AIR PRESSURE PUMPS

APD (EX)	(Delivery)	Series
APDQ (EX)	(Collection)	Series
APDX (EX)	(Collection & Delivery)	Series

INSTRUCTION MANUAL

- This manual contains safety and operating instructions, which will help you to use the device correctly and safely. Please read it carefully before using the device. Misusing the device may cause malfunction of the equipment and human injuries.

- Keep this manual in a safe and easily accessible place, as you may need it in the future. Refer to it whenever necessary.

AQUA
SYSTEM CO.,LTD.

1. To begin with

Thank you for purchasing Air Pressure Pump! This drum can pump utilizes compressed air. It's a safe, inexpensive and high quality product. "Electric pumps are expensive and break down easily", "Operating manual pumps is troublesome" – we have designed this product taking customers' opinions under consideration. Everyone can use it easily. And it's safe! The regulator stabilizes pressure inside of a drum can, while the safety valve protects from regulator's malfunction. This is the end to your troubles with liquid transfer. Enjoy the safety and convenience of our product, but at first, please read this manual carefully and refer to it whenever necessary.

AQUASYSTEM CO., LTD.

Table of contents:

2. Technical specifications table (part 1/2)

The 'Gun' Type	Permitted Liquids	Material						Liquid Viscosity Range		Max Fluid Uplift	Compressor's pressure	Environmental Temperature
		Main Body	O-Ring	Suction Pipe	Delivery Hose (2 m)	Delivery Valve	Gun Nozzle	Delivery (cP)	Suction (cP)	For clear water (1 cP)	MPa	℃
APD-20N	General oil	Aluminum	Viton	Aluminum	PVC	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25N	General oil	Aluminum	Viton	Aluminum	PVC	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20GN	Gasoline, diesel oil, kerosene	Aluminum	Viton	Aluminum	Oil resistant rubber	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25GN	Gasoline, diesel oil, kerosene	Aluminum	Viton	Aluminum	Oil resistant rubber	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20ASN	Solvents	Aluminum	Teflon	Aluminum	Stainless Steel	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25ASN	Solvents	Aluminum	Teflon	Aluminum	Stainless Steel	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20SUSN	Solvents	Stainless Steel	Teflon	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60

2. Technical specifications table (part 2/2)

The 'Nozzle' Type	Permitted Liquids	Material						Liquid Viscosity Range		Max Fluid Uplift	Compressor's pressure	Environmental Temperature
		Main Body	O-Ring	Suction Pipe	Delivery Hose (2 m)	Delivery Valve	Nozzle	Delivery (cP)	Suction (cP)	For clear water (1 cP)	MPa	℃
APD-20	General oil	Aluminum	Viton	Aluminum	PVC	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25	General oil	Aluminum	Viton	Aluminum	PVC	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20G	Gasoline, diesel oil, kerosene	Aluminum	Viton	Aluminum	Oil resistant rubber	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25G	Gasoline, diesel oil, kerosene	Aluminum	Viton	Aluminum	Oil resistant rubber	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20AS	Solvents	Aluminum	Teflon	Aluminum	Stainless Steel	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-25AS	Solvents	Aluminum	Teflon	Aluminum	Stainless Steel	BC	Aluminum	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APD-20SUS	Solvents	Stainless Steel	Teflon	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	1 ~ 3000	N/A	2 m	0.1 ~ 1.0	5 ~ 60
APDQ-25	General oil	Aluminum	Viton	N/A	PVC	N/A	Aluminum	N/A	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60
APDQ-25G	Gasoline, diesel oil, kerosene	Aluminum	Viton	N/A	Oil resistant rubber	N/A	Aluminum	N/A	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60
APDQ-25AS	Solvents	Aluminum	Teflon	N/A	Stainless Steel	N/A	Aluminum	N/A	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60
APDX-25	General oil	Aluminum	Viton	Aluminum	PVC	BC	Aluminum	1 ~ 3000	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60
APDX-25G	Gasoline, diesel oil, kerosene	Aluminum	Viton	Aluminum	Oil resistant rubber	BC	Aluminum	1 ~ 3000	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60
APDX-25AS	Solvents	Aluminum	Teflon	Aluminum	Stainless Steel	BC	Aluminum	1 ~ 3000	1 ~ 3000	2 m	0.1 ~ 0.7	5 ~ 60

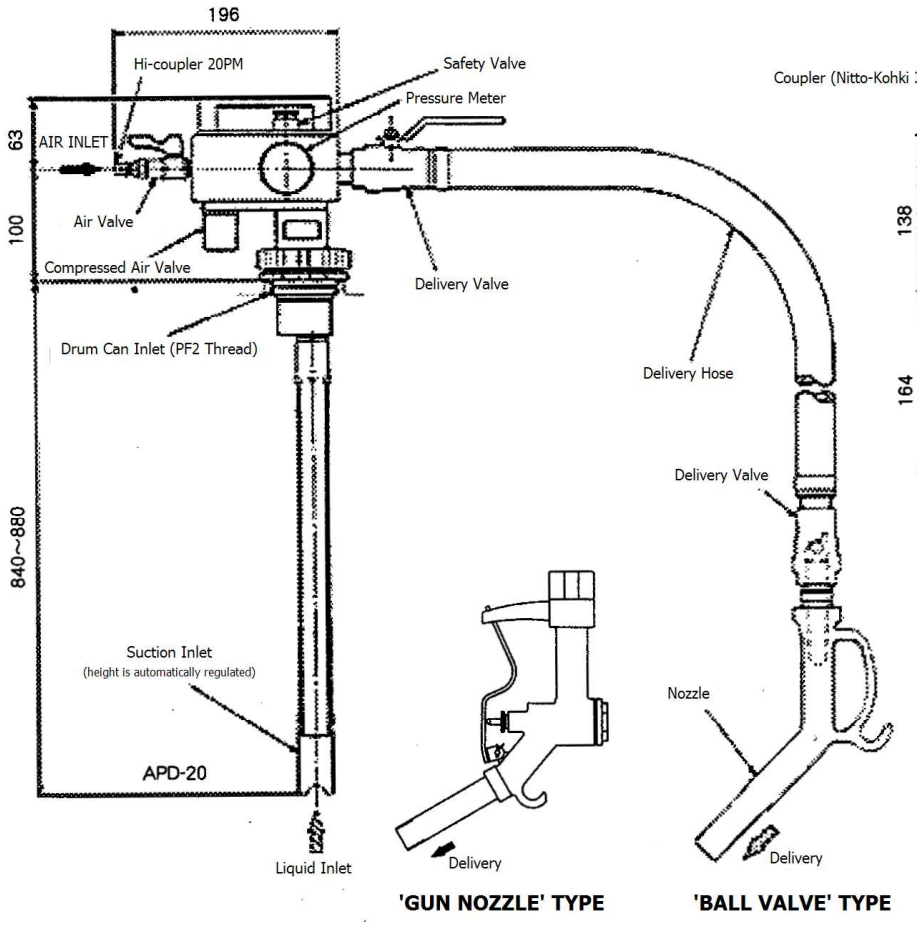
* The APD Series high-pressure type (0.1~1.5 MPa) is also available.

* Even with the temperature range given, remember to operate the device in temperatures, which are not dangerous to the transferred liquid (according to liquids specifications).

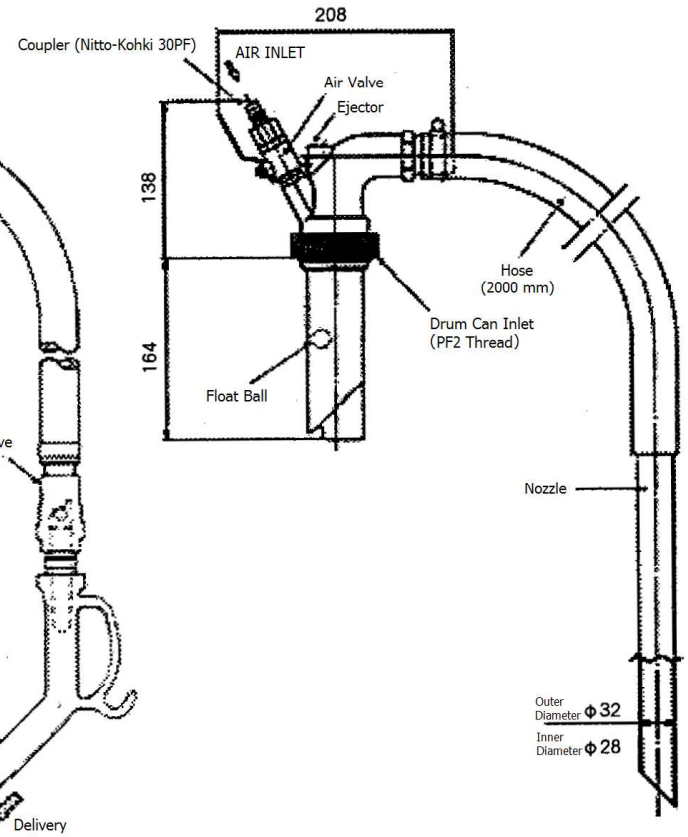
* These values are calculated. Always take usage conditions and environmental conditions under consideration.

3. Parts

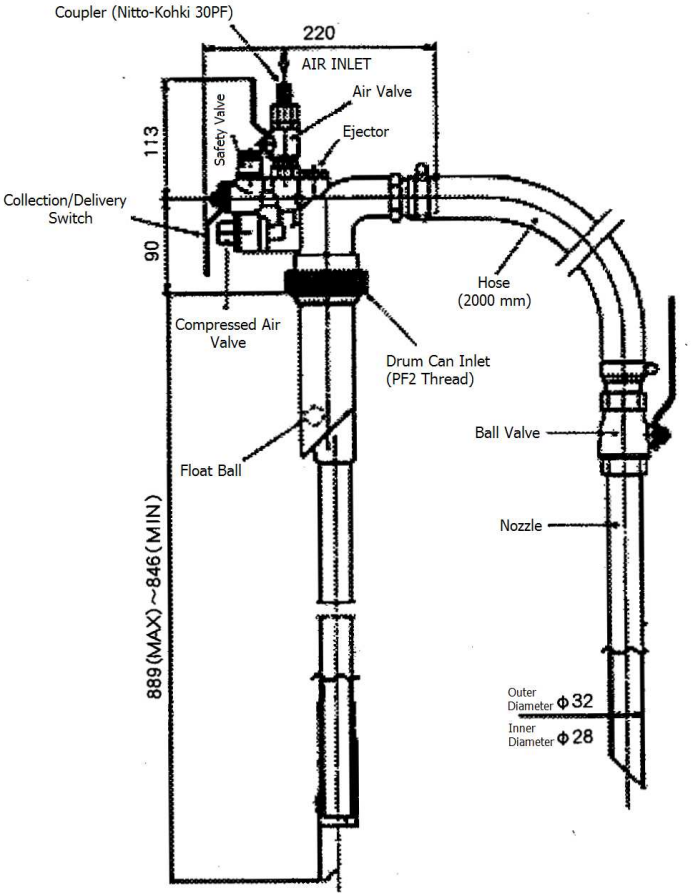
DRAWING 1 APD (DELIVERY)



DRAWING 2 APDQ (COLLECTION)



DRAWING 3 APDX (COLLECTION/DELIVERY)



4. Model performance table

Model	Max Delivery Rate (l/min)						Max Suction Rate (l/min)						Uplift Efficiency				
	1 cP	100 cP	500 cP	1000 cP	3000 cP	5000 cP	1 cP	100 cP	500 cP	1000 cP	3000 cP	5000 cP	1 m	2 m	3 m	4 m	5 m
APD-20N	55	45	20	9.5	1.5	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25N	80	70	40	20	4.5	1.5	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20GN	50	40	15	7	1	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25GN	70	60	30	15	3	1.5	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20ASN	30	25	15	6	1	0.3	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25ASN	70	60	30	15	3	1.5	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20SUSN	35	30	10	5	1	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-20	65	55	30	15	2.5	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25	150	125	60	25	5	2.5	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20G	55	45	20	7	1	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25G	115	95	45	20	4	2	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20AS	35	30	15	5.5	1	0.5	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APD-25AS	115	95	45	20	4	2	—	—	—	—	—	—	85 %	80 %	70 %	50 %	0 %
APD-20SUS	40	30	15	5.5	1	0.3	—	—	—	—	—	—	85 %	70 %	60 %	30 %	0 %
APDQ-25	—	—	—	—	—	—	65	60	50	30	2	0.5	85 %	80 %	70 %	50 %	0 %
APDQ-25G	—	—	—	—	—	—	50	45	35	20	1	0.3	85 %	80 %	70 %	50 %	0 %
APDQ-25AS	—	—	—	—	—	—	50	45	35	20	1	0.3	85 %	80 %	70 %	50 %	0 %
APDX-25	100	85	45	20	4	1	70	65	50	30	2	0.5	85 %	80 %	70 %	50 %	0 %
APDX-25G	70	60	25	10	1.5	0.5	50	45	35	20	1	0.3	85 %	80 %	70 %	50 %	0 %
APDX-25AS	70	60	25	10	1.5	0.5	50	45	35	20	1	0.3	85 %	80 %	70 %	50 %	0 %

* The above data consists of experimental values. They may vary according to the type of transferred liquid, its properties, relative density etc . . . Performance values are not guaranteed.

* When optional accessories like a flow meter or an auto-stop gun nozzle are attached to the system, the delivery rate may be lower than the values above (APD Series).

5. Permitted liquids table

Standard Type APD-20N APD-25N APD-20 APD-25 APDQ-25 APDX-25	Cutting fluids, spindle oil, refrigerating machine oil, turbine oil, dynamo oil, machine oil, cylinder oil, engine oil, gear oil, silicone oil, water, soapy water, detergents, others . . . * The hose for these models is made from PVC. Some oils may cause PVC hose hardening. Be careful.

The G-Type APD-20GN APD-25GN APD-20G APD-25G APDQ-25G APDX-25G	Gasoline, light oil, diesel oil, kerosene, heavy oil (A, B, C) * Can also transfer all liquids permitted for the standard type.

The AS-Type APD-20ASN APD-25ASN APD-20AS APD-25AS APDQ-25AS APDX-25AS	Acetone, Ammonia, Acetaldehyde, Ethanol, Chloromethane, Gelatin, Calcium Chloride, Naphtha, Cyclohexanone, Cyclohexane, Hexane, Trichloroethylene, Formaldehyde, Methyl Ethyl Ketone, Lacquer Thinner, Other . . . * Can also transfer all liquids permitted for the standard type and G-Type

The SUS-Type APD-20SUSN APD-20SUS	Dichloromethane, Formic Acid, Chloromethane, Acetic Acid, Nitric Acid, Chloroform, Fluorine, Furfural, Propanol, Phosphoric Acid, Brine, Alcoholic beverages (Sake, Wine etc.), Soy Sauce * Can also transfer all liquids permitted for the standard type, G-Type and AS-Type

* Corrosive fluids are not permitted. Before transferring a liquid, always take usage conditions and environmental conditions under consideration.

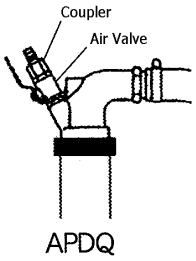
6. Safety precautions

⚠ DANGER!	• The pump has been designed to deliver/collect (according to the type) liquids stored in drum cans, by utilizing air pressure. Please do not use the device for any other purpose. • Use the product with drum cans with sheet thickness of **at least 1.2 mm**. • APD Series: Supply the device with air pressure of up to1 MPa. • APDQ, APDX Series: Supply the device with air pressure of up to 0.7 MPa. In case of higher supply air pressure, decompress the air: to 1 MPa (APD Series) or 0.7 MPa (APDQ, APDX Series) level. Not doing so may result in regulator's malfunction and damaging the drum can. • Drum can's inner pressure should be kept at 0.05 MPa level. Higher pressure may result in damaging the drum can. • Before transferring the liquid, it is advised to carefully read information on that liquid's use. Also, please remember to use protection equipment. • In case of direct contact with liquid (ingestion, skin contamination etc.), immediately proceed with safety procedures and seek medical attention. • Connect the ground wire to pump's main body and nozzle, especially when using the device in hazardous areas and/or transferring inflammable or explosive liquids (ground wire is included for G, GN, AS, ASN, SUS and SUSN types). Do not use fire while operating the device. • The regulator and safety valve are already correctly set for safe usage. Do not manipulate them. • When the level of fluid in drum can becomes low, the air is also sucked by the pump and leaves the system with the rest of the fluid through the delivery hose. Do not leave the hose immersed as the air coming out may splash the liquid. • Once you have finished using the device, remember to close the air valve and open the P-cock to restore normal pressure inside of the drum can. • Please use only provided dedicated tools to attach and detach the adapter (APD Series).
⚠ WARNING!	• Keep the equipment away from children. • If suddenly you feel worse while operating the pump, immediately discontinue the operation and seek medical attention. • Remember to wear protection clothes and equipment according to the liquids safety instructions.

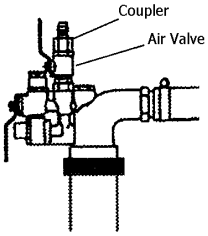
- Service (repair) related matters are restricted to experts. Do not repair the device on your own.
- When changing the liquid you are going to transfer, always carefully clean the pump out of the liquid transferred before. Not doing so may lead to dangerous chemical reactions.

⚠ CAUTION!

- When the device stops operating or operates in a strange manner, immediately turn off the device and contact technical service. Do not use broken equipment, as it may result in accidents.
- After using the pump, remove the leftover fluid from device's main body. Leftover liquid may cause corrosion and decrease pump's performance.
- Do not cause shock to device's main body. It may result in pump's malfunction, breakdowns and leakage.
- APDQ_and APDX Series models are originally equipped with an air pressure regulator thread for max 7 kg/cm^2 (#7 as shown in Table 2). If utilized pressure is lower, please change the thread according to information in Table 2:



APDQ



APDX

Utilized Pressure (max)	Pressure Regulator's Thread
7 kg/cm^2 max	#7 (Carved Seal 7)
6 kg/cm^2 max	#6 (Carved Seal 6)
5 kg/cm^2 max	#5 (Carved Seal 5)
4 kg/cm^2 and below	N/A

- When willing to transfer liquids, which should not come in contact with water, use an air dryer to absorb the moisture from compressed air.
- It is possible to transfer liquids contaminated by sludge or metal particles of size no larger than 7~8 mm.
- When you have finished using the device, remember to close the air valve.

* Please remember, that the safety measures and warnings pointed out in this manual are not exhaustive for all possible situations. Although we have designed our product to be as safe as possible, persons operating and maintaining the device should strictly follow all safety rules in the operation/maintenance area.

BY ALL MEANS USE AN AIR FILTER, WITH AN OPTIONAL AIR DRYER ATTACHMENT

7. Usage instructions

APD Series (Delivery type)

① Fix the adapter firmly to drum cans' outlet (PF2). Please use dedicated tools.

② Insert pump's main body (suction pipe) into the adapter until you can't insert it any further.

③ Fasten the cap nut firmly. If you find it difficult to fasten the cap nut, use dedicated tools.

④ Close the air valve.

⑤ Close the delivery valve.

⑥ Close the P-cock.

⑦ Attach a compressor to the hi-coupler 20PM.

⑧ Attach the ground wire (Models G, GN, AS, ASN, SUS, SUSN).

⑨ Opening the air valve will let compressed air (1 MPa max) into the pump. Make sure, that pressure meter shows value of 0.05 MPa (0.5 kgf/cm^2) or less.

⑩ Opening the delivery valve (and pulling gun nozzle's lever) will begin the delivery. When the liquid in drum can runs low, the air will come mixed with liquid out of the delivery line.

⑪ Closing the delivery valve (and releasing gun nozzle's lever) will stop the delivery.

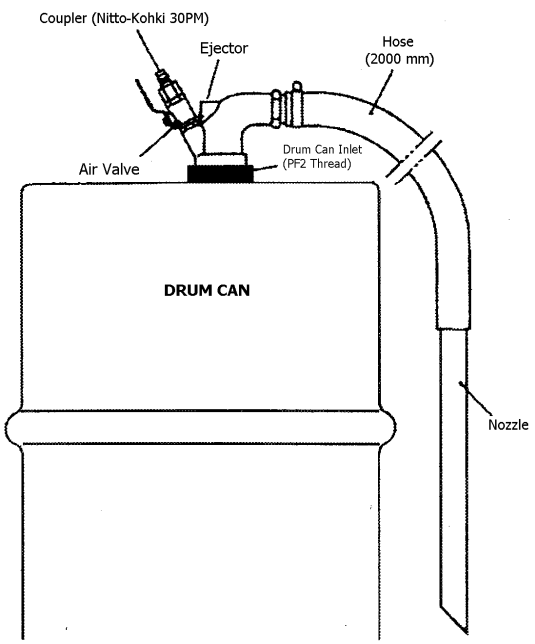
⑫ **Close the air supply valve and open the P-cock (on the back of the pressure meter) to restore normal pressure in the drum can.**

⑬ Remove pump's body from the drum can and clean it.

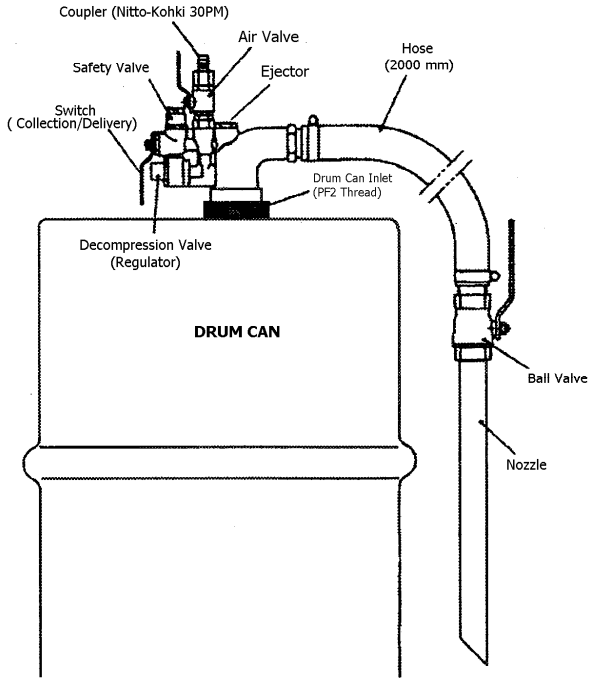
After using the pump, remember to close all the valves.

* There is a Nitto Kohki's Hi-Coupler 20PM attached to APD Series models. Please attach a 17, 20, 30, or 40-type socket to the compressed air line.

APDQ Series (COLLECTION)



APDX Series (COLLECTION/DELIVERY)



Before using the pump, you may need to change air regulator's thread (refer to "safety precautions" for more details).

APDQ (Collection-type)

① Insert pump's main body into the drum can's inlet and fix it firmly to prevent leakage. Close the drum can's vent (small opening) tightly.
② Close the air valve (set the lever in a horizontal position).
③ Connect the compressor to the coupler.
④ Opening the air valve (setting the lever/switch in a vertical position) will begin the suction.
⑤ Once the drum can becomes full, the float ball will block the suction line and suction will automatically stop.
⑥ Close the air valve. If the tip of the hose is at that time lower than drum can, the liquid may come out of the hose. Please be careful.

APDX (Collection/delivery-type)

Steps ①, ② and ③ are the same as for APDQ-type.

④ Close the ball valve (set it perpendicularly to the nozzle).
⑤ Set the collection/delivery lever (switch) in the IN (suction, collection) or OUT (dispensation, delivery) position.
⑥ Open the air valve.
⑦ Opening the ball valve and:
- Setting the lever (switch) in the IN position will begin suction.
- Setting the lever (switch) in the OUT position will begin dispensation.
  When the liquid in drum can runs out, air mixed with the rest of the liquid will come out of the delivery line.

⑧ Close the ball valve. If you have set the lever (switch) in the IN position, closing the ball valve should prevent reverse liquid flow.
⑨ Close the air valve.
⑩ When the lever is set in the OUT position, **drum can air's decompression should be performed by using the IN/OUT switch and after closing the air valve** (when the lever (switch) is set in the IN position, the air is ejected so the pressure in drum can remains normal).

APDQ, APDX

① A strainer is inserted into the air-coupling plug. Dirt may accumulate on the inner strainer, reducing device's performance. Remember to occasionally clean the strainer with soapy water.

② Keep the float ball and its duct clean. Dirt may accumulate on float ball's surface, preventing the ball to function properly. In result, the liquid may leave the system through the ejector.

8. Regulator's (decompression valve/compressed air valve) setup and usage.

Originally, at compressor's pressure of 0.7 kgf/cm2, the regulator is set to stabilize drum can's inner pressure to 0.5~0.6 kgf/cm (2.5 rotation from the 'closed' state). In case the regulator has been or became deregulated, please do the following:

Setting up the regulator – SMC AR25

① If you can't rotate the regulator's handle, it means it's locked. To unlock it, pull it up once.

② Rotating the handle right increases pressure. Rotating the handle left decreases pressure.

③ Operate the handle manually. Do not use any tools as they may damage the handle and cause an accident.

④ Pressing the handle locks it. When experiencing troubles while locking the handle, rotate it slightly left and right, and press it.

⑤ Check the pressure after setting the regulator.

⑥ Always set the pressure lower than the original setting (max 85% of the original setting).

* To deal with the leftover pressure, open the P-cock. Simply disconnecting compressed air supply will not restore drum can's normal pressure.

9. Changing the O-Ring for APD-20 (25) AS

APD 20 (25) AS models are originally equipped with a Viton (fluoro-rubber) o-ring. According to the liquid you are going to transfer, you may need to change the o-ring to a one made from EPT. Please refer to the table below. (Perfluoro o-ring is a special, optional product - please contact us for more information)

O-Ring for APD20 (25). Solvent and chemical resistance.

O-Ring's Size: G45

Viton: Fluororubber

EPT: Ethylene propylene rubber

Perfluoro: Teflon Substitute

Liquid	O-Ring's Material		
	Originally installed (Viton)	Spare (EPT)	Optional (Perfluoro)
Acetone	×	○	○
Ammonia	×	○	○
Ethyl Chloride	×	○	○
Ethylene Chloride	○	×	○
Methylene Chloride	△	×	○
Gasoline	○	×	○
Chrome Plating Liquid	○	○	○
Chromic acid 10% max	○	×	○
Light oil, diesel oil	○	×	○
Kerosene	○	×	○
Acetic Acid 10%	○	×	○
Acetic Acid 25%	×	○	○
Acetic Acid 50% max	○	×	○
Ethyl Acetate	×	○	○
Sodium Hypochlorite 20% max	○	○	○
Heavy Oil	○	×	○
Sodium Hydroxide 10~30%	×	○	○
Sodium Hydroxide 50%	○	×	○
Trichloroethylene	○	×	○
Toluene	○	×	○
Hexane	○	×	○
Benzine (naphtha)	○	×	○
Methanol	○	○	○
Methyl Ethyl Ketone (MEK)	×	○	○

○ = Resistant △= Conditionally resistant × = Not resistant

* For information on other liquids, please contact us.

* The list above does not contain information on liquids corrosiveness, as it may vary with temperature and liquid's contamination or mixture. Please be careful.

* If a liquid from the 'resistant' group leaks out during device's operation, immediately stop the device.

*There are parts made of plastic in the regulator. Please take both transferred liquid's properties and environmental conditions under consideration. Do not expose the device to direct sunlight.

10. Troubleshooting

If the pump operates in a strange manner, immediately turn it off and carefully read the troubleshooting section below:

APD, APDX

Delivery (OUT)

Symptom	Make sure that. . .
The liquid is not delivered at all.	● Suction pipe is not blocked. ● Compressed air supply is properly connected. ● Drum can is tightly closed. ● Drum can and hose are not damaged. ● The valves are open.
The delivery rate is very low.	● Suction pipe is not blocked. ● Drum can's inner pressure is not too low (the device is originally set up to stabilize pressure at 0.05 MPa) ● Compressed air supply's pressure is not too low. ● Valves are fully open. ● Liquid's viscosity is not too high. ● The P-cock is tightly closed.
The drum can is deforming.	● Drum can's inner pressure is not too high (the device is originally set up to stabilize pressure at 0.05 MPa). ● The drum can is durable enough (please refer to safety precautions).

APDQ, APDX

Collection (IN)

Symptom	Make sure that…
There is no suction at all.	● The compressor is properly connected to the pump. ● The drum can is tightly closed.
The suction rate is very low.	● Regulator's threads are suitable. ● The drum can and the hose are not damaged. ● The hose and the nozzle are not blocked. ● The switch is properly set into the IN position. ● The strainer is clean. ● Liquid's viscosity is not too high.
The drum can is deforming.	● Compressed air supply's pressure is not too high. (7 kg/cm^2 max). ● Regulator's threads are suitable. ● The drum is durable enough (refer to safety precautions).

If you are unable to solve the problem with the device, please contact the vendor, or AQUASYSTEM Co., Ltd.

AQUASYSTEM CO., Ltd.

1-3-1 K-1 Kyo-machi, Hikone-shi,
Shiga-ken, JAPAN 522-0081
Phone: +81-749-23-9123
Fax: +81-749-23-9130

AQUA
SYSTEM CO.,LTD.