Doc. No.	NDP431U-00

OPERATION MANUAL

YAMADA AIR-OPERATED DIAPHRAGM PUMPS

(for powder material)

NDP-25 series
NDP-40 series
NDP-50 series
NDP-80 series

- **Introduction**

Thank you for purchasing a Yamada Diaphragm Pump. This product is a positive-displacement pump that transfers materials by movement of diaphragms driven by compressed air through a unique switching mechanism. The casing that comes in contact with the material is made of aluminum, stainless steel depending on the model you have selected according to the type of material to be pumped. The diaphragms are made of a thermoplastic elastomer material suitable for the Application.

- **For safe operation**

This document contains information vital for safe and efficient operation of this product. Before using the pump, be sure to read this document carefully, particularly the "warnings and cautions", and be fully familiar with the operating procedures. Be sure to keep this document handy for future reference.

- Warnings and cautions

For safe use of this product, be sure to NOTE the following: In this document, warnings and cautions are indicated by symbols. These symbols are for those who will operate this product and for those who will be nearby, for safe operation and for prevention of personal injury and property damage.
The following warning and caution symbols have the meanings described below. Be sure to remember their meanings.

⚠ **WARNING:** This indicates the existence of potential hazard which, if not avoided, will result in death or serious injury.

⚠ **CAUTION :** This indicates the existence of potential hazard which, if not avoided, may result in bodily injury or in physical damage.

To indicate the contents of danger and damage, the following symbols are used together with the above indications.

This symbol indicates an act that is prohibited (prohibition). The concrete contents of prohibition are indicated by the side of the indication.

This symbol indicates the contents that must be observed. The concrete contents of observance are indicated by the side of the indication.

- Operating caution

Before using this product

⚠ WARNING

- When using compressed gas (hereinafter called "compressed air") to drive this pump, be sure it is one of the following:
  * Compressed air supplied from an air compressor
  * Nitrogen (N_2) gas

  Use of compressed air other than the above may cause air pollution, damage to the pump, or even an explosion.

- The maximum allowable operating pressure for compressed air and powder material being pumped is shown in [9.1 Main specifications] as Operating Air Pressure.
  Use of compressed air or powder material which exceeds the operating air pressure can cause material leaks, damage to the pump casings and diaphragms, or even fatal accidents.

- When moving this product, make sure that the internal pressure is released. If the pump is moved while under pressure, any shock imparted by droppage, etc. may damage the pump or even cause an explosion.

- Hazardous material (strongly-acid or -alkaline, flammable, or toxic) and its atmosphere may cause serious injury or even death if it comes in contact with your eyes or skin or if it is inhaled or ingested. Therefore, the following precautions are strongly advised.
  *Be fully familiar with the properties of the material to be pumped and work in strict accordance with the operating instructions provided by the suppliers of such materials (such as wearing goggles, gloves, mask or work clothes).
  *When storing a hazardous material, strictly comply with the regulatory procedures (such as using proper containers, storage conditions, etc.).
  *Always install the piping and exhaust port of this pump away from human and animal traffic.

- When a diaphragm is damaged, material will gush out together with air through the exhaust port. Also when pump has positive suction head, material will be forced out from exhaust port due to positive inlet pressure. Make sure to provide protective measures in consideration of possible leakage of material (see ＜NOTE＞Arranging outside exhaust on P.9). For example using a hose and pit etc., also be sure you are using a model with appropriate corrosion resistance for the material to be pumped.

⚠ WARNING

- When installing this product, be sure to connect a ground wire from the specified position of this product. When this product is installed and operated without the ground wire properly connected, friction between parts, as well as abrasion caused by the flow of some materials inside the casing, may generate static electricity. Also, depending on the type of material being pumped and the installation environment (such as gases in the air and type of surrounding fixtures), static electricity could become a cause of fire or electric shock.

- Improper grounding, poor ventilation, or unshielded fire or spark can create a danger of fire or explosion. Therefore, the following precautions are strongly advised.
  *All peripheral equipment and piping connected to this product should be properly grounded.
  *Whenever you notice any spark while operating this product, immediately stop its operation, and do NOT start using it again unless you are sure of the cause and corrective actions have been taken.
  *Depending upon the type of material being pumped, bubbles of flammable gas may be generated. Make sure that ventilation is satisfactory.
  *This product itself, its piping and exhaust ports should be kept away from unshielded fire, spark and other causes of ignition. If a diaphragm is damaged, material will gush out together with air from the exhaust port.
  *Do NOT leave gasoline or solvent etc. that contains waste at the work site.
  *Machinery and other equipment near the place of installation of this product should be properly insulated to prevent conduction with each other.
  *Do NOT operate heating devices that create flames or have heating filaments anywhere near the pump or its piping.
  *If there are flammable gases in the air while the pump is operating, do NOT switch electric appliance on and off.
  *Do NOT operate a gasoline engine at the work site.
  *Restrict smoking at the work site.

- Remove residual material from the pump and piping before disconnecting or storing. Even when not in operation, the pump and piping may contain residual material inside. Also, if the pump is not in use for a long period of time, residual material may stick to the inside of the pump and piping, resulting in damage to the pump or material leaks when the pump is restarted.

- Always use genuine Yamada parts when replacing component parts of this product. Do NOT attempt to modify the components parts or replace them with other than genuine Yamada parts.

- Torque of all tightening parts must be inspected before operation. Designated torque are mentioned in maintenance manual.

⚠ WARNING

- When pumping a hazardous material (hot, flammable, strong acid, etc.) with this product, provide protective measures (install a pit, a protection box, sensors, etc.) in consideration of possible leakage of material, and post warning signs at necessary places.
  Make the warning symbols in [12.Warning symbols], and attach them to the casing and piping, etc.
  Leakage of material may cause fire, air pollution or a serious accident.
  When pumping a hot material, the casing and piping will become hot, which may burn the skin when touched.

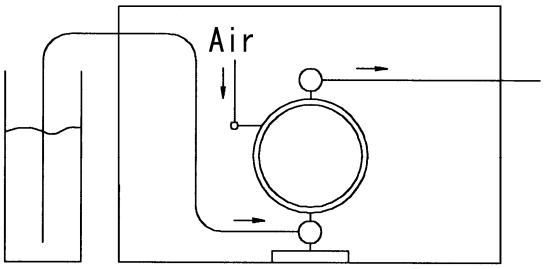


Fig.0.1

- Before use, be sure you are familiar with the precautions regarding the powder material to be pumped and verify the material compatibility for the pump parts that will come into contact with the powder material. NEVER use the pump with any powder material which is not compatible with the pump parts or poses a risk of explosion. If you are unsure of the material compatibility for the pump parts, contact your dealer or our regional office.
  Use of the powder material which is not compatible with the materials used in the pump parts may result in damage to the pump or material leaks.
- When working in the vicinity of pumping of material with this product, be sure to wear protective gear (goggles, mask, etc.).
- When using this product, observe the relevant regulatory rules concerning fire prevention, labor safety standards, etc.
- If you have any questions on the operation of this product (method of connection or installation), contact your dealer or our regional office.

⚠ CAUTION

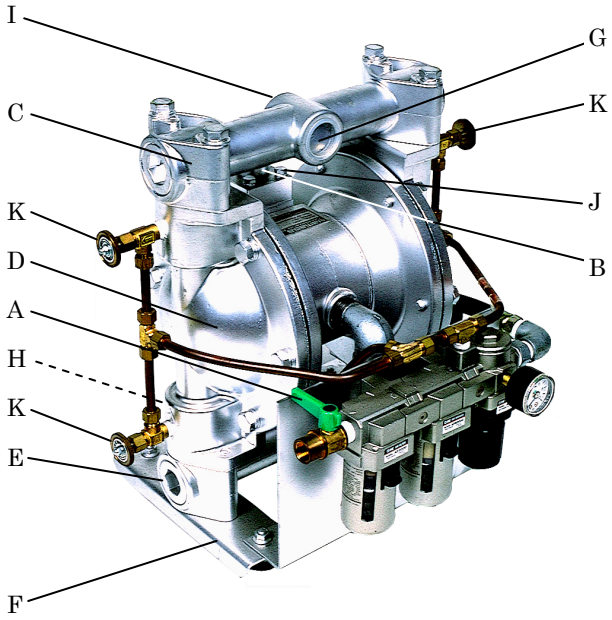
- When operating this product, it may generate loud operating noise, depending upon the condition of use (material pumped, supply air pressure and discharge pressure). If regulatory rules apply, provide appropriate acoustic measures where necessary. (For the noise value of this product, see [9.1 Main specifications].)
- To drive this product, use supply air with minimum moisture content.
- If a diaphragm is damaged, the powder material may be exposed to supply air or flow into the main body. Considering this, do not use the pump if the powder material can be affected by supply air or air dust or if the powder material is incompatible with the material use in the main body.
- While operating this product, do NOT cover the intake port by hand.
- If the pump remains unused for a long period of time, or you have misgivings about running the pump, please consult with the dealer where you purchased it or our Sales office.

Table of Contents

1. Names of parts and materials

1.1 NDP-25 series

A : Air Valve
B : Reset Button
C : Out Manifold
D : Out Chamber
E : In Manifold
F : Pump Base
G : Discharge Port
H : Intake Port
I : Lift Point
J : Ground Connection Point
K : Needle Valve



NDP-25BA□, NDP-25BS□

- Aluminum type

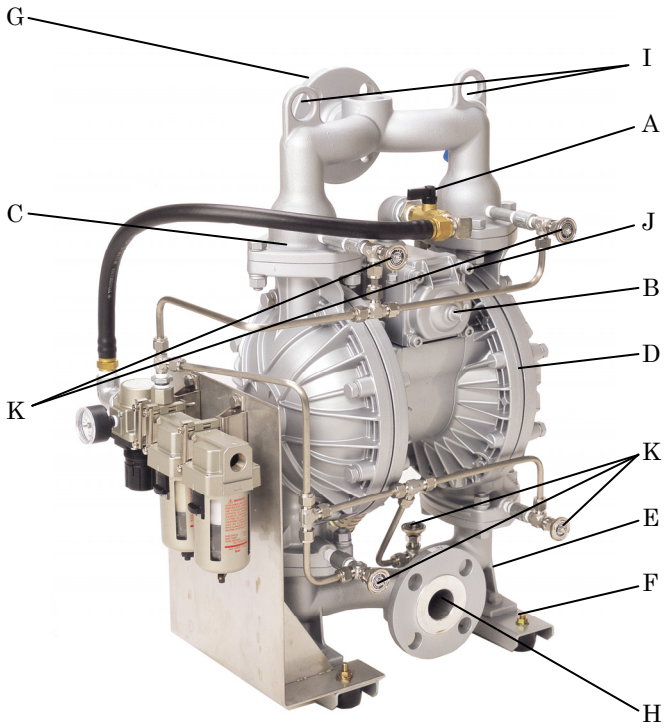
Type	BAC	BAN
Switching Portion	ADC12	
Material Contact Portion	ADC12	
Diaphragm	CR	NBR
Ball/O Ring	CR/NBR	NBR
Valve Seat	SMS1025	
Center Disk	SUS316	

- Stainless-steel type

Type	BSC	BSN
Switching Portion	ADC12	
Material Contact Portion	SCS14	
Diaphragm	CR	NBR
Ball/O Ring	CR/NBR	NBR
Valve Seat	SUS316	
Center Disk	SUS316	

1.2 NDP-40, 50, 80 series

A : Air Valve
B : Reset Button
C : Out Manifold
D : Out Chamber
E : In Manifold
F : Pump Base
G : Discharge Port
H : Intake Port
I : Lift Point
J : Ground Connection Point
K : Needle Valve



NDP-40BA□, NDP-40BS□
NDP-50BA□, NDP-50BS□
NDP-80BA□, NDP-80BS□

- Aluminum type

Type	BAC	BAN
Switching Portion	ADC12	
Material Contact Portion	ADC12, AC4C-T6	
Diaphragm	CR	NBR
Ball/O Ring	CR/NBR	NBR
Valve Seat	CR	NBR
Center Disk	A5056	

- Stainless-steel type

Type	BSC	BSN
Switching Portion	ADC12	
Material Contact Portion	SCS14	
Diaphragm	CR	NBR
Ball/O Ring	CR/NBR	NBR
Valve Seat	CR	NBR
Center Disk	SUS316	

2. Installation

2.1 Method of transport

When lifting the pump using a chain hoist or crane before transporting it, be sure to lift it by the specified lift point (see [1. Names of parts and materials]).

⚠ WARNING

- Be careful that nobody will pass under the pump when you lift it. It would be very dangerous if the pump should fall.

⚠ CAUTION

- See [9.1 Main specifications]. Remember that the pump is heavy, so extreme care must be taken when lifting it.
- When moving the pump with a forklift or truck, make sure that the pump will not fall. If it does, it may be damaged and/or cause bodily injury.
- NEVER try to move the pump by pulling the hose connected to the pump. The hose or the pump may be damaged.

2.2 Installing the pump

1) Decide where the pump should be installed and secure a suitable space (see Fig. 2.1 A to C).
2) Remove the pump from the package and install it in the designated location.
3) When fixing the pump in place, use the cushions on the pump base, and secure the pump by tightening the tied-down bolts a little at a time.

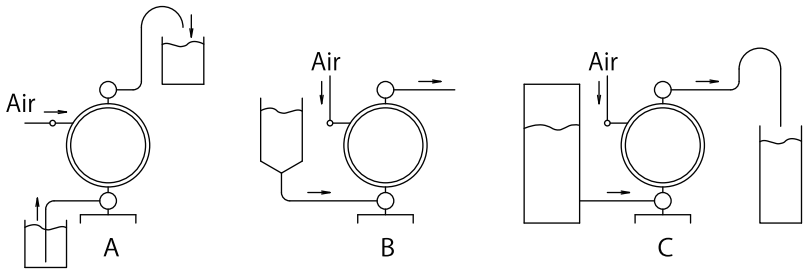


Fig2.1

⚠ WARNING

- If using the pump with a flammable material or in a flammable environment, read the applicable operating caution on P.3.

⚠ CAUTION

- Even if you do not use the cushions to secure the pump in place, mount it in such a way that vibration generated by pump operation will be absorbed.
- When operating the pump, operation noise may be generated, depending upon conditions of use (kind of material being pumped, supply air pressure and discharge pressure).
  If any regulatory rules apply, provide appropriate acoustic measures. (For the noise level of this product, see [9.1 Main specifications].)
- When pumping a hazardous material (hot, flammable, strong acid, etc.), provide protective measures (installation of a pit or sensors, etc.) in consideration of possible leakage of material, and post warning signs at necessary places. For details, see the applicable operating caution on P.2 and P.4.

＜NOTE＞Arranging outside exhaust

- Remove the silencer.
- Connect a hose with a ground wire to the pump's exhaust port, and attach the silencer to the tip of the hose. Use a hose of the same diameter as the exhaust port. (If the hose is longer than 5 meters, consult your dealer or our regional office.)
- Have a pit, a protection box, etc. at the end of the hose.

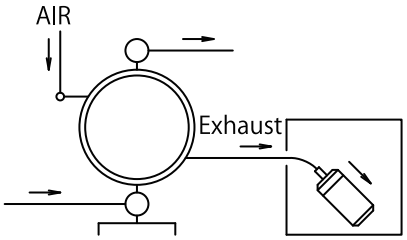


Fig2.2

⚠ WARNING

- Be sure to have a pit, a protection box, etc. at the end of the hose in preparation for the flow of material in case of damage to a diaphragm. For details, see the applicable operating caution on P.2.
- Pump exhaust should be directed to a safe place, away from people, animals and food.

＜NOTE＞

When air line operation is to be controlled by a solenoid valve, a three way type is recommended.
A three-way solenoid valve allows any trapped air to bleed off, in turn improving pump performance.

2.3 Connecting the ground wire

a) When installing the pump, be sure to connect the ground wire at the specified position. For the specified position for connecting the ground wire, see [1. Names of parts and materials].
b) Also connect ground wires to peripheral equipment and piping.
c) Use 2.0mm^2 minimum ground wire.

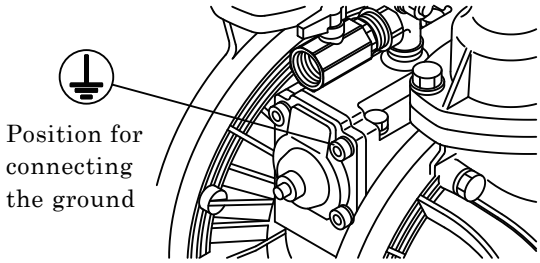


Fig2.3

⚠ WARNING

- Be sure to connect ground wires to the connected piping and any other connected equipment. For details, see the applicable operating caution on P.3.
When the pump is operated without a ground wire or otherwise not properly grounded, friction between parts and abrasion caused by some fluids flowing inside the casing may generate static electricity. Also, depending on the type of fluid being pumped and the installation environment (such as gases in the air or the surrounding fixtures), it may be a cause of fire or electric shock.

3. Connection

3.1 Connecting fluid piping

1) Connect a hose to the valve on the suction-port side and the valve of the discharge-port side of the pump.
2) Connect a hose on the suction-side intake and the discharge-port side to the respective vessels.

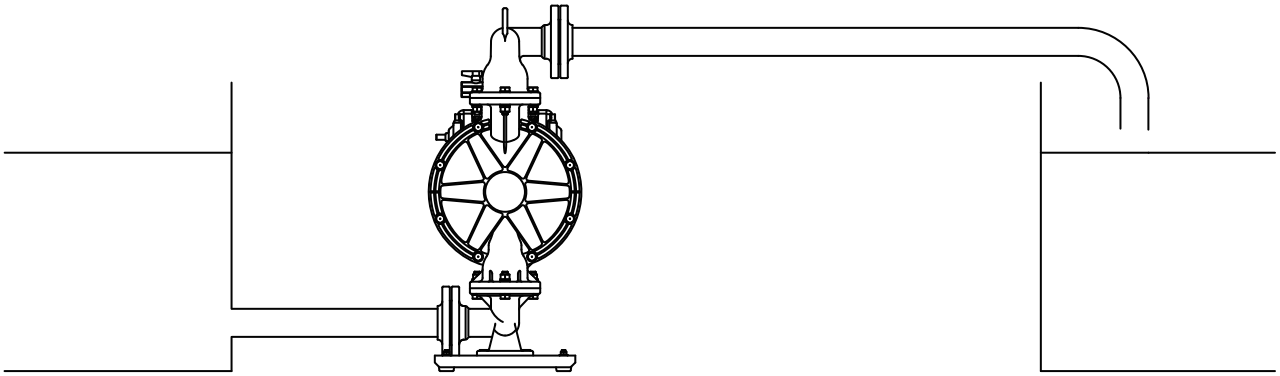


Fig3.1

⚠ CAUTION

- Use a flexible hose to absorb pump vibration, and ground the hose.
- Make sure that there will be no external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.
- Use a sturdy hose that will not collapse under the strong suction of the pump. Also, make sure the hose is of more than sufficient pressure rating.
- Use a hose of a diameter the same as or larger than the pump's ports. If you use a hose of smaller diameter, the pump's performance will be adversely affected, and it may even malfunction.
- Verify that the particle size doesn't exceed the particle size limitation (see [9.1 Main specifications]).
  If it exceeds the limitation, attach a strainer to the pump to prevent larger particle from entering the pump. Failure to do so may cause damage to the pump.
- When testing the piping, either install a valve between the pump's suction inlet and the discharge outlet and piping, or disconnect the pump from the piping and install plugs so that there will be no pressure from outside.
- We have done the operation verification of the pump by air. To prevent dust into the material to be pumped, run the pump dry to clean the inside before finishing installation work.

3.2 Connecting air piping

⚠ WARNING

- Before starting work, make sure that the air compressor is shut off.

1) Connect an air valve, air filter, regulator and if necessary lubricator (hereinafter called the "peripheral equipment") to hose which connected to compressor. Refer 〈NOTE〉 for detail information.
2) Install these peripheral items supported by brackets, etc., near the pump.
3) Connect the hose from the peripheral equipment to the air valve of the pump's supply port.

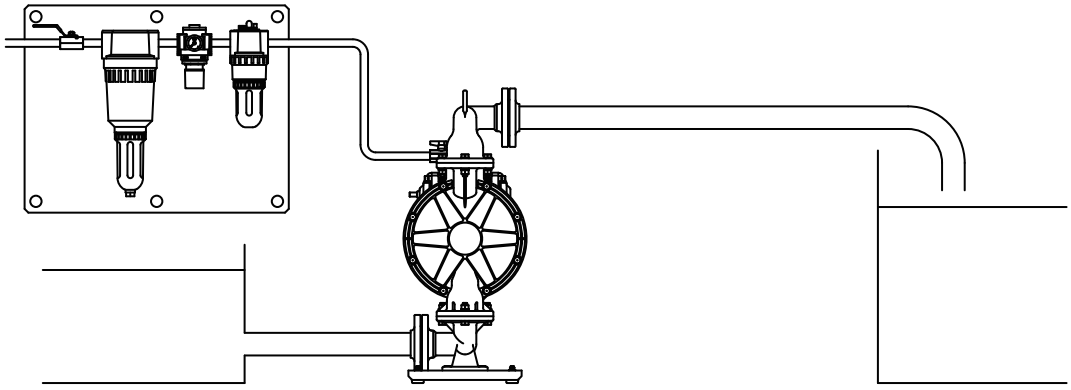


Fig3.2

⚠ CAUTION

- Use a flexible hose to absorb pump vibration, and ground the hose.
- Make sure that there will be no external force on any connection part of the pump. Be especially careful not to have the pump support part of the weight of the hose and the piping.
- The piping and the peripheral equipment may become clogged with sludge. Clean the inside of the piping for 10 to 20 seconds before connecting it to the pump.
- Be sure to sufficiently ground the piping and peripheral equipment.
- For air purging, use clean air such as N_2 because the purge air will come in contact with the powder material being pumped.

＜NOTE＞

- Air piping size should be equal to the inlet port of the pump to supply enough air to run the pump. The air compressor should be able to provide adequate air flow to the pump. Attach the compressor as close as possible to the pump, considering operability and stability of air pressure.
- If you use a solenoid valve as the air valve, be sure it is a three-way valve. When the valve is closed, the internal compressed air of the pump will be released, and this will switch the spool to its normal position.
- Use of a coupler for the connection part of each hose will make operation and maintenance easier.
- If you use the pump intermittently the pump will not require lubrication. However lubrication is recommended if running the pump continuously for long periods or using very dry air or at high temperatures. This will guarantee the life of the pumps seals.
  *Continuous operation: When the pump operates continuously for longer than 1 hour and is stopped for less than 15 minutes.
  *Lubrication: Use only turbine oil Class 1 grade oil (equivalent to ISO VG 32), under the following conditions; Oil concentration at 50mg/m^3, Absolute pressure at 0.1MPa. Maximum temperature of 20°C and Humidity at 65%.

4. Operation

4.1 Method of operation

⚠ CAUTION

- Before starting the pump, make sure that all piping is properly connected.
- Also, before starting the pump, make sure that all the bolts are securely tightened.
- Make sure that the air valve, regulator and the drain valve on the discharge side are closed. Also, make sure that the valve on the suction side is opened.

1) Start the air compressor. Use dry compressed air.
2) Open the air valve in front of each piece of peripheral equipment, and adjust the supply air pressure with a regulator to within the permissible range (0.4-0.7MPa).
3) Turn the closed needle valves (5 pcs) to the right about 30 degrees. Adjust the valves if the air volume is not enough at this time.
4) Press the RESET button, and then slowly open the air valve of the pump.
5) First, verify that material is flowing inside the piping and is being pumped to the discharge side, and then fully open the air valve.

4.2 Shutdown

- Close the air valve of the pump and shut off the supply air.

⚠ CAUTION

- After the pump shuts down, powder material will precipitate and get stuck in the out chambers. Restarting the pump in such condition may result in damage to the diaphragms or overload of the center disks, causing the center rod to bend.
  Be sure to run the pump dry to remove the residual material from the inlet/outlet hoses, out chambers, and piping at the end of work.

5. Method of cleaning

⚠ WARNING

- Before starting operation, make sure that compressed air is not supplied to the pump.
- Before starting operation, make sure that the pump is not pressurized.

1) Remove the hose from the suction side of the pump.
2) Close the flow valve on the discharge side, open the drain valve, and then operate a pump by starting air pressure for a while to discharge any material remaining inside the pump as much as possible.
3) Remove the hose from the discharge side, and attach different hoses to the suction side and the discharge side for cleaning.
4) Remove the hose from the suction side of the pump, run the pump for a while and purge the pump of remaining material as much as possible.

⚠ CAUTION

- Be careful when removing piping. Material will gush out.
- After cleaning by running the pump dry, hang the pump upside down to remove the residual material.
- Using water or any other liquid to clean the pump may cause powder to absorb water and stick to the inside of the pump, resulting in operation failure.

6. Daily check

- Before starting pump operation, be sure to conduct the following check every day. If any irregularity is found, do NOT start running the pump until the cause of the irregularity has been found and corrective measures have been taken.
  a) Verify the drain flow through the air filter.
  b) Make sure that there are no cracks in the pump casing or piping.
  c) Check the tightness of every bolt of the pump.
  d) Make sure that the connection parts of the piping and peripheral equipment are not loose.
  e) Make sure that the time has not elapsed for replacing any parts of the pump that are to be replaced at regular intervals.

7. Troubleshooting

7.1 Pump does not run

Cause	Action to be taken
The exhaust port (silencer) of pump is clogged with sludge.	Check and clean the exhaust port and silencer.
Air is not supplied.	Start the compressor, and open the air valve and air regulator.
The supply air pressure is low.	Check the compressor and the configuration of air piping.
Air leaks from connection parts.	Check the connection parts and tightness of bolts.
Air piping or peripheral equipment is clogged with sludge.	Check and clean the air piping.
The flow valve on the discharge side is not open.	Open the flow valve on the discharge side.
The spool stopped in neutral position.	Press the RESET button.
The material piping is clogged with sludge.	Check and clean the material piping.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

7.2 Pump runs, but fluid does not come out

Cause	Action to be taken
The suction lift or discharge head is long.	Confirm the piping configuration and shorten the length.
The discharge-side material piping (including the strainer) is clogged with sludge.	Check and clean the material piping.
The valve on the suction side is not open.	Open the valve on the suction side.
The pump is clogged with sludge.	Disassemble the casing, check and clean.
The ball and valve seat are worn out or damaged.	Disassemble the manifold, check and replace parts.

7.3 Flow (discharge volume) decreased

Cause	Action to be taken
The supply air pressure is low.	Check the compressor and configuration of air piping.
Air piping or peripheral equipment is clogged with sludge.	Check and clean the air piping.
The discharge-side flow valve opens differently.	Adjust the discharge-side flow valve.
Air is taken in together with material.	Replenish material and check the configuration of the suction-side piping.
Chattering occurs.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting material pressure and volume.
Icing on air-switching portion.	Eliminate ice from air-switching valve and check and clean the air filter. Use external exhaust hose to control exhaust air speed. (Refer Fig.2.2)
The material piping (including the strainer) is clogged with sludge.	Check and clean the material piping and strainer.
The exhaust port (silencer) of the pump is clogged with sludge.	Check and clean the exhaust port and silencer.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

7.4 Material leakage from exhaust port (silencer)

Cause	Action to be taken
The diaphragm is damaged.	Disassemble and check the pump and replace the diaphragm.
The fastening nuts for the center disk are loose.	Disassemble and check the pump, and tighten the nuts.

7.5 High air consumption during operation

Cause	Action to be taken
The seal ring and sleeve are worn out.	Disassemble the air-switch portion, check and clean. Replace parts as necessary.

7.6 Irregular noise

Cause	Action to be taken
The supply air pressure too high.	Adjust the supply air pressure.
The spool oscillates, and occur ball chattering.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting material pressure and volume.
The pump is clogged with sludge with particles of larger than the permissible diameter.	Disassemble the casing, check and clean.

7.7 Irregular vibration

Cause	Action to be taken
The supply air pressure is too high.	Adjust the supply air pressure.
The spool oscillates, and occur ball chattering.	Adjust the supply air pressure and exhaust pressure.
Connection parts and pump mounting are loose.	Check each connection part and tighten the bolts.

- If any of the above mentioned causes does not apply to your problem, contact your dealer or our regional office.

8. Returning the product for servicing

8.1 How to use the FAX Sheet

- Copy the FAX Sheet on [10. Trouble-Reporting FAX Sheet], fill out the necessary details regarding your problem and conditions of operation, and fax it to your dealer or our regional office.

8.2 Before returning the product

1) Purge the pump of material and clean (see [5. Method of cleaning]).
2) Return the product in the same package as when it was first shipped from the factory.

⚠ WARNING

- It will be the end-user responsibility to thoroughly wash a clean the pumps to prevent accidents caused by material leaks.

⚠ CAUTION

- Be sure to prevent material leak from pump for safe transport.

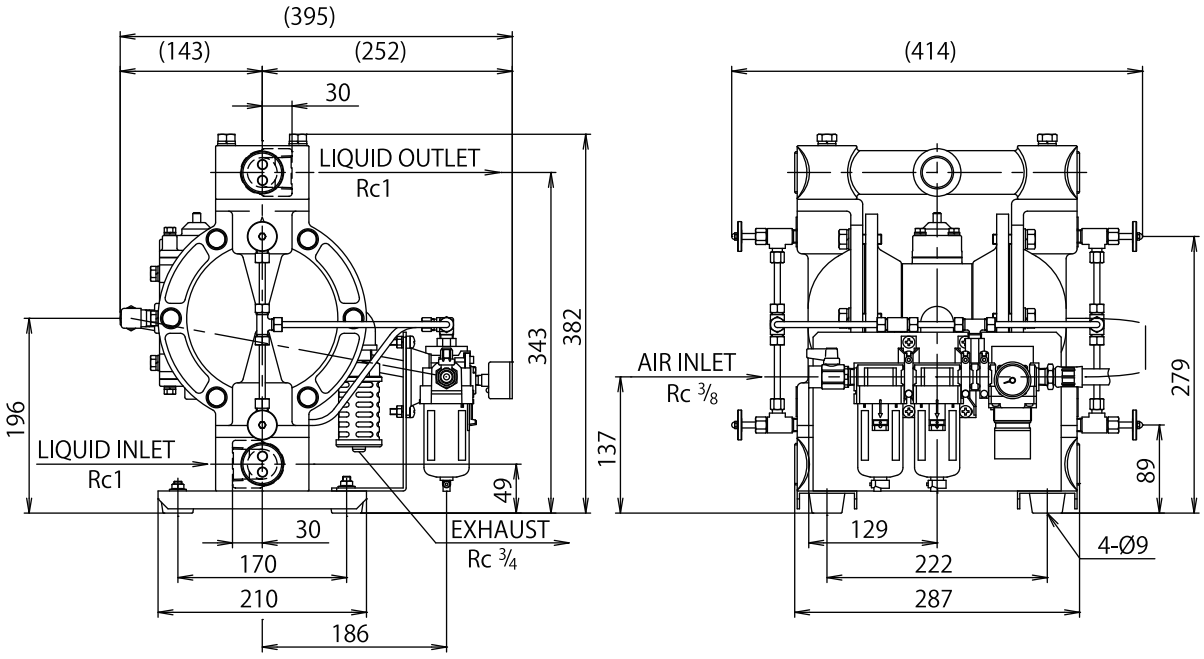
9. Main body specification

9.1 Main specifications

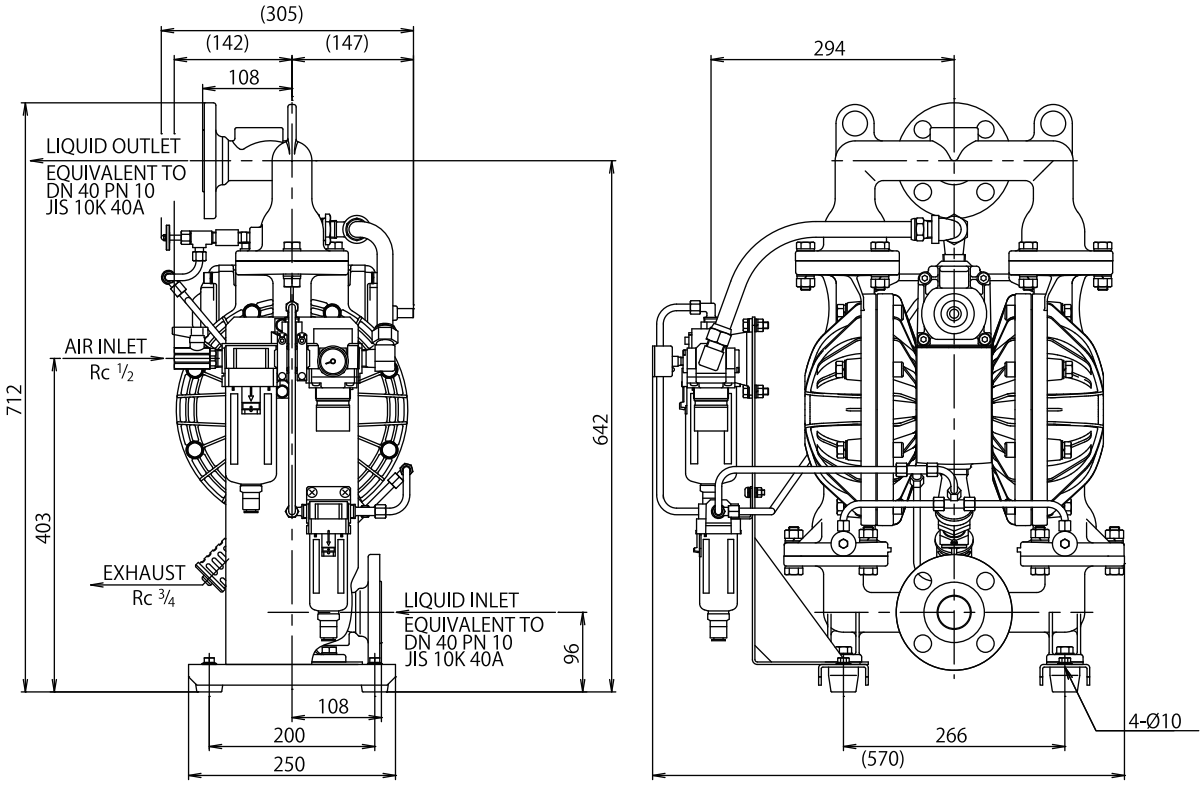
Type		NDP-25		NDP-40		NDP-50		NDP-80	
		BA□	BS□	BA□	BS□	BA□	BS□	BA□	BS□
Nominal Diameter		1″ (25m)		1・1/2″ (40 mm)		2″ (50 mm)		3″ (80mm)	
Material Connection	Suction Port	Rc 1		Equivalent to JIS flange 10K40A		Equivalent to JIS flange 10K50A		Equivalent to JIS flange 10K80A	
	Discharge port								
Air Connection	Supply Port	Rc 3/8		Rc 1/2		Rc 3/4			
	Exhaust Port	Rc 3/4		Rc 3/4		Rc 1			
Operating Air Pressure		0.2～0.7 MPa							
Maximum Discharge Volume		approx. 200 kg/h		approx. 500 kg/h		approx. 1000 kg/h		approx. 1500 kg/h	
Maximum Air Consumption		1600 L/min(ANR)		4000 L/min(ANR)		6000 L/min(ANR)		6000 L/min(ANR)	
Operating Ambient Temperature Range		0～70 °C							
Operating Noise		97 dB		95 dB		94 dB		92 dB	
Weight		13 kg	20 kg	29 kg	40 kg	37 kg	60 kg	65 kg	102 kg

9.2 Appearance and dimensions

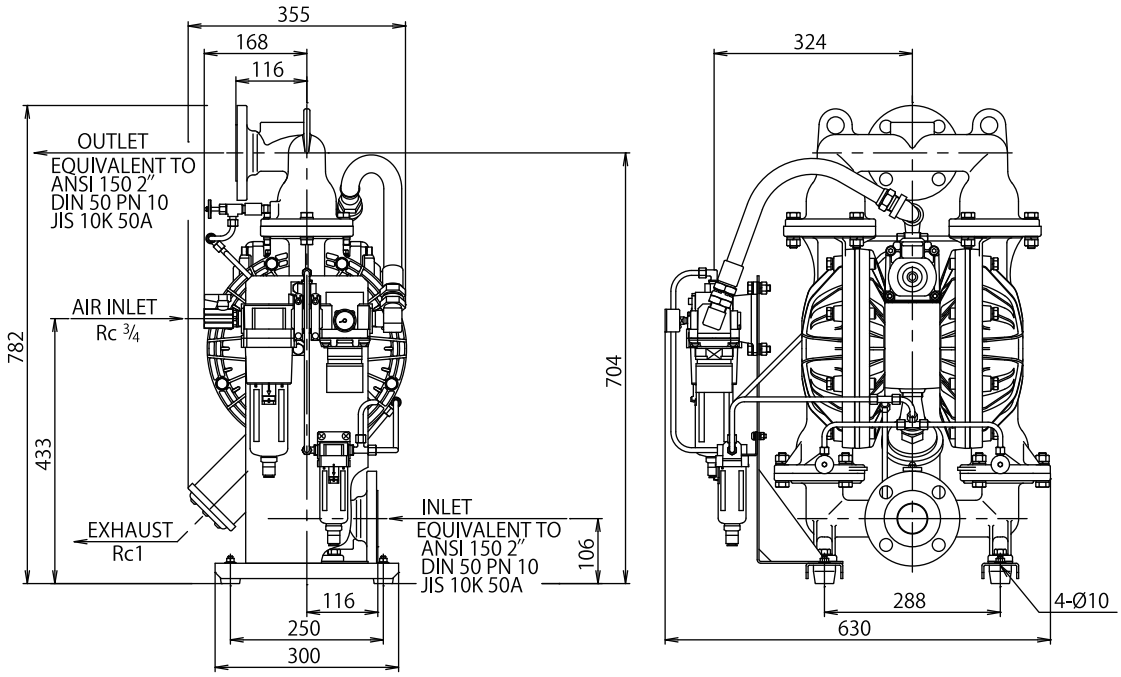
9.2.1 NDP-25 series



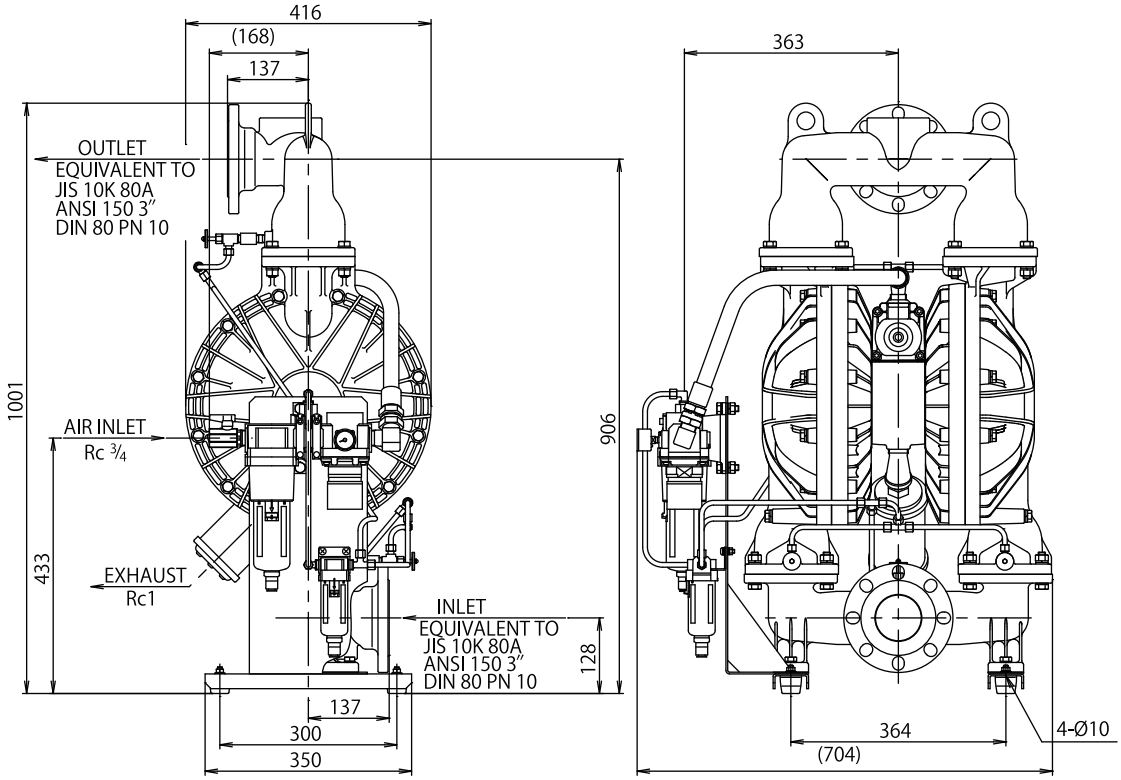
9.2.2 NDP-40 series



9.2.3 NDP-50 series



9.2.4 NDP-80 series

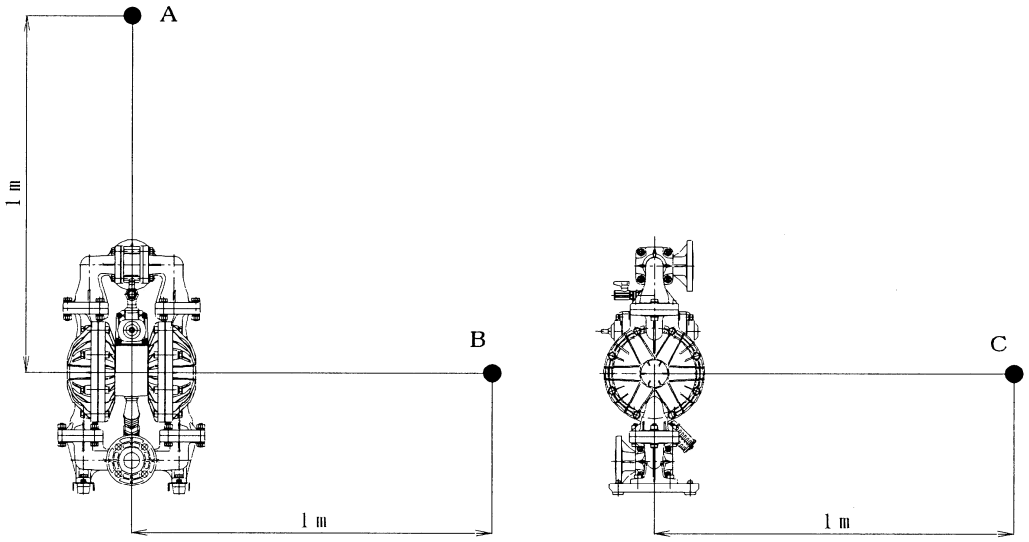


⚠ CAUTION

- Concerning section size and the like, it differs depending upon pump body specification. Please contact your distributor our regional office for detailed information.

＜NOTE＞Method of measurement of operating noise

- With a specified noise meter, the operating noise is measured at measurement points A, B and C, and the maximum value is to be used.
- The display noise level is the maximum value at flow rate measurement condition.
- The noise level depends on the condition.



10. Trouble-Reporting FAX Sheet

Your information will be most helpful in our efforts to improve our service as well as checking into causes of troubles and irregularities. Therefore, please, fill out the following FAX sheet and fax it to your distributor or our regional office. Thank you.

Trouble-Reporting FAX Sheet

Name of your firm _____	Name of person in charge _____
Address _____ _____	Department _____ Telephone ( ) _____ – _____ Fax ( ) _____ – _____
MODEL/No. (Product name/Product No.)	Date of product
Period of use From to _____/____ _____/____	SERIAL No. (Lot No.)
Operating conditions ☐Indoor ☐Outdoor Frequency of operation ☐Continuous ☐Intermittent _____ Hours / day / week / month	Date of purchase _____ Name of dealer _____
Operating air pressure _____ MPa Discharge volume _____ kg/h. Stroke Suction side _____ m Discharge side _____ m	Type of material pumped _____ Specific gravity _____ Particulate diameter _____ mm
Condition of pump (nature of problem)	
Draw a summary drawing of application (size, length of piping, and component parts)	

11. Limited warranty

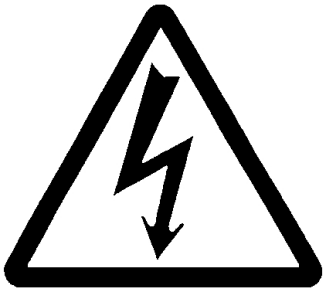
This product is shipped to customers only after meeting strict inspection standards. If an abnormality occurs during normal operation in accordance with the operating instructions and other operating Cautions within the warranty period (12 months after date of purchase) that can be attributed to a Manufacturing defect, the defective parts of this product will be serviced or the product will be replaced Free of charge. However, this warranty will not cover compensation for incidental damage or any Malfunction listed below.

1. Warranty period
   This warranty will be valid for a period of 12 months after the date of purchase.
2. Warranty
   If, during the warranty period, any of the material of the genuine parts of this product or the workmanship of this product is found defective, and is so verified by our company, the servicing cost will be fully born by our company.
3. Exclusion
   Even during the warranty period, this warranty does not cover the following:
   (1) Malfunction arising from use of parts other than manufacturer-specified genuine parts
   (2) Malfunction arising from misuse or operating errors, or lack of storage or maintenance care
   (3) Malfunction arising from use with a fluid that may cause corrosion, inflation or dissolution of the component parts of the product
   (4) Irregularity arising from repair made by other than by our firm, our regional office, dealer or authorized service personnel
   (5) Malfunction arising from modification of the product by other than authorized service personnel
   (6) Wear and tear of parts that must be regularly replaced in the course of normal operation, such as diaphragms, valve seats, balls, air switch sleeve valves and O-rings
   (7) Malfunction and/or damage due to transportation, moving or drop page of the product after purchase
   (8) Malfunction and/or damage due to fire, earthquake, flood or other force majeure
   (9) Malfunction arising from use of compressed air that contains impurities or excessive moisture or use of gases or fluids other than the specified compressed air
   (10) Malfunction arising from use with a fluid that causes excessive abrasion or use of lubricating oil other than that specified for this product.
   Furthermore, this warranty does not cover the rubber parts, or other parts that are subject to wear in normal operation, used in this product and its accessories.
4. Parts
   Parts for this product will be kept available for 5 years after discontinuation of production. Once 5 years have elapsed after close of production, availability of parts for this product cannot be guaranteed.

12. Warning symbols

BEWARE: HIGH TEMPERATURE

ELECTRIC SHOCK



POISON

FLAMMABLE

CORROSION

EXPLOSION

General warnings, cautions and danger notifications

FIRE STRICTLY PROHIBITED

Manufactured by
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