CE Original Instruction

Coolant Floating Oil Portable Collecting System

“COOLANT SAVER PORTABLE”

YD-150FS-16CSP

Instruction manual
Version: 230425

World Chemical Co.,Ltd.

“COOLANT SAVER PORTABLE”
YD-150FS-16CS Instruction manual

Table of contents

Caution	The instruction manual is intended for the standard specification system. For the special system, replace the corresponding items or phrases in the text accordingly.

⚠ Safety precautions

The document classifies safety precautions into “Danger” and “Caution” as follows.

Use

Danger	Wrong handling may result in a dangerous state which causes a death or severe injury.
Caution	Wrong handling may result in a dangerous state which may cause a medium or light injury or property damage.

Any item described as caution may result in a serious result depending on the situation. Both of the above describe important information that must be observed.

I. Transportation and installation precautions

(1) When carrying the system, be careful that liquid does not spill out of the separator. It becomes slippery due to accumulated oil after using, be careful of a fall or slips.

(2) Wrong handling the system or accessories may cause a serious accident.
(Ex. Excessive operating air, use of inappropriate liquid or chemical, etc.)

(3) When unpacking wooden crates, be careful not to get injured by nails or chips of wood.

(4) Install the mount horizontally at the firm ground to become stable and not to move unexpectedly during operation.

(5) Use compressed air supplied from an air compressor to operate the pump. Do not use anything else. (Refer to the pump instruction manual.)

II. Prepare and operation precautions

(1) When collecting high temperature liquid, the flow path of the skimmer, pump, separator and hose rises close to the liquid temperature. Handle the system with great care not to burn. Meanwhile, the max. temperature of the liquid is 50 degrees.

(2) Stop the operation in emergency such as earthquake or fire.

(3) If abnormality occurs, stop the operation soon and take appropriate measures.

(4) Do not use the system at the place where flammable gas enters, because fire or explosion may occur.

(5) Do not put your hands and fingers closer. It may cause contact with rotating parts (shaft or transmission) during operation and injury.

III. Maintenance precautions

(1) When repairing the system, contact your supplier or us. At that time, clean it thoroughly and check no adherent liquid. Then return it with plastic bag in a carton box or a wooden crate.

IV. Other precautions

(1) Do not use the system with the specification other than the prescribed. Use with the non-prescribed specification is not covered our warranty.

(2) The modification by customer is not covered our warranty.

(3) When disposal of the system, remove adherent oil and discard it as the industrial waste.

(4) When collecting chemical material other than oil (mineral oil, animal oil, etc.) by the system, contact your supplier or us.
It is impossible to use the system for collecting solvent, organic acid, strong acid or strong alkali regardless of oil deposit or water deposit unless the special specification. Additionally, never use it for flammable liquid.
(Do not use it for the purpose other than collecting floating oil.)

1. Introduction

Thank you for purchasing our floating oil collecting system with scraper “COOLANT SAVER PORTABLE”. It is a floating oil collecting system with an oil collecting skimmer such as our float suction. It is possible to install to a water collecting tank or drainage tank in flow of oily waste water or dirty water discharged from factories or plants to collect floating oil.

Make sure to read and understand this manual to fully utilize the performance of the system. Furthermore, store this manual where it can be easily accessed.

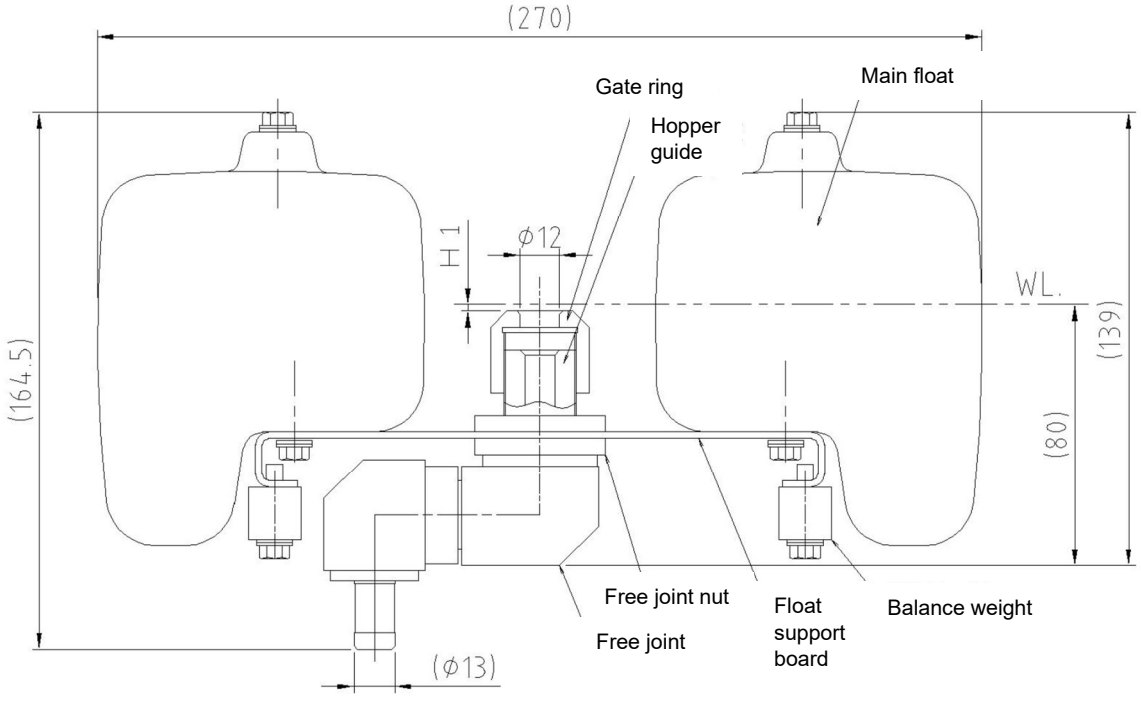
2. Structure

The system is mainly configured with a collecting skimmer, strainer unit, collecting pump and separator. The weight is depending on the specification, but the standard one is about 30 kg in the dry state.

(1) Collecting skimmer

It is used to float in a tank to collect floating oil and configured with parts as the below picture.

It is possible to adjust the flow rate by rotating the gate ring. The clockwise rotation makes the flow drop (H1 in the picture “Collecting skimmer”) increase, and the anti-rotation makes it decrease.



Collecting skimmer

Collecting skimmer handling procedure

① Attach a suction hose with a hose joint (The tip of the free joint: Φ13) under the main body and float the skimmer in a tank of floating oil.

② The free joint attached with the hose can move from side to side
Set the hose and skimmer at the position which has no effect on the tilt of the float by the connecting hose.

③ Check that the gate ring is submerged.

④ Adjust the flow drop of the gate ring (H1 in the picture “Collecting skimmer”) to be the state that oily water flows in. (Approx. 3 mm at the shipment.)
If the water in the tank is not clear water, oily layer is thick, the viscosity of the floating oil is high or the specific gravity is small, the float buoyancy or the flow speed of oily water may change, cause to change the flow drop. In this case, adjust it as one thinks fit.

⑤ When adjusting the flow drop, rotate the gate ring with pushing the main float by hand. If the specific gravity is small, the clockwise rotation makes the flow drop increase, and the anti-rotation makes it decrease.

⑥ Adjust the flow drop in a balance with the floating oil nature (specific gravity, viscosity, etc.), thickness and the pump’s flow amount.

⑦ If the flow drop becomes much deeper than the thickness of the oily layer, low-level water more than surficial oil flows in and moreover, if the suction ability of the pump is exceeded, the gate ring is submerged and floating oil overflows at the inlet. It makes the skimmer impossible to collect smoothly. On the other hand, if the oily layer is thin and the flow drop is set much shallow to collect only surficial oil, oil adheres on the gate ring, cause the flow rate decrease dramatically for the viscosity.

⑧ The best flow drop is the state that collected oily water from the gate ring goes down the inside wall of the hopper with a thin layer.
The best flow drop of the normal mineral oil is approx. from 3 to 5 mm.

⑨ For the smooth operation, get the skimmer out of the tank, clean and maintain like tightening the nuts again at the dirty situation demands.

⑩ As the surface of the float gets dirty, foreign objects such as sludge is easy to adhere. The following of the float gets worse against wave in conjunction with the growth of the adherent objects.

⑪ Pay attention to the dirty on the gate ring and free joint.
The free joint can move in conformity with the action of the hose and float. If they get dirty or draw in foreign objects, the free joint cannot move smoothly, too.

Refer to the following list about the relation between the flow drop to the gate ring (H1) and the flow rate. However, the list shows the flow rate of fresh water base on theoretical calculations and does not guarantee an actual collecting amount. Collecting amount depends on the floating oil nature, quality, floating objects and ambient environment.

Flow drop H1 (mm)	Flow rate to the gate ring (L/min)
3	1
4	3
5	5

(2) Separator

The capacity is approx. 16L.

Oily water, which is transferred from the collecting skimmer through the strainer unit by the collecting pump, flows into the separator and goes to near the surface of the separator through the top of the center pipe.

Oily water flowed into the separator is separated from oil during making one revolution along the wall in a tank, and discharged from the oil drain port.

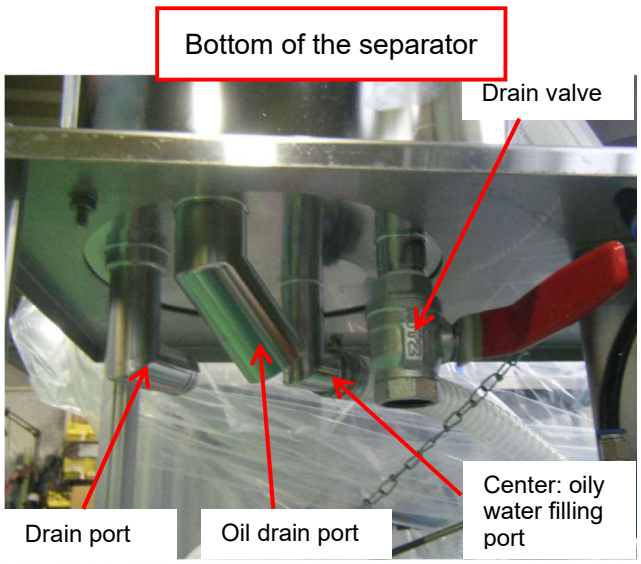
On the other hand, drainage water overflows from the drain cap of the separator and is discharged from the drain port at the bottom of the tank. Usually, the flexible hose is used for the drain hose and set that drainage water is back to the oil collecting pit.

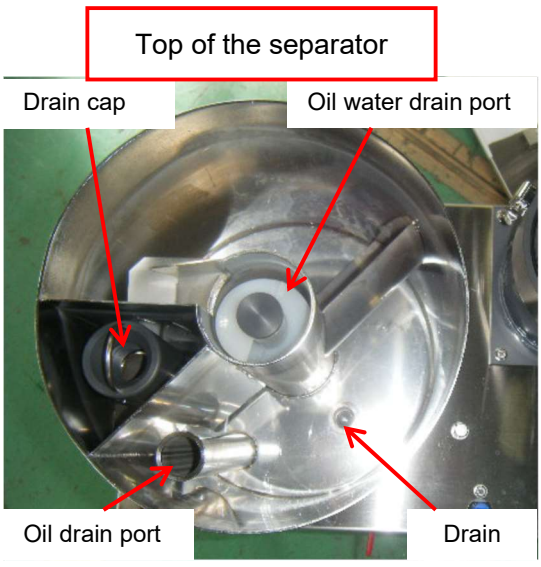
The water level in the tank is designed as the same as the upper level of the drain cap and it is possible to adjust the water level in the separator by up and down of the drain cap.

The clockwise of the drain cap is up and anti-clockwise makes it down.

In case of the normal low viscosity mineral oil, the difference between the upper height of the oil drain port and the water level (the oil drain port drop) is approx. from 3 to 5 mm.

The separator is attached the ball valve (20A) for the drain.





(3) Collecting pump

Air drive diaphragm pump is used for oily water collection.

Adjust the supplied air by a regulator. Meanwhile, the air pressure basically is adjusted 0.1MPa.

The start and stop of the pump is operated by the on/off valve.

The collecting amount is adjusted by the flow drop of the gate ring (H1 in the picture “Collecting skimmer”) and the pump is adjusted for the viscosity and lifting height by the flow rate adjusting valve. The adjustment of the pump depends on the flow rate of the collecting skimmer and separating condition. According to the circumstances of the collected oily water, adjust that the collected amount is from 1 to 3 L/min.

It is possible to increase the collecting amount by adjusting the flow drop, air pressure and air amount, but there is high possibility to mix inseparable oil in the drainage water by increasing the collecting amount.

Follow the included pump instruction manual about the pump handling such as supplied air, specification, operation precaution and whatever.

(4) Strainer unit

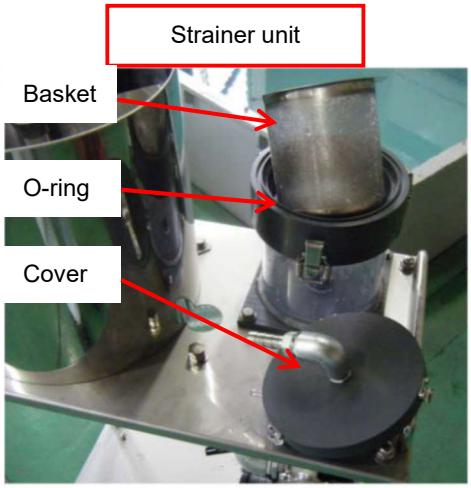
The strainer unit is installed between the collecting skimmer and the collecting pump (diaphragm pump). It reduces problems, which are the pump damage by foreign objects enters in the pump and deposition in the separator, by collecting and separating sludge with collected oil in a basket inside of the unit.

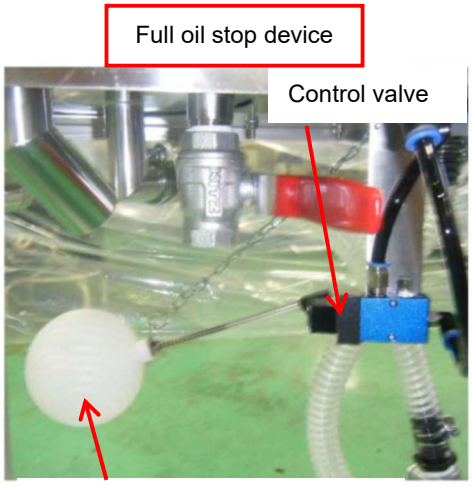
The unit is made of PVC and the inside basket is made of Stainless. The reticulation of the basket is approx. 1 mm and the max. capacity is 1200 cc.

(5) Full oil stop device for waste oil collecting tank (Option)

It is possible to install the “full oil stop device” which stops the collecting pump automatically to prevent overflow by using a control valve or floating ball when collected oil reach to a certain amount and level.

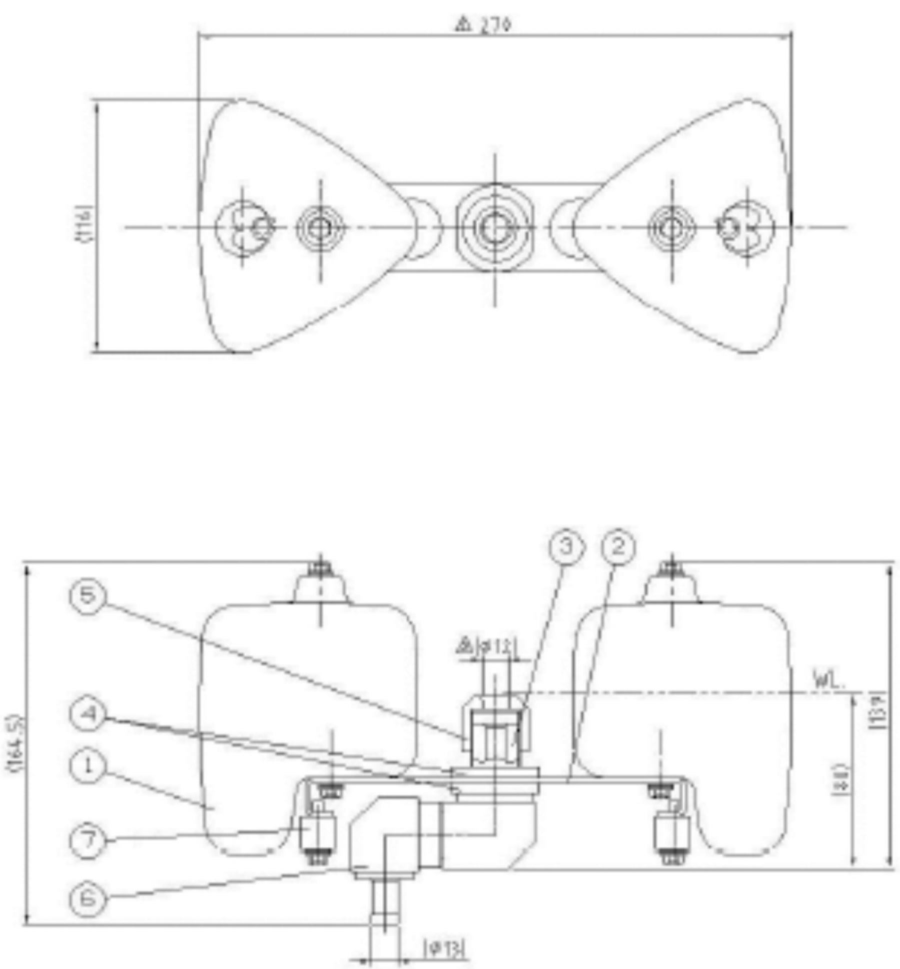
Clockwise is CLOSE.
Anti-clockwise is OPEN.





Up of the ball is operation.
Down of the ball is stop.

REV.	DATE	DESCRIPTION	APPROVED BY	CHECKED BY	BY
△1	[illegible]	Change of total length	[illegible]	[illegible]	[illegible]
△2	[illegible]	Gate bore :Φ24→12, Parts' material / shape is changed	[illegible]	[illegible]	[illegible]

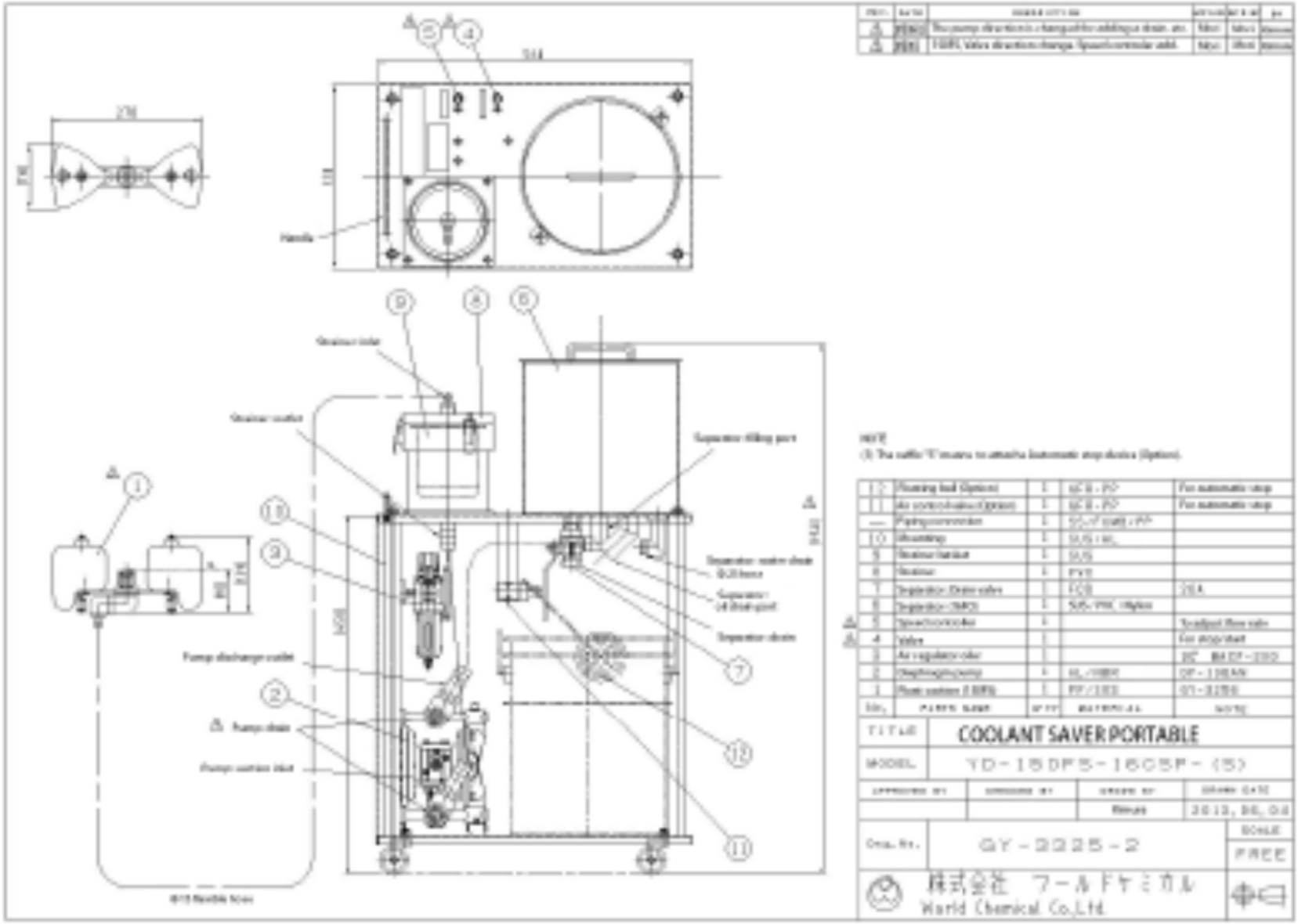


No.	PARTS NAME	Q'TY	MATERIAL	NOTE
7	Balance weight	2	SUS304	
6	Free joint	1	PP	Hose bore: Φ13
△ 5	Gate ring	1	PP	
4	Free joint nut	△2	SUS304	
△ 3	Hopper guide	1	PP	
2	Float support board	1	SUS304	
1	Main float	2	PP	

TITLE	Float suction		
MODEL	YD-150FS		
APPROVED BY	CHECKED BY	DRAWN BY	DRAWN DATE
Horigoe	Kimura	Horigoe	'12. 01. 27
Dwg. No.	GY-3256-2	SCALE	FREE

株式会社 ワールドケミカル
World Chemical Co.,Ltd.

YD-150FS Float suction outline dimension



YD-150FS-16CSP COOLANT SAVER PORTABLE Outline dimenstion

World Chemical Co.,Ltd.

3. Installation procedure

(1) When transportation, be careful of the overflow from the separator by vibration.
It is possible to prevent it by carrying after the water level lower in the separator by drawing water.

(2) The system separates collected oil from water in the separator and discharges the water by using natural drop. Mare sure to install the drain port higher than the water level in the pit.

(3) Place the mount at the hard and flat place.
If the installation is inclined, oil drain or water drain function may not work properly.

(4) Fix the mount with caster stoppers or wheel clamps.
If installing it without fix, be careful that the position may become unstable by operation vibration. Also, it may cause unexpected accidents by falling down. Ensure the safe place and operate the pump.

(5) Attach the suction hose from the collecting skimmer with the suction inlet of the strainer unit and fix it with the suction band firmly.
Attaching failure may cause suction failure that air enters from the connection.
Do not twist or crash the hose.

(6) Connect the drain hose at the drain port of the separator and fix it with the hose band firmly. When returning the separated water to the oil collecting pit, install the tip of the hose at the height near the water level and as far from the collecting skimmer as possible.
If the drain hose is installed near the collecting skimmer, it may stir the floating oil by force of the drain water and decrease the oil collecting ability. On the other hand, if drain is higher than the water level, it may cause to further emulsification of floating oil.
However, when the tip of the drain hose is submerged, drain becomes less efficient. Do not submerge it.
When transfer the separated water to the other tank, install the drain port of the tank lower than the drain port of the separator.
At any rate, incline the drain hose downwardly for smooth discharge.

(7) Put the appropriate waste oil collecting tank under the separator.
20L pale can is available for the space. (The pale can is an option.)

(8) Oil for the air three-piece set.
- Lubrication: Turbine oil compatible for ISO VG32

4. Operating precaution

(1) Check that the ON/OFF valve is “close”.

Connect the supplied air to the air regulator of the mount. If the ON/OFF valve is not closed, be careful that the pump starts unattended at the same time as the connection.

Turn the air valve of the regulator anti-clockwise and check to make sure that it is completely closed (Side of “small” for pressure).

Supply air and turn the air valve clockwise to apply pressure.

When the air adjusted value of the regulator is high, the pump works excessively. It may cause the breakdown or accidents.

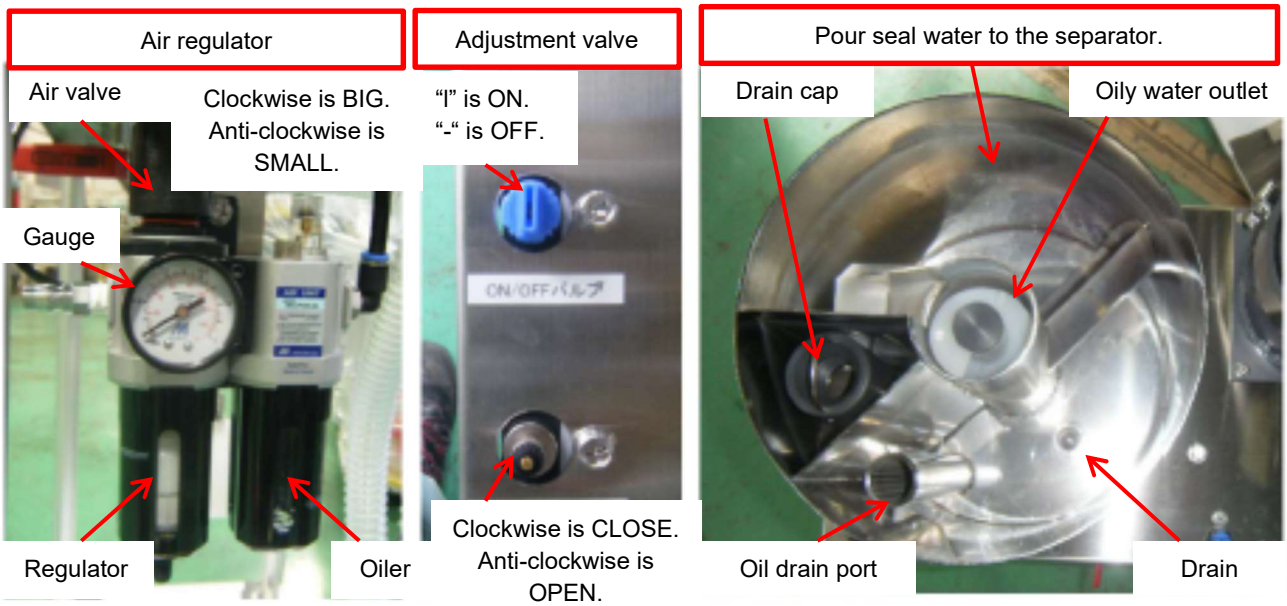
Basically, adjust the air pressure is 0.1MPa.

(2) Check the drain valve of the separator closed.

(3) Check that the flexible hose is connected firmly and the connection is correct, again. (Check the hose.)

(4) Pour seal water (Tap water) to the tank through the cover of the separator until overflow from the drain cap. At this time, if the upper of the drain cap is higher than the upper slope of the oil drain port, the water flows from the oil drain port before the overflow from the drain cap.

* It is possible to use the collected water, but if large amount of oil is floating, enough seal water for the separation cannot be secured and it may not be separated correctly. Oil may return to the raw water tank. When starting at the state of the separator empty, make sure to pour the seal water.



5. Operation / Adjustment

When adjustment, observe the following precautions.

[A] When collecting high temperature oily water, the temperature of the collecting skimmer, pump, separator and hose rises near the water temperature. Leave them until they get enough colder after stopping the operation.
When adjustment during operation, be careful not to burn.

[B] When collecting hazardous liquid, obligate to take safety measures for workers such as rubber gloves and protect glasses.

The system is tested and run a check in our factory, but if the oil drain way is re-set by customer's request, adjust it depending on the condition of the collected oil with the following procedure.

What is needed to adjust is only the height of the drain cap.

Firstly, stay the system to operate and collect oil normally. Then, adjust the drain cap during checking the condition of the waste oil.
When the collected oil is low viscosity and trying to be less of mixed water, rotate the drain cap clockwise to adjust down below and lower the water level in the separator.

When sludge is mixed with the collected oil and the collected oil with a small amount of water is no problem, rotate the drain cap anti-clockwise to adjust upward and raise the water level in the separator.

When sludge is mixed with the collected oil, but trying to be less of mixed water, rotate the drain cap clockwise to adjust down below and lower the water level in the separator.

The capacity of the separator is 8 L/min or less. Adjust it in conformity with the processing ability of the collecting skimmer and pump. (It is recommended 3 L/min or less.)

The capacity of the collecting pump depends on the collected oil's S.G., floating oil's condition, the pump's stroke count (air supplied amount, pressure, etc.) and total head. Figure out the pump capacity when trial operation or preparation and adjust it to correspond with the processing ability of the separator.
When operating the pump at the state that the amount of collected oily water is more than the processing ability of the separator, separation failure or pour drainage may occur.

● Operation procedure

Check that the preparation of adjustment/installation of the collecting skimmer, the connecting of the drain hose and oil drain collecting tank.

1. Pour the use liquid or tap water, if no problem, into the separator.
   * Seal water is necessary for the separator in advance to separate oily water by the difference in specific gravity.
2. Open the cover of the strainer unit to pour priming water for self-priming.
   * Even if no priming water, self-priming is sometimes possible, but for smooth self-priming, pour the priming water at the first operation.
3. Move the drain cap for the water level adjustment up and down, and adjust that the water level in the separator is 3 to 5 mm lower than the tip of the oil drain port.
4. Adjust the supplied air.
   Basically, the air pressure is 0.1MPa.
   Switch the ON/OFF valve to ON.
   Adjust the pump performance correctly by using the adjustment valve.
   (Only as a guide, open the valve that the aperture is 1 or 2 rotation from the pump suspension.)
   The recommended collecting amount (the pump capacity) is 3 L/min or less.
   As a rule, adjust the collecting amount on the state of the raw water or floating oil.
   * If the collecting amount increases, it leads to the separation ability decreases. When the separation ability is not enough, adjust the gate ring of the skimmer and the pump capacity to reduce the collecting amount.
5. The collected oil from the separator is discharged from the oil drain port and saved in a collecting container (pale can, etc.) under the mount.
   The water level in the separator rises gradually with increasing the amount of the collected oil because the specific gravity is heavy and is discharged. If it is difficult to discharge, adjust the top of the drain cap. The collected oil can be discharged by reducing the water level in the separator.
6. When stop operation, close ON/OFF valve.

● Automatic stop operation device

When unattended operation, it is the device to stop the operation that supplied air is stopped by the air control valve with a float when the collected oil is saved until the certain water level in the collecting container (pale can, etc.) at the bottom of the system.

1. Set the float at the pale can.
2. When it is full of the collected oil, float operates and supplier air is stopped by the connected air control valve.
3. Close the ON/OFF valve not to start the operating pump.
   If the float moves unexpectedly for opening the ON/OFF valve, the pump starts. Make sure to close the air stop valve.

4. Fix the float at the state of upward by using a hook chain at the tip of the float.
5. Withdraw the pale can, collect the collected oil.
6. Re-convey the pale can, unchain the hook and place it back together.
7. Open the ON/OFF valve and proceed with the operation.

6. Maintenance

If sludge or foreign objects are mixed with the collecting oily water, it creates problems in the performance. Make checks periodically or as necessary.
When maintenance, observe the following cautions.

[A] Stop the supplied air to the system.
[B] When transferring high temperature oily water, the temperature of the collecting skimmer, pump, separator and hose rises, so stop the operating and leave them until the enough low temperature.
[C] When transferring hazardous liquid (Danger or poisoned), take obligate to take safety measures such as wearing rubber gloves and protect glasses.
[D] Follow the instruction manual when disassemble and maintenance of the pump.

(1) Collecting pump

1) Remove the suction hose with the collecting skimmer from the filling port.

2) Check the abnormal noise, liquid leakage or performance reduction from the pump during operation.
If any abnormalities occur, refer the next article “Troubleshooting” or take appropriate measures with consulting us.
As necessary, have an overhaul, check and replace parts of the pump.

3) The life of the consumable parts is different from each use condition. It is not covered our warranty.

4) Even if the pump works properly, take an overhaul once a year.
Regarding the consumable parts, check abrasion, corrosion, scratch or deformation during overhaul and replace the necessary parts.

(2) Separator

1) When withdrawing liquid in the separator, put a pale can for receiving the drain under the separator and open the drain valve.

2) Check the inside of the separator. When sludge, dirty or scum is adhered inside of the separator, wash it with tap water.

3) Check that corrosion or accretion does not occur after washing inside. If it occurs, remove it.

4) Connect each hose with the separator. Wash hoses, if getting dirty when disassemble.

5) Pour seal water gradually after closing the drain valve and check no water leakage from the drain or hose connection.

6) The check cycle of the separator depends on the change of the floating oil or inlet amount of sludge and dirty, but even if it works properly, withdraw liquid and check inside once a month. When deposit such as sludge or dirty enters, it has negative impact such as drain failure or oil drain failure. Depending on flow rate, withdraw liquid and wash inside.

(3) Strainer

1) The strainer is mad of clear PVC. As needed, check inside and clean it when sludge is pile up.

2) It is easy to remove the cover of the strainer by taking off the snap locks at three points.

3) Clean the inside basket and container after removing the cover.

4) The container has O-ring and do not catch it for assemble.
If the sealing between the container and cover for catching O-ring, it cannot be the self-priming.

7. Troubleshooting

	Cause of trouble	Cause	Measures
Suction failure	Suction failure.	Maladjustment of the collecting skimmer.	Move the inlet of the collecting skimmer and adjust the flow rate of the oily water.
		Decrease of the capacity.	Check the pump and replace parts as necessary.
		Pump clogged for foreign objects.	Check and clean the suction inlet, discharge outlet and inside of the pump.
		Flexible hose clogged for foreign objects.	Check and clean the inside of the flexible hose.
		Air suction.	Optimize the flow rate of oily water by adjusting the inlet of the collecting skimmer. Check the connection of the flexible hose.
Noise	Abnormal noise of the pump.	Foreign objects suction to the pump casing.	Disassemble the pump and get rid of the foreign objects.
Separation failure	Oil is mixed with the drain.	Maladjustment of the pump capacity.	Adjust the capacity inconformity with the separator capacity (3L/min).
	Water is mixed with the collected oil.	Emulsification of the collected oil.	It is hard to separate water from the emulsified oil.
		Maladjustment of the drain cap.	Adjust the drain cap downward to be lower the water level in the separator.

	Cause of trouble	Cause	Measures
Drain failure	Separated water is not discharged smoothly.	Install the separating tank at the lower position.	Install the drain port of the separator higher than the surface of oily water in the oil collecting tank.
		Angle failure of the drain hose.	Install the drain hose with down angle.
		The tip of the drain hose is submerged.	Set the tip of the drain hose upper than the surface of oily water in the oil collecting tank.
		The drain hose is clogged.	Check and clean the inside of the drain hose or near the drain.
		Sludge deposits at the bottom of the separator.	Withdraw liquid in the separator and clean inside.
Oil drain failure	Oil drain port is clogged.	Oil drain port is clogged.	Remove adherent oil and foreign objects near the oil drain port and clean it.

8. Warranty / Repair

1. period and coverage

The warranty period is 12 months from dispatched from our factory.

However, the warranty of the submersible pump is 3,000 working hours.

(1) submersible pump is 3,000 working hours.

(2) During warranty period, if the pump breaks down or is damaged at the use under the condition instructed in this manual due to manufacturing defect(s), the failure parts are repaired free of charge.

(3) Even if the failure occurs within the warranty period, the followings are repaired or replaced for compensation in principle.

- Breakdown or damage due to different use or safekeeping from the instructions in this manual.
- Breakdown or damage due to incorrect use or unjust repair or modification.
- Breakdown or damage as result of pollution, salt damage, gas damage, abnormal voltage or undesigned power (voltage, frequency) as well as fire, earthquake, flood disaster, lightning strike or other natural disaster.
- Abrasion or degradation of consumable parts like a gasket or O-ring.
- Breakdown or damage during transportation, for relocation or fall after your purchase

(4) We cannot be responsible for the break down or damage of the customer-specified pump.

(5) Irregularities or breakdowns due to chemical or hydrodynamic corrosion by liquid and abrasion by the slurry are not covered under the warranty. The material chosen at the time of the contract is only a recommendation. We do not guarantee the chemical resistance of the material.

(6) If the determination of the cause for the breakdown or damage is questionable, it attributes to the negotiation between the customer and us.

(7) Expenses or other damage incurred as a result of breakdowns at the use under the different condition from the instruction in this manual are not covered under the warranty.

2. Repair

Notice:

For repair, consult the supplier. When returning a pump, thoroughly clean and pack the wet parts kit.

If irregularities are detected during operation, stop the operation immediately for check. (Refer to the section on “troubleshooting”).

(1) Consult your supplier or us for repair.

(2) Read this manual again and re-check before requesting repair.

(3) When visiting to a distance location for repair, the travel expenses are charged.

(4) Inform the followings when requesting repair.

- Model name and serial number
- Use duration and condition
- Damages parts and condition
- Liquid (Name, Specific gravity, Temperature, Slurry)

If liquid leaks during transportation, it is very dangerous, so make sure to clean inside thoroughly.

Installation record

Model:	
Purchase date:	Serial number:
Start date:	Supplier:

9. EC Declaration of Conformity

World Chemical Co.,Ltd.

EC DECLARATION OF CONFORMITY

(Directive 2006/42/EC of the European Parliament and of the council)

Manufacturer: World Chemical Co., Ltd.

Address : 3rd Floor, ANTEX24, 1-1-14 Taito, Taito-ku, Tokyo
110-0016, Japan

Machinery: COOLANT FLOATING OIL PORTABLE COLLECTING SYSTEM
"COOLANT SAVER PORTABLE"

Type: YD-150FS-16CSP

Serial No.:_____

-is in conformity with the provisions of the Machinery Directive 2006/42/EC

And furthermore declares that

-the following (parts / clause of) harmonized standards have been applied:

EN ISO 12100-1: 2003

Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology

EN ISO 12100-2: 2003

Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications

EN ISO 14121-1: 2007

Safety of machinery - Risk assessment – Part 1: Principles

EN ISO 4414: 2010

Pneumatic fluid power – General rules and safety requirements for systems and their components

The authorized person to compile the technical file:

Ms. Yoko Aono / 56 Avenue Charles Peguy 94210, La Varenne, Saint Hilaire, France

Tokyo, 26th November, 2012

Wataru Mori / President

World Chemical Co., Ltd.

20130618

10. Instruction manual of air regulator and diaphragm pump

SERVICE MANUAL

CE

AIR UNIT

MACP (T)300-8A~10A

Thanks for using MAC*300 series air unit. Pls. refer to this manual and use correctly.

MINDMAN INDUSTRIAL CO., LTD.

Address: No. 106, Sec.3, CHENG TE Road, Taipei, Taiwan, R.O.C
TEL: 886-2-2591-4100
FAX: 886-2-2597-5522

Mindman

Symbol of safety

Pls. read this manual and understand the meaning of symbol hereunder before applying, Maintaining, Repairing and disassembling the product.

⚠ This means 「error operations may have product malfunction or be out of order」

Caution

● Installation and operation

⚠ Caution to operation

- Operation pressure, below 0.97Mpa(9.9kgf/cm²)
- Pls. be avoided direct sunrays and free of volatility environment like Thinner and trichloroethylene to prevent the PC made "case" from crack.

● Specification

Bore	8A	10A
Port size	PT 1/4	PT 3/8
Working fluid	Air	
Pressure range	0.05~0.97MPa(0.5~9.9kgf/cm²)	
Proof pressure	1.47MPa(15kgf/cm²)	
Regulation pressure range	0.05~0.85MPa(0.5~8.5kgf/cm²)	
Ambient temp	-5~60℃ (No freezing)	
Filter grade	5 μm	
Recommended lubricant	Turbine oil ISO-VG32	

● Installation

⚠ Caution

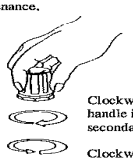
- Pls. keep product free from dropping and knocking, be aware that the "case" will happen to break if there is any crack.

- The installation direction must follow the arrow direction at body top to have air flow in.
- Pls. have this product installed at the location where the air is cooled at the lower altitude of piping, no hard particle or seal chips are allowed to reside inside.
- The gradually slow of air speed means the decreasing of filter's efficiency. Pls. use suitable piping size and keep the proper flow speed at 20~30m/sec.
- Pls. reserve enough space to access for maintenance.

●Pressure regulation

Pull up the handle lightly to be unlocked.

Pls. turn the "handle" counter-clockwise to reset pressure to zero, then gradually turn clockwise while watching gauge pressure to set as desired. When turned over to have a greater value than desired, pls. turn back to have pressure reduced then turn clockwise to set to desired pressure.

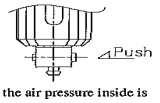


Clockwise turn of the handle increases the secondary pressure

Clockwise turn of the handle decreases the secondary pressure

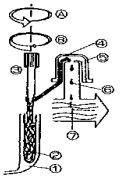
● Draining

- Pls. operate the drain valve when airline is pressurized and inside water has reached the "drain limit" lever of mark.
- Pls. note that the accumulated water may flow out to the piping and reduce the efficiency of the dehumidity of filter if the water reach above the "Drain limit" level.
- Push the bigger end of push button to drain off the water.
- The drain valve will automatically function when the air pressure inside is below 0.05Mpa(0.5kgf/cm²)



○ADJUSTING OF DRIPS

Quantity of drips is in proportion with quantity flow.
After the needle valve is set, quantity of drips varies, increase or decrease, depending upon increase or decrease of quantity of airflow. Clockwise turn of the needle valve decreases dripping quantity, which counterclockwise increases. Drips are to be adjusted or set according to the characteristics of operation of the equipment on the line. For lubrication to solenoid valve and air cylinder, for instance as airflow largely increases in operation. Lubricant is largely required. Lubrication can be made reasonably by adjusting at the time airflow is highest.



ADJUSTMENT OF DRIPS

1.CASE
2.OIL RESERVIOR
3.NEEDLE VALVE :
Ⓐ CONTERCLOCKWISE TURN INCREASES DRIPPING
Ⓑ CLOCKWISE TURN DECREASES DRIPPING
4.DRIPPING CHAMBER OUTER DOME
5.DRIPPING CHAMBER INNER DOME
6.OIL DRIP
7.ENTERING THE COMPRESSED AIR FLOW

⚠ Caution to maintenance

- Relieve the air pressure inside filter and pipe before disassembling. If not, during disassembling the filter, highly pressurized air will be relieved suddenly to outside, and may make parts dropped down.
- When re-assembling, Pls. hold "clamp ring" and turn right ("S" direction) to end stop point, do not stop in the middle way to prevent the "case" and "clamp ring" from dropping down.

<Case disassembling>
relieve the compressed air pressure, Then hold the "clamp ring" slightly upward and true left about 45°can disassemble the case and clamp ring.

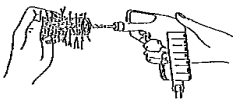
< Case assembling >
Make sure 0 ring located on the body, hold the "clamp ring" slightly upward and turn right to end stop point (do not stop in the middle way) can assemble the case and clamp ring.

● Filter element cleaning

Outlet pressure and flow rate will be reduced if filter element accumulate too many dirts. Pls. clean the filter element and assemble for reuse.

When the pressure down between inlet and outlet reach 0.07mpa (0.7kgf/cm²), Pls. dismantle the filter element and clean it by air gun blowing from inside to outside (because air flow from outside to inside) and pay attention not blow to human eyes.

(As right diagram shows)



● Part cleaning

- Metal parts can be cleaned by using volatile solvent and will not cause any harm.
- Other parts (except made of metal) can be cleaned by using light mineral oil or neutral solvent.

Pls. wipe off all the solvent and cleaner before re-assembling。

Pls. KEEP THIS MANUAL FOR REFERENCE

Pls. consult to local agent or distributors for any requirements of parts.
All part made of metal or plastic can be recycled for use.

Doc. No.	NDP 170U-14

OPERATION MANUAL

YAMADA AIR-OPERATED DIAPHRAGM PUMPS

NDP-5 series
DP-10 series
NDP-15 series

DECLARATION OF CONFORMITY

Name of company : YAMADA CORPORATION

Address : No.1-3,1-Chome,Minami-Magome,Ohta-ku,Tokyo,143-8504 Japan

declares, in sole responsibility, that the following product

Equipment : Diaphragm Pumps

Type : NDP- and DP- series

Referred to in this declaration conforms with the following standard(s) or directive(s) :

- European Standard EN 809 / October 1998
- Directive 2006/42/EC

YAMADA CORPORATION will keep on file for review the following technical documentation :

- operating instructions as required
- plans
- description of measures designed to ensure conformity
- other technical documentation

Importer / Distributor in EU

Name of company : YAMADA EUROPE B.V.

Danny Kyte (President)

Address : Aquamarijnstraat 50, 7554 NS Hengelo (O), The Netherlands

Place and date issued : Sagamihara Factory / July 30 2010

Name and signature as well as position of undersigned :

Shigeru Murata (General manager, Sagamihara Factory) CE

yamada

·Introduction

Thank you for purchasing a Yamada Diaphragm Pump. This product is a positive-displacement pump that transfers fluids by movement of diaphragms driven by compressed air through a unique switching mechanism. The casing that comes in contact with the fluid is made of aluminum, stainless steel, forged iron, polypropylene, polyvinylidene fluoride, polyacetal depending on the model you have selected according to the type of fluid 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: If you ignore the warning described and operate the product in an improper manner, there is danger of serious bodily injury or death.

⚠ CAUTION : If you ignore the caution described and operate the product in an improper manner, there is danger of personal injury or property damage.

Furthermore, to indicate the type of danger and damage, the following symbols are also used along with those mentioned above:

This symbol indicates a DON'T, and will be accompanied by an explanation on something you must not do.

This symbol indicates a DO, and will be accompanied by instructions on something you must do in a certain situation.

·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.
- Pressure Ratings are dependent on pump material and liquid temperature variations. Please see "Temperature Pressure Curve" in the [10.1 Main Specification] and check for the allowable working pressure at the specific temperature of the liquid being pumped. Air pressure and discharge pressure must not exceed the allowable working pressure. If air pressure and discharge pressure exceed the allowable working pressure, it may cause liquid leaks, damaged pump casings or diaphragms and could cause a fatal accident.
- 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 fluids (with strong acid or alkali, flammable or toxic) or gas bubbles generated by such fluids may cause serious injury or even death if accidentally inhaled or consumed or if they come into contact with the eyes or adhere to skin. Therefore, the following precautions are strongly advised.
  - *Be fully familiar with the properties of the fluid to be pumped and work in strict accordance with the operating instructions provided by the suppliers of such fluids (such as wearing goggles, gloves, mask or work clothes).
  - *When storing a hazardous fluid, 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, fluid will gush out together with air through the exhaust port. Also when pump has positive suction head, liquid will be forced out from exhaust port due to positive inlet pressure. Make sure to Provide protective measures in consideration of possible leakage of fluid (see NOTE: Arranging outside exhaust on P.11). For example using a hose and pit etc., be sure you are using a model with appropriate corrosion resistance for the fluid to be pumped.

⚠WARNING

•When installing this product, be sure to connect a ground wire from the specified position of this product (excluding NDP-5FPT, 15FP).
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 fluids 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 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.
- *To pump flammable liquids, use a model with an aluminum or stainless-steel casing.
- *Whenever you notice any spark while operating this product, immediately stop it 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 fluid 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, fluid 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.
- *When filling cans, drums, etc. with combustible or flammable liquids, both containers should be bonded and ground to dissipate possible accumulations of static electricity, this will minimize sparks caused by static electricity (refer NFPA 77).
- *Removal of outer garments in work areas where there may by flammable or explosive liquids, which ignite with low electrical energy, can be fatal and/or cause property damage (refer NFPA 56A, 77).

Follow all electrical and safety codes, including the Occupational Safety and Health Act (OSHA), most recent National Electrical Code (NEC), National Fire Protection Association, Inc. (NFPA) Code 30 (Flammable and Combustible Code), NFPA 77 (Static Electricity), NFPA 78 (Lightning Protection Code), NFPA 80 (Standard Method of Fire Test of Building Construction), NFPA 704 (Identification of the Fire Hazards of Materials), other NFPA codes, local codes and ordinance, as needed in a particular application.

•After you shut down the pump and disconnect the piping, some fluid may remain inside the pump. Also, if the pump is left unused for a prolonged period, some fluid may remain inside the pump and connected piping. Therefore, be sure to purge the system of fluid and clean the pump after prolonged disuse.
If the product is left unused for a prolonged period with fluid remaining in the connected piping as well as the pump itself, the fluid may expand, depending on the ambient temperature (because of freezing or heat), which may cause damage to the pump and/or piping, and possible leakage of fluid.

•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.

•Maximum air pressure for non-metallic pumps decreases with temperature (See Temperature Pressure Curve).see [10.1 MAIN SPECIFICATIONS].

⚠WARNING

·When pumping a hazardous fluid (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 fluid, and post warning signs at necessary places.
Make the warning symbols in [13.Warning symbols], and attach them to the casing and piping, etc.
Leakage of fluid may cause fire, air pollution or a serious accident.
When pumping a hot fluid, the casing and piping will become hot, which may burn the skin when touched.

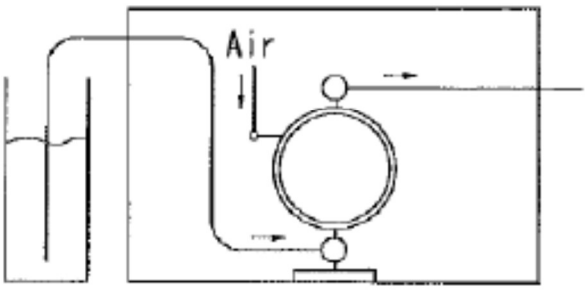


Fig.0.1

·Before using this product, be sure you are familiar with the precautions regarding the fluid to be pumped, and verify the corrosion resistance of the parts that will come into contact with the fluid. NEVER use the product with any fluid against which it does not have sufficient corrosion resistance or with a fluid that poses a risk of explosion. If you are unsure of the corrosion resistance, contact your dealer or our regional office.
Please make sure that pump material is compatible with liquid being pumped, or damage may result to the pump or product being pumped.

·When working in the vicinity of pumping of fluid with this product, be sure to wear protective gear (goggles, mask, etc.).

·It is the responsibility of the user to operate the pump in conformance with O.S.H.A. rules for dispensing liquid.

·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 (fluid 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 [10.1 Main specifications].)

·To drive this product, use supply air with minimum moisture content.

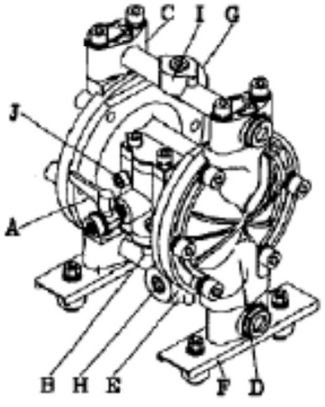
·If a diaphragm of this product is damaged, supply air may mix with the fluid or the fluid may flow into the main body (air-switching portion). If air supply is inadequate or contaminated, do NOT operate the pump.

·While operating this product, do NOT cover the intake port by hand.

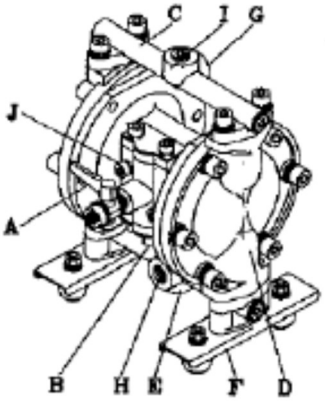
·If the pump remains unused for a long period of time, or you have misgivings about running the pump, please consult with the dealer where you purchased it or our Sales office.

1.2 DP-10 series

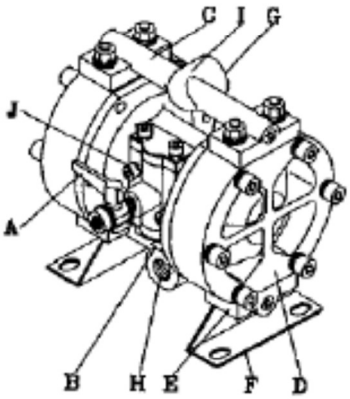
A:Air Valve
B:Reset Button
C:Out Manifold
D:Out Chamber
E:In Manifold
F:Pump Base
G:Discharge Port
H:Intake Port
I:Lift Point
J:Ground Connection Point



DP-10BA_



DP-10BS_



DP-10BP_

·Aluminum type

Type	BAC	BAN	BAT	BAH	BAS
Switching Portion	ADC12				
Fluid contact Portion	ADC12				
Diaphragm	CR	NBR	PTFE	TPEE	TPO
Ball/O Ring	CR/PTFE	NBR/PTFE	PTFE	TPEE/PTFE	TPO/PTFE
Valve Seat	A5056				
Center Disk	A5056				

·Stainless-steel type

Type	BSC	BSN	BST	BSH	BSS
Switching Portion	ADC12				
Fluid contact Portion	SCS14				
Diaphragm	CR	NBR	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	PTFE	TPEE/NBR	TPO/EPDM
Valve Seat	SS316				
Center Disk	SS316				

·Polypropylene type

Type	BPC	BPN	BPT	BPH	BPS
Switching Portion	ADC12				
Fluid contact Portion	PPG				
Diaphragm	CR	NBR	PTFE	TPEE	TPO
Ball/O Ring	CR/NBR	NBR	PTFE	TPEE/NBR	TPO/EPDM
Valve Seat	CR	NBR	PPG	PPG	PPG
Center Disk	PPG(SS304)				

■List of accessories

·Operation Manual ·····1
·Maintenance Manual ·····1
·Air Valve ·····1
·Silencer ·····1

2. Assembly

2.1 Installation of accessories

1) First, open the product package and make sure that all the accessories are in order (see [1. Names of parts and materials] ■List of accessories).
2) Attach the air valve and the silencer (nipple) (see the appearance drawings on [1. Names of parts and materials]).
(With some models, these are already installed.)

⚠CAUTION

- ·All of the connection parts are capped or taped for shipment. Remove the caps and tapes.
- ·When installing accessories, make sure that no foreign matter falls into the product, as it could cause malfunction of the switching portion.
- ·Use PTFE tape when installing air valve.
- ·See [10.1 Main specifications]. Remember that the pump is heavy, so extreme care must be taken when lifting it.

3. Installation

3.1 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 [10.1 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.

3.2 Installing the pump

1) Decide where the pump should be installed and secure it in a suitable space (see Fig. 3.1 A to D).

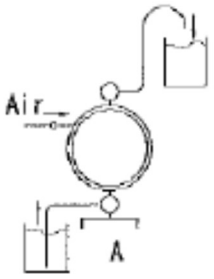
NOTE:

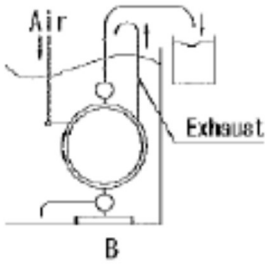
·Try to keep the suction lift as short as possible.
To protect diaphragm from abnormal breakage, inlet pressure must be kept below the following values:
*PTFE diaphragm : 2.8 PSI (height 6.6 ft) During operation
: 7 PSI (height 16.4 ft) Not in operation
*Other diaphragms : 14 PSI (height 32.8 ft)
(When using clean water under ambient temperature)

·Remember to provide sufficient space around the pump for maintenance.

· The direction of the fluid intake port and the discharge port can be switched opposite from each other. (For switching, see the maintenance manual.)

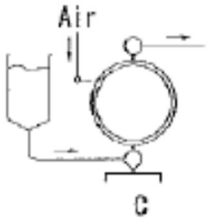
· In the event diaphragm failure the exhaust from pump may contain some sludge.
When operating the pump where it would have an impact on the environment, the exhaust should be directed to a place where there will be no environmental impact.





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.



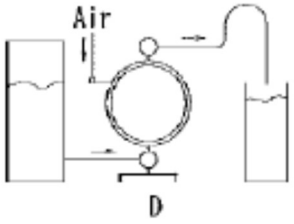


Fig. 3.1

⚠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.
- If the pump will be submerged during operation, follow the steps below:
  - Verify the corrosion resistance of each component of the pump, and do NOT expose the pump to any fluid for which it does not have proper corrosion resistance.
  - Exhaust should be directed outside, not into the fluid in which the pump is submerged. For information on how to arrange the exhaust, see Note: Arranging outside exhaust and Fig. 3.2 below.
  - Make sure that you can reach all of the valves without submerging your hand.
- When operating the pump, operation noise may be generated, depending upon conditions of use (kind of fluid 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 [10.1 Main specifications].)
- When pumping a hazardous fluid (hot, flammable, strong acid, etc.), provide protective measures (installation of a pit or sensors, etc.) in consideration of possible leakage of fluid, and post warning signs at necessary places. For details, see the applicable operating caution on P.2 and P.4.

⚠WARNING

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

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 16.4 ft consult your dealer or our regional office.)
- Have a pit, a protection box, etc. at the end of the hose.

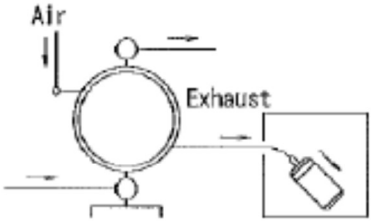


Fig. 3.2

⚠WARNING

- Be sure to have a pit, a protection box, etc. at the end of the hose in preparation for the flow of fluid 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: Solenoid Operation

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.

3.3 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]. (excluding NDP-5FPT, NDP-15FP_).

b) Also connect ground wires to peripheral equipment and piping.

c) Use 2.0mm^2 minimum ground wire.

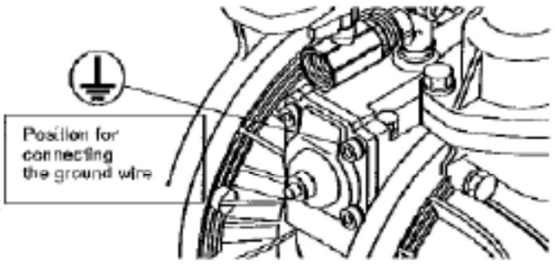


Fig. 3.3

⚠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.

4. Connection

4.1 Connecting fluid piping

1) Connect a flow valve and a drain valve to the fluid discharge port of the pump.
2) Connect a valve for maintenance to the fluid suction intake port of the pump.
3) Connect a hose to the valve on the suction-port side and the valve of the discharge-port side of the pump.
4) Connect a hose on the suction-side intake and the discharge-port side to the respective vessels.

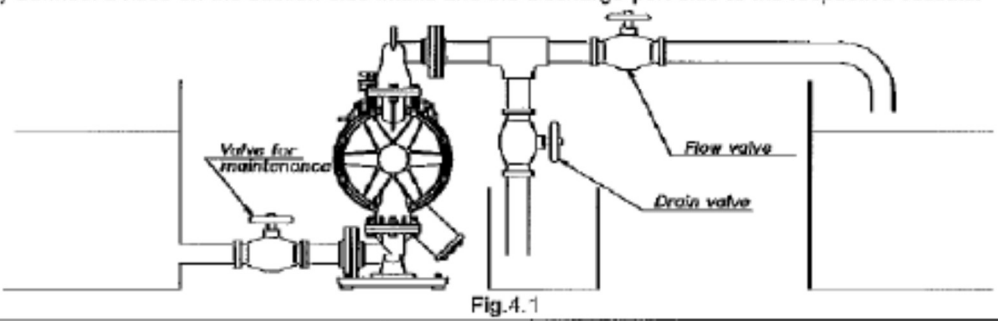


Fig.4.1

⚠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.
- When pumping a fluid that contains slurry, verify that the particle size is below the slurry limitation (see [10.1 Main specifications]). If it exceeds the limitation of slurries indicated in the main specifications, attach a strainer to the pump to stop larger particles. Otherwise, such particles may cause a malfunction.
- If, depending upon the place of pump installation, the volume of the pumped fluid changes drastically, install a relief valve on the discharge side, and bring the pressure down below the maximum permissible value. If, owing to a change in the volume of fluid, the pressure inside the pump exceeds the maximum permissible pressure, it may cause damage.

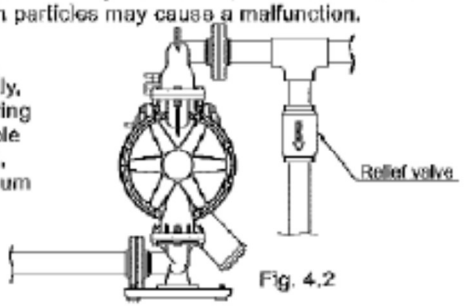


Fig. 4.2

- Keep a vessel below the relief valve to catch any drain off.
- When testing piping for leakage, do NOT apply pressure to the pump's inlet and outlet sides with compressed air from outside. It may cause abnormal breakage to the diaphragm or the switching portion. 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.
- In our product inspection, clean water is used. To prevent mixture of dirty water into the fluid to be pumped, clean the inside of the pump before finishing installation work.
- When installing a standby pump or two pumps in parallel form, be sure to provide a valve on each of the IN and OUT sides and perform pump switching by using the liquid material valve. If the valve of the stop-side pump is open, the diaphragm will be inverted by the discharge pressure of the operating-side pump, resulting in damage in an early stage.

4.2 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.

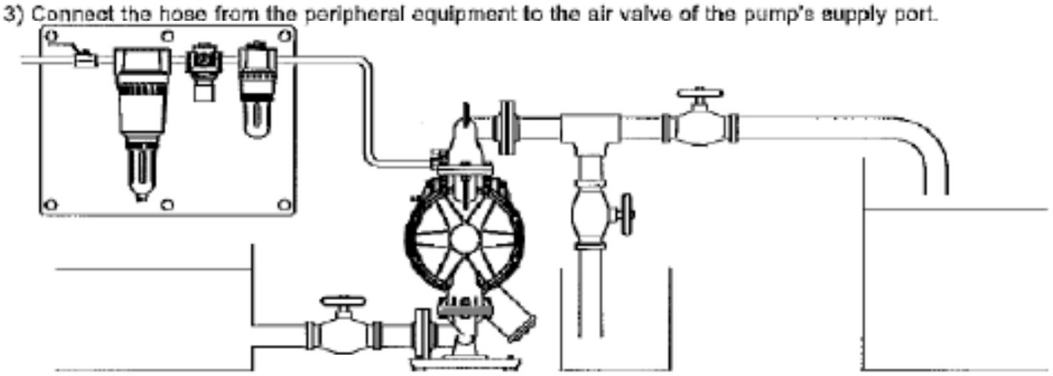


Fig.4.3

⚠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.

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.

·High temperature operation: When transferring liquid whose temperature exceeds 158°F (70°C)

·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/m³, Absolute pressure at 0.1MPa. Maximum temperature of 68°F (20°C) and Humidity at 65%.

5. Operation

5.1 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. (Refer to the maintenance manual for the bolts that a regulation torque are explained.)
- 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.
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 (see [10.1 Main specifications]).
3) Open the flow valve on the discharge side.
4) Press the RESET button, and then slowly open the air valve of the pump.
5) First, verify that fluid is flowing inside the piping and is being pumped to the discharge side, and then fully open the air valve.
6) Again adjust the supply air pressure with a regulator to within the permissible range (see [10.1 Main specifications]).

⚠CAUTION

- Do NOT open the air valve suddenly.
- In case of use lubricator, must be used turbine oil none addition class 1 turbine oil (equivalent ISO VG32 grade) for lubricants.
  Do not apply lubricants more than required and also do not use any other lubricants, which designated on this instruction manual. This may cause of pump problem and there is danger of serious bodily damage.

5.2 Flow adjustment

- Adjust the flow valve on the discharge side. For the relationship among the flow, supply air pressure and discharge pressure, see [10.3 Performance curve].

⚠CAUTION

- As you start closing the flow valve, the supply air pressure may rise.
  Make sure that the pressure is kept within the normal operating range (see [10.1 Main Specifications]).
- Depending upon the viscosity and specific gravity of the fluid, the suction stroke and other conditions, the permissible suction flow speed of fluid into the pump will vary; however, if the pump speed (flow speed of fluid) increases greatly, cavitation will occur, and this not only will reduce pump performance, but it may cause a malfunction. Adjust the supply air pressure as well as the flow in order to prevent cavitation.
- If fluid is not discharged after you start the pump, or if you hear an abnormal noise or notice any irregularity, shut down the pump immediately (see [8. Troubleshooting]).

5.3 Shutdown

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

⚠CAUTION

·There is no problem in shutting down the pump with the flow valve closed while air is being supplied; however, if this condition continues for many hours while there is nobody watching the pump, it may continue running when there is a leak from the pump or piping, and fluid may continue flowing out of the position of leakage. Upon finishing your work, release the internal pressure from the pump and close the air valve (see [5.4 Releasing the pressure]).

·When the pump is shut down while pumping slurry, particulate matter contained in the slurry will be deposited and get stuck inside the out chamber. If the pump is started again as is, the diaphragm may be damaged or the center disk may be overloaded, and this may cause damage such as bending of the center rod. After finishing your work, purge the remaining fluid from the pump (see [6. Method of cleaning]).

5.4 Releasing the pressure

1) Make sure that the air valve of the pump is closed.
2) Shut down the air compressor or close the valve on the air-supply side of the peripheral equipment.
3) Close the flow valve on the discharge side, start slowly opening the drain valve, and discharge the fluid under pressure.
4) Open the air valve of the pump, start running the pump, and discharge the remaining air.
5) After making sure that the pump has been shut down and the pressure has been released, fully open the regulator, and close the air valve and drain valve of the pump.

⚠CAUTION

·Keep a vessel below the relief valve to catch any drain off.

·Fluid under pressure will gush out as soon as you open the valve, so be careful.

·If the pump will be unused for a prolonged period, purge and clean the pump (see the Operating caution on P.3).

6. 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 fluid 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) Be ready with a vessel with cleaning solution, select cleaning solution appropriate for the type of fluid pumped, and then connect the suction-side and the discharge-side hoses of the pump.
5) Operate a pump by starting air pressure slowly, and let the cleaning solution circulate for sufficient cleaning.
6) Finally, flush with clean water.
7) Remove the hose from the suction side of the pump, run the pump for a while and purge the pump of remaining fluid as much as possible.

⚠CAUTION

- Be careful when removing piping. Fluid will gush out.
- After cleaning with clean water, turn the pump upside-down to drain out the water.

7. 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) If using a lubricator, verify the quantity of lubricating oil.

c) Make sure that there is no leakage of fluid from any connection part or the pump.

d) Make sure that there are no cracks in the pump casing or piping.

e) Check the tightness of every bolt of the pump.
(Refer to "maintenance manual" about the retighten of " Tie rod")

f) Make sure that the connection parts of the piping and peripheral equipment are not loose.

g) Make sure that the time has not elapsed for replacing any parts of the pump that are to be replaced at regular intervals. For details, see the maintenance manual.

8. Troubleshooting

8.1 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 fluid piping is clogged with sludge.	Check and clean the fluid piping.
The pump is clogged with sludge.	Disassemble the casing, check and clean.

8.2 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 fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid 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.

8.3 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 fluid.	Replenish fluid and check the configuration of the suction-side piping.
Cavitation occurs.	Adjust the supply air pressure and discharge pressure, and shorten the suction lift.
Chattering occurs.	Adjust the supply air pressure and discharge pressure. Reduce inlet flow valve to adjusting liquid 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.3.2)
The fluid piping (including the strainer) is clogged with sludge.	Check and clean the fluid 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.

8.4 Liquid 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. Tighten the nuts.

8.5 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.

8.6 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 liquid pressure and volume.
The pump is clogged with sludge with particles of larger than the permissible diameter.	Disassemble the casing, check and clean.

8.7 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 disassembly is required, refer to the maintenance manual and follow with the instructions.
·If any of the above mentioned causes does not apply to your problem, contact your dealer or our regional office.

9. Returning the product for servicing

9.1 How to use the FAX Sheet

·Copy the FAX Sheet on [11.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.

9.2 Before returning the product

1) Purge the pump of fluid and clean (see [6. 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's responsibility thoroughly wash and clean the pumps to prevent accidents caused by liquid leaks.

⚠CAUTION

·Be sure to prevent liquid leak from pump for safe transport.

10. MAIN BODY SPECIFICATION
10.1 MAIN SPECIFICATIONS

■NDP-5 series

Type		NDP-5				
		FAT	FST	FPT	FVT	FDT
Nominal Diameter		0.24 inch [6 mm]				
Fluid Connection	Suction Port	NPT 1/4				
	Discharge Port					
Air Connection	Supply Port	NPT 1/4				
	Exhaust Port	NPT 3/8				
Operating Air Pressure		30~100 psi [0.2~0.7 MPa]		30~100 psi *5 [0.2~0.7 MPa]		
Maximum Discharge Pressure		100 psi [0.7 MPa]		100 psi *5 [0.7 MPa]		
Discharge Volume/cycle*2		20 mL				
Maximum Discharge Volume		2.9 Gallon/min [11 L/min]				
Maximum Air Consumption		8.83 SCFM [250 L/min(ANR)]				
Slurry Limitation*1		—				
Limitation of Viscosity		0.1 Pa·s or less				
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]				
	Fluid Temp.	32~212 °F [0~100 °C]		32~140 °F [0~60 °C]		
A-weighted emission sound pressure level*4		81 dB		80 dB		
A-weighted sound power level*5		92 dB		90 dB		
Weight		3.5 lbs [1.6 kg]	6.0 lbs [2.7 kg]	2.9 lbs [1.3 kg]	3.7 lbs [1.7 kg]	3.1 lbs [1.4 kg]

■DP-10 series

Type		DP-10		
		BA_	BS_	BP_
Nominal Diameter		0.39 inch [10 mm]		
Fluid Connection	Suction Port	NPT 3/8		
	Discharge Port			
Air Connection	Supply Port	NPT 1/4		
	Exhaust Port	NPT 3/8		
Operating Air Pressure		30~100 psi [0.2~0.7 MPa]		30~100 psi *5 [0.2~0.7 MPa]
Maximum Discharge Pressure		100 psi [0.7 MPa]		100 psi *5 [0.7 MPa]
Discharge Volume/cycle *2		50 mL		
Maximum Discharge Volume		5.28 Gallon/min [20 L/min]		4.49 Gallon/min [17 L/min]
Maximum Air Consumption		10.6 SCFM [300 L/min(ANR)]		8.83 SCFM [250 L/min(ANR)]
Slurry Limitation		1mm or less		
Limitation of Viscosity		0.5 Pa·s or less		
Operating Ambient Temperature Range	Temp.	32~158 °F [0~70 °C]		
	Fluid Temp.	*3		32~140 °F [0~60 °C]
A-weighted emission sound pressure level*4		84 dB		82 dB
A-weighted sound power level*5		92 dB		93 dB
Weight		7.7 lbs [3.5 kg]	11.5 lbs [5.2 kg]	6.6 lbs [3.0 kg]

*1.Do not use the flat valve type pump for the liquids with slurry.
*2.Discharge Volume/cycle is highly dependent on application. Contact your local distributor or Yamada for more information.
*3.Diaphragm NBR/CR : 32~158 °F [0~70 °C]
TPEE : 32~176 °F [0~80 °C]
TPO/PTFE : 32~212 °F [0~100 °C]
*4.The measuring method is based on ISO 1996.
*5.The measuring method is based on ISO 3744.
*6.Maximum air pressure for non-metallic pumps decreases with temperature (See P.21 of Temperature Pressure Curve).

Ver.20240819

World Chemical Co.,Ltd.

WORLD CHEMICAL CO., LTD. / Japan

Head Office / Overseas department

3F, 1-1-14, Taito. Taito-ku, Tokyo, 110-0016 Japan

TEL 81-3-5818-5130　FAX 81-3-5818-5131 (Head office)

TEL 81-3-5818-5131 FAX 81-3-5818-5131(Overseas epartment)

Osaka Office

3F, 1-19-25, Edobori, Nishi-ku, Osaka-shi, Osaka, 550-0002 Japan

TEL 81-6-6467-8565　FAX 81-6-6467-8566

Nagoya Office

5F, 1-5-27, Nishiki, Naka-ku, Nagoya-shi,
Aichi, 460-0003 Japan

TEL 81-52-253-8426　FAX 81-52-253-8436

Fukuoka Office

5F, 2-17-19,Hakataekimae,Hakata-ku,Fukuoka-shi,Fukuoka,
812-0011 Japan

TEL 81-92-710-6001　FAX 81-92-710-6125

Tsukuba Factory

6127-5, Onogo-machi, Joso-shi, Ibaraki, 300-2521 Japan

TEL 81-297-24-1071　FAX 81-297-24-1075

WORCHEMI TAIWAN CO., LTD. / Taichung, Taiwan

No.915, Zhongshan Rd., Shengang Dist., Taichung City 42955, TAIWAN

TEL 886-4-2562-8358　FAX 886-4-2562-8351

WORLD CHEMICAL USA, INC. / California, U.S.A.

25691 Atlantic Ocean Dr.Unit B-15 Lake Forest, CA 92630, U.S.A.

TEL 1-949-462-0900　FAX 1-888-860-3364

SUZHOU WORLD TECHNOLOGY CO., LTD. / Jiangsu, China

61, Fu Yuan Road, Xiang Cheng Economic District, Suzhou, Jiangsu Province, China

TEL 86-0512-6579-8212　FAX 86-0512-6579-8215