CA72153030

Instruction Manual (Original Instructions)

Oil-free Scroll Vacuum Pump

ISP-50

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

EC DECLARATION OF CONFORMITY

Identification of the product : Scroll Vacuum Pump

Name and address of the manufacturer :

ANEST IWATA Corporation
3176, Shinyoshida-cho, Kohoku-ku,
Yokohama 223-8501,
Japan

Name and address of the authorised representative :

ANEST IWATA EUROPE GmbH
Am StahlbUgel 2,
74206 Bad Wimpfen,
Germany

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration :

Series	ISP-50
Models Designation	ISP-50-SV**ab**

a = 1 or 2 , b = S9 , S12 , S34 or blank

Ratings	1-phase, 100V class,	50Hz, AC100V
		60Hz, AC100/115V
	1-phase, 200V class,	50Hz, AC200/230V
		60Hz, AC200/230V

The object of the declaration described above is in conformity with the relevant EU harmonisation legislation :

2006 / 42 / EC	Machinery Directive
2011/65/EU & (EU)2015/863	Restriction of the use of certain Hazardous Substances in Electrical and electronic equipment

References to the relevant harmonised standards used or references to the specifications in relation to which conformity is declared :

EN 1012-2:1996+A1:2009	Compressors and Vacuum Pumps-Safety Requirements, Part 2: Vacuum pumps
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Name and address of the notified body :

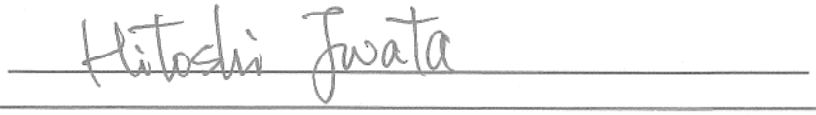
TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg, Germany

Technical Documentation From File No. AM 50163404

Signed for and on behalf of the above named manufacturer :

Place and date of issue : Yokohama, Japan 1-Oct-2022
Name, function : Hitoshi Iwata
Chief Operating Officer, Air Energy Division

Signature :



UK DECLARATION OF CONFORMITY

Identification of the product : Scroll Vacuum Pump

Name and address of the manufacturer :

ANEST IWATA Corporation
3176, Shinyoshida-cho, Kohoku-ku,
Yokohama 223-8501,
Japan

Name and address of the person authorised to compile the technical file :

Hidetoshi Ishikawa
ANEST IWATA Corporation
3176, Shinyoshida-cho, Kohoku-ku,
Yokohama 223-8501,
Japan

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration :

Series	ISP-50
Models Designation	ISP-50-SV**ab**

a = 1 or 2 , b = S9 , S12 , S34 or blank

Ratings	1-phase, 100V class,	50Hz, AC100V
		60Hz, AC100/115V
	1-phase, 200V class,	50Hz, AC200/230V
		60Hz, AC200/230V

The object of the declaration described above is in conformity with the relevant UK harmonisation legislation :

2008 No. 1597	The Supply of Machinery (Safety) Regulations 2008
2012 No. 3032	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

References to the relevant harmonised standards used or references to the specifications in relation to which conformity is declared :

BS EN 1012-2:1996+A1:2009	Compressors and Vacuum Pumps-Safety Requirements, Part 2: Vacuum pumps
BS EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Signed for and on behalf of the above named manufacturer :

Place and date of issue : Yokohama, Japan 1-Oct-2022
Name, function : Hitoshi Iwata
Chief Operating Officer, Air Energy Division

Signature :

Hitoshi Iwata

Important information

Be sure to read this instruction manual to understand how to operate the equipment correctly. Only operators, who fully understand warnings, cautions and instructions, are to operate the equipment. Improper operation (mishandling) can cause serious 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 will assume no responsibility for any injury or damage caused by disregarding warnings, precautions or instructions.

Supplementary notes

Important	The sign indicates: Please observe these notes and instructions. They are useful to achieve maximum performance and operation lifetime.

For safe operation

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

⚠ WARNING

Be careful about lifting	**Danger of cargo collapse** Hold the bottom of the product (ISP-50 mass 12kgs) firmly, when installing vacuum pump. If not, it can cause damage, failure or injury from falling vacuum pump, or by being caught between vacuum pump and other material.
Avoid moisture	**Danger of electric shock** Install the unit 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 injury due to short-circuit or electric shock.
Install the unit at a safe site	**Danger of explosion, fire and accident** Install the unit 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 injury.
Turn off electric source	**Danger of electric shock and entanglement** Be sure to turn off electric source on the installation site before wiring. If not, it can cause electric shock or injury due to turning objects.
Install overcurrent protective device	**Danger of accident, fire and failure** Be sure to install protective device to protect circuitry. We recommend overcurrent protective device (rated 15A) to protect branch circuit. If the 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 the 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 injury due to fire or electric shock.
Install motor protective circuit breaker to protect motor	**Danger of electric fire and electric shock** Install motor protective circuit breaker to protect motor. If not, injury due to electric fire or electric shock can result. If you have any questions about the selection of protective devices, contact either the dealer who sold it to you or us.
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 10A) cross section area for electric source cable and earth cord. Be careful to avoid voltage drop considering local situation. If not, it can cause a short-circuit fire and may result in injury from electric shock.

For safe operation

⚠ WARNING

 **Be careful about insertion**	**Danger of short-circuit and electric shock** Insert the connector to the receptacle surely by using an electric source cable with an appropriate connector. If not, it can cause short-circuit fire or injury from electric shock due to looseness or disconnection.
 **Be sure to ground**	**Danger of electric shock** Connect earth cord to electric source. If not, it can cause injury from electric shock.
 **With a thermal protector**	**Danger of restart** Be sure to switch off electric source before maintenance or inspection. Single-phase motor has a thermal protector. Vacuum pump restarts become cool without warning after vacuum pump.
 **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 any gas with substances containing chemicals, solvents, and powders. If done, it can cause failure or injury by gas, explosion or ignition.
 **Avoid foreign objects**	**Danger of entanglement and foreign objects dispersal** Never put finger or foreign objects into air hole of fan cover, air hole of motor or clearance between FS(1) and FS(2) cooling fins. If done, it can cause injury from entanglement with turning section, or foreign objects dispersal.
 **Never make any modifications**	**Danger of electric shock and entanglement** Do not remove or modify safeguards or insulation parts. If done, it can cause 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 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 injury.
 **Conduct periodical maintenance and inspection**	**Danger of failure and injury** Conduct periodical maintenance and inspection. If not, it can cause insufficient performance, failure of vacuum pump, and 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 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 injury such as burns due to overheating.
Pay attention to ventilation	**Danger of overheating** Install the unit in a well-ventilated area. Poor ventilation can disrupt cooling and cause accident, failure or 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 1cm or more, and separate outlet side by10cm 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 unbalance** Be sure to install on solid and level floor (less than 5° inclination). Uneven installation can cause failure and movement of vacuum pump. If installation floor is unstable, fix pump base with 4-φ9 holes of pump leg (ISP-50).
Avoid direct sunlight	**Danger of overheating** Install the unit in a place where it is not exposed to direct sunlight. Vacuum pump is exposed to direct sunlight can overheat, resulting in failure.
Check voltage	**Motor burnout** Before doing any wiring, check electric source and voltage. ISP-50-SV1 is AC100V class. ISP-50-SV2 is AC200V class. Voltage can not be changed. Check your electric source, voltage, and wire correctly to receptacle. Improper wiring and incorrect voltage can cause motor burnout.
Inspect cause of problem	**Danger of problem recurrence and failure** If protective device or thermal protector 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 blank flange	**Danger of exhaust disruption** Remove blank flange from inlet and outlet. Operation with blank flange being fitted can disrupt air flow or cause blank flange to fly by exhaust impetus, resulting in accident, failure, or injury from contact with flying objects.
Prevent foreign objects from entering	**Danger of foreign objects entering inlet** When checking turning direction, be careful not to enter foreign objects into an inlet. Foreign objects 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 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.
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.

For safe operation

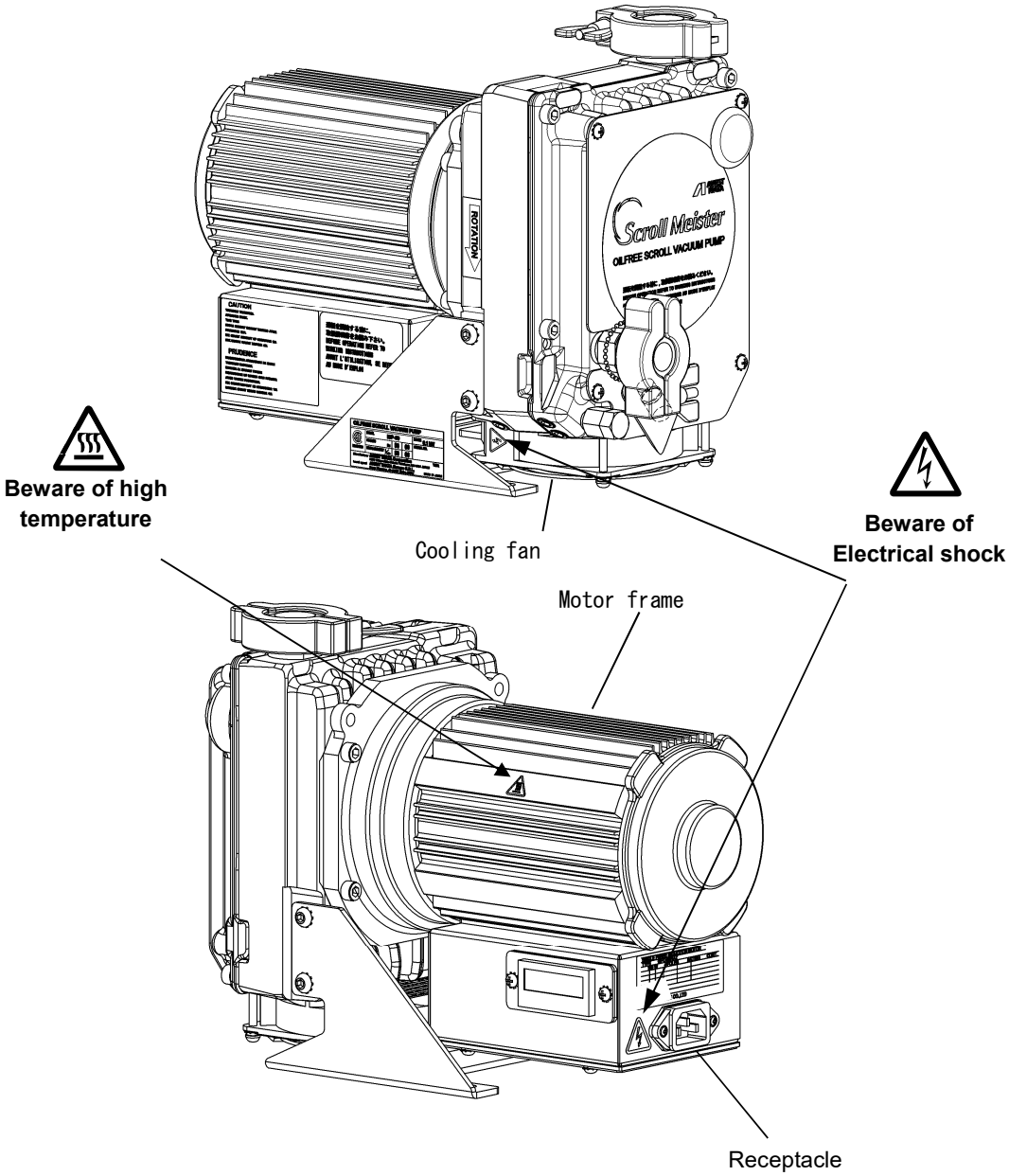
⚠ CAUTION

 **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 the unit 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 water 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 4L/min. If not, it can increase pressure inside vacuum pump, resulting in failure.
 **Caution for frequent start/stop and short interval**	**Risk of motor malfunction** Refrain from frequent start/stop operation. It induces malfunction of motor such as burn out. Please consult your dealer or factory representative for details. Appropriate operating mode with adequate interval and frequency of start/stop is varies owing to operating condition.

Where to attach warning stickers

Where 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 dealer who sold the vacuum pump to you.



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.**

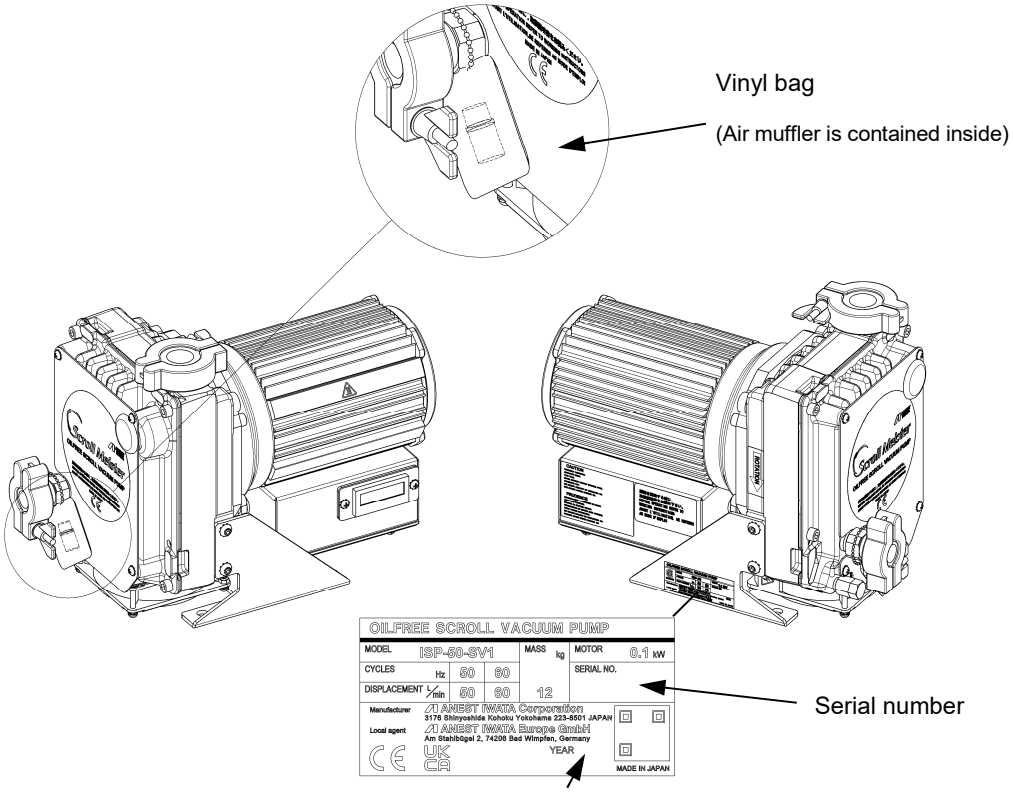
How to read model name

ISP：model

I S P – 5 0 – S V 1

Displacement (swept volume)	50：50 L/min at 50Hz Motor
Motor	S：Single phase
Inlet direction	V：vertical
Input Voltage	1：AC100V 50/60Hz , 115V 60Hz 2：AC200V 50/60Hz , 230V 50/60Hz

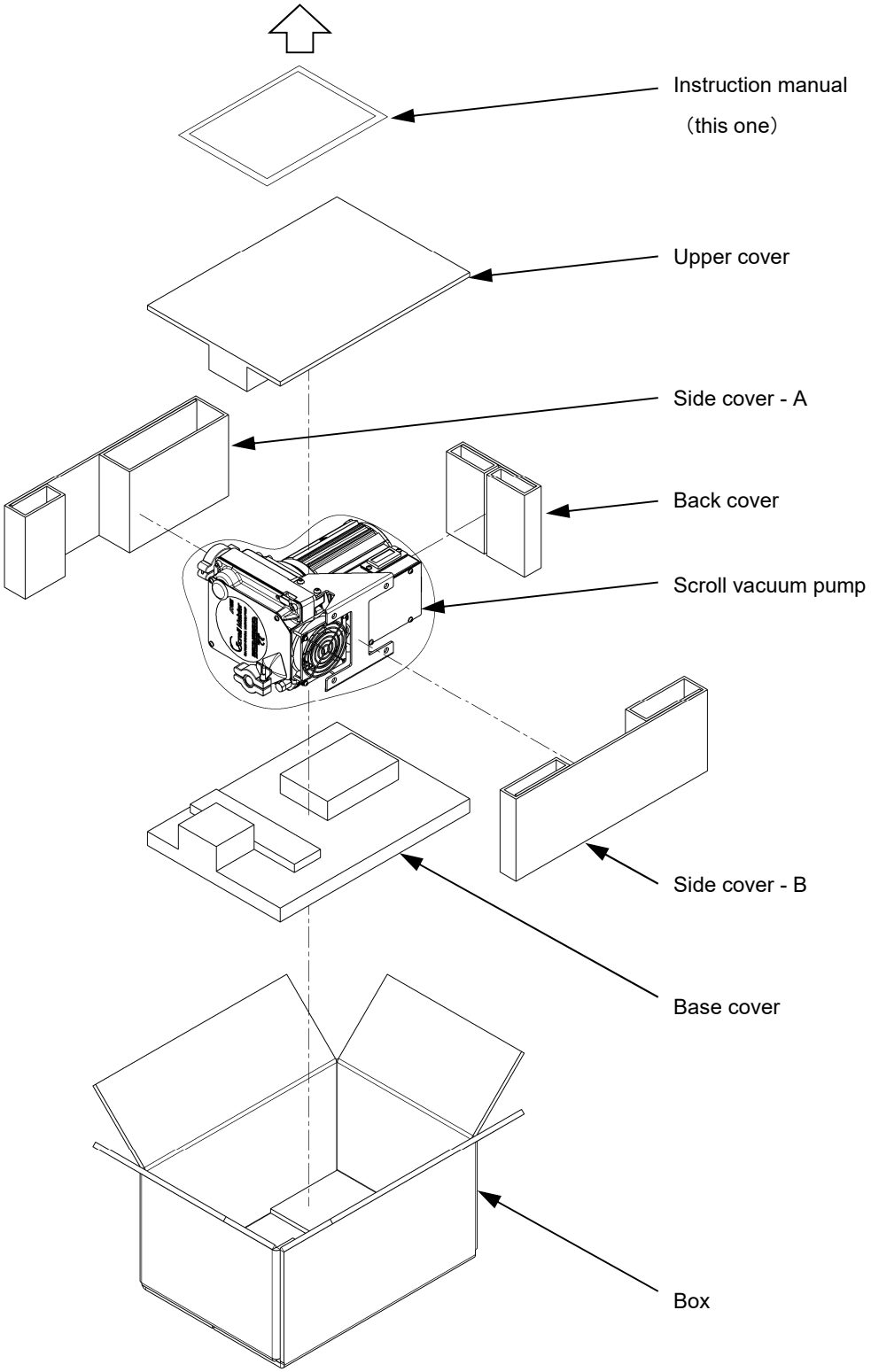
- **Check the unit that there is no damage.**
  If there is any damage, contact either the dealer who sold it to you or us.
- **Check the following accessories.**
  Instruction manual (this one)
  Air-muffler for air-flush (ISP-50 is attached to outlet flange.)



※Please prepare electric source cables, crimp-style terminal, electric source protective devices, piping to inlet, and piping from outlet on customer side.

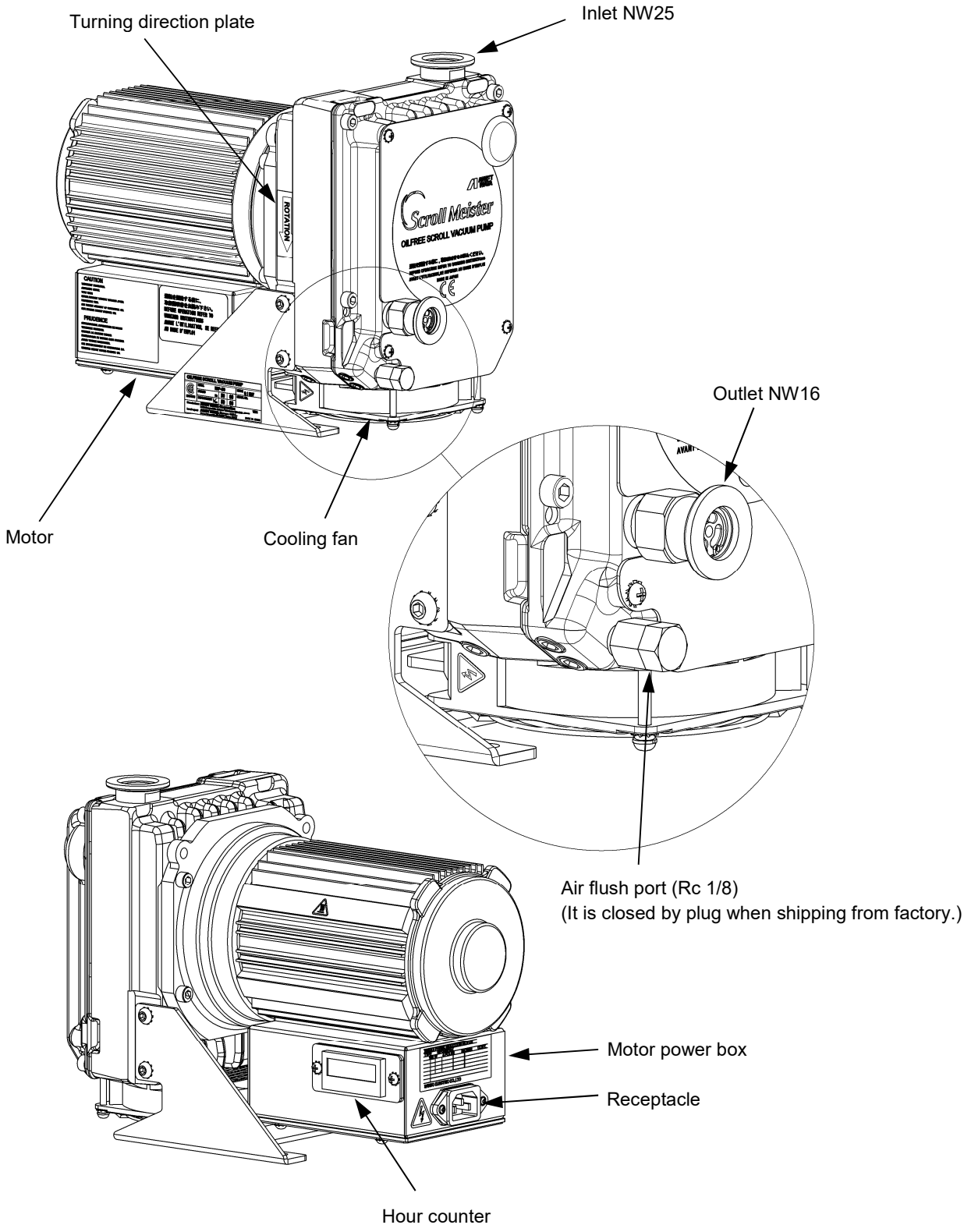
Open package

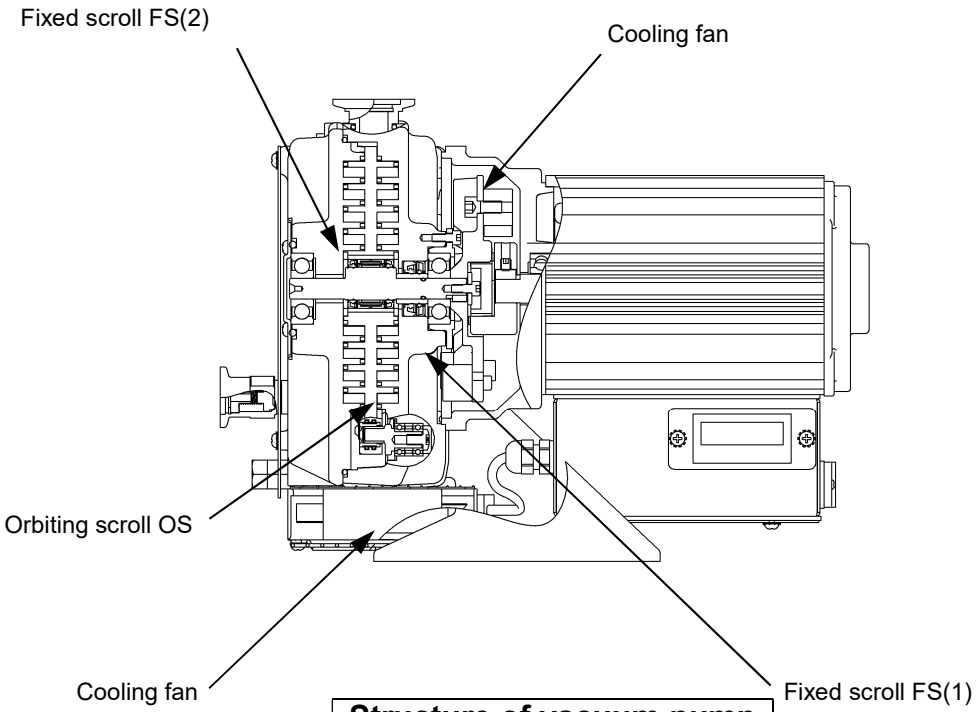
⚠ WARNING	
Danger of cargo collapse **Hold the bottom of the product (ISP-50 mass 12kgs) firmly, when installing vacuum pump.** If not, it can cause damage, failure or injury from falling vacuum pump, or by being caught between vacuum pump and other material.	**Be careful about lifting**



※This product does not come with an electric source cable.

2. Name and structure of each section





Structure of vacuum pump

3. Installation

⚠ WARNING

Danger of electric shock

Install the unit 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 injury due to short-circuit or electric shock.

Avoid moisture

Danger of explosion, fire or accident

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

Install the unit 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 injury such as burns due to overheating.

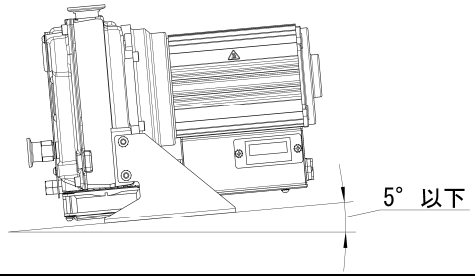
Use at designated temperature

Danger of overheating

Install the unit in a well-ventilated area (refer to below chart).
Poor ventilation can disrupt cooling and cause accident, failure or 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 1cm or more, and separate outlet side by10cm or more)

Necessary ventilated air volume
Over 2 m^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 unbalance **Be sure to install on solid and level floor (less than 5° inclination).** Uneven installation can cause failure and movement of vacuum pump. If installation floor is unstable, fix pump base with 4-ϕ9 holes of pump leg (ISP-50).  	**Install on a solid, level floor**
Danger of overheating **Install the unit in a place where it is not exposed to direct sunlight.** Vacuum pump is exposed to direct sunlight can overheat, resulting in failure.	**Avoid direct sunlight**

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 the dealer who sold it to you or us.

3.1 Wiring

⚠ WARNING

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 injury.	**Ask qualified electrician**
Danger of electric shock and entanglement **Be sure to turn off electric source on the installation site before wiring.** If not, it can cause electric shock or 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 an overcurrent protective device (rated 15A) to protect branch circuit.** If the equipment is not stopped in an emergency, it can cause accident, fire or failure.	**Install overcurrent 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 the 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 injury due to fire or electric shock.	**Install short circuit protective device**

Danger of electric fire and electric shock (refer to chart 1 on page 14) **Install motor protective circuit breaker to protect motor.** If not, injury due to electric fire or electric shock can result. If you have any questions about the selection of protective devices, contact either the dealer who sold it to you or us.	 **Install motor protective circuit breaker to protect motor**
Danger of short-circuit and electric shock **We recommend an electric source cable of more than 2mm2 (more than rated 10A) cross section area for electric source cable and earth cord.** **Be careful to avoid voltage drop considering local situation.** If not, it can cause a short-circuit fire and may result in injury from electric shock.	 **Be careful about wiring**
Danger of short-circuit and electric shock **Insert the connector to the receptacle surely by using an electric source cable with an appropriate connector.** If not, it can cause short-circuit fire or injury from electric shock due to looseness or disconnection.	 **Be careful about insertion**
Danger of electric shock **Connect earth cord to electric source.** If not, it can cause injury from electric shock.	 **Be sure to ground**
Danger of restart **Be sure to switch off electric source before maintenance or inspection.** **Single-phase motor has a thermal protector.** Vacuum pump restarts become cool without warning after vacuum pump.	 **With a thermal protector**

CSA Requirement

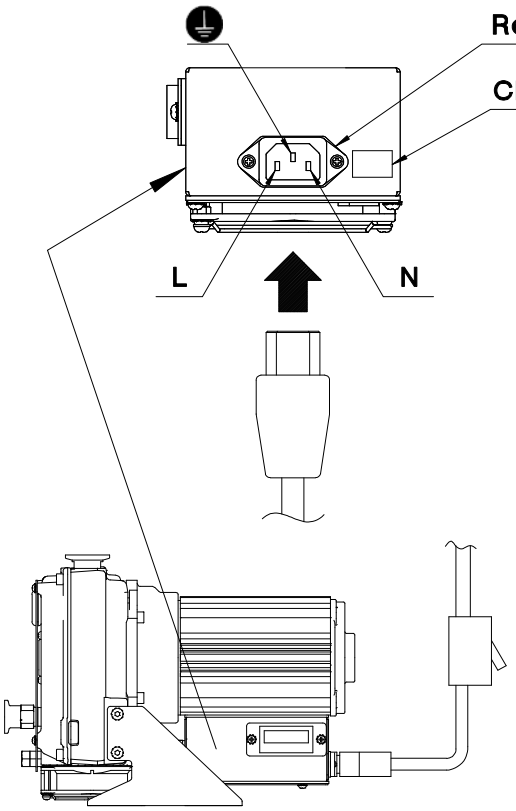
Thermally protected automatic reset. TYPE TP212. Motor restart without warning after protector trip.
Min. circuit ampacity of conductor is 10A
Max. branch circuit breaker is 15A

When you use this pump in Europe or UK.

This vacuum pump must be equipped with a main disconnect device in accordance with requirements of EN/BS EN 60204-1, clause 5.3.2. It is recommended to use a circuit breaker as main breaker which is suitable for isolation according to EN/BS EN 60947-2 and is equipped with an operating handle which is lockable in OFF position and complies with the other requirements of EN/BS EN 60204-1, clause 5.3.

⚠ CAUTION

Motor burnout **Before doing any wiring, check electric source and voltage.** **ISP-50-SV1 is AC100V class.** **ISP-50-SV2 is AC200V class.** **<u>Voltage can not be changed.</u>** **Check your electric source, voltage, and wire correctly to receptacle.** Improper wiring and incorrect voltage can cause motor burnout.	**Check voltage**
Danger of problem recurrence and failure **If motor protective device or thermal protector 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**



- Activate the emergency stop by electric source switch or protective device.
- Avoid motor burnout by protective device (chart 1).
- Use rated over 10A electric source cable and earth cord.
- Make sure to insert the connector into the inlet.
- Be sure ground the device.

Chart-1

ISP-50-SV1			ISP-50-SV2		
Single-phase 100V class specifications			Single-phase 200V class specifications		
Voltage V	Frequency Hz	Recommended protective device (or breaker) capacity A	Voltage V	Frequency Hz	Recommended protective device (or breaker) capacity A
100	50	2.6	200	50	1.2
100	60	2.4	200	60	1.2
115	60	2.4	230	50	1.4
-	-	-	230	60	1.1

How to wire

⚠ WARNING

Danger of fire and electric shock (refer to chart 1 on page 14)

Install motor protective circuit breaker to protect motor
If not, it can cause injury due to electric fire or electric shock.
If you have any questions about the selection of protective devices, contact either the dealer who sold it to you or us.

Install motor protective circuit breaker to protect motor

① Prepare electric source cable with a connector corresponding to the receptacle (table-2). Protective device must be installed between this cable and electric source.

② Insert a connector of electric wire into receptacle of motor power box.

Table－2

Receptacle		Electric source (primary side)
CM-11 (HIRAKAWA HEWTECH CORP.)	L	Single Phase AC100 / 115V(in case of 100V class) Single Phase AC200 / 230V(in case of 200V class)
	N	
	⏚	Ground

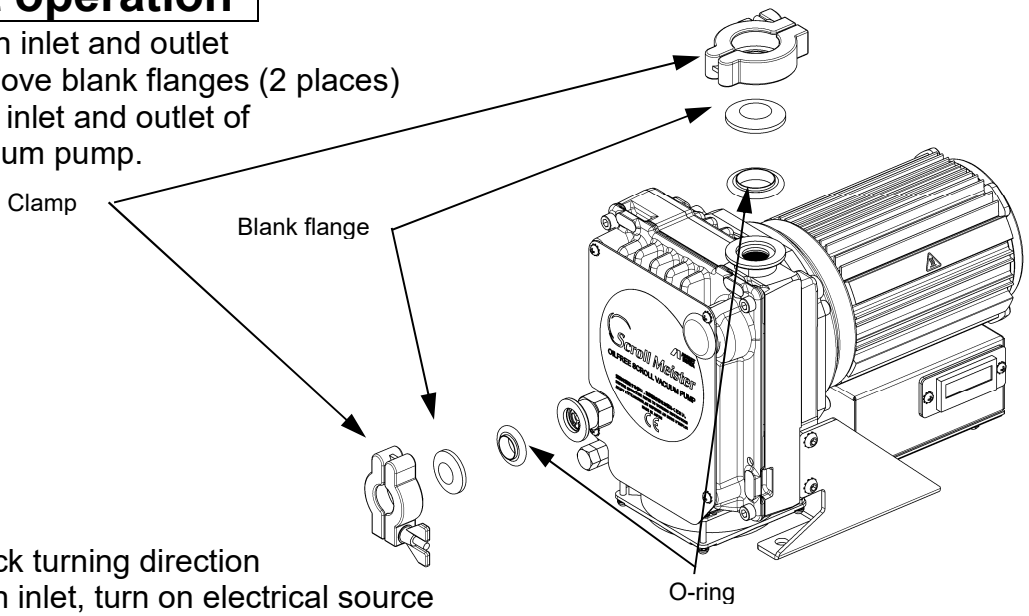
※Receptacle has specified dimension to IEC60320. Selection of connector must be along with IEC60320. If you have any questions about the selection of electric wire with a connector, contact either the dealer who sold it to you or us.

3.2 Test operation

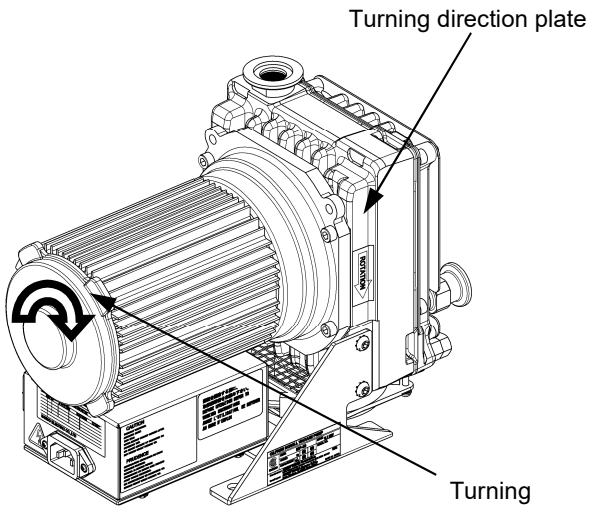
⚠ CAUTION	
Danger of exhaust disruption **Remove blank flange from inlet and outlet.** Operation with blank flange being fitted can disrupt air flow or cause blank flange to fly by exhaust impetus, resulting in accident, failure, or injury from contact with flying objects.	**Remove blank flange**
Danger of foreign objects entering inlet **When checking turning direction, be careful not to enter foreign objects into an inlet. Foreign objects entering inlet can cause failure.**	**Prevent foreign objects from entering**
Danger of overheating **Check that cooling fan is turning and cooling air is flowing.** If not, it can cause accident, failure or injury such as burns due to overheating.	**Check fan**

Test operation

① Open inlet and outlet
Remove blank flanges (2 places) from inlet and outlet of vacuum pump.

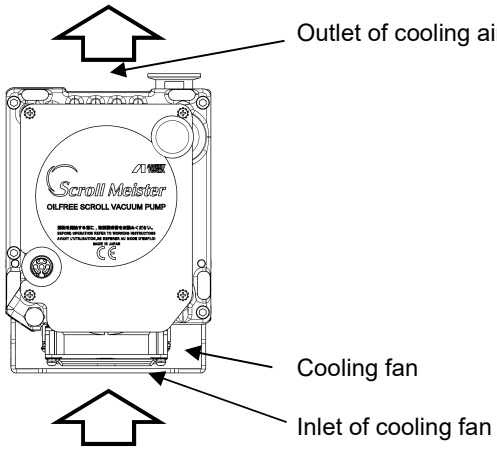


② Check turning direction
Open inlet, turn on electrical source to start operating vacuum pump and check that air comes out of outlet.



If you install pump to vacuum system and control operation of vacuum pump by remote control, **first check pump itself for turning direction** and then install it to vacuum system.

③ Check cooling air
Check that cooling fan is turning and cooling air is flowing in that direction as indicated.



3.3 Connection to vacuum system (chamber)

Inlet is NW25 and outlet is NW16.

⚠ 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 overcurrent.	**Pay attention to exhaust resistance**

Important

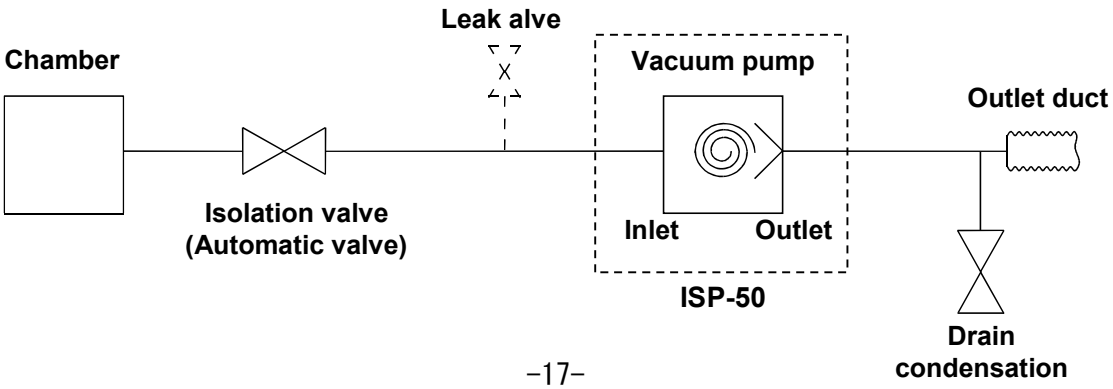
Use isolation valve between vacuum system and inlet.
Isolation valve is necessary to prevent the drawback of debris attached to the inside of vacuum pump into the vacuum chamber during start-up and shut-down. (We also recommend the use of leak valve). We recommend the use of an **automatic valve** **as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

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. **30m** direct pipe length for exhaust pipe size **NW16 (inner dia.16 mm)**
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.

In order to keep condensation away from feeding into the exhaust port, take proper measure.
It causes exhaust disturbance. Drain condensations periodically by using valve separately arranged.



4. Operation

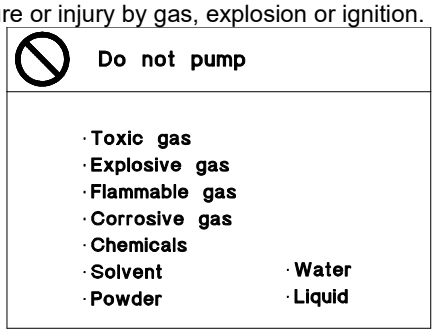
Be sure to use the procedure below to start up or shut down the pump.

- When you do not use air-flush device,
  proceed 4.1 Standard operation [page 20].
- When you use air-flush device,
  proceed 4.2 Air-flush operation [page 21].

⚠ WARNING

Danger of explosion and ignition

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

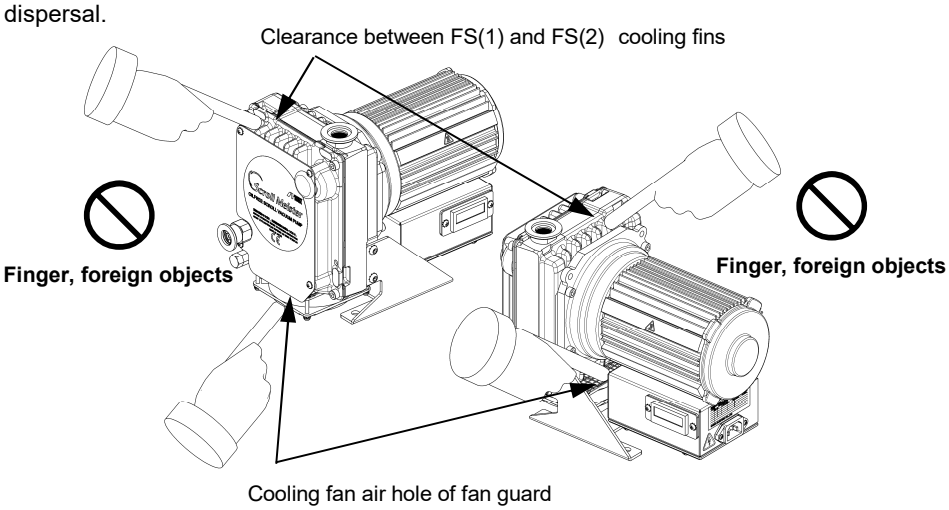


※When evacuating vapor, operate in accordance with 4.2 [page 21].

Never evacuate hazardous gas

Danger of entanglement and foreign objects dispersal

Never put finger or foreign objects into air hole of fan guard or clearance between FS(1) and FS(2) cooling fins.
If done, it can cause injury from entanglement with turning section, or foreign objects dispersal.



Avoid foreign objects

Danger of electric shock and entanglement

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

Never make any modifications

Danger of failure and 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 injury.

Change after vacuum pump is stopped

⚠ CAUTION

Danger of exhaust disruption **Remove blank flange from inlet and outlet.** Operation with blank flange being fitted can disrupt exhaust or cause blank flange to fly by exhaust impetus, resulting in accident, failure, or injury from contact with flying objects.	 **Remove blank flange**
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.	 **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 the unit 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 water 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 4L/min.** If not, it can increase pressure inside vacuum pump, resulting in failure.	 **Beware of intake gas volume**
Risk of motor malfunction **Refrain from frequent start/stop operation.** It induces malfunction of motor such as burn out. Please consult your dealer or factory representative for details. Appropriate operating mode with adequate intervals and frequency of start/stop is varies owing to operating conditions.	 **Caution for frequent start/stop and short interval**

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 remain inside pump, causing insufficient ultimate pressure and failure.
In that case, do air-flush operation in accordance with 4.2 [page 21].

4.1 Standard operation

4.1.1 Start-up

① Check that blank flange of outlet have been 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 Turn on vacuum pump.
Please install an external power switch or protective device (breaker) before letting vacuum pump operate.

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 (for example, using as fore line pump of turbo molecular pump) ,
It can cause foreign objects 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.
Be careful not to damage air-flush port (especially air-muffler section).
If not, it can cause failure.
When doing air-flush operation,
Noise level and ultimate pressure will increase (by 7~8dB, about 5Pa).
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.

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 Turn off vacuum pump.
Please install an external power switch or protective device (breaker) before letting vacuum pump operate.

③ Check shut-down of vacuum pump.

Important

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 returning air-flush operation to standard operation, operate as per 4.2.3[page 22].

4.2 Air-flush operation

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

Processing humid air by vacuum pump may cause condensed water to remain in pump. This remaining condensation will cause a failure of ultimate pressure of pump. Air-flush operation will contribute to remove the remaining condensation inside. Air-flush operation does not only remove condensation but also restores ultimate pressure.

※Continuous operation with the air flush function does not affect performance of the vacuum pump.
※Vapor disposal volume is max. 3g/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.

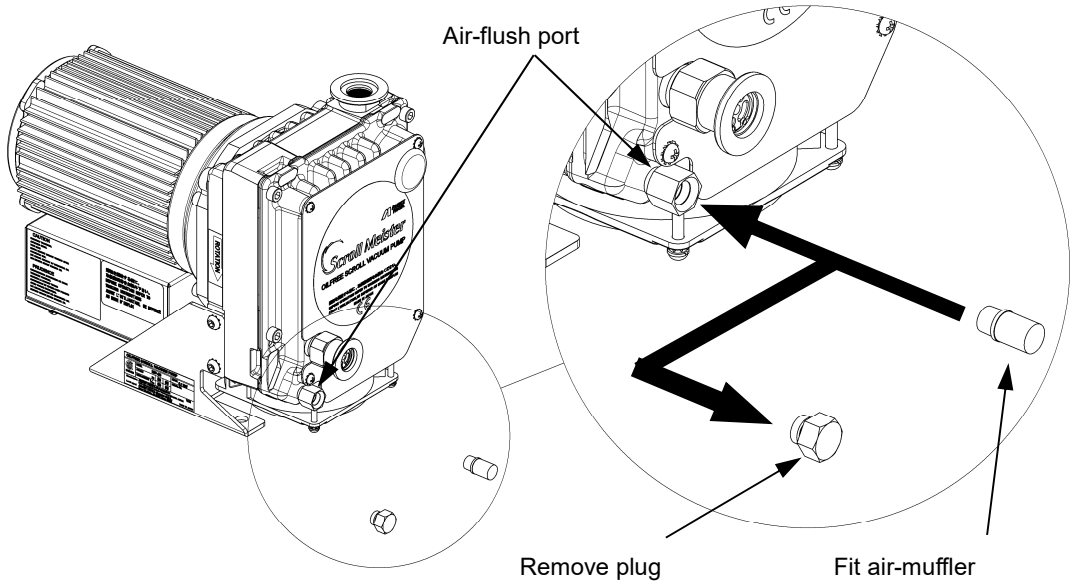
You must shorten maintenance interval (5.2[page 24]) when evacuating vapor since vapor temperature, disposal volume, disposal frequency and substances in vapor have an influence on pump operation. When evacuating vapor, pay attention to all WARNING, CAUTION and Important notes (4 [page 18~19]).

4.2.1 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 plug from air-flush port with a spanner (nominal dia. 13mm).
③ Lightly fit the attached air-muffler to air-flush port.
※Store the removed plug and do not misplace it.



4.2.2 Start-up and shut-down

① Start vacuum pump according to 4.1.1 Start-up [page 20].
② Stop vacuum pump according to 4.1.2 Shut-down[page 20].

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 and ultimate pressure will increase (by 7~8dB, about 5Pa).

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 4.2.3[page 22].

4.2.3 Returning to standard operation

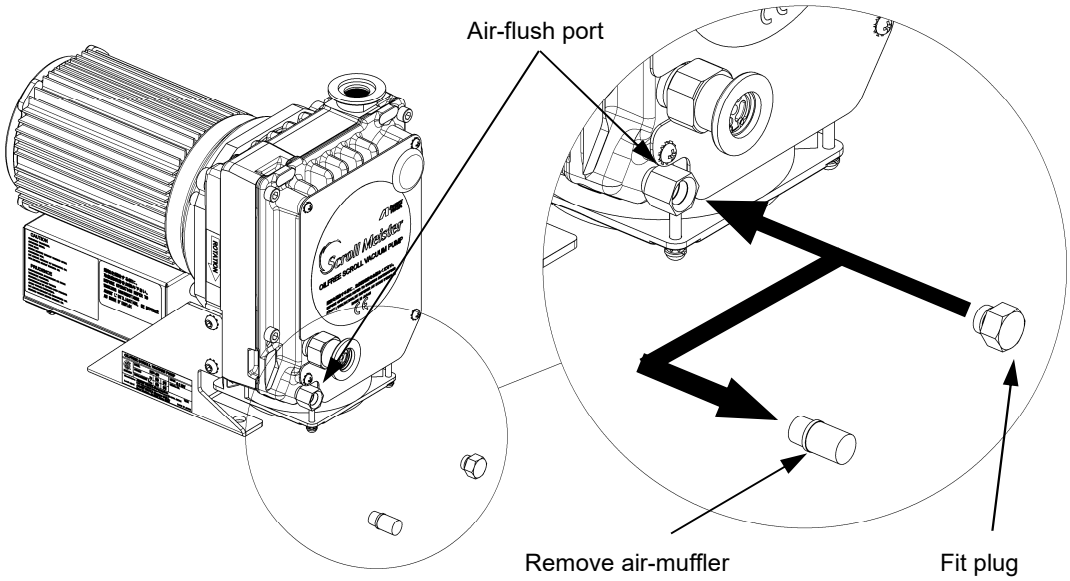
Before terminating air-flush operation, first stop vacuum pump and proceed in accordance with the following procedure. Never perform this procedure during operation.

Remove air-muffler

① Stop vacuum pump.
② Remove air-muffler from air-flush port.
③ Lightly fit plug to air-flush port with a spanner (nominal dia. 13mm).

※When restarting air-flush operation, refer to 4.2.1~4.2.2[page 21~22] and prepare and start.

※Store removed air-muffler and pay attention not to misplace it.



5. Maintenance and inspection

⚠ WARNING	
Danger of failure and injury **Conduct periodical maintenance and inspection.** If not, it can cause insufficient performance, failure of vacuum pump, and 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 restart **Be sure to switch off electric source before maintenance or inspection.** **Single-phase motor has a thermal protector.** Vacuum pump restarts become cool without warning after vacuum pump.	 **With a thermal protector**
Danger of electric shock **Be sure to conduct maintenance and inspection after you turn off electric source.** If not, it can cause 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**

5.1 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	Blow air, cleaning
Cooling fan Fan cover	Abnormal rotation	Ask specialist to repair.
	Dirty, clogged, damaged	Blowing air, clean, Ask specialist to repair.
Air-muffler	Dirty, clogged	Replace
Exhaust valve	Dirty, clogged	Blowing air, clean
Electric source cable	Deteriorated	Replace

5.2 Maintenance

When maintenance interval has elapsed, be sure to contact our dealer who sold the pump to you. This vacuum pump requires maintenance conducted only by our authorized specialist.
Never try to disassemble, reassemble or modify 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.

The following parts are consumable and need to be replaced periodically.
Whenever something goes wrong with them, replace them immediately.

Where to inspect	Maintenance interval		Every 400 times of vapor pumping
	Every 1-year or every 8,000 hours	Every 2-year or every 16,000 hours	
Bearing kit	grease／△	○	△
Tip seal set	△	○	△
Seal set	○	○	△
O-ring set	○	○	△
Exhaust valve set	○	○	△
Air-flush kit	○	○	○
Pin crank kit	△	△	△
Cooling fan	△	△	△
Vacuum pump itself	Inside cleaning/△	Inside cleaning /△	Inside cleaning /△

○・・・Replace
△・・・Replace if something goes wrong.
Note 1：Maintenance interval should be shorter than either the period or operating hours.
Note 2：When you want further maintenance and inspection after either the 6th year or 48,000 operating hours, please contact our dealer who sold the pump to you.

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 either the dealer who sold it to you or us.

6. Problems and remedies

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

Problems	Causes	Remedies
Motor does not rotate.	Protective device (or breaker) activates.	Check protective device (or breaker) capacity. ※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 objects enters.	※Inspect and repair.
	Motor protection gear activates.	Air outlet is clogged. Reset thermal protector. ※Inspect and repair.
Motor stops soon.	Protective device (or breaker) activates.	Check protective device (or breaker) capacity. ※Inspect and repair.
	Voltage drops.	Check size and length of cable.
	Motor malfunctions.	※Inspect and repair.
	Pump malfunctions. Foreign objects enters.	※Inspect and repair.
	Improper exhaust piping.	Check exhaust piping diameter and length. Air outlet is clogged. Remove blank flange from exhaust outlet.
	Motor protection gear activates.	Air outlet is clogged. Reset thermal protector. ※Inspect and repair.
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 installation is not level.	Correct vacuum pump inclination within 5°. ※Inspect and repair.
	Foreign objects enters pump.	※Inspect and repair.
	Motor malfunctions.	※Inspect and repair.
	Pump malfunctions.	※Inspect and repair.
Cooling fan does not rotate.	Cooling fan cord is loose or cut.	Check connection. ※Inspect and repair.
	Cooling fan malfunctions.	※Inspect and repair.

※ Contact our dealer who sold the pump to you.

7. Disposal

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

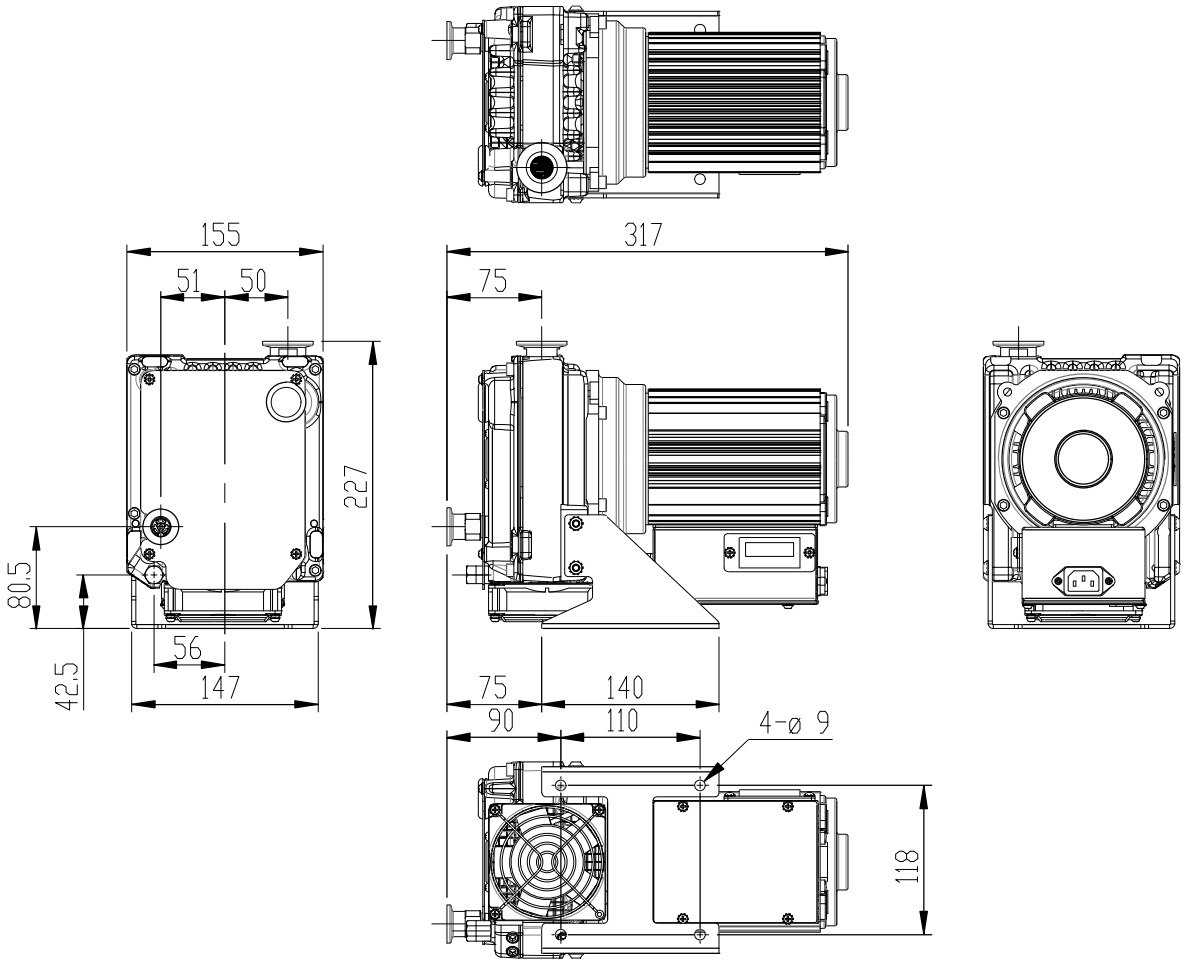
8. Specifications

8.1 Specifications

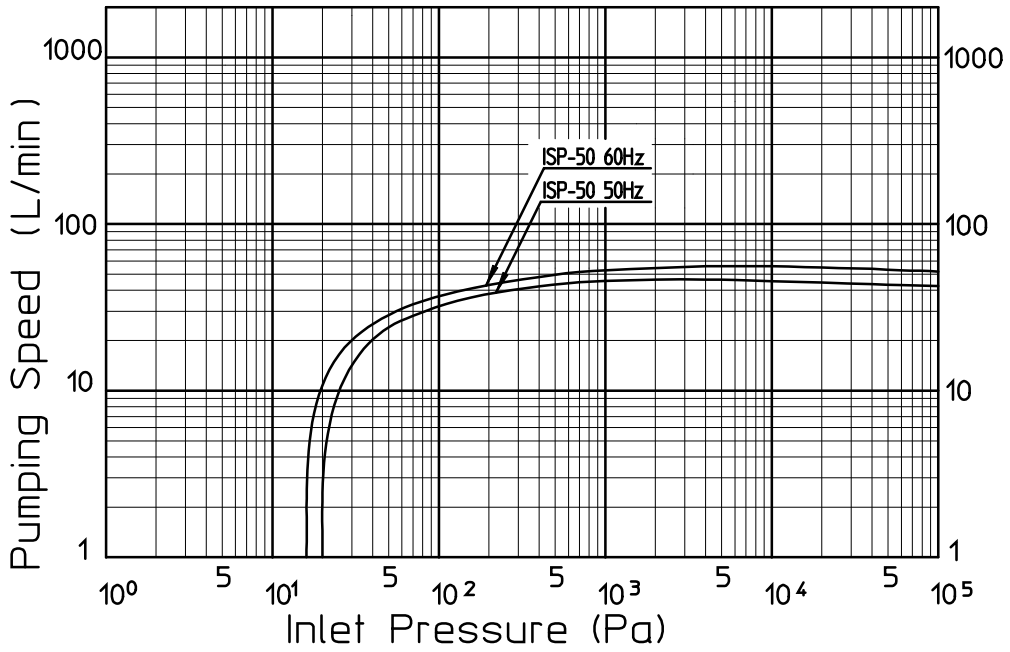
Model			ISP-50-SV1		ISP-50-SV2	
Displacement L/min		50Hz	50			
		60Hz	60			
Ultimate pressure Pa		50Hz	≦20			
		60Hz	≦15			
Leak tightness Pa・m^3/s			≦$1.0x10^{-7}$			
Max. inlet pressure			Atmospheric pressure			
Ambient operating temperature ℃			5~40			
Motor	Type		Single-phase induction motor, Totally Enclosed No Ventilated, 4-pole, Insulation Class B, Capacitor start, run, Thermal Protector TP212, Automatic reset type			
	Output kW		0.1			
	Voltage type		AC100V class		AC200V class	
	Voltage V		100	115	200	230
	Rated current A	50Hz	2.3	-	1.1	1.2
		60Hz	2.1	2.1	1.1	1.0
	Revolution min^{-1}{rpm}	50Hz	1390	-	1448	1464
		60Hz	1670	1700	1733	1750
Noise level 1m dB(A) (With air-flush ON)			≦48 (≦57)			
Inlet connection			NW25			
Outlet connection			NW16			
Dimensions mm L×W×H			317×155×227			
Mass kg			12			
Cooling system			Air-cooled			
Others			With hour counter and air-flush			

Note 1：Pumping speed and ultimate pressure should remain the same whether air-flush system is used or not.
Note 2：Maximum voltage allowance is + or - 10% from motor rating.
Note 3：Noise level is measured at ultimate pressure in an anechoic room.
Note 4：Leak tightness is measured while the product is stopped and air flush is shut off (closed).
Note 5：Vapor handling volume is no more than 3g/day (at 25℃ 60%RH) with air-flush operation. Air-flush flow rate is 4L/min.
Note 6：Air-flush port is closed for normal operation when this product is shipped.
Note 7：Install branch circuit protection device for safety. Consult to qualified electrician for details.
Note 8：This product is designed for indoor use. Install the product away from moistures or excessive humidity.
Note 9：This product does not come with electric source cable.
All wiring and electrical connections must be in accordance with local and national cables, and performed by a qualified electrician.
Note 10：All data shown in this literature were measured based on our test standard and specific conditions.
Actual measurements are subject to change of conditions of use.
Note 11：ANEST IWATA reserves the right to change descriptions or specifications in this literature without prior notice.

8.2 Dimensions



8.3 Performance data



Memo

Manufacturer

ANEST IWATA Corporation

3176,Shinyoshida-cho, Kohoku-Ku,
Yokohama 223-8501, Japan
Tel +81 (0) 800-100-1926
Fax +81 (0) 45-591-1539
https://www.anest-iwata.co.jp/

European agent

ANEST IWATA Europe GmbH

Am Stahlbügel 2,
74206 Bad Wimpfen, Germany
Tel +49-7063-93-3670
https://www.anest-iwata-air.com

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