ANEST IWATA

Instruction Manual

Oil-free Scroll Vacuum Pump

GVSU-1000

This instruction manual includes very important warnings, cautions and operating procedure in order to operate this pump safely and efficiently.
Be sure to read this instruction manual thoroughly and fully understand before operation.
After reading it, store it in a convenient place for immediate and future reading.

※Before use, be sure to fill in the blank spaces below for future repair and after-service.

Serial No.
Who sold it to you
Purchase date
When you began operation

Important information

Be sure to read this instruction manual to understand how to operate equipment correctly. Only operators, who fully understand warnings, cautions and instructions, are to operate the equipment. Improper operation (mishandling) can cause serious bodily injury, death, fire or explosion.

Store this manual in a convenient place for immediate and future reference.

◆Regarding safety

- The safety instructions given in this manual are the minimum operating requirements. Follow all national or municipal laws and regulations pertaining to fire, electricity, and other safety regulations, as well as corporate regulations.
- Pay special attention to items which are shown by the below marks and symbols.
- Symbols and marks have the following meanings.

Examples of marks

WARNING	Indicates a potentially hazardous situation which, if not avoided, may result in serious injury or loss of life.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

Examples of symbols

	Indicates [Beware]. We will explain briefly in or near the symbol. (The example on the left is [Beware of electric shock]).
	Indicates [Prohibited action]. We will explain briefly in or near the symbol. (The example on the left is [Do not touch]).
	Indicates [Required action]. We will explain briefly in or near the symbol. (The example on the left is [Be sure to ground]).

∗We shall not be responsible for any injury or damage caused by disregard of warnings, cautions or instructions.

Supplementary notes

Important	Indicates notes which we ask you to observe. They are helpful to achieve full performance and functionality of the equipment.

For safe operation

Below is very important information about how to safely operate the equipment. Before operation, be sure to read and fully understand the contents.

⚠ WARNING

Be careful about hoisting	**Danger of cargo collapse** Be careful to install vacuum pump using elongated hole of connected flange and crane with sufficient allowable load capacity (GVSU-1000 mass 170kgs) while paying attention to stability of suspended load. If not, it can cause damage, failure or bodily injury from falling cargo due to hoisting failure, or by being caught between suspended cargo and other material.
Avoid moisture	**Danger of electric shock** Install in an area which is not exposed to moisture such as rain or steam. If moisture comes into and tact with the electric source connection, it can cause fire or bodily injury due to short-circuit or electric shock.
Install at a safe site	**Danger of explosion, fire and accident** Install in an area free from explosive, flammable or corrosive substances. If not, it can cause explosion, fire or accident.
Ask qualified electrician	**Danger of short-circuit and electric shock** Ask a qualified electrician to perform electric wiring. If not, short-circuit or electric shock can cause fire or bodily injury.
Turn off electric source	**Danger of electric shock and entanglement** Be sure to turn off electric source on building site before wiring. If not, it can cause electric shock or bodily injury due to turning objects.
Install over current protective device	**Danger of accident, fire and failure** Be sure to install protective device to protect circuitry. We recommend over current protective device (rated 15A) to protect branch circuit. If equipment is not stopped in an emergency, it can cause accident, fire or failure.
Install emergency stop switch	**Danger of accident, fire or failure** Be sure to install an electric source emergency stop switch (or protective device that can urgently stop). If equipment is not stopped in an emergency, it can cause accident, fire or failure.
Install short circuit protective device	**Danger of fire and electric shock** Install short circuit protective device. If not, it can cause bodily injury due to fire or electric shock.
Install overload protective device to protect motor	**Danger of electric fire and electric shock** Install overload protective device to protect motor. If not, it can cause bodily injury due to electric fire or electric shock.
Be careful about wiring	**Danger of short-circuit and electric shock** We recommend an electric source cable of more than $2mm^2$ (more than rated 15A) cross section area for electric source cable and ground cable. Be careful to avoid voltage drop considering local situation. If not, it can cause a short-circuit fire and may result in bodily injury from electric shock.

For safe operation

⚠ WARNING

 **Use crimp-style terminal**	**Danger of short-circuit and electric shock** Fit firmly proper round type crimp-style terminal to electric source cable using crimp tool and connect to motor terminal section. If not, it can cause short-circuit fire or bodily injury from electric shock due to looseness or disconnection.
 **Protect cable from being pulled**	**Danger of short-circuit and electric shock** Be sure to fit cable gland to hole of PG 16 at motor terminal box. If not, it can cause short-circuit fire or bodily injury from electric shock.
 **Be sure to ground**	**Danger of electric shock** Connect ground cable to ground terminal in motor terminal box. If not, it can cause bodily injury from electric shock.
 **Never evacuate hazardous gas**	**Danger of explosion and ignition** Do not evacuate gas which is hazardous to humans or explosive, flammable, or corrosive. Do not evacuate with substances containing chemicals, solvents, and powders. If done, it can cause failure or bodily injury by gas, explosion or ignition. It is not guaranteed fluorine rubber can be used for all solvents.
 **Avoid foreign matter**	**Danger of entanglement and foreign matter dispersal** Never put finger or foreign matter into air holes of fan cover, motor, FS cover. If done, it can cause bodily injury from entanglement with turning section, or foreign matter dispersal.
 **Never alter**	**Danger of electric shock and entanglement** Do not remove or alter safeguards or insulation parts. If done, it can cause bodily injury from electric shock or turning section and it can cause deteriorated performance and operating lifetime, and invalidate guarantee.
 **Change after vacuum pump is stopped**	**Danger of failure and bodily injury** Change air-flush port only after vacuum pump is stopped. If you change it during vacuum pump operation, it can cause vacuum pump failure and bodily injury.
 **Conduct periodical maintenance and inspection**	**Danger of failure and bodily injury** Conduct periodical maintenance and inspection. If not, it can cause insufficient performance, failure of vacuum pump, and bodily injury.
 **Be careful about high temperature**	**Danger of burns** Conduct maintenance and inspection only after vacuum pump becomes cool enough. Maintenance and inspection soon after vacuum pump stops can cause burn injury.
 **Turn off electric source**	**Danger of electric shock** Be sure to conduct maintenance and inspection after you turn off electric source. If not, it can cause bodily injury from electric shock or turning object.
 **Ask specialist to perform repairs**	**Danger of accident, failure and shorter operating lifetime** Ask specialist to perform repairs. Defective repairs can cause accident, failure or shorter operating lifetime.

For safe operation

⚠ CAUTION

 **Use at designated temperature**	**Danger of overheating** Operate at ambient temperature of 5℃ ～40℃. Operating at a temperature range other than that designated can cause accident, failure or bodily injury such as burns due to overheating.
 **Pay attention to ventilation**	**Danger of overheating** Install in a well-ventilated area. Poor ventilation can disrupt cooling and cause accident, failure or bodily injury such as burns since this vacuum pump is an air-cooled type. Do not block inlet and outlet of cooling air with obstruction. (Separate inlet side of the cooling air from obstruction or wall by 50cm or more, and separate outlet side by 30cm or more)
 **Avoid dust**	**Danger of dust** Be sure site is free from dust. Sucking in of dust can cause failure.
 **Install on a solid level floor**	**Danger of movement** Please be sure to fix a vacuum pump on solid and flat floor for installation (within 5° degrees inclination). Uneven fixing can cause failure and movement of vacuum pump.
 **Avoid direct sunlight**	**Danger of overheating** Install where equipment is not exposed to direct sunlight. Vacuum pump exposed to direct sunlight can overheat, resulting in failure.
 **Check voltage**	**Motor burnout** Please check electric source and voltage before wiring. The motor specification is three-phased AC460V (60Hz). Other related parts have single voltage. Connection alteration inside motor, improper wiring to motor and application of incorrect voltage can cause breakdown such as motor burnout.
 **Inspect cause of problem**	**Danger of problem recurrence and failure** If protective device activates, be sure to turn off electric source and inspect causes to solve the problem. Do not operate until problem is solved. Operation while problem is left unsolved can cause problem recurrence and failure.
 **Remove cap**	**Danger of cap to fly** Remove cap from inlet and outlet. If the rotation of the vacuum pump is opposite, operation with cap being fitted can cause cap to fly by intake or exhaust impetus, resulting in accident, failure, or bodily injury from contact with flying objects.
 **Prevent foreign matter from entering**	**Danger of foreign matter entering inlet** When checking turning direction, be careful not to enter foreign matter into an inlet. Foreign matter entering inlet can cause failure.
 **Check fan**	**Danger of overheating** Check that cooling fan is turning and cooling air is flowing. If not, it can cause accident, failure or bodily injury such as burns due to overheating.
 **Pay attention to exhaust resistance**	**Danger of exhaust disruption** When connecting exhaust piping to vacuum pump and when combining piping with another vacuum pump, pay attention to piping size and length so that it does not cause exhaust resistance. Exhaust resistance can disrupt air flow, resulting in failure and over current.
 **Prevent foreign matter from entering**	**Danger of foreign matter entering inlet** If you use the seal material or the adhesive, etc. to prevent Leak of the joint when piping with internal screw of inlet, be careful not to enter the seal material or the adhesive into an inlet. The seal material or the adhesive entering inlet can cause failure.

For safe operation

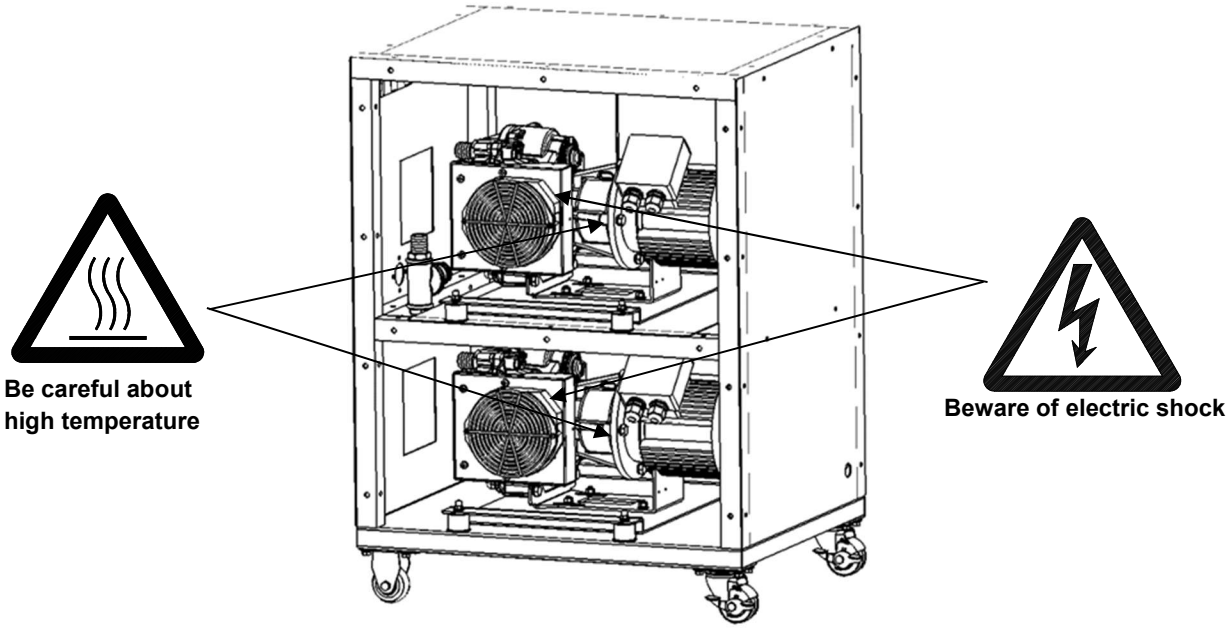
⚠ CAUTION

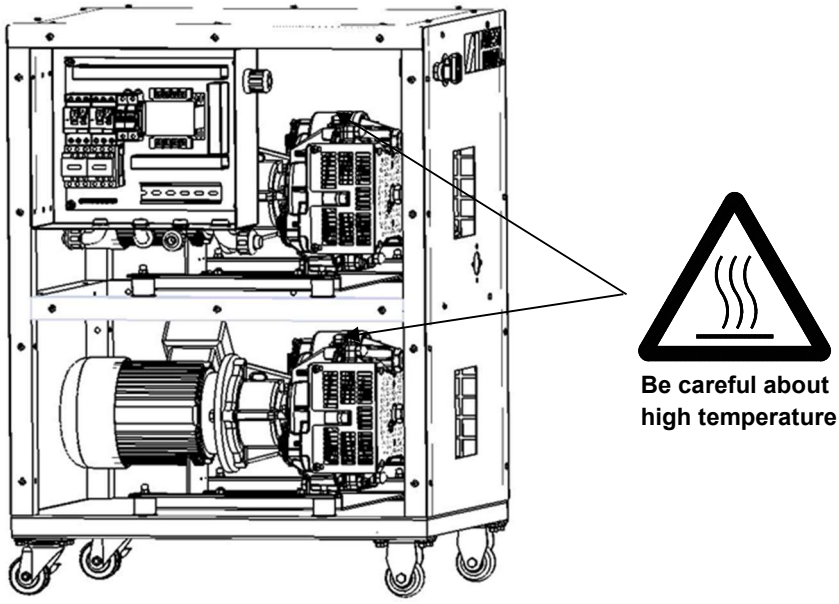
 **Start or stop after closing isolation valve**	**Danger of vacuum break and pollution** Be sure to close isolation valve between vacuum pump and vacuum system (chamber) during start-up and stop. Start-up or stop with isolation valve in the open position can draw back gas and debris attached to inside of pump to vacuum chamber due to pressure differential, resulting in vacuum break and pollution on vacuum chamber side.
 **Open air inlet**	**Danger of abnormal sound and failure** Open inlet to atmosphere for about 5 seconds before restarting vacuum pump. If not, it can unbalance temperature inside vacuum pump, resulting in failure.
 **Beware temperature of intake gas**	**Danger of exceeding permissible temperature of intake gas** If intake gas temperature is over 50℃, be sure to install a chiller or trap between vacuum pump and vacuum chamber so that gas intake temperature of vacuum pump keeps below 50℃. If not, vacuum pump temperature can increase, resulting in failure.
 **Operate while opening air-flush port**	**Danger of remaining moisture** When evacuating moisture, be sure to open air-flush port (air-flush operation). If you evacuate vapor while air-flush port is closed, condensed moisture will remain inside vacuum pump and cause failure.
 **Caution after exhausting vapor**	**Danger of insufficient vapor exhaust** After evacuating vapor, do air-flush operation for at least one hour. If you close air-flush port or stop vacuum pump soon after evacuating vapor, condensed water will remain inside vacuum pump which will cause failure.
 **Beware of intake gas volume**	**Danger of exceeding permissible intake gas volume** When sending N_2 gas or dry air into air-flush port, pressure should be the same as atmospheric pressure and flow rate should be less than 10NL/min. If not, it can increase pressure inside vacuum pump, resulting in failure.

Where to attach warning stickers

here to attach warning stickers

Always keep warning stickers clean and legible. If they become dirty or detached, replace them with new ones. If you need replacement stickers, contact the distributor from who you purchased your vacuum pump.





Contents

1. Before use

1.1 Check the product

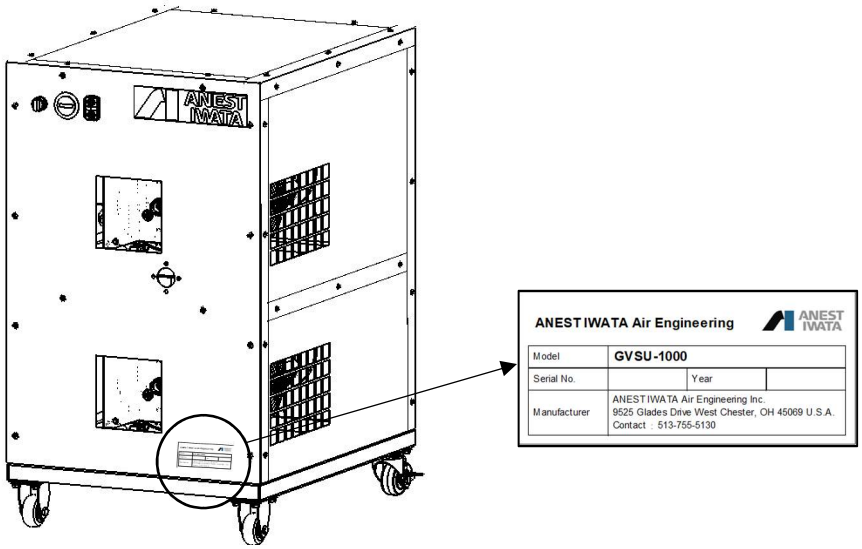
- **Check that the package is right-side-up before opening.**
- **Check that the model of the product is the same as the one you ordered.**
  How to read model name

GVSU : model

G V S U – 1 0 0 0

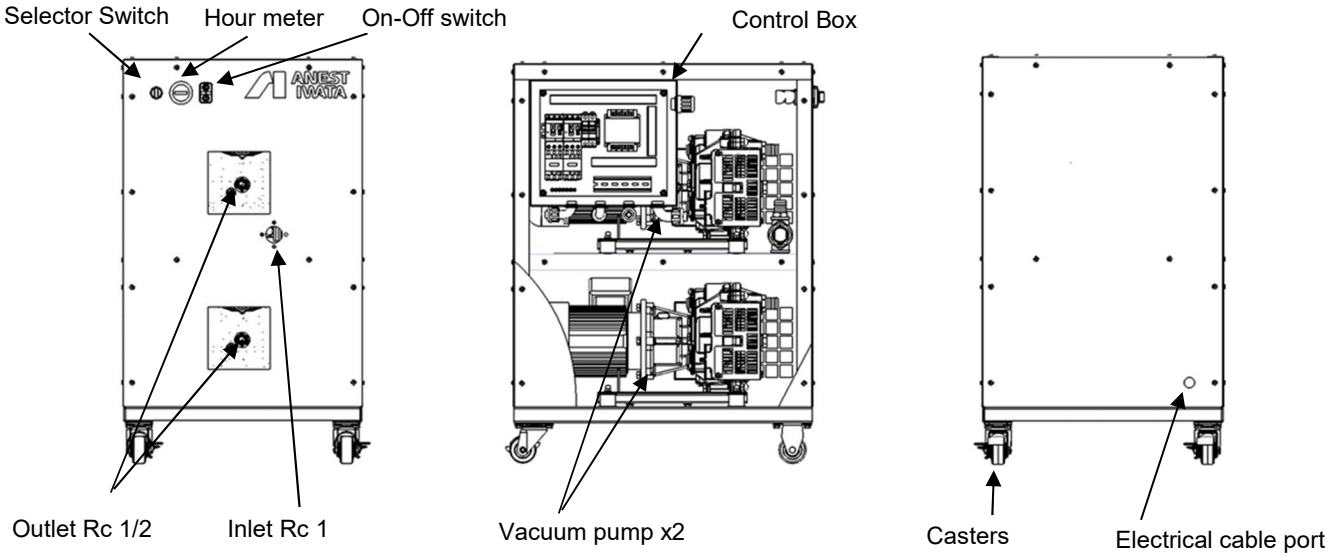
Displacement (swept volume)
1000:1000 L/min

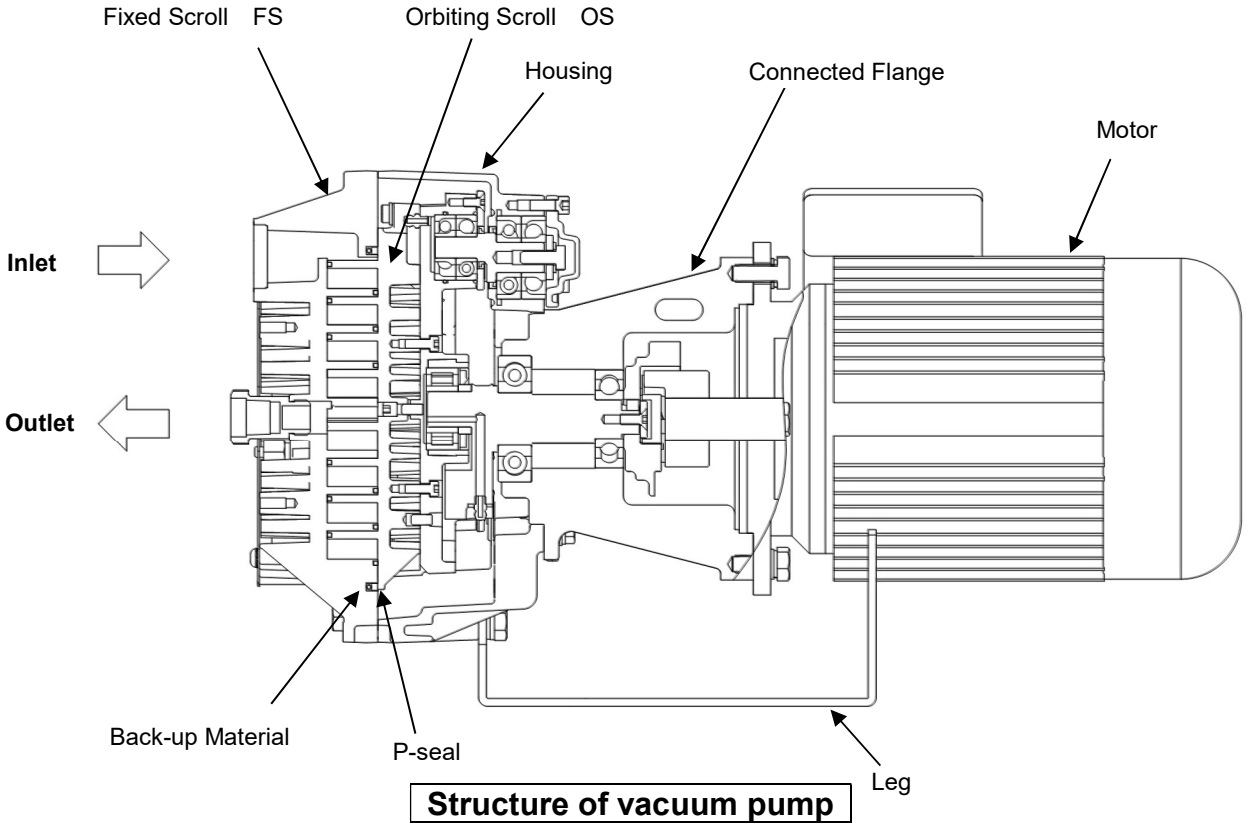
- **Check that there is no damage.**
  If there is any damage, contact either the distributor from who you purchased your vacuum pump.
- **Check the following accessories.**
  Instruction manual (this one)



※Please prepare electric source cords, crimp-style terminal, electric source protective devices on customer side.

2. Name and structure of each section





Structure of vacuum pump

3. Installation

⚠ WARNING

Danger of electric shock

Install in an area which is not exposed to moisture such as rain or steam.
If moisture comes into and tact with the electric source connection, it can cause fire or bodily injury due to short-circuit or electric shock.

Avoid moisture

Danger of explosion, fire and accident

Install in an area free from explosive, flammable or corrosive substances.
If not, it can cause explosion, fire or accident.

Install at a safe site

⚠ CAUTION

Danger of overheating

Operate at ambient temperature of 5℃～40℃.
Operating at a temperature range other than that designated can cause accident, failure or bodily injury such as burns due to overheating.

Use at designated temperature

Danger of overheating

Install in a well-ventilated area (refer to below chart).
Poor ventilation can disrupt cooling and cause accident, failure or bodily injury such as burns since this vacuum pump is an air-cooled type.
Do not block inlet and outlet of cooling air with obstruction.
(Separate inlet side of the cooling air from obstruction or wall by 10cm or more, and separate outlet side by 30cm or more)

Necessary ventilated air volume
Over 16m^3/min

Pay attention to ventilation

Danger of dust

Be sure site is free from dust.
Sucking in of dust can cause failure.

Avoid dust

Danger of movement
Please be sure to fix a vacuum pump on solid and flat floor for installation (within 5° degrees inclination). Uneven fixing can cause failure and movement of vacuum pump.

Install on a solid, level floor

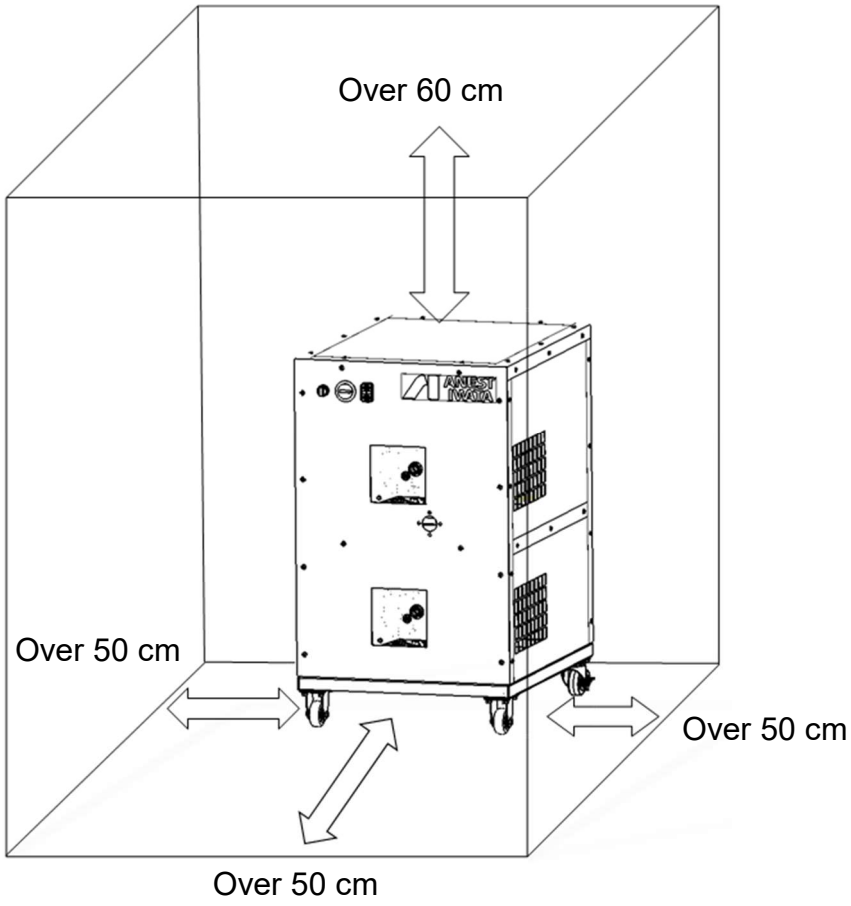
Danger of overheating

Install where equipment is not exposed to direct sunlight.
Vacuum pump exposed to direct sunlight can overheat, resulting in failure.

Avoid direct sunlight

Installation space

For the maintenance, keep the space as below drawing around vacuum pump.



Important

When building vacuum pump into vacuum system, pay attention to space for maintenance, ambient temperature and piping. Be sure to fix vacuum pump on solid and level floor.
If you have any questions, contact our distributor from who you purchased your vacuum pump.

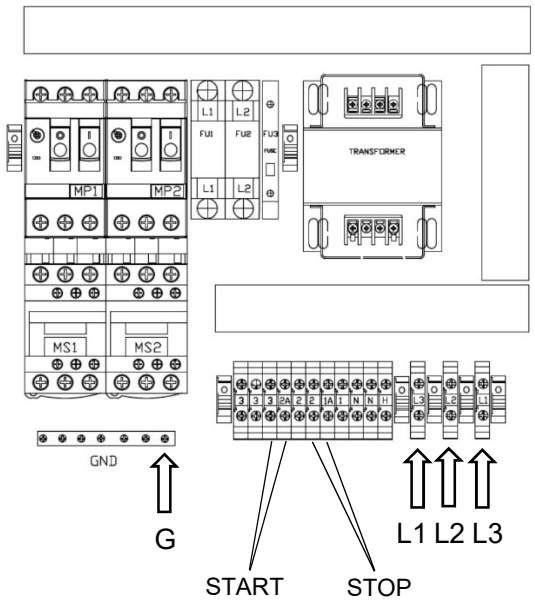
3.1 Wiring

⚠ WARNING	
Danger of short-circuit and electric shock **Ask a qualified electrician to perform electrical wiring.** If not, short-circuit or electric shock can cause fire or bodily injury.	 **Ask qualified electrician**
Danger of electric shock and entanglement **Be sure to turn off electric source on building site before wiring.** If not, it can cause electric shock or bodily injury due to turning objects.	 **Turn off electric source**
Danger of accident, fire and failure **Be sure to install protective device to protect circuitry. We recommend over current protective device (rated 15A) to protect branch circuit.** If equipment is not stopped in an emergency, it can cause accident, fire or failure.	 **Install over current protective device**
Danger of accident, fire or failure **Be sure to install an electric source emergency stop switch (or protective device that can urgently stop).** If equipment is not stopped in an emergency, it can cause accident, fire or failure.	 **Install emergency stop switch**
Danger of fire and electric shock **Install short circuit protective device.** If not, it can cause bodily injury due to fire or electric shock.	 **Install short circuit protective device**
Danger of electric fire and electric shock **Install overload protective device to protect motor. (refer to chart 1 on page 13)** If not, bodily injury due to electric fire or electric shock can result.	 **Install overload protective device**
Danger of short-circuit and electric shock **We recommend an electric source cable of more than 2mm² (more than rated 15A) cross section area for electric source cable and ground cable.** **Be careful to avoid voltage drop considering local situation.** If not, it can cause a short-circuit fire and may result in bodily injury from electric shock.	 **Be careful about wiring**
Danger of short-circuit and electric shock **Fit firmly proper round type crimp-style terminal to electric source cable using crimp tool and connect to motor terminal section.** If not, it can cause short-circuit fire or bodily injury from electric shock due to looseness or disconnection.	 **Use crimp-style terminal**
Danger of electric shock **Connect ground cable to ground terminal in motor terminal box.** If not, it can cause bodily injury from electric shock.	 **Be sure to ground**

⚠ CAUTION	
Motor burnout **Please check electric source and voltage before wiring Terminal block.** **The motor specification is three-phased AC460V (60Hz).** Other related parts have single voltage. Connection alteration inside motor, improper wiring to motor and application of incorrect voltage can cause breakdown such as motor burnout.	**Check voltage**
Danger of problem recurrence and failure **If protective device activates, be sure to turn off electric source and inspect causes to solve the problem. Do not operate until problem is solved.** Operation while problem is left unsolved can cause problem recurrence and failure.	**Inspect cause of problem**

How to wire

① Remove the right side panel as viewed from the front.
※ Be careful not to lose removed bolts.
② Insert power cable from bottom of back panel.
③ Insert power cable and 4 wires for remote control to the control box through the cord grip.
④ Connect each phase of electric source terminal L1, L2, L3 and ground to each respectively in accordance with the below wiring diagram.
⑤ Connect each wires for control to 1A and 2 for STOP signal, 2A and 3 for START signal.



Chart－1

Voltage V	Frequency Hz	Recommended breaker (or protective device) capacity A
460	60	6.2

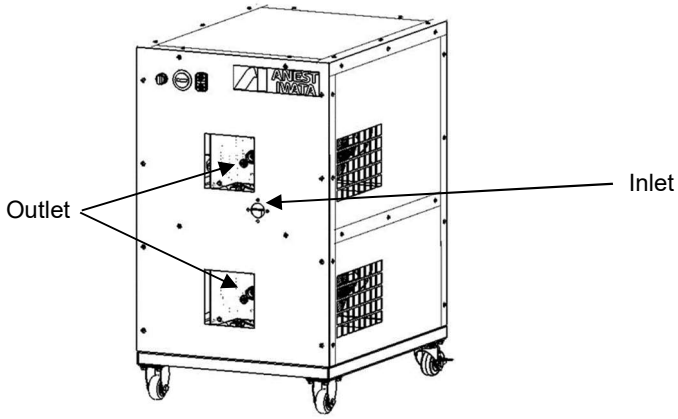
3.2 Test operation

⚠ CAUTION	
Danger of cap to fly **Remove cap from inlet** If the rotation of the vacuum pump is opposite, operation with cap being fitted can cause cap to fly by exhaust impetus, resulting in accident, failure, or bodily injury from contact with flying objects.	**Remove cap**
Danger of foreign matter entering inlet **When checking turning direction, be careful not to enter foreign matter into an inlet.** Foreign matter entering inlet can cause failure.	**Prevent foreign matter from entering**
Danger of overheating **Check that cooling fan is turning and cooling air is flowing.** If not, it can cause accident, failure or bodily injury such as burns due to overheating.	**Check fan**

Test operation

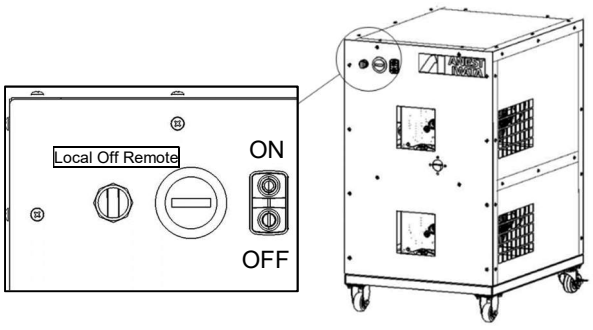
①Open inlet and outlet

Make sure inlet and outlet ports are open



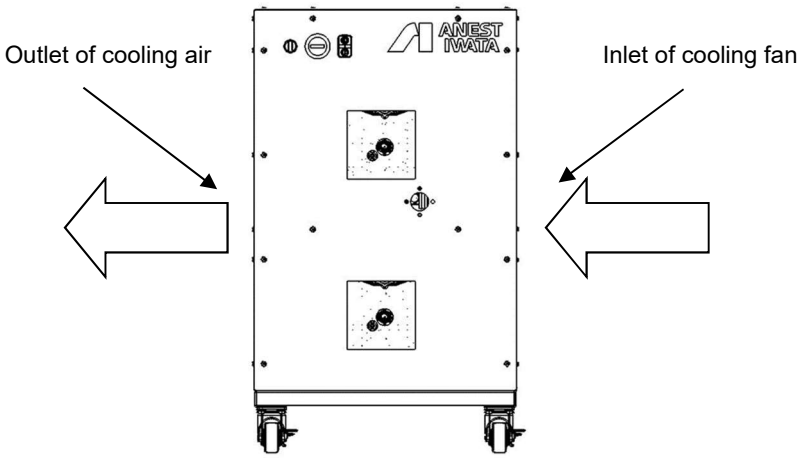
② Check pump's rotation direction

1) Local mode
   a) Turn selector switch to Local
   b) Push ON switch.
   c) Make sure the light at ON-OFF switch lightning and pump evacuate gas from inlet port.
2) Remote mode
   a) Turn selector switch to Remote
   b) Send a ON signal from the system.
   c) Make sure the light at ON-OFF switch lightning and pump evacuate gas from inlet port.



③ Check pump's rotation direction

Check that cooling fan is turning and cooling air is flowing in that direction as indicated.



Important

Vacuum pump turns counter-clockwise when viewed from motor side.

Check that air comes out from water separator & silencer-mounted rubber hose.
If air does not come out from rubber hose, stop vacuum pump, turn off electrical source and change 2 out of 3 wires of electrical source connection.

3.3 Connection to vacuum system (chamber)

Inlet is 1” NPT and outlets are 1/2” NPT x 2 ports.

⚠ CAUTION	
Danger of exhaust disruption **When connecting exhaust piping to vacuum pump and when combining piping with another vacuum pump, pay attention to piping size and length so that it does not cause exhaust resistance.** Exhaust resistance can disrupt air flow, resulting in failure and over current.	**Pay attention to exhaust resistance**
Danger of foreign matter entering inlet **If you use the seal material or the adhesive, etc. to prevent Leak of the joint when piping with internal screw of inlet, be careful not to enter the seal material or the adhesive into an inlet.** The seal material or the adhesive entering inlet can cause failure.	**Prevent foreign matter from entering**

Important

Use isolation valve between vacuum system and inlet.

Isolation valve is necessary to prevent the drawback of debris attached to the inside of vacuum pump into the vacuum chamber during start-up and shut-down. (We recommend the use of leak valve also). We recommend the use of an **automatic valve** as the isolation valve which closes during power failure in order to prevent the drawback of debris inside pump into the vacuum chamber during power failure.

Use the clean connecting pipe between vacuum chamber and vacuum pump.

We recommend the use of a flexible tube between inlet of vacuum pump and vacuum chamber so that vibration of pump does not transmit to vacuum chamber.

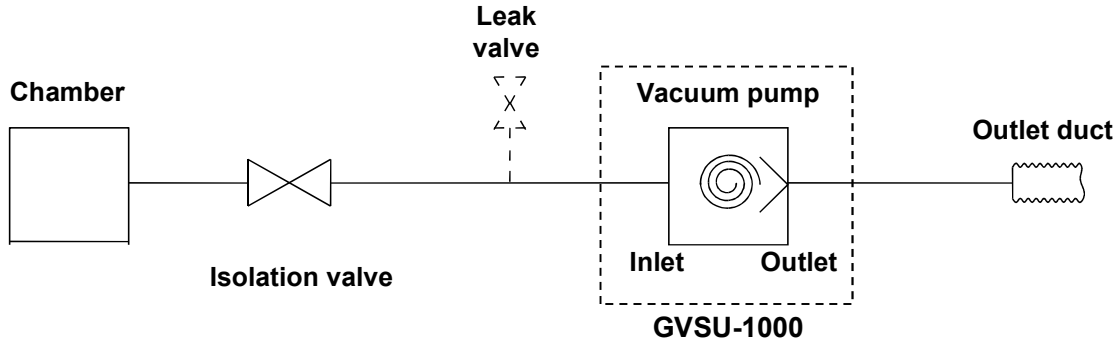
When connecting exhaust piping to outlet of vacuum pump, refer to the following size and length.

・max. **2m** direct pipe length for exhaust pipe size **1/2” NPT (inner dia.16mm)**

But if pipe length becomes longer, use a larger size exhaust pipe.

Make sure that exhaust piping is not clogged during pump operation.

Make sure that pressure at outlet does not exceed atmospheric pressure at any conditions.



4. Operation

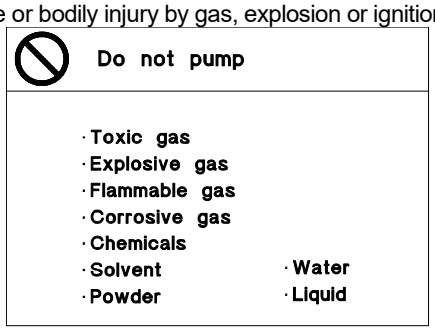
Be sure to use the procedure below to start up or shut down the pump.

- When you do not use air-flush device,
  proceed 4.1 Standard operation [page 19].
- When you use air-flush device,
  proceed 5.1 Air-flush operation [page 20].

⚠ WARNING

Danger of explosion and ignition

Do not evacuate gas which is hazardous to humans or explosive, flammable, or corrosive. Do not evacuate with substances containing chemicals, solvents, and powders.
If done, it can cause failure or bodily injury by gas, explosion or ignition.

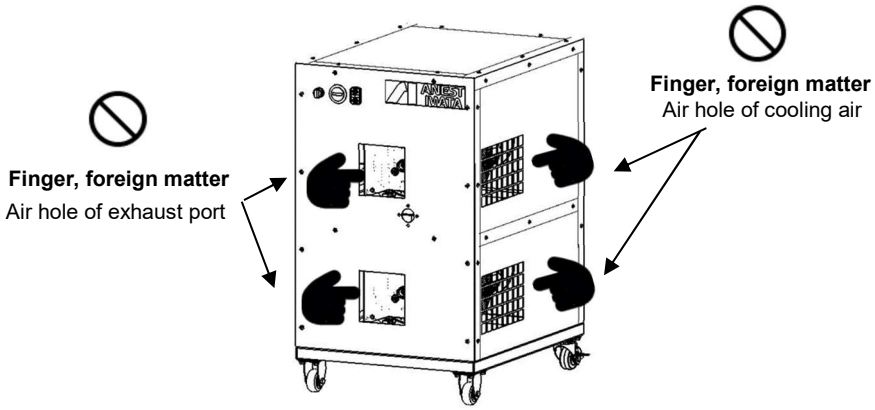


※When evacuating vapor, operate in accordance with 5.1 [page 20].

Never evacuate hazardous gas

Danger of entanglement and foreign matter dispersal

Never put finger or foreign matter into air holes of fan cover, motor, FS cover.
If done, it can cause bodily injury from entanglement with turning section, or foreign matter dispersal.



Avoid foreign matter

Danger of electric shock and entanglement

Do not remove or alter safeguards or insulation parts.
If done, it can cause bodily injury from electric shock or turning section and it can cause deteriorated performance and operating lifetime, and invalidate guarantee.

Never alter

Danger of failure and bodily injury **Change air-flush port only after vacuum pump is stopped.** If you change it during vacuum pump operation, it can cause vacuum pump failure and bodily injury.	 **Change after vacuum pump is stopped**
⚠ CAUTION	
Danger of vacuum break and pollution **Be sure to close isolation valve between vacuum pump and vacuum system (chamber) during start-up and stop.** Start-up or stop with isolation valve in the open position can draw back gas and debris attached to inside of vacuum pump to vacuum chamber due to pressure differential, resulting in vacuum break and pollution on vacuum chamber side.	 **Start or stop after closing isolation valve**
Danger of abnormal sound and failure **Open inlet to atmosphere for about 5 seconds before restarting vacuum pump.** If not, it can unbalance temperature inside vacuum pump, resulting in failure.	 **Open air inlet**
Danger of exceeding permissible temperature of intake gas **If intake gas temperature is over 50℃, be sure to install a chiller or trap between vacuum pump and vacuum chamber so that gas intake temperature of vacuum pump keeps below 50℃.** If not, vacuum pump temperature can increase, resulting in failure.	 **Beware temperature of intake gas**
Danger of remaining moisture **When evacuating moisture, be sure to open air-flush port (air-flush operation).** If you evacuate vapor while air-flush port is closed, condensed water will remain inside vacuum pump and cause failure.	 **Operate while opening air-flush port**
Danger of insufficient vapor exhaust **After evacuating vapor, do air-flush operation for at least one hour.** If you close air-flush port or stop vacuum pump soon after evacuating vapor, condensed moisture will remain inside vacuum pump, which will cause failure.	 **Caution after exhausting vapor**
Danger of exceeding permissible intake gas volume **When sending N_2 gas or dry air into air-flush port, pressure should be the same as atmospheric pressure and flow rate should be less than 10NL/min.** If not, it can increase pressure inside vacuum pump, resulting in failure.	 **Beware of intake gas volume**

Important

If it takes time to reach ultimate pressure of pump during initial operation (also operation after pump has not been used for a long time),
Close inlet, and continue operation for 6～8 hours while opening inlet for 3～5 seconds to atmosphere 2～3 times per hour. During pump stoppage, moisture might have entered inside of pump and deteriorated performance to reach ultimate pressure.

If pump has evacuated liquid such as water or high humid air (over 60%RH),
Moisture can deposit inside pump and cause pump failure. In that case, close isolation valve, and open inlet to atmosphere for 3～5 seconds several times and exhaust moisture inside pump to outside.

If pump has continued operation around ultimate pressure or continuously evacuated high humid gas
Moisture can be condensed and remains inside pump, causing insufficient ultimate pressure and failure.
In that case, do air-flush operation in accordance with 5.1 [page 20].

4.1 Standard operation

4.1.1 Start-up

① Check that cap of inlet is removed.

② Close isolation valve in order to prevent the drawback of debris attached to the inside of vacuum pump into vacuum chamber due to pressure differential, resulting in vacuum break and pollution.
(Open leak valve if you use leak valve).

③ Push Start button(Local mode)/ send start signal(remote).
When selector switch is OFF, pump doesn't work.

④ Check start-up of vacuum pump and open isolation valve (close leak valve soon after start-up if you use leak valve) and evacuate vacuum chamber.

Important

When continuously operating pump at around ultimate pressure,
It can cause foreign matter or moisture to deposit inside pump, resulting in failure.
In that case, do air-flush operation or close isolation valve and open inlet to atmosphere for 3～5 seconds, 3～5 times daily.

4.1.2 Shut-down

① Be sure to close isolation valve in order to prevent the drawback of debris attached to inside of vacuum pump into vacuum chamber during operation due to pressure differential (open leak valve if you use leak valve).

② Push Stop button(Local mode)/ send stop signal(remote mode).

③ Check shut-down of vacuum pump.

5. Option

5.1 Air-flush operation

Air-flush operation requires on optional vapor handling set.
This pump is equipped with air-flush port. Before evacuating vapor, read precautions below completely and be sure to understand the contents.

Purpose of air-flush

Evacuating moisture or humid gas by vacuum pump can cause condensed water to remain in pump. This remaining water can cause failure of ultimate pressure or pump. Air-flush operation is necessary to exhaust the remaining water inside. Air-flush operation does not only exhaust moisture but also restores ultimate pressure.
※Vapor disposal volume is max. 250g/day when doing air-flush operation
(ambient temperature 25℃, humidity 60%RH).

Important

Maintenance interval of this pump is based on clean gas applications The standard differs when evacuating vapor.

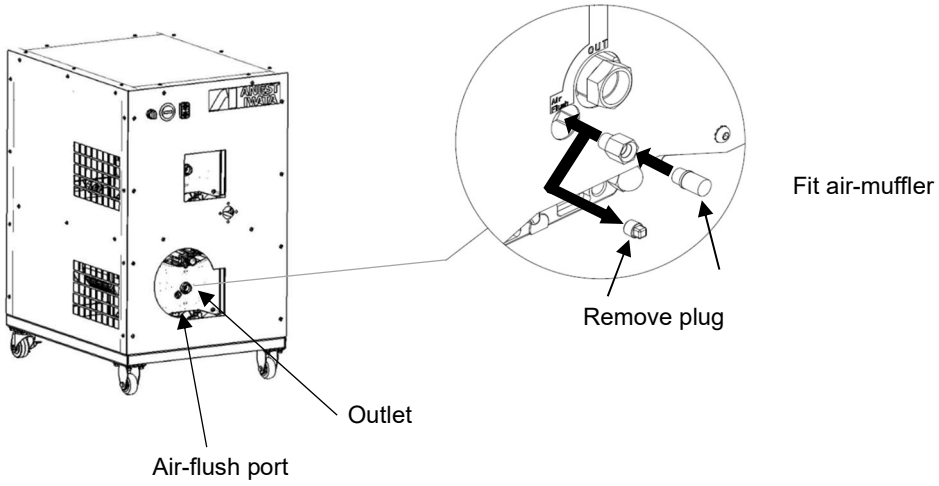
You must shorten maintenance interval (6.2[page 24) when evacuating vapor since vapor temperature, disposal volume, disposal frequency and substances in vapor have an influence on pump operation. When evacuating vapor, pay attention to all WARNING, CAUTION and Important notes (4 [page 17～19]).

5.1.1 Preparation

Before starting air-flush operation, first stop vacuum pump and proceed in accordance with the following procedure. Never try to do air-flush operation during operation.

Fit air-muffler

① Stop vacuum pump.
② Remove water separator & silencer from outlet.
③ Remove plug with a spanner (nominal dia. 7mm).
④ Lightly fit the attached air-muffler to air-flush kit.
⑤ Fit water separator & silencer into outlet.
※Store the removed plug and do not misplace it.



5.1.2 Start-up and shut-down

① Start vacuum pump according to 4.1.1 Operation [page 19].
② Stop vacuum pump according to 4.1.2 Shut-down [page 19].

Important

Continuous evacuating of humid gas
When evacuating vacuum chamber while humidity in chamber is high, moisture volume drawn into pump differs according to temperature and pressure in chamber.
When pumping vacuum chamber containing humid gas, be sure to open air-flush port and operate pump (air-flush operation).

Be careful not to damage air-flush port (especially air-muffler section).
Damage to air-flush port can cause failure.

When doing air-flush operation
Noise level will increase (by 5dB).

Install pump in an area which is not exposed to debris such as iron powder, stone powder, polish powder or wood dust.
Debris can clog air-muffler, undercutting air-flush effect.

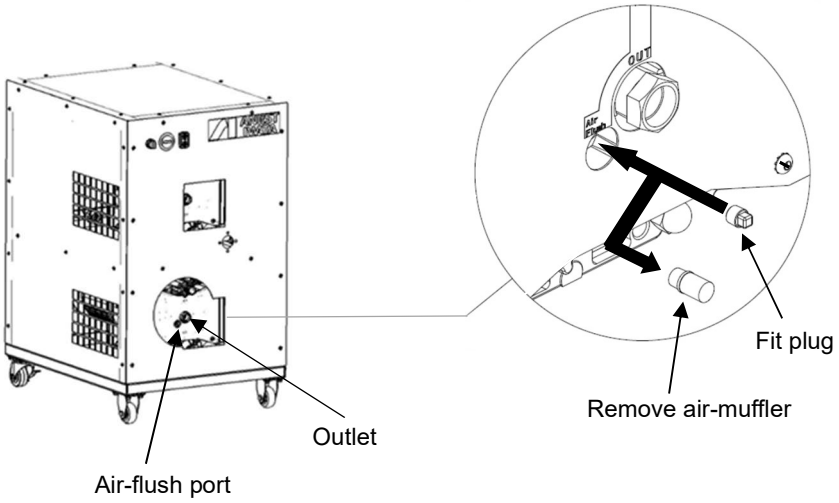
Be sure to close isolation valve between vacuum pump and vacuum chamber during pump shut-down.
If vacuum pump stops during air-flush operation, atmospheric air is drawn back from air-flush port to inside of vacuum pump, and vacuum on chamber side cannot be maintained. Be sure to close isolation valve between vacuum pump and vacuum chamber to prevent the drawback of debris from vacuum pump into vacuum chamber before stopping vacuum pump.
When operating with air-flush OFF (closed), operate as per 5.1.3[page 22].

5.1.3 When returning to standard operation

Before starting air-flush operation, first stop vacuum pump and proceed in accordance with the following procedure. Never perform this procedure during operation.

Remove air-muffler

① Stop vacuum pump.
② Remove water separator & silencer from outlet.
③ Remove air-muffler from air-flush port.
④ Lightly fit plug to air-flush port with a spanner (nominal dia. 7mm).
⑤ Fit water separator & silencer into outlet.
※When restarting air-flush operation, refer to 5.1.1～5.1.2[page 21] and prepare and start.
※Store removed air-muffler and pay attention not to misplace it.

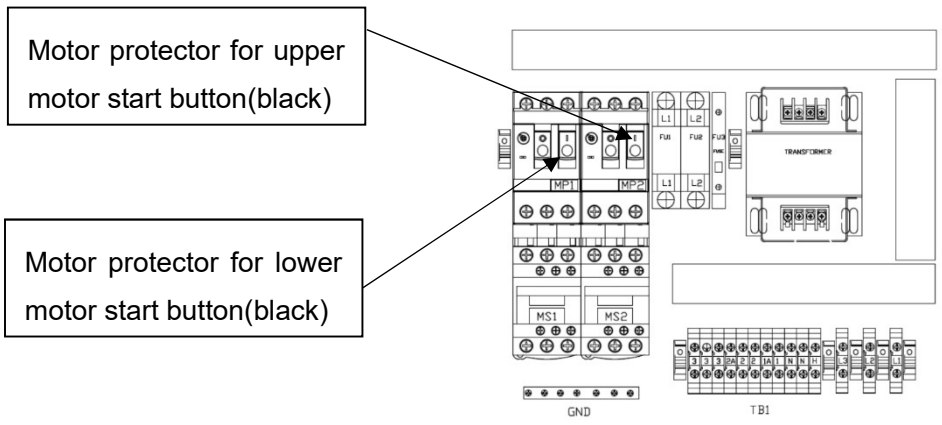


6. Maintenance and inspection

⚠ WARNING	
Danger of failure and bodily injury **Conduct periodical maintenance and inspection.** If not, it can cause insufficient performance, failure of vacuum pump, and bodily injury.	**Conduct periodical maintenance and inspection**
Danger of burns **Conduct maintenance and inspection only after vacuum pump becomes cool enough.** Maintenance and inspection soon after vacuum pump stops can cause burn injury.	**Be careful about high temperature**
Danger of electric shock **Be sure to conduct maintenance and inspection after you turn off electric source.** If not, it can cause bodily injury from electric shock or turning object.	**Turn off electric source**
Danger of accident, failure and shorter operating lifetime **Ask specialist to perform repairs.** Defective repairs can cause accident, failure or shorter operating lifetime.	**Ask specialist to perform repairs**

Important
Motor protector worked When one of the motor protector worked, whole system stop immediately. Resolve root cause

To reset a motor protector, push a start button(black) respectively in accordance with the below drawing.



6.1 Daily maintenance and inspection

Conduct the following daily maintenance and inspection.

Items	Contents	Measures
Vacuum pump itself	Abnormal sound	Ask specialist to repair.
	Abnormal vibration	Ask specialist to repair.
	Abnormal temperature	Ask specialist to repair.
	Cooling fins are dirty or clogged	Blowing air, cleaning
Cooling fan Fan cover	Smooth turning	Ask specialist to repair.
	Dirty, clogged, damaged	Blowing air, cleaning, ask specialist to repair.
Air-muffler ※	Dirty, clogged	Replace
Water separator & silencer ※	Dirty, clogged	Blowing air, cleaning
Electric source cable ※	Deteriorated	Replace

※Marked items need to be inspected when an optional vapor handling set is used.

6.2 Maintenance

When maintenance interval has elapsed, be sure to contact our distributor who sold it to you. This vacuum pump requires maintenance conducted only by our authorized specialist. Never try to disassemble, reassemble or alter on user's side. We are not responsible for any accidents caused by disassembly, reassembly or alteration which was done by the user or non-specialist.

Where to inspect	Maintenance interval			
	Yearly (8,000h)	Biennially (16,000h)	Triennially (24,000h)	4th years (32,000h)
Angular contact Ball bearing set	-	Grease / △	−	○
Pin crank set	Grease / △	Grease / △	Grease / △	○
Duplex arrangement angular ball bearing set [Housing]	-	Grease / △	−	○
Roller bearing set [OS]	Grease / △	Grease / △	Grease / △	○
Spider	○	○	○	○
P-seal [FS set]	○	○	○	○
Tip seal FS	○	○	○	○
Tip seal OS	○	○	○	○
O-ring [Inlet flange]	○	○	○	○
Air-flush kit	○	○	○	○

○・・・Replace

△・・・Replace if something goes wrong.

Note 1：Be sure to use designated GVSA or SL-165E exclusive grease.

Note 2：You must shorten maintenance standard when pumping vapor since vapor temperature, disposal volume, disposal frequency and substances in vapor have influence on pump operation.

Note 3：Air flush set needs to be inspected when an optional vapor handling set is used.

Note 4：The maintenance interval should be earlier one in either the period or running hours.

Note 5：When you want further operation after either the 4th year (32,000 operating hours), please contact our distributor from who you purchased your vacuum pump.

Important

Causes of failure

Shorten maintenance interval if conditions of installation or operation are unfavorable.

In particular, ambient temperature has a great influence on failure. Maintenance interval is based on an ambient temperature 5～40℃ and a yearly average ambient temperature 25℃.

Shorten the maintenance interval if temperature exceeds the foregoing. If not, it can cause failure.

Maintenance interval is not a guarantee period.

Exceeding maintenance interval

Operation exceeding maintenance interval increases risk of failure and accidents.

When maintenance interval has elapsed, be sure to contact our distributor who sold it to you.

7. Problems and remedies

If something goes wrong, refer to the following chart and remedy problems.
If you cannot solve your problems, please contact our distributor who sold it to you.

Problems	Causes	Remedies
Motor does not rotate.	Protective device (or breaker) activates.	※Inspect and repair.
	Electric source cable is loose or cut.	Check connection. Repair or replace.
	Voltage drops.	Check size and length of cable.
	Motor malfunctions.	※Inspect and repair.
	Pump malfunctions. Foreign matter enters.	※Inspect and repair.
	Motor protection gear activates.	Air outlet is clogged. ※Inspect and repair.
Motor stops soon.	Protective device (or breaker) activates.	※Inspect and repair.
	Voltage drops.	Check size and length of cable.
	Motor malfunctions.	※Inspect and repair.
	Pump malfunctions. Foreign matter enters.	※Inspect and repair.
	Improper exhaust piping.	Check exhaust piping diameter and length. Air outlet is clogged.
	Motor protection gear activates.	Check if air outlet is clogged. ※Inspect and repair.
Cooling fan does not rotate.	Cooling fan malfunctions.	※Inspect and repair.
	Any cables are loose or cut.	Check connection. Repair or replace.
	Transformer malfunctions.	Check wiring and voltage. Check if air hole of transfer cover is clogged. ※Inspect and repair.
	Cooling fan protection gear activates.	Air outlet is clogged. ※Inspect and repair.
	Voltage drops.	Check wiring and voltage.
Ultimate pressure is insufficient.	Air leaks from piping. O-ring is damaged.	Check tightness of piping. Replace.
	Moisture and solvent are drawn.	Open inlet to atmosphere and operate for a few minutes and then close inlet and operate for about 24 hours. Do air-flush operation. Install trap and filter.
	Number of motor revolutions drops.	Check wiring and voltage. ※Inspect and repair.
	Pump malfunctions.	※Inspect and repair.
Abnormal sound, abnormal vibration.	Connection becomes loose.	Tighten connection. ※Inspect and repair.
	The fix is not level.	Fix vacuum pump on solid and level floor (less than 5° inclination). ※Inspect and repair.
	Foreign matter enters pump.	※Inspect and repair.
	Motor malfunctions.	※Inspect and repair.
	Pump malfunctions.	※Inspect and repair.

8. Disposal

When a vacuum pump is disposed, please comply with local law and/or regulations such as the Waste Disposal Low.

9. Specifications

9.1 Specifications

Item			GVSU-1000
Vacuum Pump	Pump model		GVSU-500B x 2
	Back-up material		Silicon rubber
	Displacement at 60Hz	Cfm [L/min]	37.0 [1044]
	Ultimate pressure	Torr [Pa]	3.8 [500]
	Max. inlet pressure		Atmospheric pressure
	Ambient operating temperature	^{O}F [^{O}C]	41-104 [5-40]
Motor	Type		3-Phase squirrel cage induction motor Totally-enclosed , 2-pole F class insulation, IP55
	Output	kW	1.5 x 2
	Voltage	V	460
	Rated current	A	2.5 x 2
	Revolution at 60Hz	min^{-1}	3520
Others	Starting Switch		Remote/Off/Local
	Inlet connection		Rc 1”
	Outlet connection		Rc 1/2” x 2
	Outlet filter		SMC ANB1-04 x 2
	Caster		Fixed caster x 2, Swivel caster x 2
	Dimensions W x L x H	in. [mm]	29 x 23 x 40 [733 x 579 x 1014]
	Approximate mass	Lbs. [Kg]	375 [170]
	Cooling system		Air-cooled, cooling fan system
	Hour meter, Selector switch(Remote/Off/Local), On-Off Switch, magnet contactor, Air Flush		

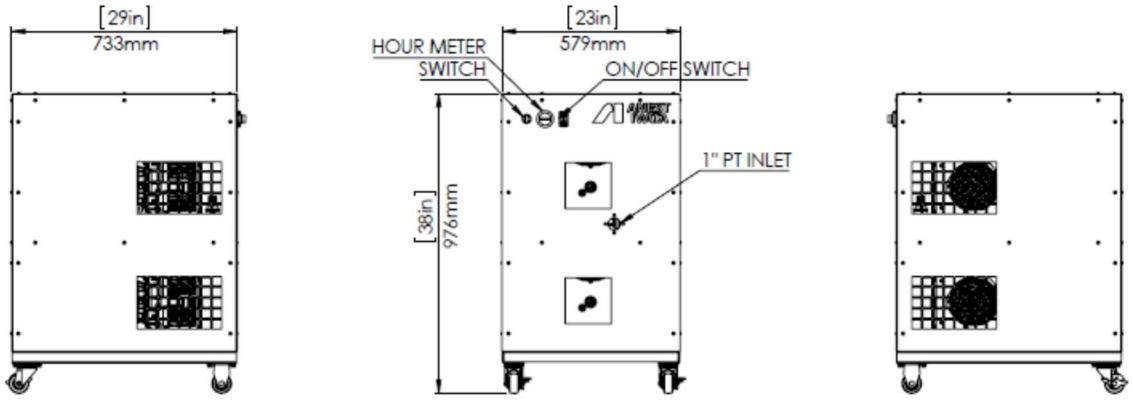
Note 1：Pumping speed and ultimate pressure remain the same during air-flush operation and standard operation.

Note 2：Noise level is measured by optional vapor handling set at ultimate pressure in an anechoic room.

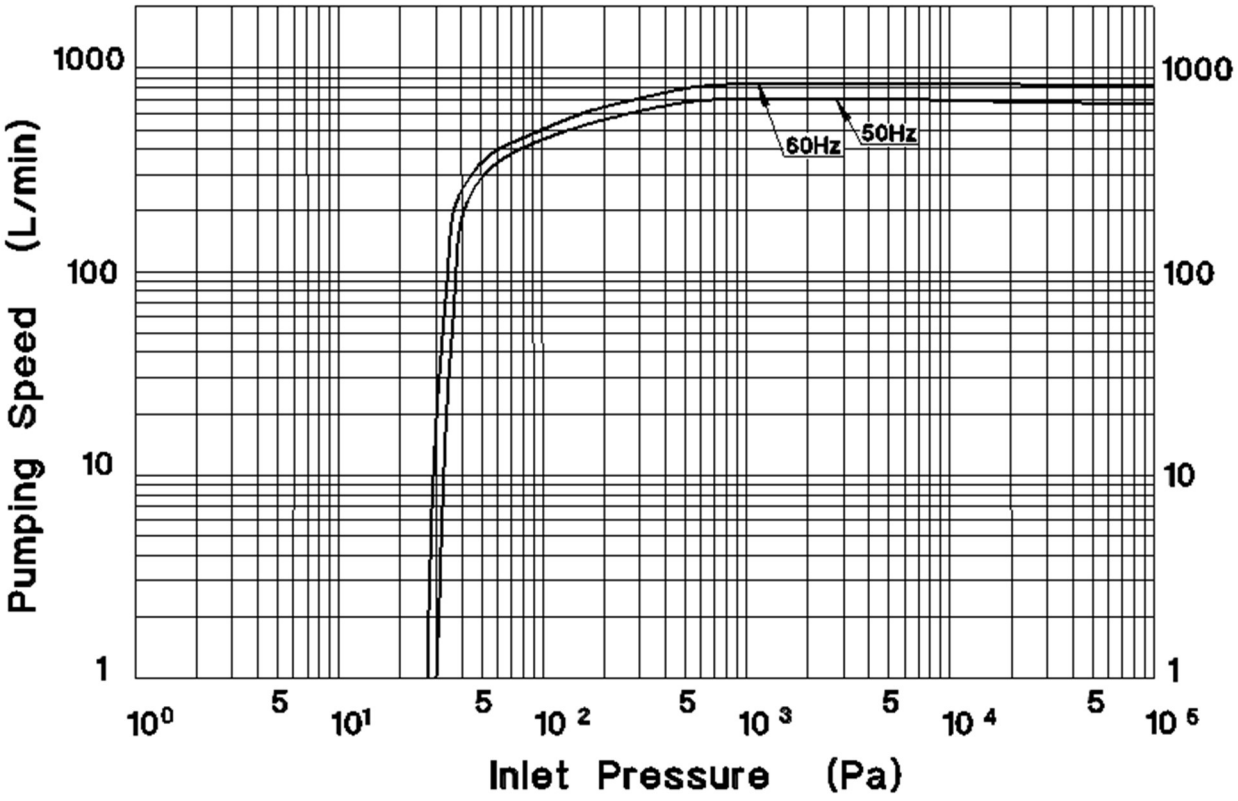
Note 3：When an optional vapor handling set is used and with Air-flush open, the amount of vapor handling is less than 250g per day. Air-flush volume is 10L/min. Air-flush is OFF (closed) when pump is delivered.

Note 4：The specification might change without a previous notice for the quality improvement.

9.2 Dimensions



9.3 Performance data



10. Warranty

- Warranty and Remedies

(a) **General. Anest Iwata - Air Engineering warrants each Compressor System, Vacuum System, Vacuum Pump, Compressor Air-End, or Anest Iwata branded accessory (collectively "products", individually each a "product") to be free from defects in material and workmanship ("Defects") at the date of shipment. EXCEPT AS SET FORTH BELOW, NO OTHER WARRANTY, WHEATHER EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABLILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL EXIST IN CONNECTION WITH THE SALE OR USE OF SUCH PRODUCTS. TO THE EXTENT PERMITTED BY LAW ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED. All claims under this warranty must be made in writing and delivered to Anest Iwata Air Engineering, or such claim shall be barred. Upon timely receipt of a claim, Anest Iwata Air Engineering shall inspect the product claimed to have a defect, and Anest Iwata Air Engineering shall repair, or, at its option, replace, free of charge, any product which it determines to have had a defect at the time of shipment from Anest Iwata Air Engineering; provided, however, that if circumstances are such as to preclude the remedying of defect by repair or replacement, Anest Iwata Air Engineering shall, upon return of the product, refund to buyer any part of the purchase price of such products paid to Anest Iwata Air Engineering. Freight for the returning products to Anest Iwata Air Engineering for inspection shall be paid by buyer. The warranties and remedies herein are the sole and exclusive remedy for any breach of warranty or for any other claim based on any defect, or non-performance of the products, whether based upon contract, warranty or negligence.**

(b) **Initial period of warranty – Parts and Labor.** Anest Iwata Air Engineering warrants and represents all products shall be free from defects for the first twelve (12) months from the date of shipment by Anest Iwata Air Engineering, or eight thousand (8,000) hours of use, whichever occurs first. During such warranty period, Anest Iwata Air Engineering shall be fully liable for all defects in the products (the "product defects"), i.e., all costs of repair or replacement, which may include "in and out" charges, so long as the products are located in the continental United States, and the products are reasonably located and accessible by service personnel for removal. "In and out" charges include the costs of removing a product from buyer's equipment for repair or replacement.

(c) **Additional period of Warranty – Parts Only (No Labor).** In addition to the above, Anest Iwata Air Engineering warrants each Anest Iwata branded compressor air-end, and vacuum pump shall be free of defects for a period of eighteen months from the date of shipment of product, or 10,000 hours of use, whichever occurs first. Supplier's repair or replacement of any product shall not extend the period of any warranty of any product. This warranty applies to the exchange of part(s) found to be defective by an authorized Anest Iwata service center only.

(d) **Coverage.** The above mentioned warranty applies to Anest Iwata Air Engineering manufactured units or systems only.

(e) **Exceptions.** Notwithstanding anything to the contrary herein, Anest Iwata Air Engineering shall have no warranty obligations with respect to products:

- **(i)** That have not been installed in accordance with Anest Iwata Air Engineering's Written specifications and instructions;
- **(ii)** That have not been maintained in accordance with Anest Iwata Air Engineering's written instructions;
- **(iii)** that have been materially modified without the prior written approval of Anest Iwata Air Engineering; or
- **(iv)** That experience failures resulting from operation, either intentional or otherwise, in excess of rated capacities or in an otherwise improper manner.

(f) The warranty provided herein shall not apply to: (i) any defects arising from corrosion, abrasion, use of insoluble lubricants, or negligent attendance to or faulty operation of the products; (ii) ordinary wear and tear of the products; or (iii) defects arising from abnormal conditions of temperature, dirt or corrosive matter; (iv) any OEM component which is shipped by Anest Iwata Air Engineering with the original manufacturer's warranty, which shall be the sole applicable warranty for such component.

Limitation of liability. TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, NOT WITHSTANDING ANYTHING TO THE CONTRARY HEREIN, UNDER NO CIRCUMSTANCES SHALL ANEST IWATA AIR ENGINEERING BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTAL, PUNITIVE, SPECULATIVE OR INDIRECT LOSSES OR DAMAGES WHAT SO EVER ARISING OUT OF OR IN ANY WAY RELATED TO ANY OF THE PRODUCTS OR GOODS SOLD OR AGREED TO BE SOLD BY POWEREX TO BUYER. TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, ANEST IWATA AIR ENGINEERING'S LIABLITY IN ALL EVENTS IS LIMITED TO AND SHALL NOT EXCEED THE PURCHASE PRICE PAID.

Warranty Disclaimer. Anest Iwata Air Engineering has made a diligent effort to illustrate and describe the products in this literature accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions.

Product Suitability. Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Anest Iwata Air Engineering attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product applications, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Claims. Claims pertaining to the products, with the exception of warranty claims, must be filed with Anest Iwata Air Engineering within 6 months of the invoice date, or they will not be honored. Prices, discounts, and terms are subject to change without notice or as stipulated in specific product quotations. All agreements are contingent upon strikes, accidents, or other causes beyond our control. All shipments are carefully inspected and counted before leaving the factory. Please inspect carefully any receipt of products noting any discrepancy or damage on the carrier's freight bill at the time of delivery. Discrepancies or damage which obviously occurred in transit are the carrier's responsibility and related claims should be made promptly directly to the carrier. Returned products will not be accepted without prior written authorization by Anest Iwata Air Engineering and deductions from invoices for shortage or damage claims will not be allowed. **UNLESS OTHERWISE AGREED TO IN WRITING, THESE TERMS AND CONDITIONS WILL CONTROL IN ANY TRANSACTION WITH ANEST IWATA AIR ENGINEERING** Any different or conflicting terms as may appear on any order form now or later submitted by the buyer. All orders are subject to acceptance by Anest Iwata Air Engineering.

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