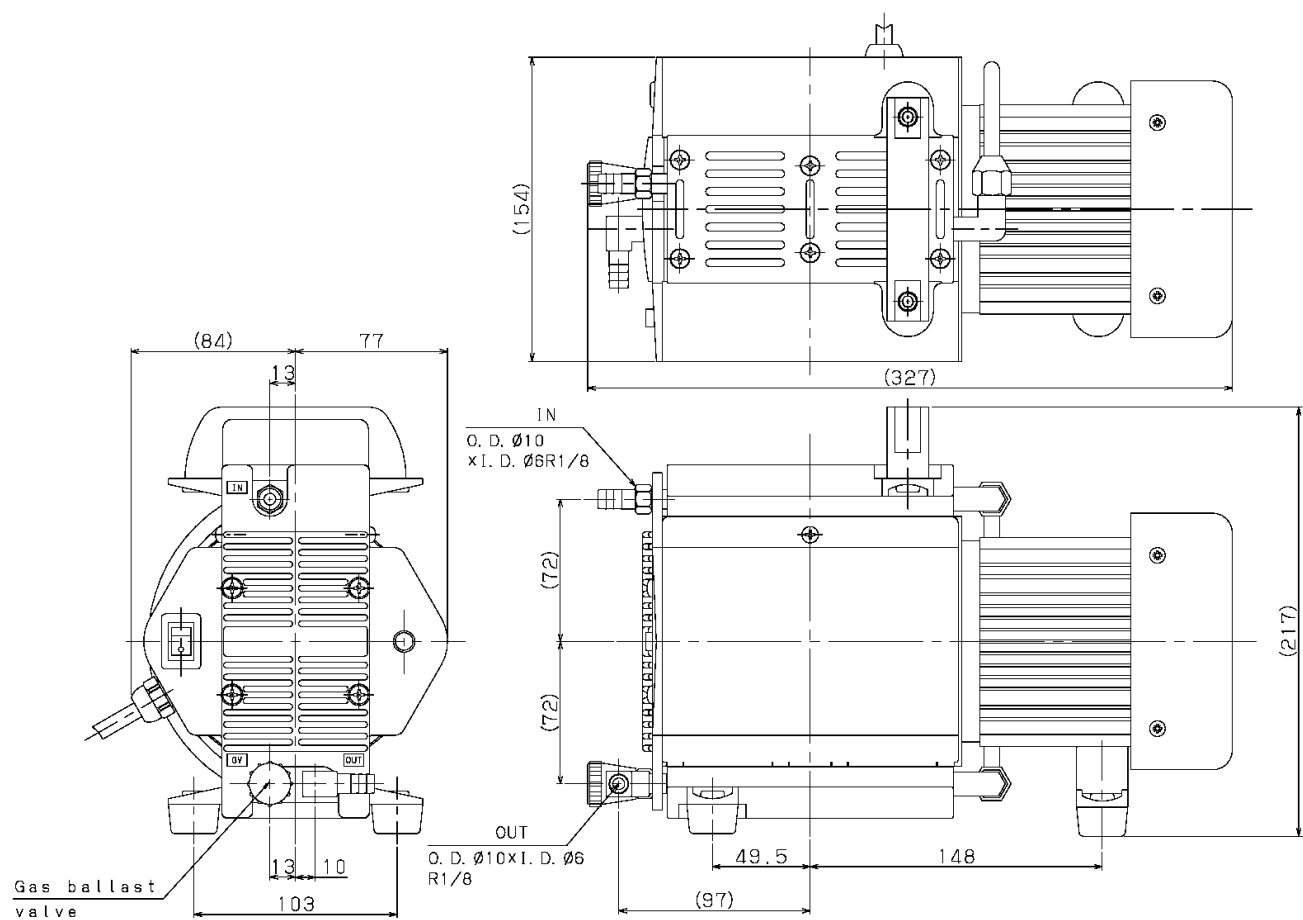






Fig2-1 DTU-20 Appearance

3. Installation / Storage

3-1. Precautions in Installation / Storage

| | |
|---|--|
|  DANGER | See "Danger" (4) (5) (6) (24) (25) (26) (27) (28) on P. 04. 05. |
|  WARNING | See "Warning" (1) (2) (3) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) on P. 06. |
|  CAUTION | See "Caution"(1) (2) (3) (4) on P. 07. |
|  Note | See "Note" (1) (2) (6) (7) (8) on P. 08. |

3-2 Installation / Storage and Ambient Condition during Operation

This pump is a machine having precise clearance. Satisfy the following requirements when conducting storing, installation and operation.

- (1) Altitude / temperature and humidity when operating
Lower than 1000 m (3281') 5°C to 40°C in temperature, Lower than 85% (relative humidity) in humidity.
- (2) Miscellaneous (applicable both storing and operation)
 - a. Level floor of sufficient strength.
 - b. No condensation
 - c. Dust-free environment
 - d. For indoor use only.
 - e. Well ventilated.
 - f. No explosive gas.
 - g. No direct sun rays.
 - h. No danger of fire.
 - i. When Equipment is installed, temperature in pump circumference shall not exceed 40°C (104 degF).

3-3 Installation location

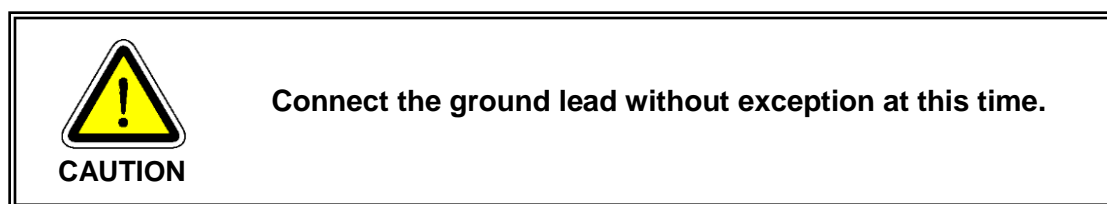
Select a location where dust and moisture are small, and install the equipment in level at the installation location. Arrange considering work such as mounting, detachment, inspection, cleaning of a pump.

In case building in equipment, pay enough attention to ambient temperature in particular. Loosen from the equipment by using a rubber cushion, etc. so that no vibration may be conveyed between the pump and equipment.

Refer "3-2 Installation / Storage and Ambient Condition during Operation" for ambient conditions.

3-4 Electric wiring

- 1) Detach rubber screen that attached to the inlet / exhaust pipe.
- 2) Confirm that the pump switch is set to OFF (pushed to ○ side) and connect it to power source.



- 3) Turn the switch ON (push to — side) and confirm the unit is absorbing.
- 4) After confirmation is finished, turn the power switch OFF (pushed to ○ side) and stop the pump operation.

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·m).

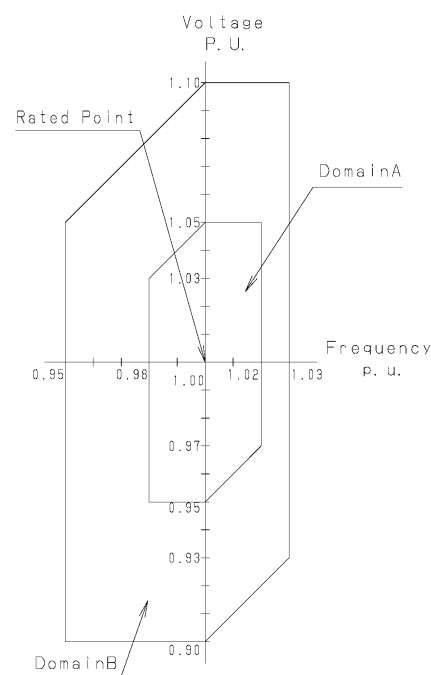


Fig. 3-1
Change region of the voltage and frequency

3-6 Piping

- 1) Connect piping tightly so that no leak is found.
- 2) Use the pipe larger than 6 mm internal diameter (close to AWG 3) for inlet / exhaust port piping.
- 3) In case the back pressure is inevitable, make it less than 0.03MPa.
- 4) Piping for evacuation of the container shall have a blocking valve as shown on Fig. 3-1 in order to maintain vacuum status between an inlet pipe and container of the pump.
- 5) 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.
- 6) **When connecting a pipe to inlet / exhaust port, always hold the inlet / exhaust port by hands.**
Also, hold the inlet / exhaust port by hands when detach the pipe.

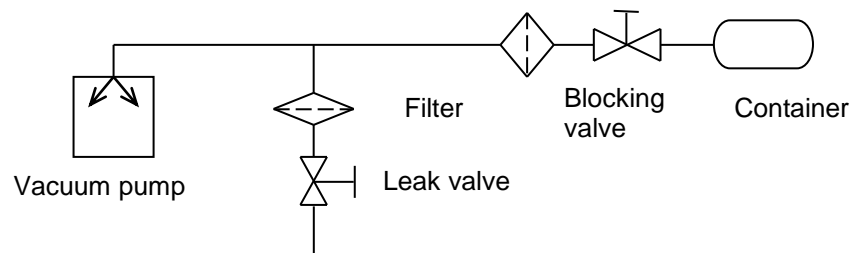






Fig. 3 -2 Piping Example for Evacuation of Container

3-7 Storage

Make a switch of a pump OFF (be clicked by ○ side), and pull power cord, and install rubber screen in inlet / exhaust pipe, and please archive it in a few places of moisture.

4 Caution in Operation


4-1 Caution in Operation

| | |
|---|---|
|  DANGER | See "Danger" (1) (2) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) on P. 04.05. |
|  WARNING | See "Warning" (9) (15) (16) (17) on P. 06. |
|  CAUTION | See "Caution" (4) (5) (6) (7) (8) on P. 07. |
|  Note | See "Note" (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) on P 08. |

- 1) It is necessary to clean internal pump when stopped operation in order to maintain the pump performance.
Have the pump to absorb clean air for 3 - 5 minutes and conduct idling operation.
- 2) Consult factory in case of special application usage.

4-2 When Thermal Protector Operated

- 1) When a thermal protector operated, at first turn off the pump power supply (push to ○ side) and disconnect power cable. Contact Ulvac or local agent. Temperature of the pump is very high at this time.
Do not touch the pump by hand definitely.
- 2) When the cause of failure was corrected, start operation after confirming the motor temperature is cooled down.

| | |
|---|-----------------------------|
|  CAUTION | See "Caution" (6) on P. 07. |
|---|-----------------------------|

4-3 Starting in Cold Ambient

In the cold ambient, there is a case to confront with difficulty in start because of hardened grease and diaphragm of the bearing.

When it is difficult to start, follow the procedure described below.

- 1) Open the inlet port to atmosphere and repeat switch ON, OFF two or three times until the pump starts.

If still it does not start, warm up the ambient temperature to 5°C (41 degF).

- 2) Operate the pump a few minutes while the inlet port is open so that the temperature of the pump become warmer gradually.
- 3) When the pump is warmed up, operate the pump as usual.

5 Pump Performance

5-1 Ultimate pressure

"Ultimate Pressure" mentioned in Catalog and this Instruction Manual means "the lowest pressure obtained by a pump in the status that no gas is filled from the pump inlet port (idling operation status)". Ulvac is measuring the pressure by connecting a film-type (diaphragm type) vacuum gauge to inlet port of the pump.

Please note that the indicated value of the pressure may be different depend on the type of the vacuum gauge.

Ultimate pressure of the actual vacuum devises usually higher pressure than the catalog value. Reason of this phenomena is as follows.

- (1) The mounting location of the vacuum gauge is far from the pump and steam and various kinds of gases generated from drops of water or rust that attached to the inner wall of the equipment and piping make the ultimate pressure higher.
- (2) Ultimate pressure becomes higher in case there is resource of gas such as vacuum leakage in the vacuum route.

5-2 Exhaust velocity

Flow rate of the diaphragm type dry vacuum pump varies according to the type and pressure of gas to intake. Generally, it shows the maximum exhaust velocity in atmosphere introduction that becomes lower little by little as the pressure becomes low.

In addition, the thinner diameter of piping and longer piping would make piping resistance large resulting the slower discharge velocity.





Nominal discharge velocity of this pump shows the maximum when breathe dry air.

5-3 Power Required

Power to drive a pump is the sum of the work for rotating friction of the machine element (machine work) and the work to compress air (work of compression). It becomes the largest in the vicinity of 3×10^4 to 10×10^4 Pa inlet pressure. When this becomes lower, work of compression is small and power is consumed by machine work.

6. Maintenance Inspection Repair

6-1 Caution in Maintenance/Inspection/Repair

| | |
|---|---------------------------------------|
|  DANGER | See "Danger" (3) on P. 04. |
|  WARNING | See "Warning" (4) (19) (20) on P. 06. |
|  CAUTION | See "Caution" (9) (10) (11) on P. 07. |
|  NOTE | See "Note" (13) on P. 08. |

Maintenance / repair range that allowed to perform by repair engineers in the Customers are the following 2 items. Do not conduct the other repair and remodeling other than Ulvac standard option.

- 1) Replacement of diaphragms
- 2) Replacement of valves

6-2 Maintenance

During an operation of the vacuum pump, check the following items at least once in 3 days.

- (1) Generation of abnormal noise.
- (2) Abnormally hot temperature of the pump.
- (3) Normal exhausting.

When there is abnormality, conduct necessary measure according to "6-5. Trouble Check List".

6-3 Periodic Inspection

Conduct periodic inspections of consumable parts in every 3,000 hours after started using and replace parts according to "Guideline of Parts Replacement". Replacement method [6-4. refer to replacement] of consumable part. In case there is no repair engineer, Ulvac Service Section shall be happy to replace the parts.

Table 6 -1 Consumable Parts List

| Part name | Quantity | Material | Reference life |
|-------------------|----------|---|----------------|
| Diaphragm | 4 | Main body: Synthetic rubber (EPDM) Parts exposing to gas: PTFE | 6,000 hr |
| Valve | 6 | FFKM | 6,000 hr |
| Valve (With hole) | 2 | | |
| Bearing | 1 set | ——— | 15,000 hr |

Kalrez is registered trademark of DuPont Kabushiki Kaisha.

These lives may differ according to the working conditions.

Lives may be extended by operating the pump with smaller load by observing "4-1 Caution in Operation".

Operating the pump with smaller load means the operation at ultimate pressure (inlet port closed).

Bearings shall be replaced by Ulvac Service Section.

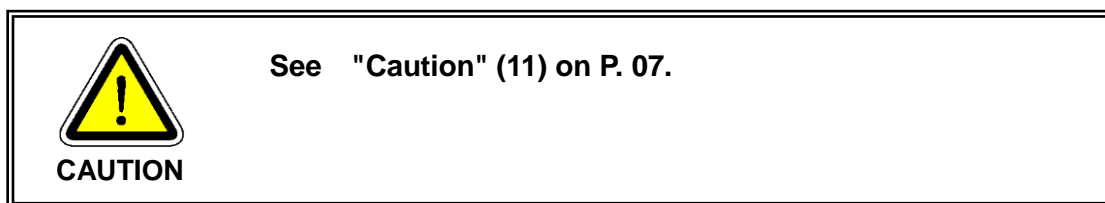
<Guideline of Parts Replacement>

Replace parts when declined performance and symptom described in Table 6-2 are found.

Table 6 -2 Inspection Positions and Guideline of Parts Replacement

| Operating time | Inspection method | Guideline of Parts Replacement | Inspection method |
|-------------------|----------------------------|---|-------------------|
| Every 3,000 hours | Diaphragm | Peel off or wear of PTFE area Rubber deformation hardening, or crack, etc. | Visual inspection |
| | Valve Valve (With hole) | Rubber deformation hardening, or crack, etc. | Visual inspection |
| | Abnormal bearing | Allophone | Auscultation |

6-4 Replacement of Consumable Parts



Wear dust mask and gloves when conducting replacement work.

A minute abrasive particle suspends in the air, and there is a risk to go into the human body when breathing.

Confirm that pump power source is disconnected from outlet or terminal blocks before conducting replacement work without fail.

Confirm whether you do not absorb hazardous solvent for the human body. When it is hazardous, do not conduct disassembly work definitely.

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

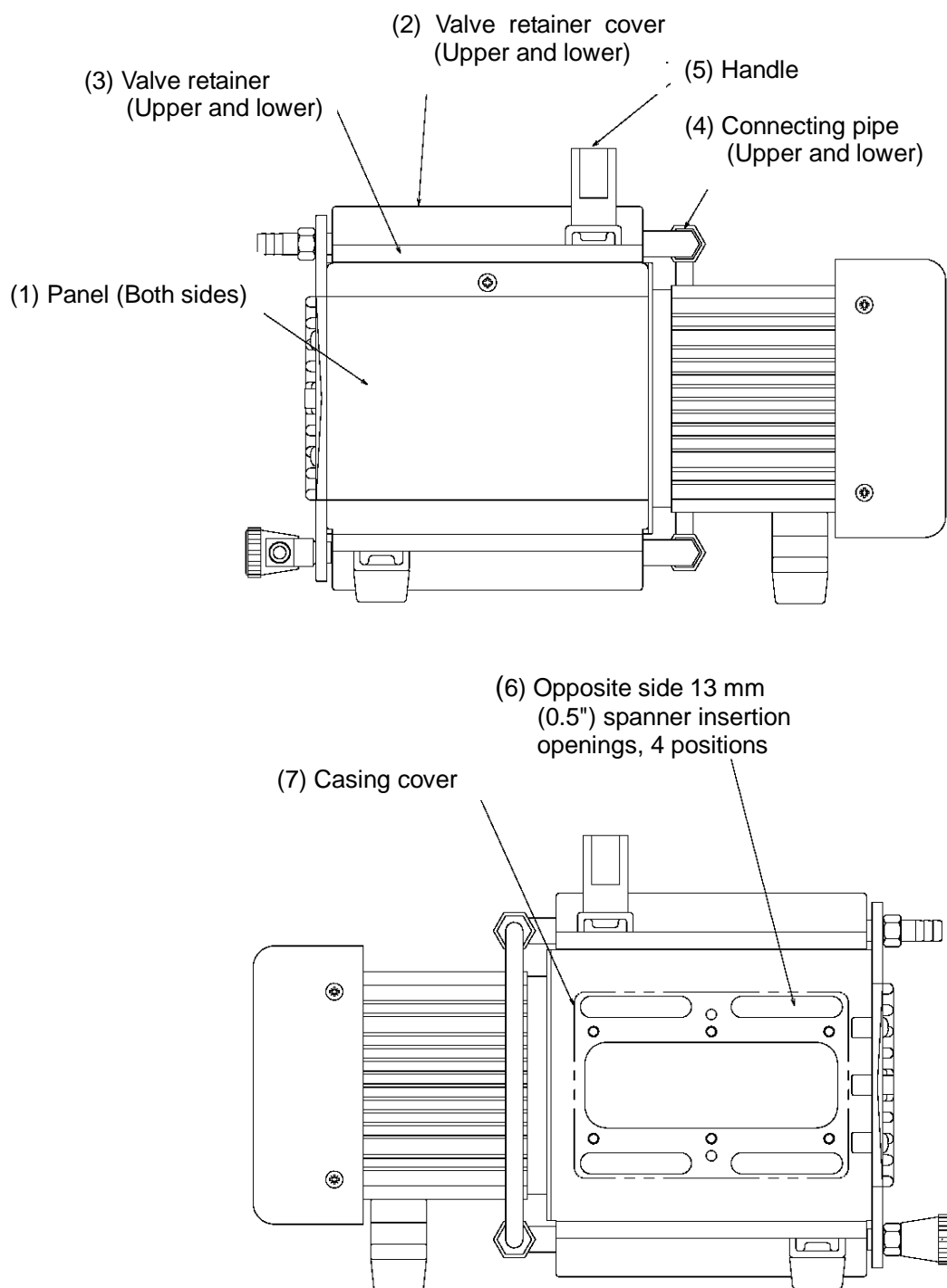
- 1, Phillips screwdriver: No. 2
 - 2, Torque driver (plus) set tightening torque to 4N·m
 - 3, Spanner: Opposite sides 13 mm (0.5") (thickness lower than 5.5 mm (0.2")),
Torque spanner (4N·m) Opposite sides 17 mm (0.7")
 - 4, Wipe off solvent: Chemical without influence to rubber parts such as ethyl alcohol.
 - 5, Paper (paper rags)
- ※Wipe off the dirty parts with No.4 and No.5.

- 1) Replacement of diaphragm valves. It is recommended to replace all sheets at the same time.

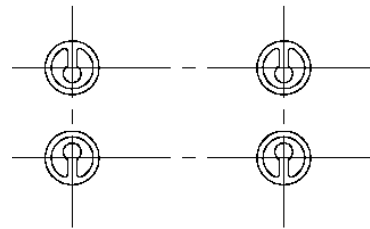


CAUTION

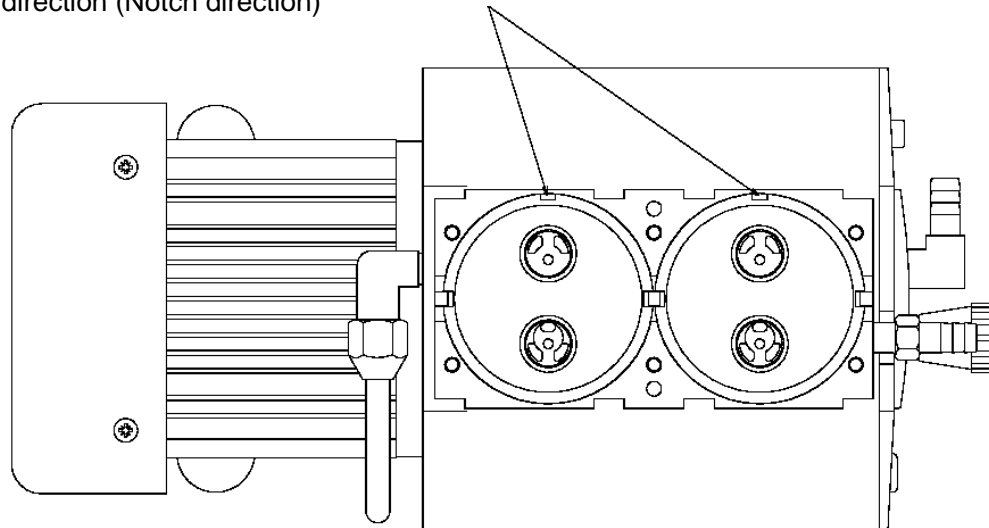
**When working on replacement, wear gloves always.
There is risk of injury.**



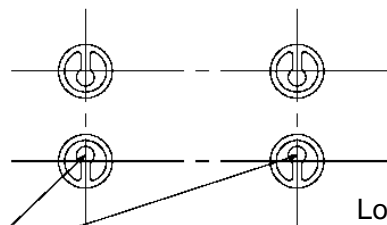
Mount upper level valve in orientation as shown in right drawing.



Upper level pump head mounting direction (Notch direction)

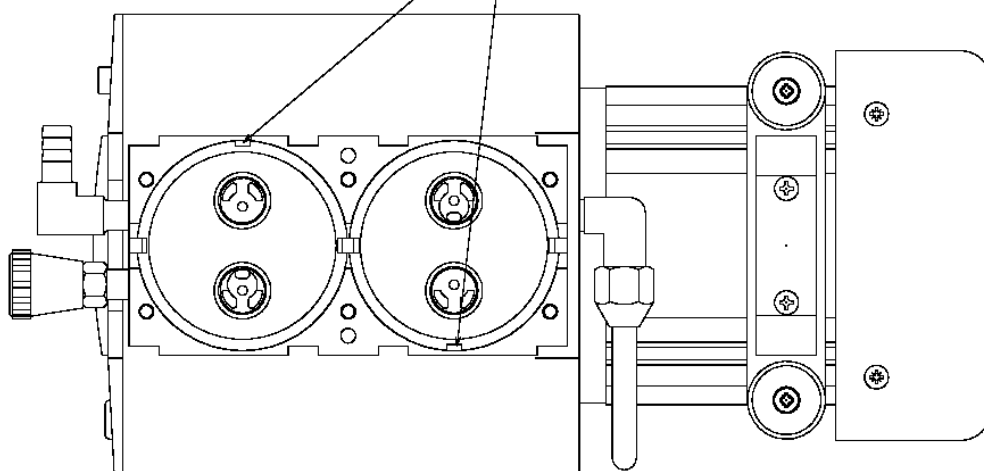


Open hole valve



Mount the lower level valve in orientation as shown in left drawing

Lower level pump head mounting direction (Notch direction)



Tools to use No. 1, 2, 3, 4, 5

Replacement work procedure

(Replacement procedure from the upper level)

- 1 Detach handle ⑤ at first.
- 2 Detach panel ① of pump left and right.
- 3 Detach switch plug terminal and ground lead of the side that power cord is connected.
- 4 Loosen 6 pan head small screws and detach Casing Cover ⑦.
- 5 Loosen 6 pan head small screws on pump top face and detach Valve Retainer Cover ②.
- 6 Detach Valve Retainer ③ and loosen nuts that fixed Connecting Pipe ④ simultaneously and detach the pipe.
- 7 Detach Valve and Pump Head, and Parallel Pin.
- 8 Insert a spanner of opposite side 13 mm (0.5") into Elongated Hole ⑥ on casing, and detach Diaphragm.



(The diaphragm is bonded on the casing in some model. In such case, work after removing the diaphragm from the casing by rotating a shaft.)

- 9 In case spacers are attached to the diaphragm and connecting rod, attach the spacers when replacing the diaphragm.
- 10 Attach new diaphragm and tighten with a spanner of opposite side 13 mm (0.5") lightly. Afterwards, tighten with a torque spanner in 4N·m as final tightening.
- 11 Align a direction of the pump head and attach it on the diaphragm.(see P.09 for orientation)
- 12 Confirm a direction of a valve on the circular form shaped portion of pump head and attach it. (see P.09 for orientation)
- 13 Insert Parallel Pins in the casing and attach Valve Retainer.
- 14 Attach Valve Retainer cover ② and tighten 6 pan head small screws alternatively. Finally, tighten it with a torque driver (4N · m).
- 15 Attach Connecting Pipe to L Form Coupling on Valve Retainer and tighten nuts with hands. Afterwards, further tighten with a spanner of opposite side 17 mm (0.7") 1/4 to 3/4 turn



If tighten too much with a spanner, it may cause cracked nuts or leakage. Pay enough attention.

- 16 Conduct replacement work on the lower level by following procedures 4 through 15 described above.
- 17 When replacement work of lower level was finished, rotate the pump 180° so that rubber leg is moved down and attach Casing Cover ⑦.
- 18 Attach Panel ① of left and right and switch plug terminal and ground simultaneously.
- 19 Attach Handle ⑤.
- 20 In the last, confirm whether screws or valves besides the parts replaced are not left. If anything left, it would be conceivable to fail replacement or mounting. Check the procedure from the item 1.
- 21 Before turning the switch ON, check the work, particularly the area related to the power supply, again and start the pump operation.

2) Replacement of bearing

Request Ulvac Service Section.

6-5 Trouble Check List

Table 6 -3 Trouble Check List

| Trouble contents | Cause | How to resolve problem | Reference |
|---|--|--|-----------|
| Start failure - Rotation failure of pump | (1) Not connected to power supply | (1) Connected to power supply | 3-4. |
| | (2) Switch is not turned ON | (2) Push switch to side | |
| | (3) Abnormal voltage of power source input | (3) Adjust voltage fluctuation to lower than $\pm 10\%$ | |
| | (4) Wire connection to pump failure | (4) Conduct wire connection to pump again. Consult factory. | |
| | (5) Circuit breaker tripped | (5) Investigate cause of breaker trip | 4-2. |
| | (6) Thermal protector operated | (6) Shut off power supply and eliminate cause of protector operation. Consult factory. | |
| | (7) Ambient atmosphere is low temperature | (7) Adjust temperature 5 to 40°C (41 to 104 degF) | 4-3. |
| | (8) Voltage drop | (8) Adjust supply voltage, evaluation of supply cable | |
| | (9) Power source is failed | (9) Replace or repair | |
| | (10) Power switch failure | (10) Replace or repair | |
| | (11) Disconnection of cord | (9) Replace or repair | |
| | (12) Motor failure | (12) Replace or repair | |
| | (13) Damage or connection failure of capacitor | (13) Replace or repair | |
| | (14) Locked connecting rod | (14) Disassembly / inside inspection of pump head | |
| | (15) Abnormal bearing | (15) Replacement | 6-4. |
| | (16) Miscellaneous. Damage of pump internal parts | (16) Overhaul (replacement of damaged parts) | 6-4. |
| Pressure failed to drop | (1) Pump is small for cubic capacity of vacuum chamber | (1) Select pump again | 5-1. |
| | (2) Pressure measuring method of is wrong | (2) Measure pressure correctly | |
| | (3) Vacuum gauge is not appropriate | (3) Measure with a vacuum gauge that covers pressure range to measure and calibrated | |
| | (4) Connected piping to inlet port is small or length of piping is long | (4) Connect piping thicker than the inlet port inside diameter and make distance from the vacuum chamber | 5-1. |
| | (5) Ambient temperature is not appropriate | (5) Adjust temperature 5 to 40°C (41 to 104 degF) | |
| | (6) Leakage from inlet pipe | (6) Cleaning, replacement | |
| | (7) Leakage from piping and joint | (7) Investigate leak, diameter, length of piping and repair | |
| | (8) Foreign material is in the pump | (8) Removal of foreign material, disassembly cleaning or replacement | |
| | (9) Abnormality occurred in the pump by absorbing fluid, condensable gas | (9) Overhaul (replacement of valve, diaphragm, etc.) | 6-4. |
| | (10) Damage of inlet / exhaust valve | (10) Replacement | 6-4. |
| | (11) Damage of diaphragm | (11) Replacement | 6-4. |
| | (12) Miscellaneous. Pump internal parts were damaged | (12) Overhaul (replacement of damaged parts) | |

| Trouble contents | Cause | How to resolve problem | Reference |
|---|---|---|-----------|
| Temperature of pump surface is abnormally high (higher than room temperature +30°C (86 degF)) | (1) Performing continuous operation in the status that absorption gas pressure is high (2) Absorption gas is high temperature (3) Abnormal voltage of power source input (4) Motor is locked | (1) Do not conduct continuous operation in vicinity of atmospheric pressure (2) Mount refrigerating machine such as gas air conditioners at inlet (3) Adjust voltage fluctuation to lower than $\pm 10\%$ (4) Refer to pump rotation failure description | |

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: 5 - 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.

Disposal

When disposing of a scrapping pump, please handle according to the laws legislated by country and the ordinance issued by local government.



CAUTION

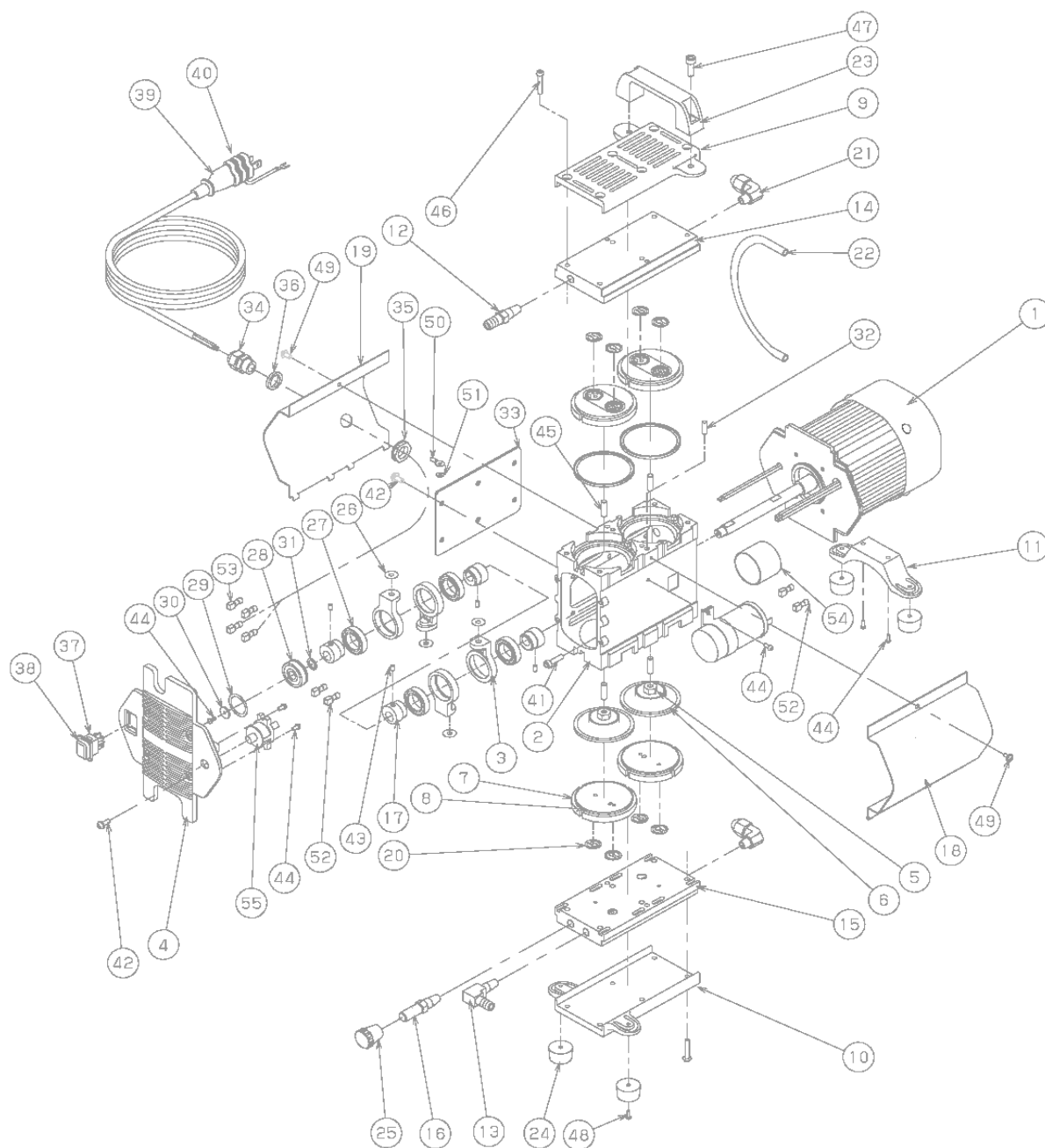
When disposing of poisonous gas that endangers the human body, consign scrapping processing with a specialized disposing vendor. Not only a pump but substance accompanying the pump shall be considered as toxic substance.

Parts Material Table

DTU-20

| No. | Name | Quantity | Material | No. | Name | Quantity | Remarks |
|-----|------------------------------|----------|-------------------------|-----|-----------------------------|----------|----------|
| 1 | Motor | 1 | — | 31 | Metal washer | 1 | Iron |
| 2 | Casing | 1 | Aluminum | 32 | Parallel pin | 4 | Iron |
| 3 | Connection rod | 4 | Aluminum | 33 | Casing cover | 1 | Aluminum |
| 4 | Front cover | 1 | Aluminum | 34 | Cable ground | 1 | Resin |
| 5 | Metal fittings for diaphragm | 4 | Aluminum | 35 | Plastics nut | 1 | Resin |
| 6 | Diaphragm | 4 | Fluorine EPDM | 36 | Gasket | 1 | Rubber |
| 7 | Metal fittings for pump head | 4 | Aluminum | 37 | Rocker switch | 1 | — |
| 8 | Pump head | 4 | Fluoroplastic, Aluminum | 38 | Protection cap | 1 | — |
| 9 | Valve retainer cover A | 1 | Aluminum | 39 | Power cord with plug | 1 | — |
| 10 | Valve retainer cover B | 1 | Aluminum | 40 | Plug adapter | 1 | — |
| 11 | Motor base | 1 | Aluminum | 41 | Bolt with hexagon head hole | 4 | SUS |
| 12 | Horse nipple | 1 | PP | 42 | Pan machine screw | 10 | SUS |
| 13 | L form nipple | 1 | PP | 43 | Setscrew | 4 | SUS |
| 14 | Valve retainer 1 | 1 | Fluoroplastics | 44 | Pan machine screw | 6 | SUS |
| 15 | Valve retainer 2 | 1 | Fluoroplastics | 45 | Setscrew | 4 | SUS |
| 16 | Gas ballast nipple | 1 | PP | 46 | Pan machine screw | 12 | SUS |
| 17 | Eccentric axis | 4 | Iron | 47 | Bolt with hexagon head hole | 2 | SUS |
| 18 | Panel B | 1 | SUS | 48 | Pan machine screw | 4 | SUS |
| 19 | Panel A (with hole) | 1 | SUS | 49 | Pan machine screw | 2 | SUS |
| 20 | Valve | 8 | Fluororubber | 50 | Crimped terminal | 1 | — |
| 21 | L form coupling (Chemifoot) | 2 | PP | 51 | Shake proof washer | 1 | SUS |
| 22 | Tube (connecting pipe) | 1 | PFA | 52 | Plug type joining terminal | 4 | — |
| 23 | Handle | 1 | Resin | 53 | Plug type joining terminal | 4 | — |
| 24 | Rubber leg | 4 | Synthetic rubber / iron | 54 | Capacitor cap | 1 | — |
| 25 | Gas ballast cap | 1 | PP | 55 | Thermal protector | 1 | — |
| 26 | Diaphragm spacer | 4 | SUS | 56 | | | |
| 27 | Bearing | 4 | Iron | 57 | | | |
| 28 | Bearing | 1 | Iron | 58 | | | |
| 29 | Pressurized washer | 1 | Spring steel | 59 | | | |
| 30 | Metal washer | 1 | Iron | 60 | | | |

Exploded view



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/>

株式会社アルバック
コンポーネント事業本部 営業部
〒253-8543
神奈川県茅ヶ崎市萩園2500
TEL:0467-89-2416

ULVAC KIKO,Inc.

<https://ulvac-kiko.com/en>

Please contact us for products, Service Base or other Inquiries from here.



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

ULVAC,Inc.
Components Business HQ
2500 Hagisono, Chigasaki, Kanagawa, 253-8543, Japan
TEL:+81-467-89-2261