

NISHIGAKI PUMP OPERATION MANUAL FOR WATER RING VACUUM PUMPS

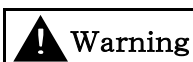
- Thank you for your purchase of a Nishigaki Pump.
Please read this manual thoroughly before using your pump.
- Please arrange for this manual to be readily available to the personnel operating this pump.
- Please keep this manual in a place where it is readily available.

This contents of this operation manual are applicable to the following pump series.

Nash Construction(cast iron)Pumps : NV-25A, 40, 50

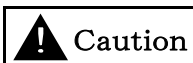
Elmo Construction(stainless)Pumps : SV-25F, 40F, 50F
SVD-20

The safety precautions included in this operation manual have been divided into two categories:[Warning] and [Caution]



Warning

Indicates that improper operation could result in the potential danger of severe personal injury or even death.



Caution

Indicates that improper operation could result in the potential danger of moderate to light personal injury, or damage to equipment.



Warning

[Unloading and Installation]

1. Be sure to give careful consideration to the weight and center of gravity of the crate when unloading.
Improper hoisting could cause the crate to fall, resulting in damage to equipment or personal injury.
2. Some of the pump components, such as metal casings or electrical motors, have eye-bolts attached to them.
These eye-bolts are for use in hoisting the individual components during maintenance.
Do not use these eye-bolts to hoist the entire pump as a single unit.
The eye-bolts could break, causing the pump to fall, and resulting in damage to equipment or personal injury.
3. The pump is to be wired by qualified personnel in a safe manner and in accordance with the appropriate electrical standards.
Improper wiring can result in electrical shock or fire.
4. Install a ground and circuit breaker for protection against short circuits.
Failure to do so could result in electrical shock, especially in the event of a malfunction or short circuit.

[During Test Runs and Normal Operation]

1. The coupling is to be fitted with a coupling guard.
Operating the pump without a coupling guard could result in personal injury from contact with rotating parts.
2. Do not loosen plug, bolts and nuts during operation.
To do so could result in danger from the spraying of liquid from the pump interior or the separation of pump components.

[During Inspection and Maintenance]

1. When performing maintenance on the pump, be sure to disconnect the electrical power source. Also, be sure to display the [Inspection in Progress-Do not Operate] indicator on the operation panel.
Failure to do so could result in electrical shock or other personal injuries from unintended operation.
2. Only qualified maintenance personnel are to be allowed to dismantle or repair the pump.
Unqualified personnel are likely to cause personal injury due to improper operation.
3. If the pump malfunctions, disconnect the electrical power source and contact either your sales agent or a manufacturer's designated service agent to arrange for inspection and repair.
Continuing operation with a damaged pump could result in electrical shock, or in a fire from a short circuit.

Caution

[Product Specifications]

1. Do not operate the pump except under the conditions described in the product specifications.
To do so could result in electrical shock, fire, or leakage.
2. Do not modify the pump configuration. To do so could result in accidents.

[Unloading and Installation]

1. Avoid installing the pump in places subject to moisture, such as baths or showers.
Short circuits could result in electrical shock in such places.
2. Avoid installing the pump in places with poisonous substances such as acids, alkalines, organic solvents or paint, or substances that give off corrosive gas, or with large quantities of dust.
To do so could result in shorts or fires, or in corrosion and malfunction.
3. After attaching the coupling, be sure to double-check the spindle alignment.
Poor spindle alignment could result in damage to the pump.

[During Test Operations and Normal Operation]

1. Use only with the approved rated voltage.
Failure to do so could result in fire or electric shock.
2. Do not allow sand or other foreign objects to enter the pump.
To do so could result in malfunctions or damage to the pump.
3. Do not use the pump for bubbly liquid such a soap water.
To do so could result in malfunctions or damage to the pump.
4. Absolutely do not perform 'dry' operation (operation without liquid) or operate the pump with the sluice valve closed.
To do so could result in damage to the pump.
5. Do not operate the pump in reverse.
To do so could result in leaks, or in damage to the pump interior.
6. Do not touch the pump or electrical motor.
In particular, if the liquid is of a high temperature, touching the pump or electrical motor could result in burns.

[During Inspection and Repair]

1. Always wear gloves when dismantling a pump, and be careful of sharp edges and corners which could cause lacerations.
2. In the event that warning labels or the manual become worn, hard-to-read, or lost, please contact the manufacturer.

Preface

After removing the pump from its packaging, perform the following inspection:

- (1) Check the name plate to verify that the contents of the delivery conform with the contents of your order.
- (2) Verify that there has been no in-transit damage to the unit, and that no nuts or bolts have come loose.
- (3) Verify that any accessories have been delivered as ordered. In the event that a problem is discovered during the above inspection, please contact your sales agent, or the manufacturer right away, and be prepared to inform them of the pump model, serial number and construction symbol [In case of SV].

Installation of the Pump and Piping

1. Location

- (1) This pump is intended to be used indoors. In the event that it is installed outdoors, be sure to install a cowl or otherwise protect it from the wind and rain.

Caution

- Avoid installing the pump in places subject to moisture, such as bath rooms.
Short circuits could result in electrical shock in such places.

- (2) Select a location in which maintenance can be performed easily.
- (3) Pump is to be installed at robust foundation, but prevention for vibration shall be considered, in case where no rigidity is expected due to iron frame construction.

2. Piping

(1) The suction line is to be kept as short and as straight as possible, so that no air pockets can form.

⚠ Caution

- Water removal device is to be installed at water pocket of piping. Otherwise damages on internal parts of pump may be expected due to cavitations.

(2) Union or equivalent is to be installed, as a countermeasure of disassembly, due to screwed connection of piping.

(3) Be sure to sufficiently support both the suction line and the discharge line so that none of their weight falls on the pump.

(4) Water removal device is to be installed. This is because make-up water of vacuum pump may form water pocket, in case where piping is long.

(5) Sluice valve is to be installed at suction piping to adjust air capacity and to confirm a degree of vacuum condition.

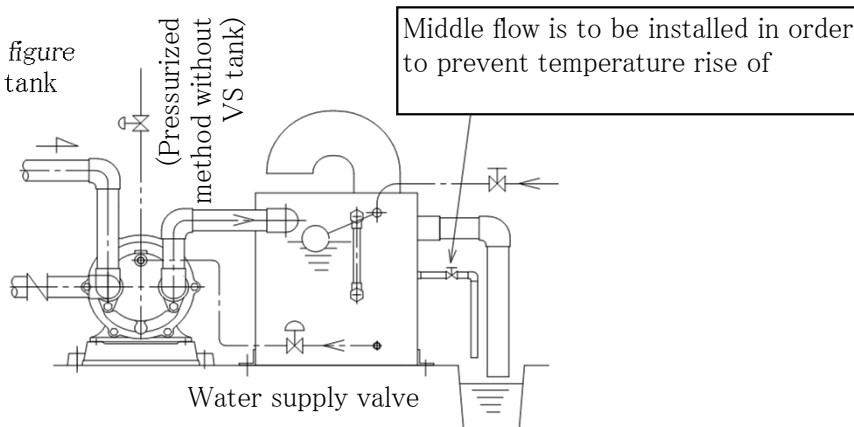
(6) Design individual piping directly from receiver tank in case where two or more pumps operate in parallel.

(7) Be sure to clean internal piping prior to operation.

Strainer is to be installed at suction side in case where slurry or foreign material is expected to be mixed.

(8) Be sure to select robust material for piping of make-up water (vinyl hose) from VS tank.

e. g. : Standard connection figure of NV model and VS tank



Installing the pump

① Place the common base, pump and electrical motor on a well cured base of concrete.

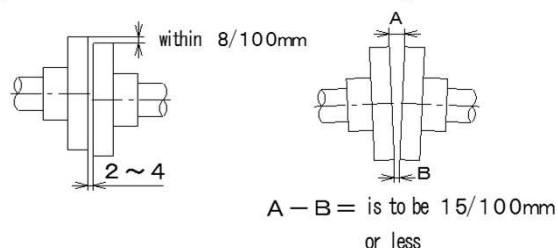
② Shim the common base as necessary to level the pump and motor.

③ Apply mortar, and let cure. Once well cured, tighten the foundation bolts evenly.

④ Spindle alignment

The spindle may come out of alignment during transport, etc. Please check the alignment when installing the pump.

⑤ After installing the piping, re-check the alignment once again.



Use the figures shown above to adjust the alignment.

⚠ Caution

- After installing the piping, be sure to double-check the spindle alignment. Poor spindle alignment could result in damage to the pump.

⑥ Be sure to securely tighten the coupling screws.

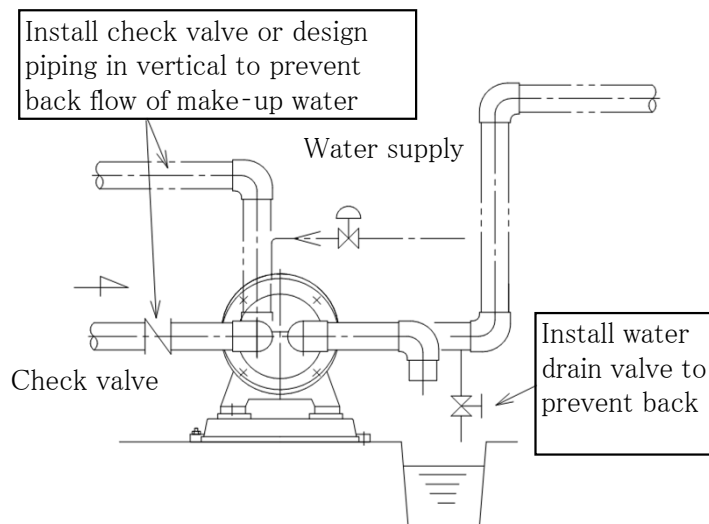
⑦ Attach the coupling guard.

⚠ Warning

- The coupling is to be fitted with a guard. Operating the pump without a coupling guard could result in personal injury from contact with rotating parts.

Piping dimension for make-up water

SVD	20	Over Rc 3/8
NV	25A	
	40	
	50	
SV	25F	Over Rc 1/2
	40F	
	50F	

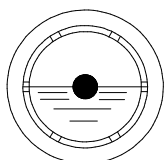


e. g. : Standard connection figure of pressurized SV model

Pre-operation Preparation

(1) Check the lubrication.

- ① For sealed grease ball bearings (units with no grease cup or oil cap): No need to lubricate.
- ② For grease lubricated ball bearings (units with a grease cup or nipple): Fill the grease cap or nipple with grease.
- ③ For oil lubricated ball bearings (units with an oil cap): Verify that there is a sufficient quantity of oil contained in the metal casing.



The oil should reach the center of the oil level gauge.

MANUF. \ OIL, GREASE	BEARING OILS		ROLLER BEARING GREASE 1-2 (NLG1-2)
	ISO VG 32	ISO VG 68	
SHOWA-SHELL	TELLUS OIL C 32	TELLUS OIL C 68	STAMINA EP 2
IDEMITSU	DAPHNE MECHANIC OIL 32	DAPHNE MECHANIC OIL 68	DAPHNE CORONEX No. 2
SINNIPPON SEKIYU (ENEOS)	FBK OIL RO 32	FBK OIL RO 68	MALTINOC GREASE 2
ESSO-STANDARD	TELESSO 32	TELESSO 68	BEACON 2
MOBIL	DTE OIL LIGHT	DTE OIL HEAVY-MEDIUM	MOBIL DELUXE EP2
COSMO OIL	COSMO ALLPUS 32	COSMO ALLPUS 68	COSMO GREASE DYNAMAX 2
JAPAN ENERGY (JOMO)	JOMO RARTUS 32	JOMO RARTUS 68	JOMO REZONIC GREASE 2

※ 1. Choose a type of bearing oil that maintains a viscosity of 30mm/s at normal operating temperatures. As a rule of thumb, for operating temperatures of 80°C or less, use ISO VG 32, and for operating temperatures of more than 80°C, use ISO VG68.

※ 2. As a rule of thumb, for operating temperatures between 0°C and 80°C, use a lithium based grease equivalent to JIS roller bearing grease 1-2, or NLG1-2.

(2) Prime the pump.

Open make-up water valve to prime more than half of pump casing.
(Be sure not to make any water pocket in piping)

⚠ Caution

- Shut off operation is prohibited !
- Shortage of vacuum condition or abnormal sound may be expected due to incompleteness of circular shaped water film.

(3) Make-up water method shall be in accordance with the following table.

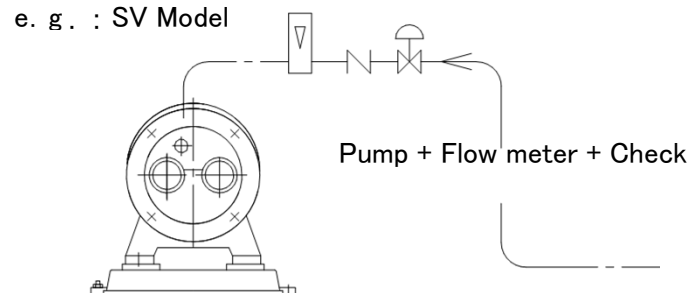
Model/Diameter	NV			SVD	SV		
	25A	40	50	20	25F	40F	50F
Amount of make-up water (ℓ/min)	3	8	11	5	8	15	20
Pressurized Feeding Method	0.01Mpa				Over 0.05Mpa		
With multi purposed VS tank (Supplementary Tank Method)	Refer to Page 2				+3 meter for Supplementary Tank Method		

【Reference】 1Mpa = 10.197kgf/cm²·G

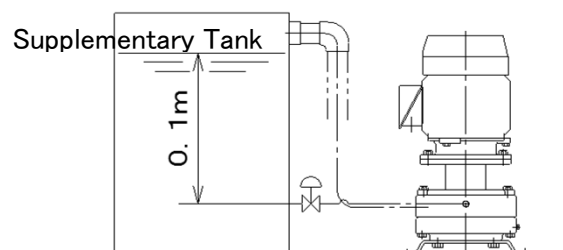
⚠ Caution

- Feed water prior to operation.
Failure to which may result in damages on pump.
- Install check valve at feed water piping in case industrial water is directly fed to pump.
Failure to which may result in unexpected accident such as remaining water reversed at backflow piping in case industrial water is stopped, though reversed pressure is not expected.

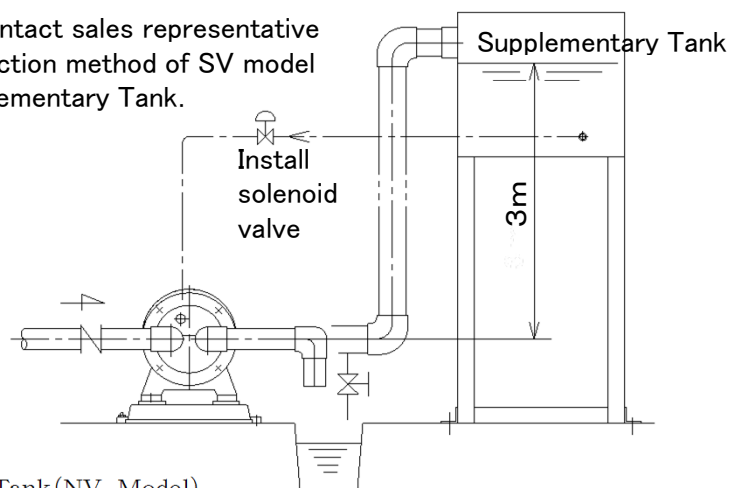
e. g. : SV Model



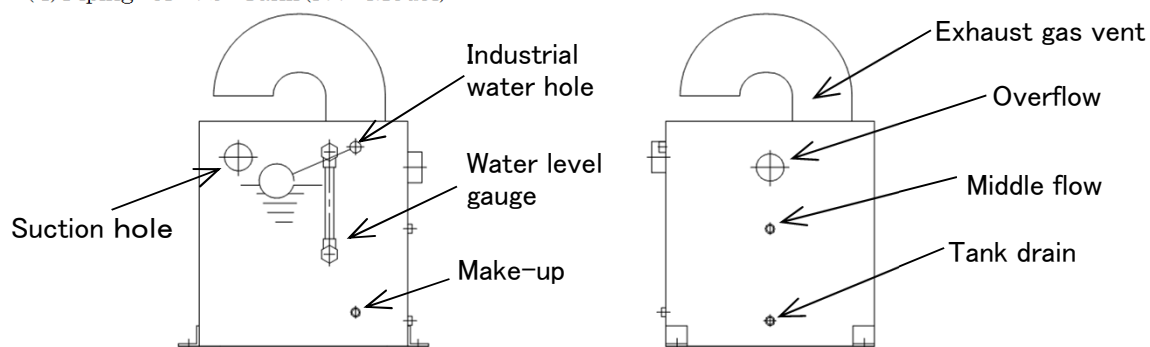
e. g. : SVD Model



e. g. : Please contact sales representative for connection method of SV model and supplementary Tank.



(4) Piping of VS Tank (NV Model)



Operation

- (1) Push the switch once or twice to verify that the pump rotates in the proper direction.
If the pump should rotate in reverse, switch two of the 3-phase connections.
(The proper direction of rotation is indicated on the metal casing or on the pump casing.)

⚠ Caution

- Do not operate the pump in reverse.
To do so could result in leaks, or in damage to the pump interior.

- (2) Feed make-up water, and verify that there are no unusual vibrations, sounds or malfunctions.
Then proceed onto continuous operation.
(3) After pump reaches to rated RPM, gradually open and adjust make-up water valve up to rated water level.

⚠ Caution

- Do not adjust flow level with sluice valve at discharge side. Failure to which may result in abnormal sound and vibration, leading to damages on inner pump parts.
- Do not operate pump over rated degree of vacuum condition. Failure to which may result in cavitations, leading to damages on inner pump parts.

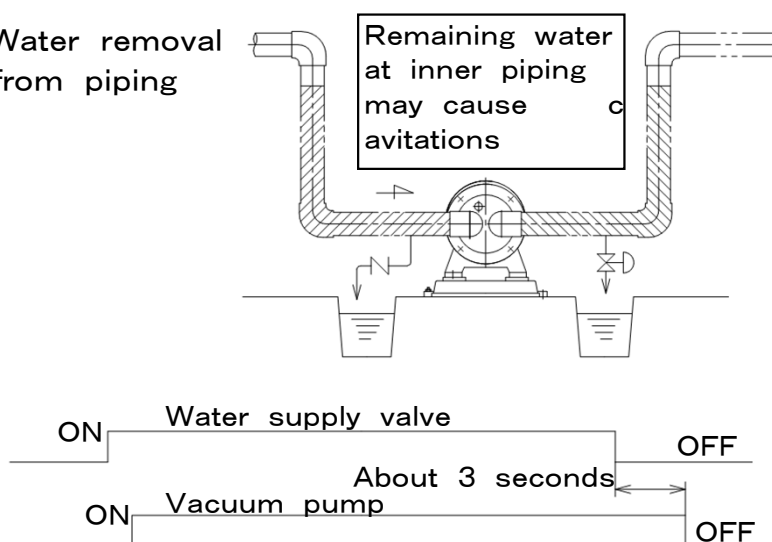
- (4) Check a degree of vacuum condition, current, air flow, vibration and sound to be sure that there are no malfunctions. In order to prevent damage on cock of vacuum gauge, close it unless otherwise used to measure vacuum condition.
(5) Pay attention to water temperature be below 40 degrees, in case VS Tank (Make-up, gas-liquid separation, noise reduction) or use inner water of supplementary tank as make-up water for circulation purpose. Feed cool water from industrial water by opening middle flow of tank to drain, in case water temperature goes up.
(6) Be note that abnormal sound may arise when pump is started. This is a moment that circular shaped water film is formed when considerable amount of priming water mixed at pump casing OR sluice valve at suction side is opened. Change one of the conditions if pump is repeatedly started and shut.

⚠ Caution

- Do not operate pump with abnormal sound more than few seconds. Failure to which may result in damages on inner pump parts.

- (7) In case of SV model, cavitations (Abnormal sound or vibration) may arise at inner pump casing, when it exceeds reached vacuum condition (Next table) due to vaporously over-pressurized make-up water. Install vacuum release valve or open vent valve installed besides port plate part to erase abnormal sound.
(Little amount of seal water is expected to leak when pump stops)
(8) When stopping pump operation, take following steps;
1) Stop make-up water and do not leave water at inner piping
2) Stop motor within three (3) seconds.
(Install water release device or solenoid valve to remove water at inner piping when make-up water is flushed continuously)

e. g. : Water removal
from piping



Performance Comparison at standard condition

Model/Diameter	Frequency (Hz)	Reached Vacuum Condition ($\times 10^4$ Pa)	Max. Air Capacity (m^3/min)
NV — 25 A	50	1.87	0.62
	60	1.60	0.75
	40	50	1.73
		60	1.60
	50	50	1.73
		60	1.47
SV — 25 F	50•60	0.53	0.70
	40 F	50•60	0.53
	50 F	50•60	0.53
SVD — 20	50•60	0.67	0.25

Maintenance

⚠ Warning

- When performing maintenance on the pump, be sure to disconnect the electrical power source. Also, be sure to display the [Inspection in Progress-Do not Operate] indicator on the operation panel.
Failure to do so could result in electrical shock or other personal injuries from unintended operation.

(1) Inspect the following items daily:

- ① Verify that there are no extreme changes in pressure, discharge flow, a degree of vacuum condition, air capacity, voltage, vibration or noise.
- ② Verify that the bearing temperature is no more than 40°C above the room temperature, and less than 75°C overall. (If cool enough to be touched, then there is no problem.)
- ③ For pumps with gland packing, verify that the liquid is flowing onto the packing at an appropriate rate. (3 to 30ml / minute)

⚠ Caution

- Do not over-tighten the gland packing.
If over-tightened, the resultant heat could shorten the life of the packing, the shaft and its sleeve, or place an overload on the electrical motor.

- ④ For pumps with mechanical seals, verify that there is no more than 10ml / hour leakage.
If the leakage exceeds that amount, prepare a replacement seal.

⚠ Caution

- Do not perform any 'dry' operation with mechanical seals.
To do so could result in damage to the pump interior or leakage.

- ⑤ Verify that there is no oil leakage from the bearing lubricant or oil seals.

(2) In addition to the daily inspections, inspect the following items monthly:

- ① Verify that the pump and electric motor coupler is attached securely. If not, refer to the section on installation, and redo accordingly.

⚠ Caution

- Do not operate the pump with the spindle out of alignment.
To do so could result in unusual vibrations and noise, or damage to the pump.

- ② Verify that the bearing lubrication is clean, and replenish as necessary.

(3) In addition to the daily inspections, inspect the following items once every 6 months:

- ① Inspect the gland packing, shaft and sleeve for wear, and replace as necessary.
 - ② Change the bearing lubricant.
- ※ The bearing lubricant is to be changed after the first 500 hours of operation, and after every 2000 hours of operation thereafter.

(4) Inspect the following items once a year:

- ① Dismantle the pump, and inspect the coupling, shaft, port plate, impeller, port cylinder and other rotating parts for wear and proper alignment, and replace as necessary.
- ② Inspect the pump interior for wear.
- ③ Replace expendable parts, such as lubricants, grease and packing.

(5) Always follow the precautions shown below during operation:

①

⚠ Caution

- Do not operate the pump for long periods of time while the discharge line sluice valve is closed, or at extremely low flow levels.
To do so could result in the pump interior over-heating, and cause unexpected accidents.

② Repeated starting and stopping of operation will reduce the life of the pump. The pump should be operated as much as possible under the conditions shown below:

Electrical output	Start / Stop Frequency
7.5kW or less	6 times / hour or less

⚠ Warning

- In the event of a power outage, be sure to turn off the power switch.
Sudden operation of the pump when power is restored could result in personal injury or unexpected accidents.

(6) Follow the precautions shown below when ceasing operation for long period of time, or storing the pump:

①

⚠ Caution

- Whether ceasing operation for long or short periods of time, always remove the drain plug and release any waste water.
Frozen water could cause damage to the pump.

② If a spare pump is kept on hand, operate it occasionally to be sure that it is operable.

③ The gland packing sometimes rusts if the pump is not operated for long periods of time.

Remove the gland packing, and remove any traces of moisture from it if it is to be reused, or replace it with a new one. (For cast iron pumps)

List of Expendable Parts

The following list contains standard expendable parts. For custom or special parts, refer to the pump drawings, or consult your sales agent or the manufacturer.

MODEL and DIAMETER	GLAND PACKING	BALL BEARING		OIL SEAL		LUBRICANT QUANTITY (ml)
	<div>300</div>	<div>060</div> ₁	<div>060</div> ₂	<div>401</div>	<div>401</div>	
NV — 25 A	□6.5－φ 33－φ 20－4本	6304ZZ	6304ZZ	(20367)	(20367)	(150)
40	□9.0－φ 48－φ 30－4本	6206ZZ	6306ZZ	(30458)	(30458)	(350)
50						
SV — 25 F	□8－φ 41－φ 25－4本	6305ZZ	6305ZZ	(25387)	(25387)	(200)
40 F						
50 F						
	MECHANICAL SEAL	LOAD SIDE BALL BEARING		OPPOSITE SIDE BALL BEARING		
SVD－20	φ 25 Ha×C (560)	6205ZZ			6304ZZ	

Note 1: Gland packing nominal size-outer diameter-inner diameter-quantity

Note 2: Nominal sizes beginning with □9 indicate custom packings for Nishigaki pumps.

Note 3: For oil seals and lubricant quantities shown in parenthesis, the number shown indicates a ZZ bearing unit that was converted to an oil bath bearing unit per standard specifications.
(For oil bath or grease lubricated ball bearings, the ball bearing is an open type.)

[Example] 6305ZZ becomes 6305

Use the following replacement parts for gland packings.

(It is most trust worthy to use the genuine parts.)

MANUFACTURER	PRODUCT NAME
	PTFE IMPREGNATED
NICHIAS	TOMBO No. 9038
VALQUA	VALQUA No. 7202
NIPPON PILLAR	PILLAR No. 4527L

Note 1: Be careful of initial adjustment after replacing the gland packing.

Tighten the gland packing gradually after operating the pump, and adjust until the liquid is flowing onto the packing at an appropriate rate. (3 to 30ml / minute)

Do not over-tighten the gland packing.

If over-tightened, the resultant heat could shorten the life of the gland packing, the shaft and its sleeve, or place an overload on the electrical motor.

Note 2: The genuine gland packing contains the silicon oil.

【Request】

When ordering parts, be sure to tell the necessary matters according to “When Ordering Parts”, which is reported in last page of this manual.

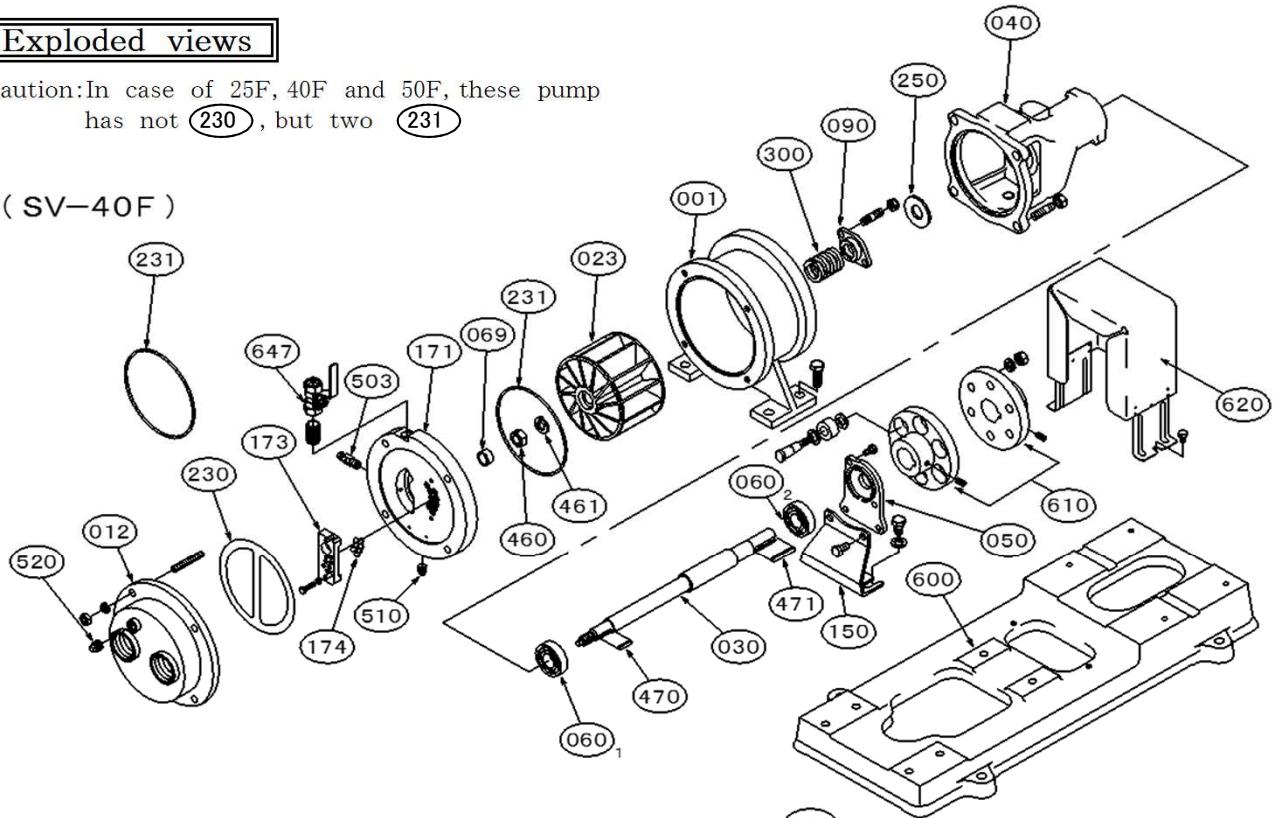
Troubleshooting

Problem	Cause	Remedy
Does not start.	<ul style="list-style-type: none"> ○ Electrical motor malfunction. ○ Electrical power source malfunction. ○ Pump malfunction. (corrosion, burnout or foreign object) 	<ul style="list-style-type: none"> ○ Repair electrical motor. ○ Inspect and repair. ○ Break down, clean and repair.
Starts, but does not go up a degree of vacuum condition (air quantity is insufficient).	<ul style="list-style-type: none"> ○ Insufficiently primed. ○ Make-up water does not go in. ○ Shortage of make-up water. (Resistance is too big) ○ Gas temperature is too high. ○ Impeller rotates in wrong direction. ○ Different RPM. ○ Clogging at discharge side. ○ Wear at clearance between impeller and port. (plate, cylinder) ○ Foreign material clog at suction side. (strainer etc) ○ Shut-off condition at end of suction side. ○ Air in the line. ○ Foreign object in the pump impeller. ○ Amount of generated gas is too small at suction side. ○ Temperature of make-up water is too high. ○ The pump impeller are corroded. 	<ul style="list-style-type: none"> ○ Prime water more than half of pump volume. ○ Pressurize water. ○ Enlarge calibration size or change piping material. ○ Cool down by condenser. ○ Change wiring of motor. ○ Change poles and frequency. ○ Remove resistance. (Remaining water) ○ Insert clearance adjust plate(Only SV model)or replace parts. ○ Break down and clean. Install a screen. ○ Release to atmospheric air or mix air bypass piping. ○ Retighten all components. Inspect from sealed parts. ○ Break down and clean. ○ Re-designing of plan. ○ Change to cool water. ○ Replace worn parts.
Occurrence of overloads (abnormal sound).	<ul style="list-style-type: none"> ○ Liquid is accidentally mixed from suction piping. ○ Specific gravity and viscosity are observed at make-up water. ○ The pump and electrical motor are in poor alignment. ○ Too many RPM. ○ The gland packing has been over tightened. ○ Adherence of foreign material. ○ Rotating parts are rubbing against each other. 	<ul style="list-style-type: none"> ○ Re-design to mix only air by installing separator. ○ Change make-up water equivalent to clear water. ○ Realign and tighten the bolt. ○ Check the voltage. ○ Adjust so that a proper amount of leakage occurs. ○ Disassemble to clean. ○ Break down and repair.
Bearings overheat or are noisy.	<ul style="list-style-type: none"> ○ Insufficient lubricant. ○ Too much grease. ○ The pump and electrical motor are in poor alignment. ○ The ball bearing is damaged. ○ The shaft is deformed. ○ The inappropriate type of lubricant. ○ The lubricant has deteriorated. ○ The coupling key has moved. 	<ul style="list-style-type: none"> ○ Replenish lubricant. Replace ball bearing. ○ Remove excess lubricant. ○ Realign and tighten the bolt. ○ Replace worn parts. ○ Repair, replace worn parts. ○ Replace with specified type. ○ Replace more often. ○ Tighten set bolt.
Unusual vibrations or noise or cavitation from the pump.	<ul style="list-style-type: none"> ○ Pump base is incomplete. ○ Foundation bolts or shims are loose. ○ Coupling rubber is worn. ○ The pump and electrical motor are in poor alignment. ○ Amount of make-up water varies more than double or below half. ○ A degree of vacuum condition goes up too much. ○ The entire unit is resonating. 	<ul style="list-style-type: none"> ○ Rebuild the base. ○ Tighten or replace. ○ Replace worn parts. ○ Realign and tighten the bolt. ○ Re-adjust flow rate and avoid any other liquid to be mixed. ○ Set condition below saturated vapor pressure by lowering temperature or by means of vacuum release valve. ○ Use flexible pipe, or anti-resonating rubber.

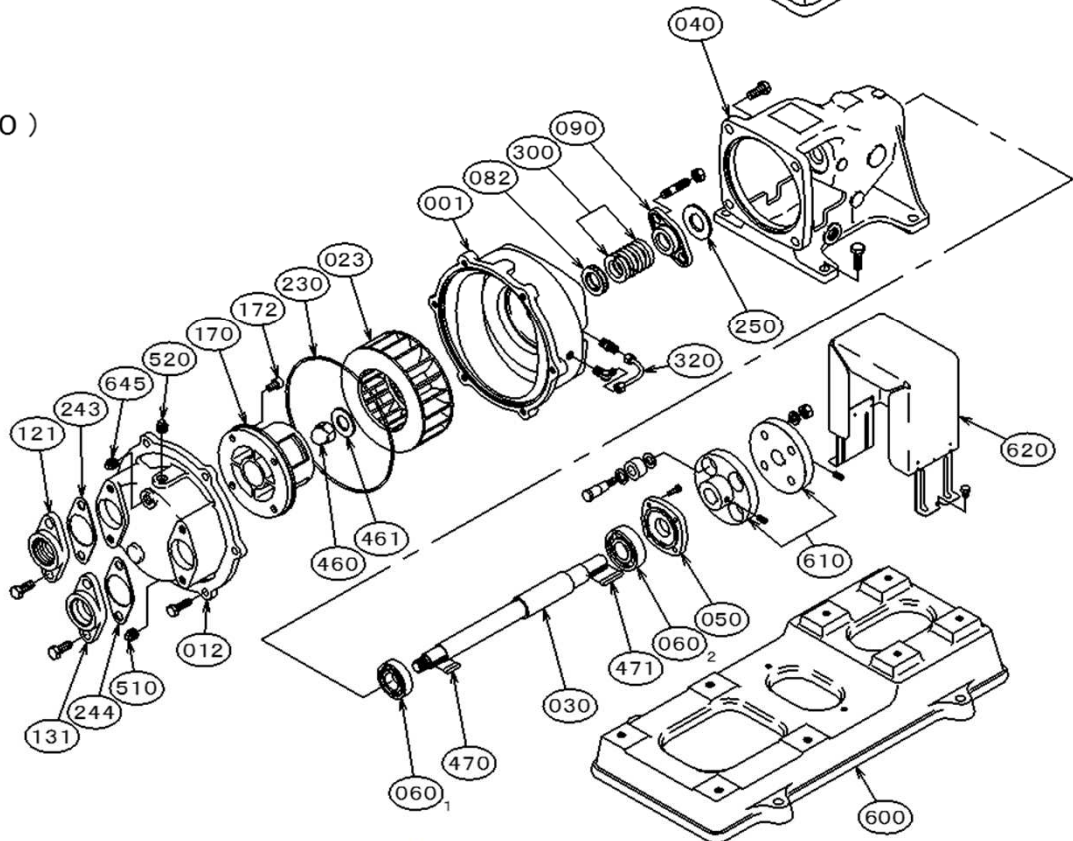
Exploded views

Caution: In case of 25F, 40F and 50F, these pump has not (230), but two (231)

(SV-40F)



(NV-40)



This diagram is representative presentation. Configurations on some models may vary.

NO.	NAME OF PART	NO.	NAME OF PART	NO.	NAME OF PART	NO.	NAME OF PART
001	Casing	121	Suction Frange	243	Flange Packing	510	Drain Plug
012	Cover	131	Discharge Frange	244	Flange Packing	520	Vacuum Gauge Plug
023	Impeller	150	Bearing Support	250	Deflector	600	Common Base
030	Shaft	170	Port Cylinder	300	Gland Packing	610	Coupling
040	Metal Casing	171	Port Plate	320	Sealing Pipe	620	Coupling Guard
050	Bearing Cover	172	Port Screw	460	Impeller Nut	645	Supply Water Plug
060	Ball Bearing	173	Ball Guide	461	Lock Washer	647	Water Supply Valve
069	Metal	174	Slide Ball	470	Impeller Key		
082	Seal Ring	230	Cover Packing	471	Coupling Key		
090	Gland	231	Casing Packing	503	Vent Valve		

Breaking Down the Pump

■ Breaking down the typical pump

- ① Remove the drain plug(510), and drain any residual liquid.
- ② Remove any auxiliary piping, such as from blow off valves, etc.
- ③ Disconnect the pump from the suction and discharge lines, and remove the cover(012) or port plate(171) and port cylinder(170) from the casing(001).
The pump interior can now be inspected.
Check to be sure that there is no conspicuous wear or damage.
- ④ Disconnect the port cylinder(170) from the cover(012).
- ⑤ Remove the impeller nut(460) and the lock washer(461), and then remove the impeller(023) and the impeller key(470).
In order to fix the pump, Set the box end wrench on the nut of the coupling(610).
After that, unfasten the impeller nut(460) with spanner.
- ⑥ Remove the casing(001) from the metal casing(040), and remove the deflector(250) from the shaft(030).
- ⑦ Remove the gland(090) from the casing(001), and remove the gland packing(300) and the seal ring(082).
- ⑧ Remove the coupling guard(620) and the coupling(610), and then remove the coupling key(471).
- ⑨ Remove the bearing cover(620), and remove the shaft(030).

■ Breaking down the special pump(Ref. another attached figure because it is special order)

※ 1. Regarding mechanical seals

Remove the mecha cover(340) from the casing(001).

Loosen the set screw, and remove the mechanical seal(310) from the shaft(030).

※ 2. About oil bath bearings

Remove the bearing cover(050) from the metal casing(040), and remove the shaft(030).

(For oil bath bearings, be sure to remove the oil drain plug(422), and drain any residual oil beforehand.)

⚠ Caution

- Take care not to damage the lip on the oil seals(401) and(402).
To do so could result in leakage.

Reassembling the Pump

Reassemble the pump following the breakdown procedure in reverse order.

At that time, follow the precautions shown below:

- (1) Adjust the gap between the impeller and the port plate(171) to be between 0.6 and 1.0mm.
If necessary, insert an adjust ring(sold separately) between the back of the impeller(023) and the ridge on the shaft(030).
- (2) Replace all old packing with new ones.
- (3) Replace all worn or damaged parts.
- (4) Be sure not to lost the slide ball(174).

We recommend the way to set the slide ball(174) on the ball guide(173).

Replacing the Gland Packing

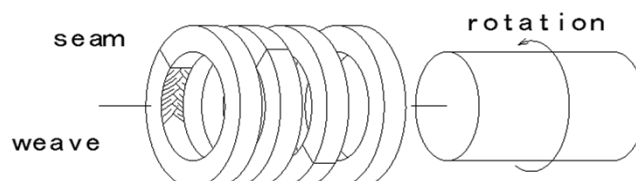
In cases where there is conspicuous leakage from the shaft even after tightening the packing, or when there is conspicuous heat, in is necessary to replace the gland packing.

Be sure that the packing seams are offset when inserting.

For woven packing, orient the weave to the rotation of the shaft as shown in the diagram below.

⚠ Caution

- Be sure to orient the packing properly when inserting.
Failure to do so could accelerate the rate of wear of the shaft and sleeve.

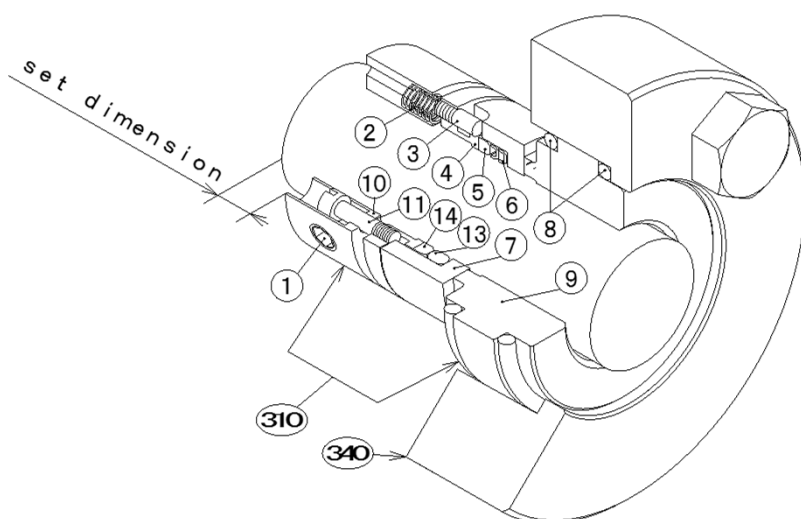


Replacing Mechanical Seals

- (1) Break down the pump as described previously.
- (2) Verify the mechanical seal set dimensions beforehand.
- (3) During reassembly, apply a coat of detergent oil (spindle oil, etc.) or the liquid to be pumped, to the shaft, sleeve, and sliding parts of the mechanical seal.
(Use a detergent oil compatible with the liquid to be pumped.)

⚠ Caution

- Be careful not to damage the shaft or sleeve.
To do so could result in leakage.
- Be careful not to damage the packing, or any sliding surfaces.
To do so could result in leakage.



NO.	NAME OF PART
1	Set screws
2	Springs
3	Drive pins
4	Comp ring
5	Adapter
6	Shaft packings
7	Seal ring
8	Insert packings
9	Insert
10	Collar
11	Spring pins
13	Shaft packings
14	Back-up ring
310	Mechanical seals
340	Mecha cover

Repairs

- (1) Repairs to damage and correction of malfunctions due to any one of the causes shown below, as well as the replacement of expendable parts, will be performed on a remuneratory basis.
 - ① Damage and malfunctions that are caused by improper use, or as a result of storage.
 - ② Damage and malfunctions that occur while using parts or components other than those approved by the manufacturer.
 - ③ Damage and malfunctions that are caused by modifications or repairs other than those approved by the manufacturer.
 - ④ Damage and malfunctions caused by fire, earthquake or other types of natural disasters.
 - ⑤ Damage and malfunctions, or corrosion and wear, caused by the physical characteristics of the liquid that is pumped.
 - ⑥ Damage and malfunctions caused by the use of parts that have exceeded their normal life expectancy.
- (2) The determination of the applicability of items ①, ②, ③, ④, ⑤ and ⑥ shown above will be done on a case by case basis, in cooperation with the customer.
- (3) The manufacturer accepts no responsibility for damage to other equipment, loss of production time, or personal injury caused by malfunctions occurring in the pump.
- ※ The expression 'expendable parts' refers here to lubricants, rubber coupling bushes, packing, mechanical seals, oil seals, sleeves, and any other parts which can be expected to deteriorate with normal use.
- (4) When requesting repairs
Before requesting inspection and repair, read the manual carefully, and reinspect the pump.
In the even of a malfunctions contact your sales agent.
- (5) Precautions when returning a pump for repair
In order to protect the personal safety of maintenance personnel, as well as the environment, always follow the precautions shown below:

⚠ Caution

- Always clean the pump thoroughly, and include a repair request form when returning a pump.
- Pumps returned without a repair request form may be refused.
- Regardless of whether or not a repair request form has been included, pumps that are evaluated as being dangerous to repair will be refused.

※ Repair request forms may be obtained at the locations shown below.

(6) Minimum period of inventory for replacement parts

Replacement parts are kept in inventory for a minimum of 10 years after the discontinuation of the manufacture of a pump model.

The expression 'replacement parts' refers to all parts necessary to maintain the performance of the pump.

Consultations

If you have any questions regarding repairs covered, or other after-sales-services, please consult your sales agent, or the Nishigaki office nearest you.

When Ordering Parts

(1) When ordering parts, or requesting a consultation, be sure to have on hand the following informations, which can be found on the name plate.

(2) Name plate

- ① TYPE (MODEL) _____ pump model
- ② SIZE (BORE) _____ inlet/outlet size
- ③ SUS _____ pump material
- ④ $\text{Pa} \cdot \text{m}^3 / \text{min}$ _____ pump specifications
- ⑤ kW _____ electrical motor output
- ⑥ min⁻¹ _____ rated rotations per minute
- ⑦ No. _____ pump serial number
- ⑧ CONSTRUCTION SYMBOL

(shown for reference on the name plate, GTE-VZN) pump configuration

Note: NV series have no construction symbol.

Example (NV-25A 1.5kW 50·60Hz)

VACUUM PUMP			
MODEL	NV-25A		
BORE	25 × 25 mm		
MAX VACUUM	15.9 18.6 × 10 ³ pa	POW.	1.5 kW
MAX DISPL	0.75 0.62 m ³ /min	SPE.	1750 1450 min ⁻¹
MFG. NO.			
NISHIGAKI PUMP MFG. CO., LTD. TOKYO OSAKA NAGOYA Gifu JAPAN K-78			

Example (SV-40F 5.5kW 50Hz)

VACUUM PUMP			
MODEL	SV-40 F	GTE-VZN	
BORE	40 × 40 mm		
MAX VACUUM	× 10 ³ pa	POW.	5. 5 kW
MAX DISPL	1. 6 m ³ /min	SPE.	2900 min ⁻¹
MFG. NO.		AA 123 B	
NISHIGAKI PUMP MFG. CO., LTD. TOKYO OSAKA NAGOYA GIFU JAPAN K105			



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