IWAKI PUMPS

IWAKI Air Pump

APN-450

Instruction Manual

⚠Read this manual before use of product

Thank you for selecting an Iwaki APN-450 Air Pump. This instruction manual deals with *"Safety instructions"*, *"Outline"*, *"Installation"*, *"Operation"* and *"Maintenance"* sections. Please read through this manual carefully to ensure the optimum performance, safety and service of your pump.

Contents

This instruction manual should be kept on hand by the end user for quick reference.

Contact us or your nearest dealer if you have any questions.

Safety instructions

For the Safe and Correct Handling of the Pump

- "Safety Instruction" section deals with important details about handling of the product. Before use, read this section carefully for the prevention of personnel injury or property damage.
- Observe the instructions accompanied with "WARNING" or "CAUTION" in this manual. These instructions are very important for protecting users from dangerous situations.
- The symbols on this instruction manual have the following meanings:

⚠ **WARNING**	**Nonobservance or misapplication of "Warning" sections could lead to a serious accident which may result in death.**
⚠ **CAUTION**	**Nonobservance or misapplication of "Caution" sections could lead to personal injury or property damage.**

Types of Symbols

Indicates that "Warning" or "Caution" must be exercised. Inside this triangle, a concrete and practical image provided as a warning or caution message is depicted.

Indicates a prohibited action or procedure. Inside or near this circle, a concrete and practical image of the activity to be avoided is depicted.

Indicates an important action or procedure which must be performed or carried out without fail. Failure to follow the instructions herein can lead to malfunction or damage to the pump.

⚠For exportation

Technology related to the use of goods in this instruction manual falls in the category of technology contained in the Foreign Exchange Order Attachment, which includes complementary export control of technology. Please be reminded that export license, which is issued by the Ministry of Economy, Trade, and Industry could be required, when this is exported or provided to someone even in Japan.

Safety instructions

⚠WARNING

- **Turn off power**
  Risk of electrical shock. Dismantling/assembling the pump unit without turning off power may cause an electrical shock. Before engaging in any maintenance or inspection work, be sure to turn off the pump and related devices.


Electrical shock

- **For specified application only**
  The use of the pump in any application other than those clearly specified may result in injury or damage. Use the pump in a specified condition.


Prohibited

- **No modification**
  Do not modify the pump. We are not responsible for any accidents or damage due to modification.


No Remodeling

- **Specified power only**
  Do not apply any power other than the specified one on the nameplate. Otherwise, personal injury or property damage may result.


Prohibited

- **Wear protective clothing**
  Always wear protective clothing such as safety goggles and protective gloves during pipework or dismantlement.


Wear protective gear

- **Do not touch the pump or pipe with bare hands**
  The surface temperature of the pump or pipe rises high along with gas temperature in or right after operation.

⚠CAUTION

- **Restriction on operators**
  The pump should be handled by a qualified person with a full understanding.


Prohibited

- **Ventilation**
  Poisoning may result when handling a toxic or odorous liquid. Keep good ventilation in a working area.


Electrical shock

- **Operating and Storage conditions**
  Do not install or store the pump in the following places where...
  1. Ambient temperature falls below 0°C or exceeds 40°C.
  2. Under a flammable/corrosive atmosphere.


Prohibited

- **Countermeasure against efflux**
  Take protective measures against the accidental efflux caused by diaphragm breakage.


Electrical shock

Safety instructions

⚠CAUTION

- **Do not wet the pump**
  If a liquid spills over electric parts or wires, a fire or electrical shock may result. Install the pump in a place free from liquid spillage.


Prohibited

- **Damaged pumps**
  Do not use any damaged pump. Using a damaged pump may lead to an electric leak or shock.


Prohibited

- **Stop operation**
  On sensing any abnormality or danger, stop operation immediately and inspect/solve problems.

- **Wear part replacement**
  Observe related instructions for part replacement. Do not dismantle the pump beyond the extent described in this manual.

- **Do not damage a power cable**
  Risk of fire or electrical shock. Do not scratch, modify, or pull a power cable. The cable can also be damaged when it is heated or loaded with a heavy thing.


Electrical shock

- **Do not place the pump close to water**
  The pump is not dust-/water-proof construction. The use of the pump in a humid place or a place where the pump can get wet may result in electrical shock or short-circuit.


Prohibited

- **Install an earth leakage breaker**
  Risk of electrical shock. Do not use the pump without an earth leakage breaker. Purchase separately.


Electrical shock

- **Damaged power cable**
  Do not use any damaged power cable for the prevention of a fire or electrical shock. The cable is not replaceable, so that the whole pump unit needs to be replaced when the cable is damaged.


Electrical shock

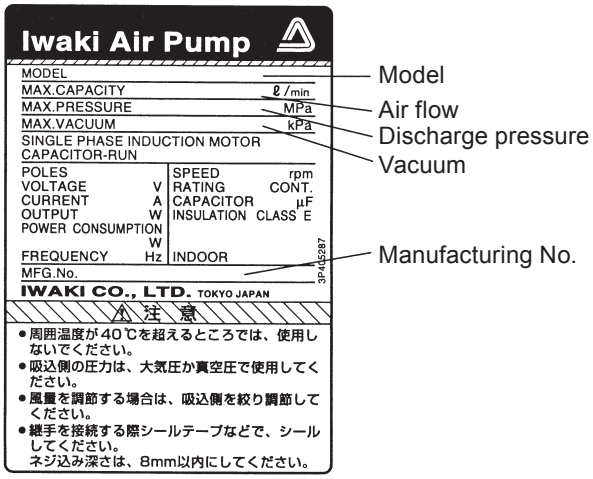
- **Pump disposal**
  Dispose of any used or damaged pump in accordance with local laws and regulations (Consult a licensed industrial waste products disposing company.).

- **Earth connection**
  Always earth the pump in order to reduce the risk of electrical shock.


Grounding

Outline

1. Unpacking & Inspection

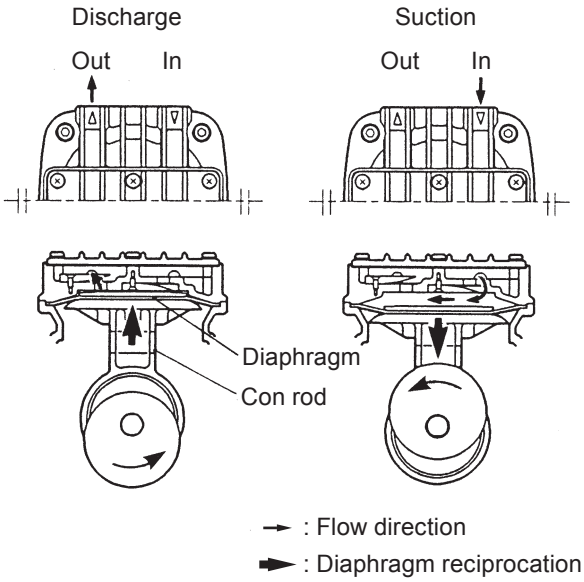


On unpacking the product, check the following points. If you find any problems, contact your nearest distributor.

1. Check the information on labels to see if the delivery is as per order.
2. Check for transit damage and loose bolts.

2. Product outline

The APN-450 is a diaphragm type air pump.



■ Principle of operation

The rotary motion of the motor is converted through a connecting rod to the reciprocation of the diaphragm in the pump chamber, where gas is transferred from the inlet to outlet.

3. Specification

Model		Air flow	Max. discharge pressure	Maximum Vacuum	Motor			Connection bore		Mass	Lowest starting temperature
					Input	Output	Current	Tube	Thread		
APN-450	NAT	50/60 L/min	0.1MPa	13.33kPa [abs.]	295/345W at 100V 310/323W at 200V	200W	3.2/3.5A at 100V 1.60/1.65A at 200V	ø12	Rc1/4	12kg	0°C
	NST									14.2kg	
APN-P450	NAT	100/110 L/min								12.8kg	
	NST									17.1kg	
APN-S450	NAT	50/60 L/min	-	3.33kPa [abs.]						13.0kg	
	NST									17.4kg	
APN-450	NAT	50L/min	0.1MPa	13.33kPa [abs.]	310W at 220/240V	200W	1.5/1.4A at 220/240V	ø12	Rc1/4	12kg	0°C
	NST									14.2kg	
APN-P450	NAT	100L/min								12.8kg	
	NST									17.1kg	
APN-S450	NAT	50L/min	-	3.33kPa [abs.]						13.0kg	
	NST									17.4kg	

NOTE1. Observe the maximum discharge pressure of 0.1MPa.

2. Allowable gas temperature range is 0-40°C.
3. Allowable ambient temperature range is 0-40°C.
4. The air flow, maximum discharge pressure and maximum vacuum are obtained when ambient temperature is 20°C and change depending on gas characteristics and temperature fluctuation.

■ Wet end material

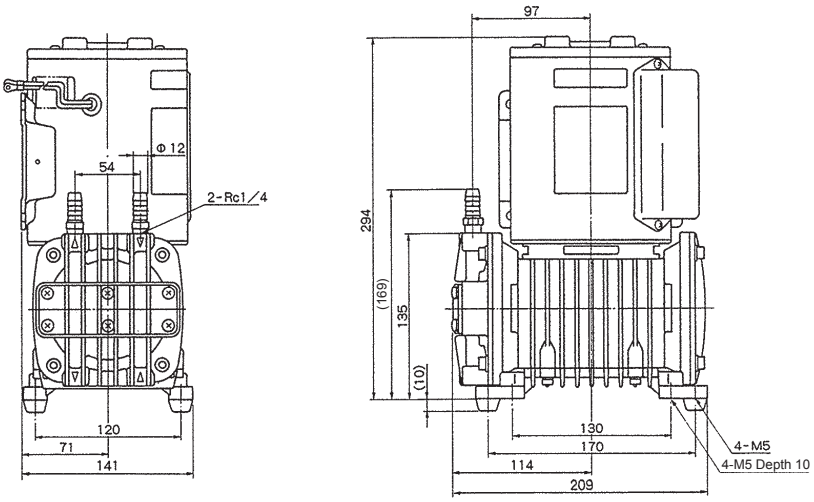
Parts \ Type	NAT	NST
Pump head	ADC12	SUS304
Valve	SUS631-CSP	
Diaphragm	PTFE (PTFE+EPDM)	
Retainer plate	ADC12	SUS304
Filter (option)	Urethan	-
Valve restraint	ADC12	GF reinforced PPS
Gasket	EPDM	FKM
Cover	ADC12	SUS304
Seat	PTFE	
Fitting	BsBM	SUS304 equivalent
Screw	SUS304 equivalent	
Tube	Nylon	ETFE

ADC12 : Aluminium die casting
SUS304 : Austenite stainless steel (18Cr-8Ni)
SUS631-CSP : Stainless steel for springs (17-Cr-7Ni-1Al)
PTFE : Polytetrafluoroethylene
EPDM : Ethylene propylene diene Monomer
PPS : Polyphenylene sulphide
FKM : Fluorine-contained rubber
BsBM : Brass
ETFE : Ethylene tetrafluoroethylene

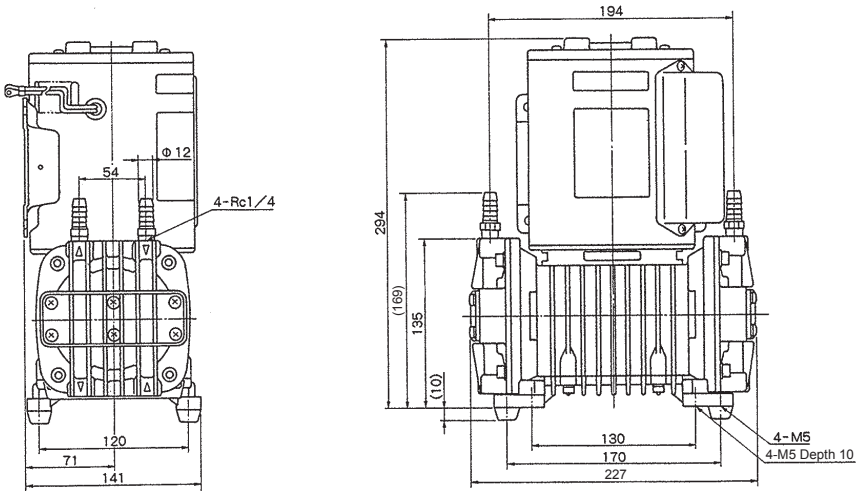
4. Dimensions

■ Aluminium pump head type

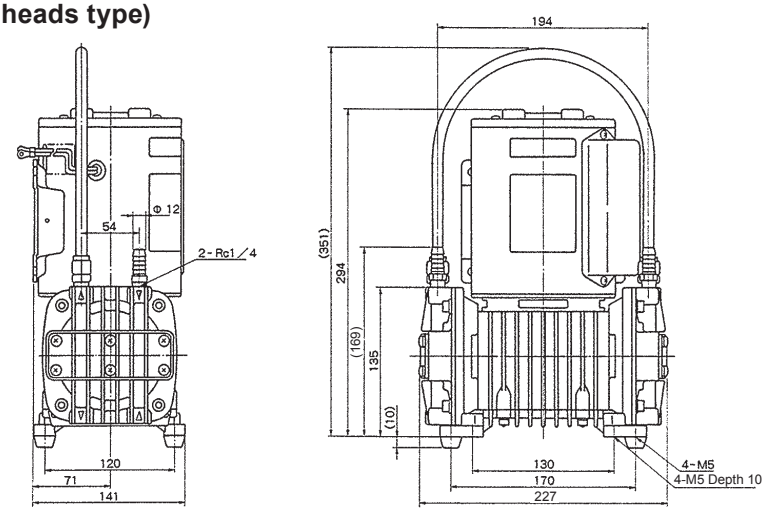
APN-450 (Single head type)



APN-P450 (Twin parallel heads type)

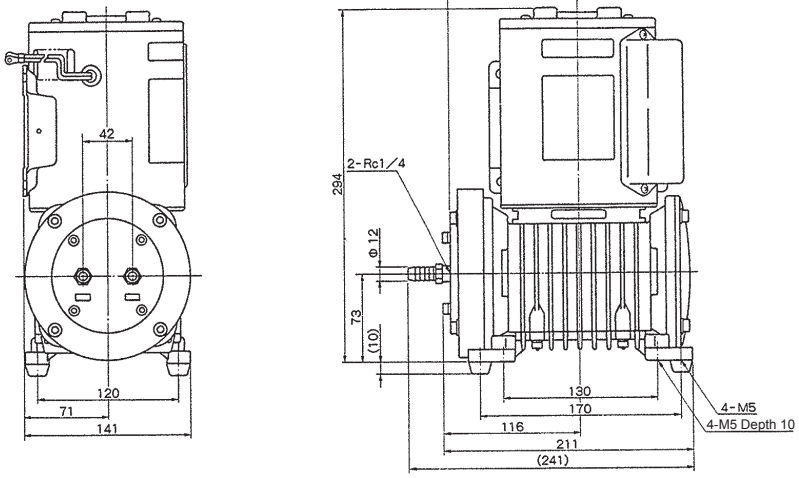


APN-S450 (Twin series heads type)

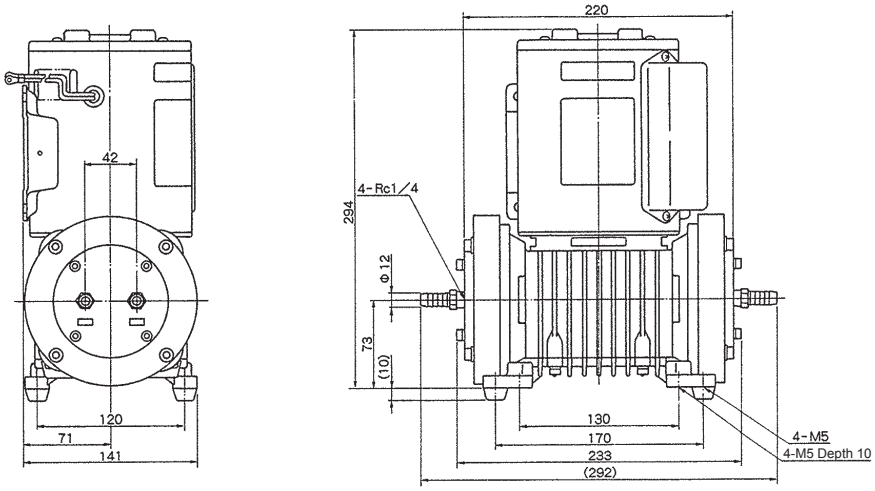


■ Corrosive resistant stainless steel pump head

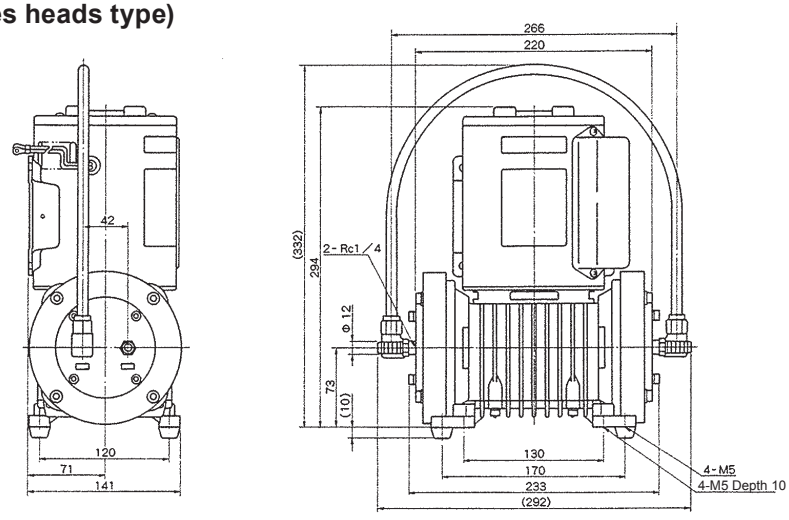
APN-450 (Single head type)



APN-P450 (Twin parallel heads type)

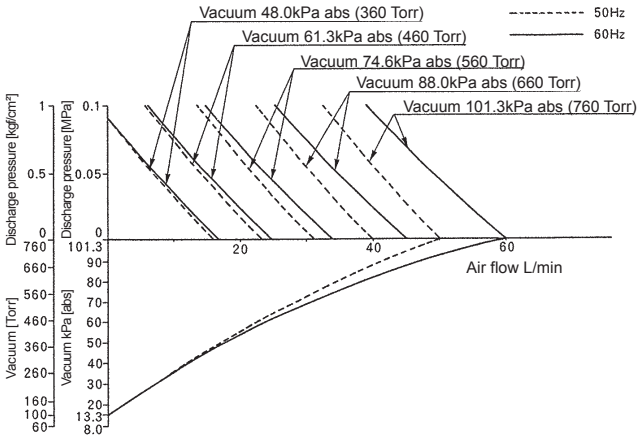


APN-S450 (Twin series heads type)

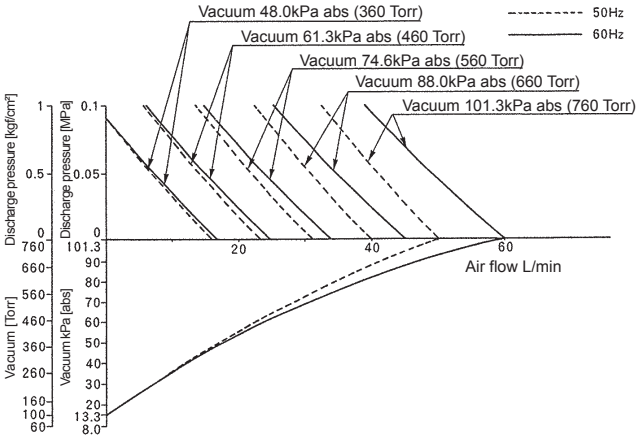


5. Performance curves

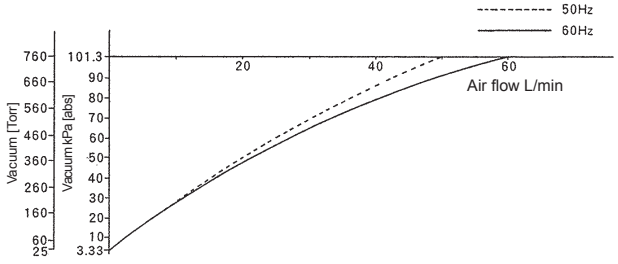
■ APN-450 (Single head type)



■ APN-P450 (Twin parallel heads type)

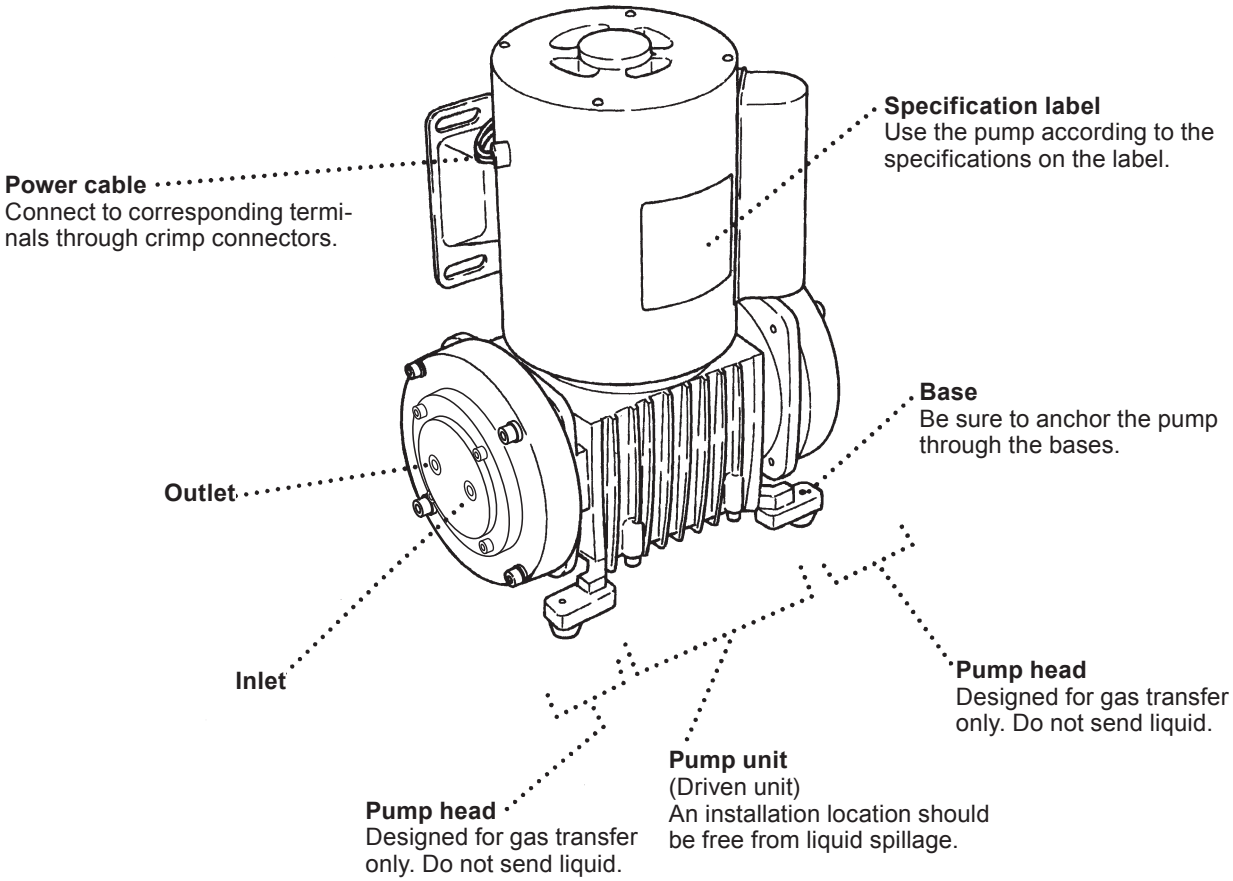


■ APN-S450 (Twin series heads type)



6. Overview

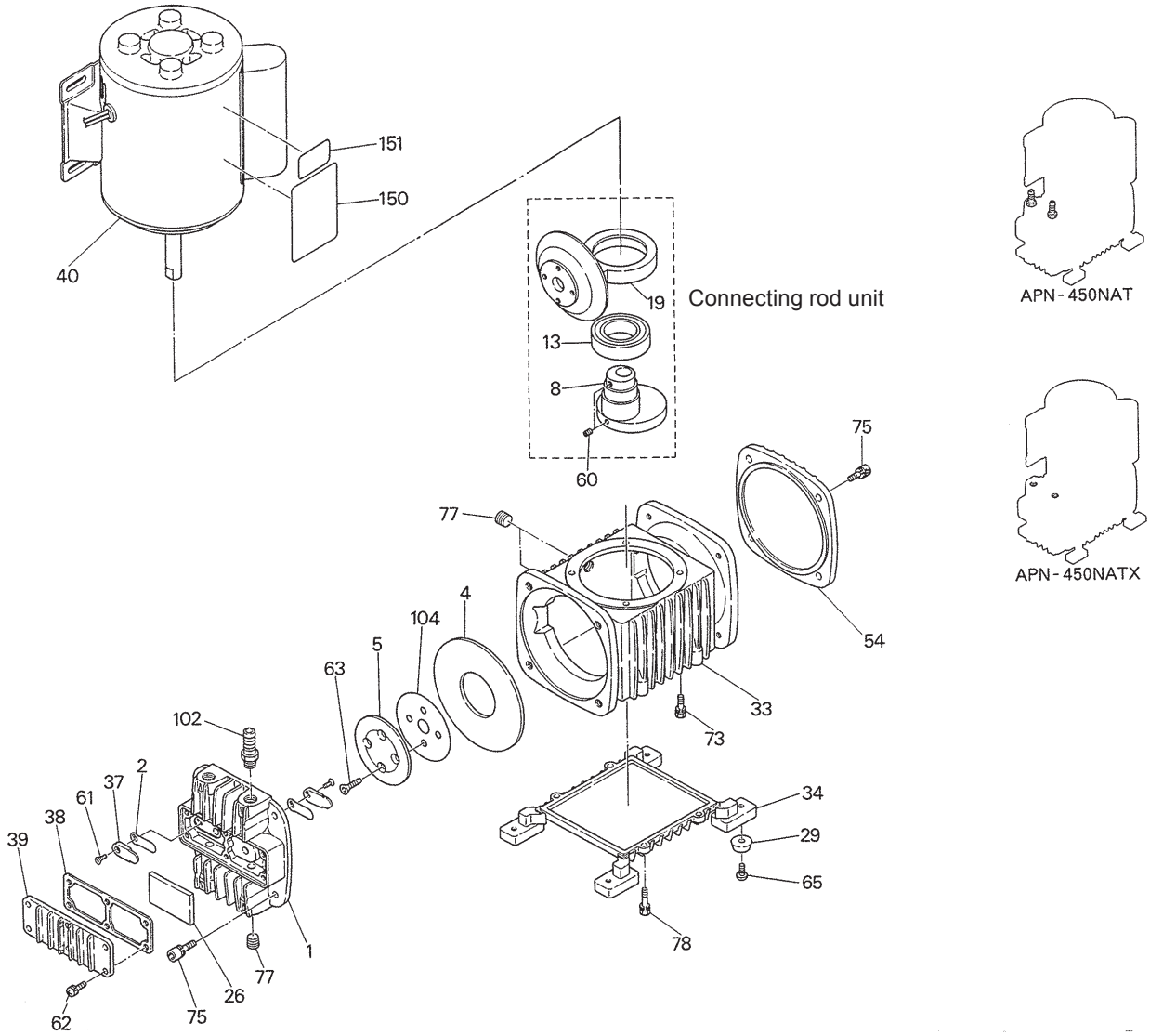
The illustration below shows an APN-450 twin head type.



7. Exploded view

■ APN-450NAT/NATX

See this exploded view when dismantling/assembling the pump. Do not dismantle the pump beyond the extent of the instructions on page 28-31, "Wear parts replacement".

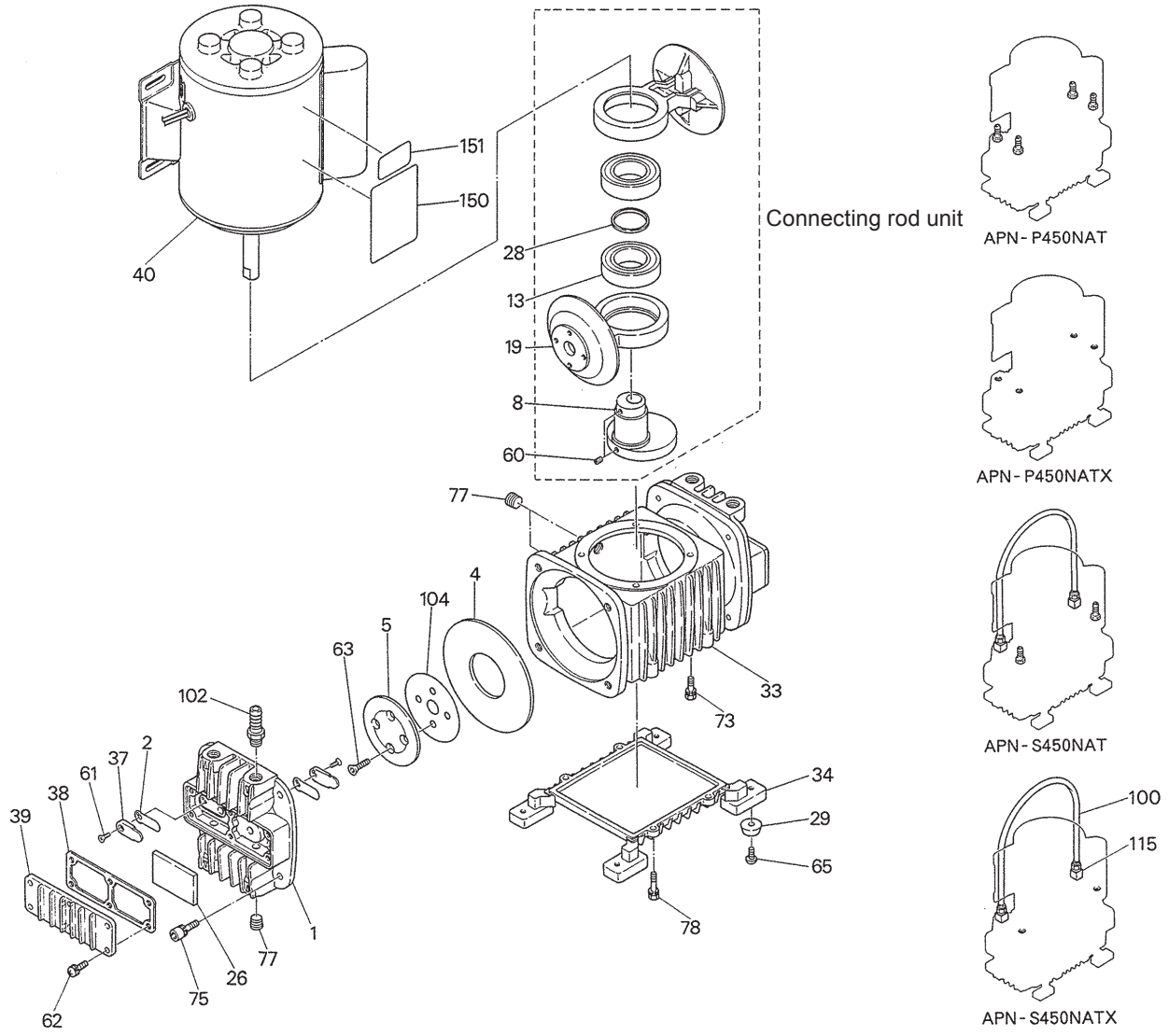


No.	Part names	Q'ty	No.	Part names	Q'ty	No.	Part names	Q'ty
1	Pump head	1	34	Base	1	65	Screw	4
2	Valve	2	37	Valve restraint	2	73	Hex. socket head bolt	4
4	Diaphragm	1	38	Gasket	1	75	Hex. socket head bolt	8
5	Retainer plate	1	39	Cover	1	77	Plug	4
8	Eccentric shaft	1	40	Motor	1	78	Hex. socket head bolt	4
13	Bearing	1	54	Cover	1	102	Fitting*	2
19	Connecting rod	1	60	Set screw	2	104	Seat	1
26	Filter (option)	1	61	Screw	2	150	Name plate (Specification)	1
29	Rubber foot	4	62	Screw	6	151	Name plate (Caution)	1
33	Case	1	63	Screw	4			

*NAT type only

■ APN-P/-S450NAT/NATX

See this exploded view when dismantling/assembling the pump. Do not dismantle the pump beyond the extent of the instructions on page 28-31, "Wear parts replacement".

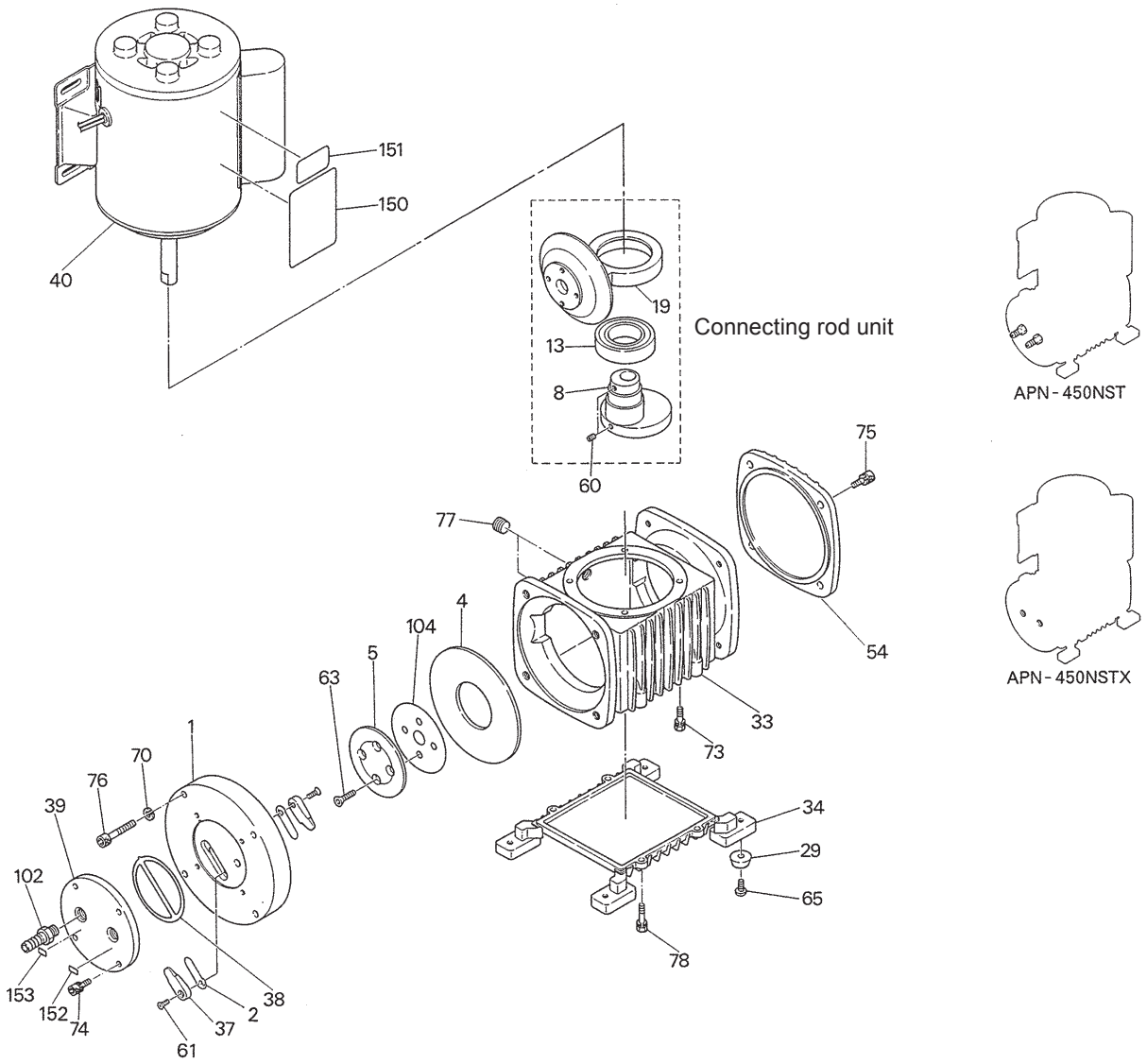


No.	Part names	Q'ty	No.	Part names	Q'ty	No.	Part names	Q'ty
1	Pump head	2	34	Base	1	75	Hex. socket head bolt	8
2	Valve	4	37	Valve restraint	4	77	Plug	6
4	Diaphragm	2	38	Gasket	2	78	Hex. socket head bolt	4
5	Retainer plate	2	39	Cover	2	100	Tube*¹	1
8	Eccentric shaft	1	40	Motor	1	102	Fitting*²	4
13	Bearing	2	60	Set screw	2	104	Seat	2
19	Connecting rod	2	61	Screw	4	115	Joint*³	2
26	Filter (option)	2	62	Screw	12	150	Name plate (Specification)	1
28	Collar	1	63	Screw	8	151	Name plate (Caution)	1
29	Rubber foot	4	65	Screw	4			
33	Case	1	73	Hex. socket head bolt	4			

*¹APN-S type only
*²APN-P450NSTX type only
*³APN-S type only

■ APN-450NST/NSTX

See this exploded view when dismantling/assembling the pump. Do not dismantle the pump beyond the extent of the instructions on page 28-31, "Wear parts replacement".

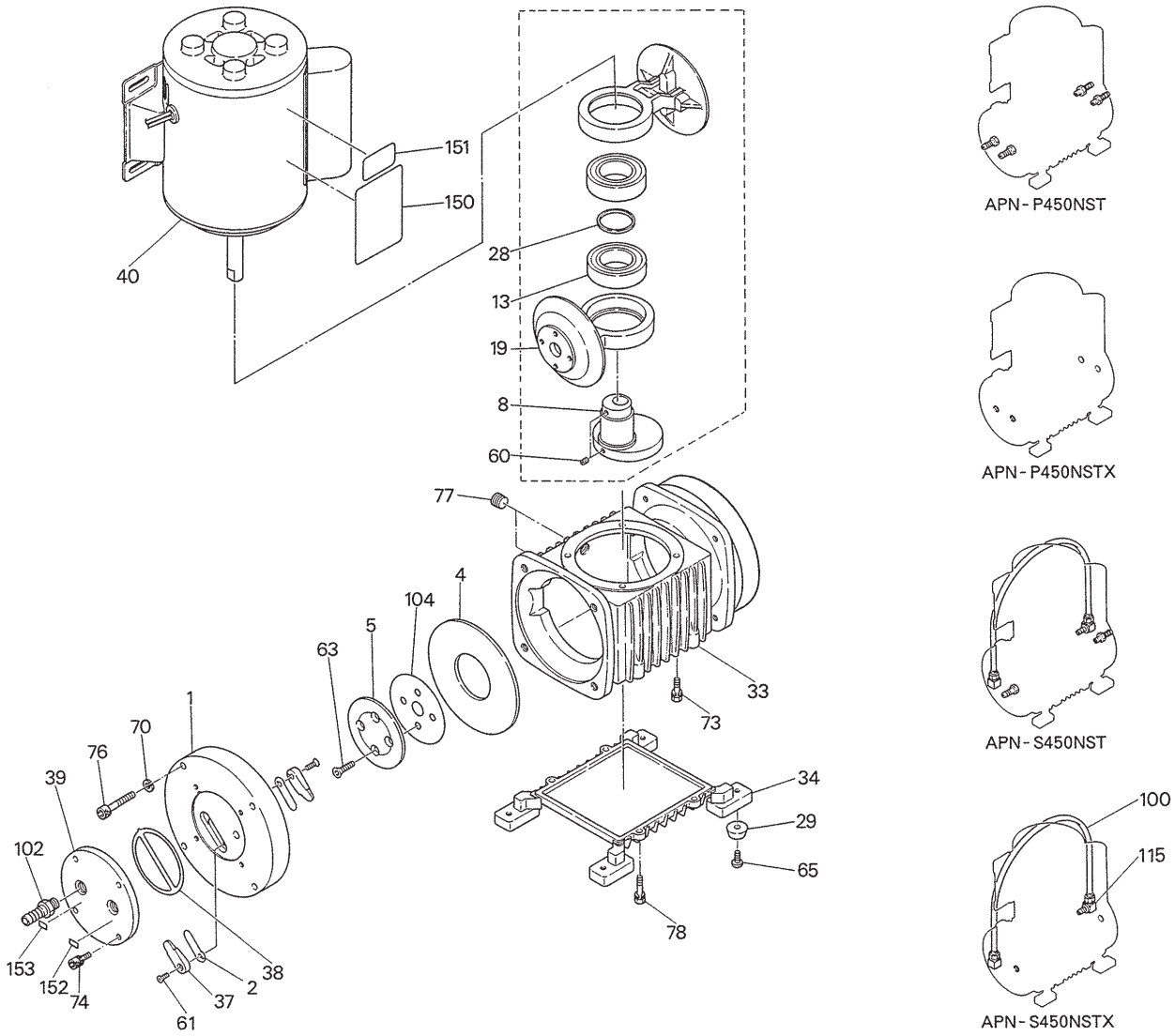


No.	Part names	Q'ty	No.	Part names	Q'ty	No.	Part names	Q'ty
1	Pump head	1	38	Gasket	1	75	Hex. socket head bolt	4
2	Valve	2	39	Cover	1	76	Hex. socket head bolt	4
4	Diaphragm	1	40	Motor	1	77	Plug	2
5	Retainer plate	1	54	Cover	1	78	Hex. socket head bolt	4
8	Eccentric shaft	1	60	Set screw	2	102	Fitting*	2
13	Bearing	1	61	Screw	2	104	Seat	1
19	Connecting rod	1	63	Screw	4	150	Name plate (Specification)	1
29	Rubber foot	4	65	Screw	4	151	Name plate (Caution)	1
33	Case	1	70	Spring washer	4	152	Name plate (IN)	1
34	Base	1	73	Hex. socket head bolt	4	153	Name plate (OUT)	1
37	Valve restraint	2	74	Hex. socket head bolt	4			

*NST type only

■ APN-P/-S450NST/NSTX

See this exploded view when dismantling/assembling the pump. Do not dismantle the pump beyond the extent of the instructions on page 28-31, "Wear parts replacement".



APN-P450NST

APN-P450NSTX

APN-S450NST

APN-S450NSTX

No.	Part names	Q'ty	No.	Part names	Q'ty	No.	Part names	Q'ty
1	Pump head	2	37	Valve restraint	4	76	Hex. socket head bolt	8
2	Valve	4	38	Gasket	2	77	Plug	2
4	Diaphragm	2	39	Cover	2	78	Hex. socket head bolt	4
5	Retainer plate	2	40	Motor	1	100	Tube*¹	1
8	Eccentric shaft	1	60	Set screw	2	102	Fitting*²	4
13	Bearing	2	61	Screw	4	104	Seat	2
19	Connecting rod	2	63	Screw	8	115	Joint*³	2
28	Collar	1	65	Screw	4	150	Name plate (Specification)	1
29	Rubber foot	4	70	Spring washer	8	151	Name plate (Caution)	1
33	Case	1	73	Hex. socket head bolt	4	152	Name plate (IN)	1
34	Base	1	74	Hex. socket head bolt	8	153	Name plate (Out)	1

*¹APN-S type only
*²APN-P450NSTX type only
*³APN-S type only

Installation

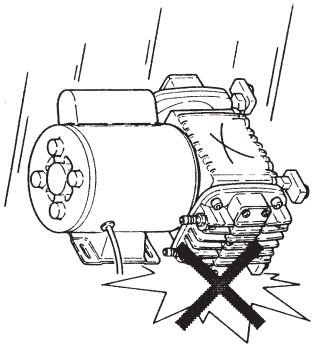
Installation

1. Before installation

Read through instructions in this section to ensure the optimum performance, safety and service of your pump.

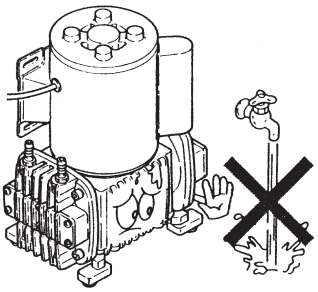
⚠ WARNING

- Do not place dangerous or flammable goods near the pump for your safety.
- Risk of an electrical leak or shock. Do not use a damaged pump.

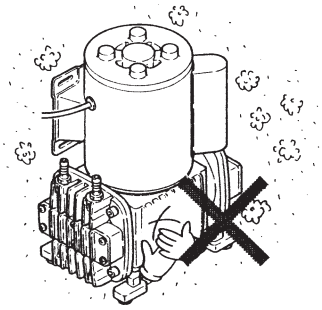


■ Precautions

- Dropping or subjecting the pump to a strong impact, failure may result. Handle the pump with care.

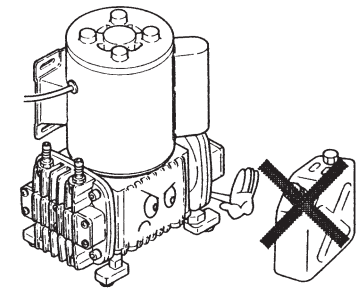


- Do not install the pump in a place where the pump can get wet. Avoid using wet gas, or internal condensation will build up and consequently result in performance deterioration or the short lives of valves and a diaphragm.

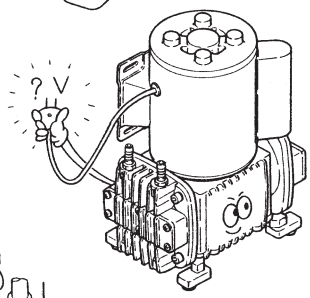


- Do not use the pump in a dusty place. Be sure to provide one end of a suction line with a filter to prevent foreign matters from getting into the pump. Otherwise, the pump performance may reduce or the lives of valves and a diaphragm may remarkably shorten.

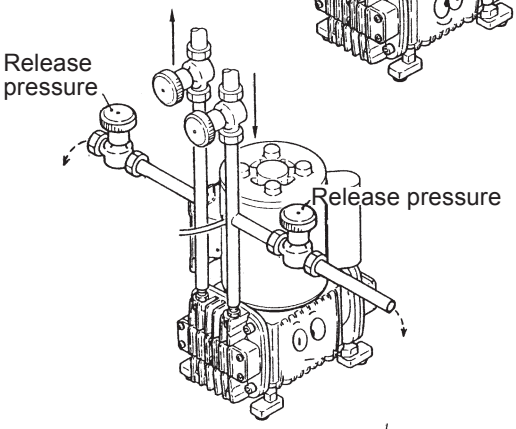
Installation



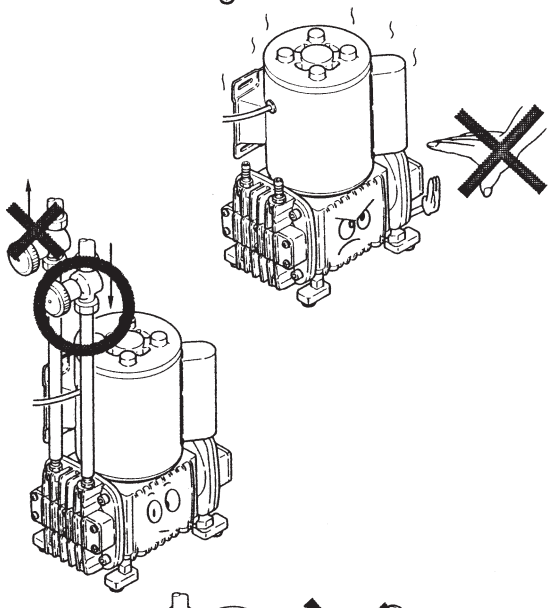
- Do not install the pump in a corrosive or flammable gas atmosphere. Keep good ventilation in a working area. Ambient temperature should not fall below 0°C or exceed 40°C. Observe the allowable gas temperature range of 0 and 40°C.



- Observe the rated voltage specified on the name plate. Applying any voltage than the rated one may result in failure.

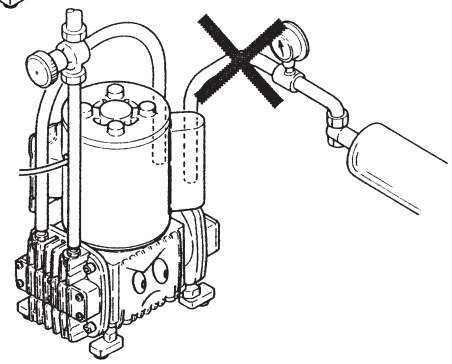


- The pump can not start when the pump head is pressurized by line pressure. Remove pressure before operation. After a long period of stoppage, pump performance at the beginning of operation becomes occasionally unstable. In this case, warm the pump up for 10 minutes with no discharge line pressure.



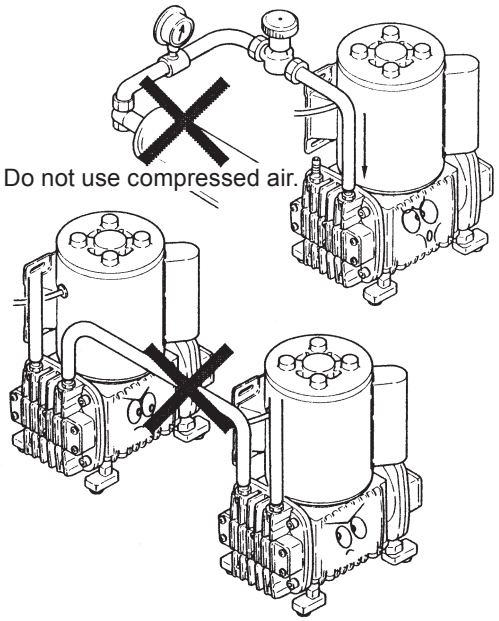
- Surface temperature may rise high in operation but it dose not mean failure. Do not touch the pump body directly or place objects which may be deformed by heat close to the pump.

- Always use a suction valve to adjust an air flow.



- The APN-S450 is designed for vacuum application only. Do not connect the pump's outlet with a pressurized discharge line.

Installation



- If the compressed air (higher pressure than atmospheric pressure) is transferred to the pump, sharp deterioration to the lives of the valves, diaphragm and bearing may result. The suction line pressure should be equal to atmospheric pressure or vacuum pressure.

- Do not tube two or more pumps in series. It may prevent the motor from starting and lead to a burn out.

- Indoor use only
  This product is not dust-/water-proof. Do not install it out of doors, in a humid place or a place where the pump can get wet.

- Do not use solvents such as benzine, alcohol, thinner for maintenance or cleaning, otherwise a coat discolours or comes off.

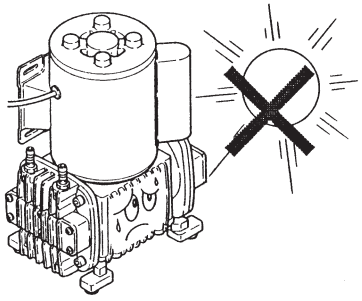
2. Installation/Tubing/Electrical wiring

⚠ WARNING

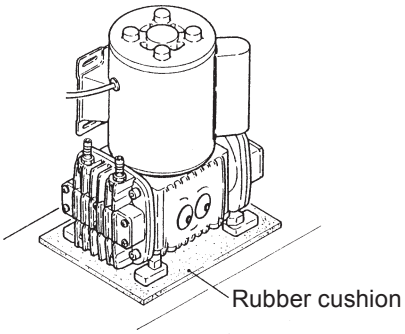
- On sensing danger or abnormality, suspend operation immediately and inspect/solve problems.

■ Installation

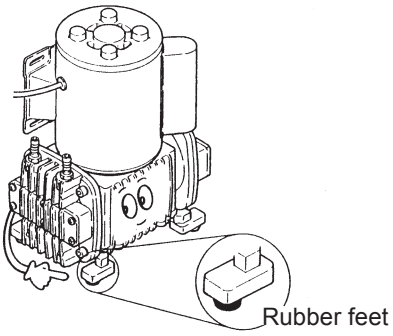
1. Ambient temperature around the pump should not exceed 40°C. Observe the allowable maximum ambient humidity of 90%RH. This product is designed for indoor use only.



2. Choose an installation location where allows convenient access to dismantlement or inspection. Place a rubber cushion under the pump to isolate it from vibration. Anchor the pump through 8 thread holds beneath the base.



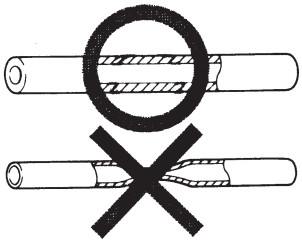
3. Fit the rubber feet to the base when just placing the pump on a flat surface.



4. Cut both ends of tubing flat.

■ Tubing

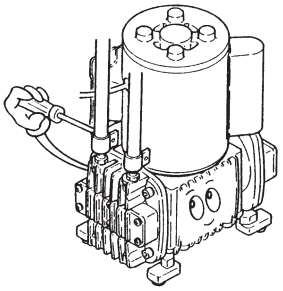
1. Tube should be thick enough. The use of a thin and light tube may reduce suction force and an air flow.



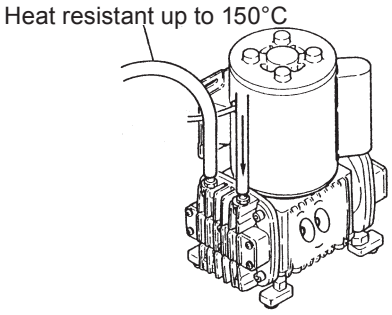
⚠CAUTION
Avoid sharp turns or bends. Otherwise, an tube end may break.

2. The short tubing with the minimum bends is optimal to reduce resistance.

3. Be sure to secure tube connection by using a screw/band tube clamp in order to eliminate the possibility of leakage.



4. In case of providing a discharge line to the pump outlet, tube material should be heat-resistant of 150ºC or more. Hot gas may be discharged through the outlet depending on operating conditions.



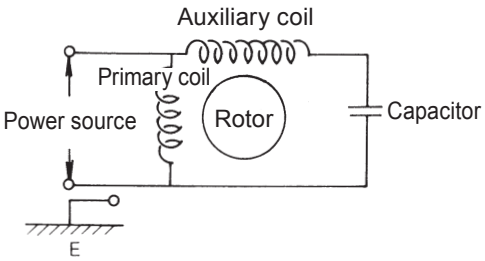
■ Electrical wiring

Electrical wiring must be done by a qualified person who has a full knowledge of safety. We are not responsible for personal injury or property damage due to nonobservance of this warning. Contact us or your nearest distributor as necessary.

<Before wiring>

1. Confirm that power is disconnected before work.

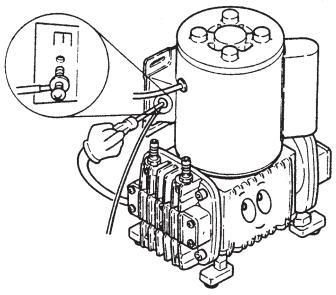
2. Wiring work should be done in accordance with relevant electric work requirements. Use the recommended wiring accessories.



3. Observe the rated voltage specified on the name plate.

4. When an earth leakage breaker is used and has tripped, always investigate and solve root causes before resuming operation. Be sure to unplug the pump during investigation.

5. Connect an earth wire to the earth terminal on the motor with a M4 screw.



Operation

Operation

1. Before operation

1. Before pump operation, check that each tube connection is secured.

2. Check that a suction line is connected to the inlet and a discharge line to the outlet.

⚠CAUTION

If a suction line and a discharge line are connected the other way around, pumping process is inverted.

3. Check that the pump is firmly fixed on a mounting position.

2. Pump operation

Operate the pump according to the following steps.

No.	Procedure	Contents
1	Check tubing, wiring and voltage.	● See "■ Tubing" and "■ Electrical wiring" sections. ● Check the spec label to see if power supply voltage is correct.
2	Open valves.	● Fully open both discharge and suction lines.
3	Supply power to the pump.	● Check the item 1 and 2. Then turn on power and start the pump. ● Smooth starting may not be obtained when ambient temperature is 10ºC or below. In this case, run the pump with no discharge line pressure for a few minutes to warm it up.
4	Adjust air flow.	● After the pump has reached a specified stroke rate, initiate full scale operation. ● Always adjust an air flow by the suction valve.
5	Points to be checked during operation	● After starting, check a pressure gauge to see if suction and discharge line pressure are correct and an air flow meter to see if the specified air flow is obtained. ● Always adjust air flow by a suction valve. ● Keep a suction line pressure at or below atmospheric pressure. ● In case electric power has failed while the pump is running, switch off main power. Otherwise, the motor may not restart or may burn out depending on a line pressure at the time of power recovery.

■ Stop and storage

● Before a long period of stop (1 week or more)...
Depressurize the system and stop air/gas supply.
Some liquids may harden or crystallize when they are left for a long time. In this case clean wet ends before resuming operation.

● Do not store the pump in the following places where...
1. Ambient temperature exceeds 40°C or falls below 0°C.
2. Under a flammable/corrosive atmosphere or in a dusty/humid place.
3. Under vibration or wind & rain.

Maintenance

Maintenance

1. Troubleshooting

Turn off power to stop operation upon sensing abnormalities. And then look for a root cause or contact us as necessary.

States	Possible causes	Solutions
Pump does not run.	The pump is not powered.	Check wiring.
	Motor failure	Replace with a new motor. Contact us.
	Plumbing damage or poor connection	Repair plumbing as necessary, or secure connection.
	Wear of an eccentric shaft	Replace the con rod unit. Contact us.
	Wear of the con rod unit bearing	Replace the con rod unit. Contact us.
	Wear of motor bearings	Replace a motor with new one. Contact us.
	Voltage reduction	Keep the rated voltage.
	Suction line pressure is higher than atmospheric pressure.	Keep the pressure at or below atmospheric pressure.
Unintentional operation stop.	Motor failure	Replace with a new motor. Contact us.
	Wear of the con rod unit bearing	Replace the con rod unit. Contact us.
	Wear of motor bearings	Replace a motor with new one. Contact us.
	Voltage reduction	Keep the rated voltage.
	Suction line pressure is higher than atmospheric pressure.	Keep the pressure at or below atmospheric pressure.
	Discharge line pressure is higher than the specified one.	For the series head type, keep the pressure equal to atmospheric pressure.
Reduction of air flow/discharge pressure	Plumbing damage or poor connection	Repair plumbing as necessary, or secure connection.
	Pump head fixing screws are loose.	Tighten them at specified torque.
	Diaphragm fixing screws are loose.	Tighten them at specified torque.
	Diaphragm damage	Replace with a new one.
	Clogging	Remove clogging.
	Worn valves	Replace with new ones.
	Bracket/Diaphragm fixing screws are loose.	Secure them.
Abnormal noise	Pump head fixing screws are loose.	Tighten them at specified torque.
	Diaphragm fixing screws are loose.	Tighten them at specified torque.
	Diaphragm damage	Replace with a new one.
	Bracket/Diaphragm fixing screws are loose.	Secure them.
	Wear of an eccentric shaft	Replace the con rod unit. Contact us.
	Wear of the con rod unit bearing	Replace the con rod unit. Contact us.
	Wear of motor bearings	Replace a motor with new one. Contact us.

2. Maintenance & Inspection

■ Daily inspection

Pay attention to the following items during operation. Stop operation on sensing danger and solve problems on the trouble shooting section.

No.	States	Points to be checked	How to check
1	Operation	● If air is pumped. ● If the suction and discharge pressure are normal. ● If power voltage and current are normal.	● Air flow meter, pressure gauge or visual inspection ● See a spec label.
2	Starting	● If abnormal noise or vibration occurs. They are signs of abnormal operation. ● A baseplate, if installed, under the pump may resonate with operation, making a mechanical noise. Insert a rubber cushion as necessary to reduce resonance.	● Visual or audio inspection ● Visual or audio inspection
3	Air leak or ingress from pump head joints and a suction line	● Tighten a loose joint.	● Air flow meter, pressure gauge or visual inspection
4	Pump and motor surface temperature rise	● Pump and motor surface temperature should be at or below a total of ambient temperature plus 50°C.	● Thermometer

■ Wear parts

If pump performance has remarkably reduced, replace diaphragms and valves with new ones.
Wear part duration varies with the pressure, temperature and characteristics of liquid.
The estimated life below is calculated based on continuous operation with clean water in a room temperature range of 0-40°C.

Model	Load range	Estimated life				
		Valve	Diaphragm	Seat	Gasket	Filter (Option)
APN-(450/P450/S450)NAT-NATX	All range	8000	4000			4000
APN-(450/P450/S450)NST-NSTX		8000	4000			-

3. Wear part replacement

⚠ CAUTION

- **Turn off power before work**
  Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before work.
- **Do not touch the pump or pipe with bare bands**
  Risk of burning. The surface temperature of the pump or pipe gets high in or right after operation.
- **Wear protective clothing**
  Always wear protective clothing such as safety goggles and protective gloves during pipework or dismantlement.
  Do not get wet with dripping residual liquid in disconnection.

■ Before dismantlement

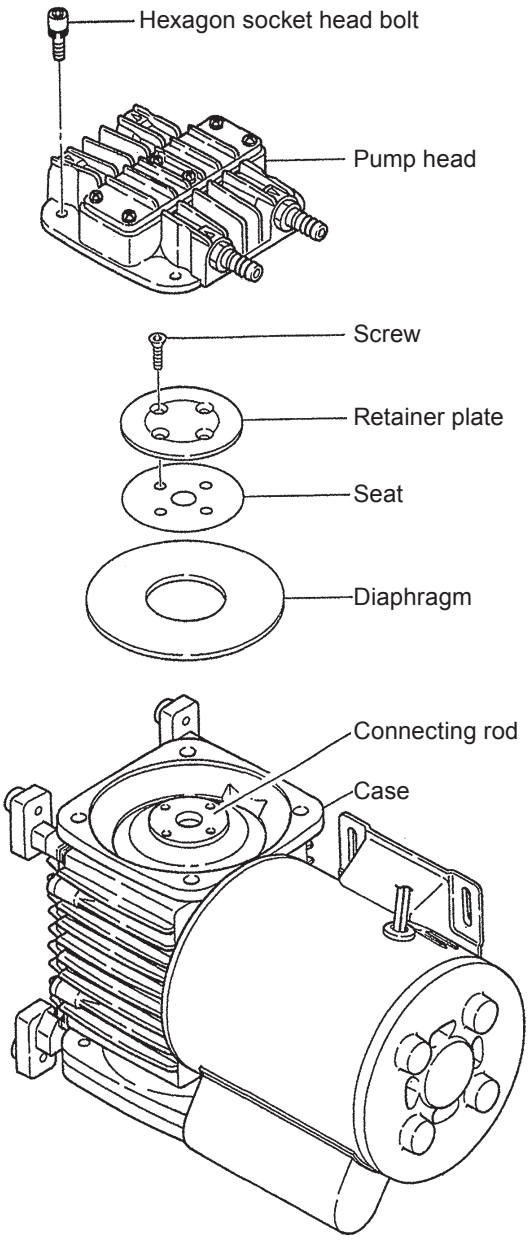
a. Turn off power to stop the pump. Then start to remove wiring including an earth wire.

b. Remove the pump from plumbing system and for the convenience of dismantlement.

■ Corrosion resistant (stainless) type

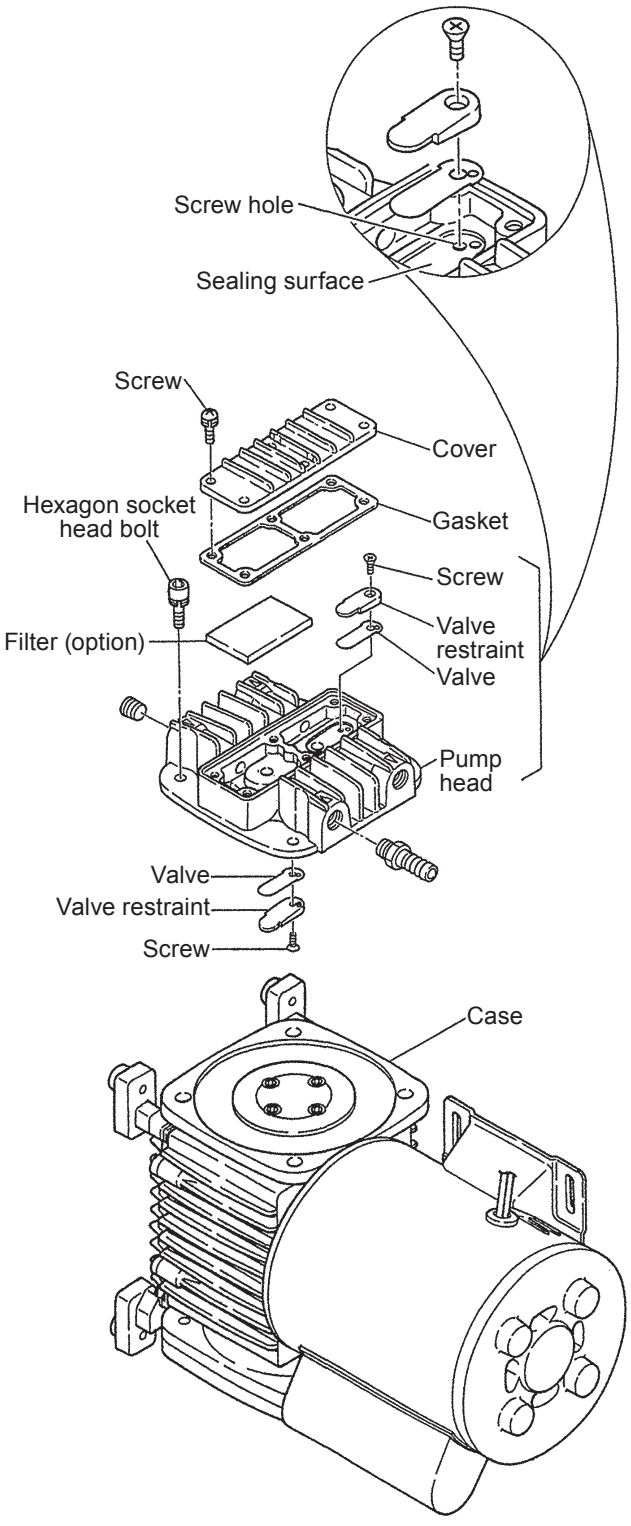
<APN-450NAT/NATX, APN-P/-S450NAT/NATX>

Go through the following steps to take apart or put together the pump. Do not dismantle the pump beyond the extent of the instructions.



Diaphragm & seat dismantlement

1. Lay the pump on its side with the pump head upwards. See the left picture.
2. Remove 4 hexagon socket head bolts with a 5mm hexagon wrench and detach the pump head.
3. Remove 4 screws with a 3mm hexagon wrench and take out a retainer plate, seat and diaphragm.
4. Place a new diaphragm onto the connecting rod.
5. Place a new seat and retainer plate onto the diaphragm. Apply locking agent (LOCKTITE No.222) or equivalent) to the thread of the screws and tighten them with a 3mm hexagon wrench by 3.4N•m to fasten these parts onto the connecting rod.
6. Press down the diaphragm until it bottoms out and then mount the pump head with 4 hexagon socket head bolts.
   Tighten hexagon socket head bolts in diagonal order until they bottom out.



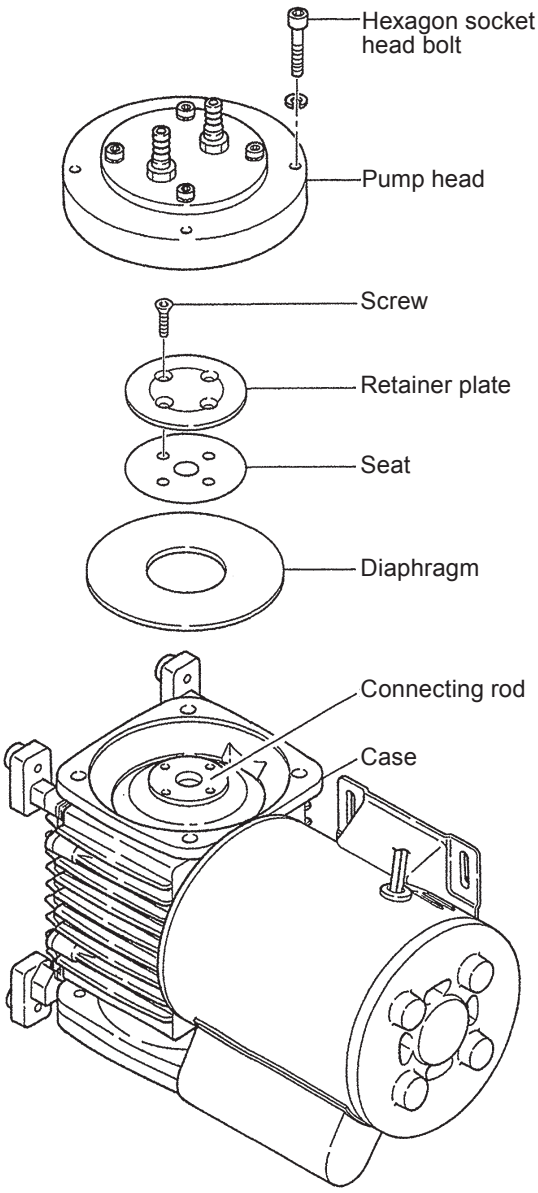
Valve replacement

1. Remove the pump head.
2. Remove all the cover mounting screws to take out the valve restraint and valve.
   Clean valve insertion areas and sealing surfaces on the pump head.
3. Take out the valve beneath the pump head as well.
4. Place a new valve and fasten a screw. Note the valve can not be mounted upside down.
5. Place a new gasket onto the pump head and secure the cover with the mounting screws by 2.8N•m. Do not forget to attach the gasket or catch it in the cover.
6. Press down the diaphragm until it bottoms out and then mount the pump head with 4 hexagon socket head bolts.
   Tighten hexagon socket head bolts in diagonal order until they bottom out.
7. Follow the same step for the other pump head of the twin heads type. Replace an optional filter with new one if it is installed.

■ Corrosion resistant (stainless) type

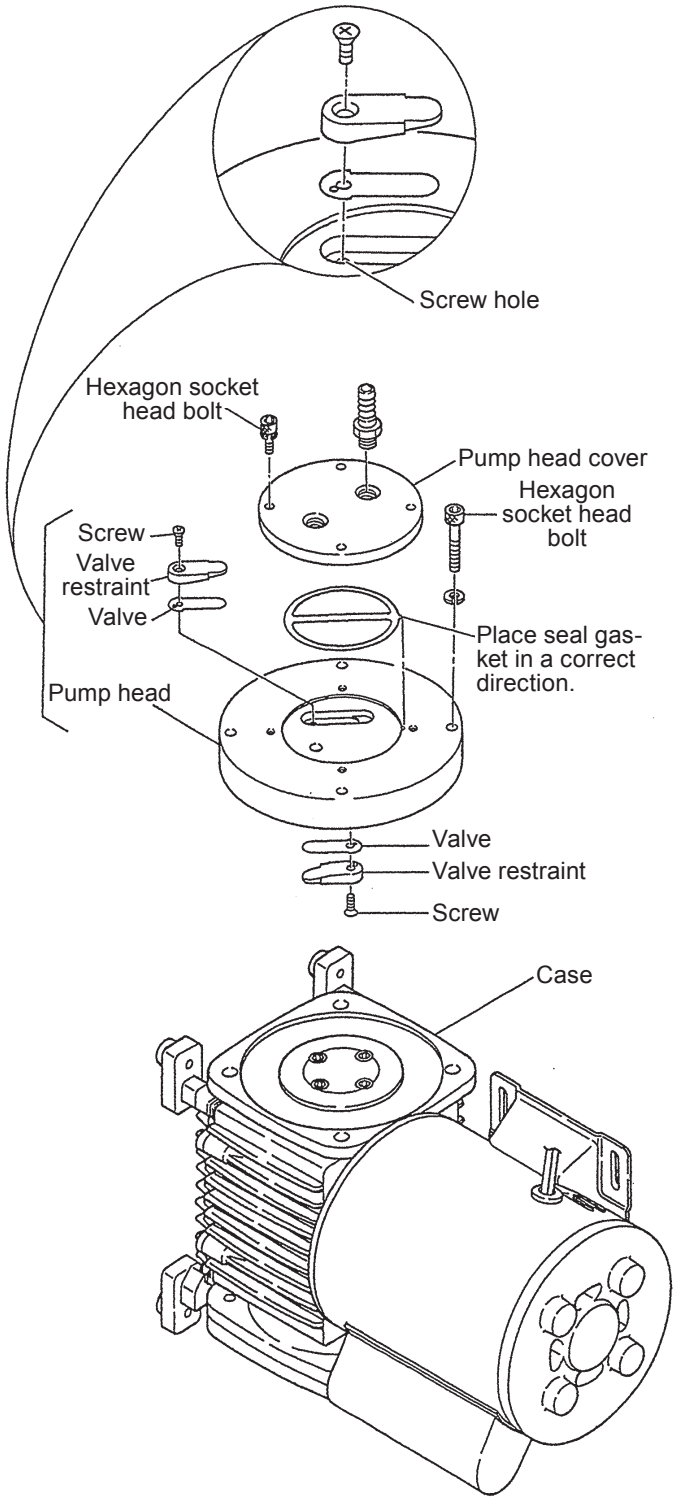
<APN-450NST/NSTX, APN-P/-S450NST/NSTX>

Go through the following steps to take apart or put together the pump. Do not dismantle the pump beyond the extent of the instructions.



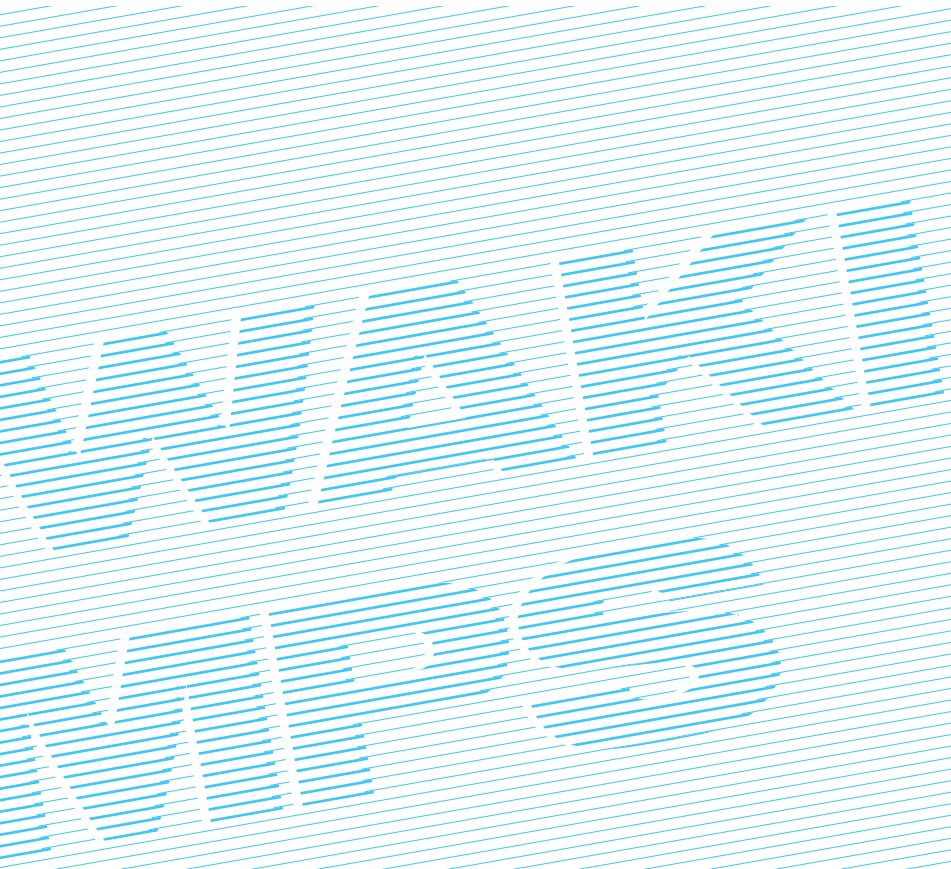
Diaphragm & seat dismantlement

1. Lay the pump on its side with the pump head upwards. See the left picture.
2. Remove 4 hexagon socket head bolts with a 5mm hexagon wrench and detach the pump head.
3. Remove 4 screws with a 3mm hexagon wrench and take out a retainer plate, seat and diaphragm.
4. Place a new diaphragm onto the connecting rod.
5. Place a new seat and retainer plate onto the diaphragm. Apply locking agent (LOCKTITE No.222 or equivalent) to the thread of the screws and tighten them with a 3mm hexagon wrench by 3.4N•m to fasten these parts onto the connecting rod.
6. Press down the diaphragm until it bottoms out and then mount the pump head with 4 hexagon socket head bolts.
   Tighten hexagon socket head bolts in diagonal order until they bottom out.



Valve replacement

1. Remove the pump head.
2. Remove the 4 hexagon socket head bolts on the cover with a 4mm wrench to remove valve retainers and valves.
   Clean valve insertion areas and sealing surfaces on the pump head.
3. Place a new valve and fasten a screw. Note the valve can not be mounted upside down.
4. Place a new gasket onto the pump head and secure the cover with hexagon socket head bolts. Tighten hexagon socket head bolts in diagonal order until they bottom out.
5. Press down the diaphragm until it bottoms out and then mount the pump head with 4 hexagon socket head bolts.
   Tighten hexagon socket head bolts in diagonal order until they bottom out.



IWAKI PUMPS

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