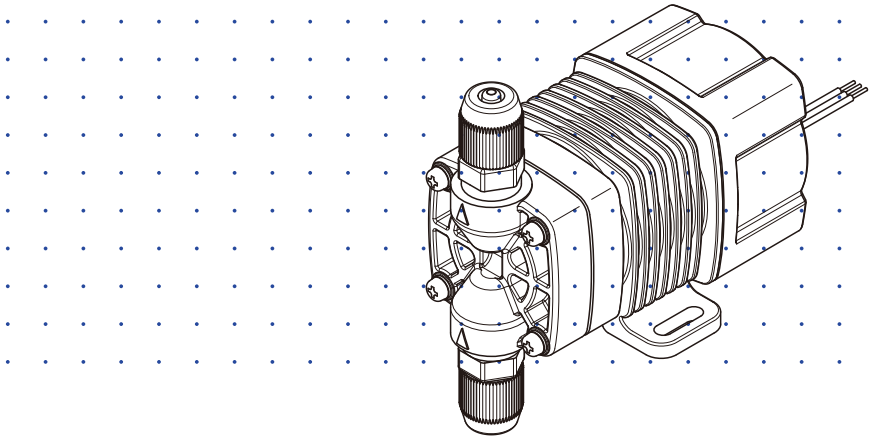
Iwaki Hi-Resolution Pump

HRP (Standard)



Instruction manual

Thank you for choosing our product.

Please read through this instruction manual before use.

This instruction manual describes important precautions and instructions for the product. Always keep it on hand for quick reference.

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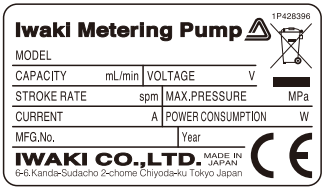
Order confirmation

Open the package and check that the product conforms to your order. If any problem or inconsistency is found, immediately contact your distributor.

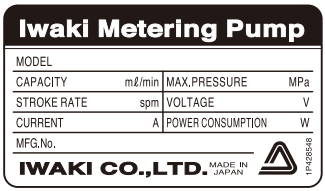
a. Check if the delivery is correct.

Check the nameplate to see if the information such as model codes, discharge capacity and discharge pressure are as ordered.

*The CE marking on our product(s) is for us to market the product(s) into the European market, however, the CE marking does not ensure any safety or conformity of the product(s) outside the European market.
When the pump is incorporated into the equipment marketed in the European market, such equipment must meet all the requirements of applicable directives.
In such a case, any person who places the equipment on the market must carry a CE mark on the equipment as a manufacturer.



Spec label for the European market



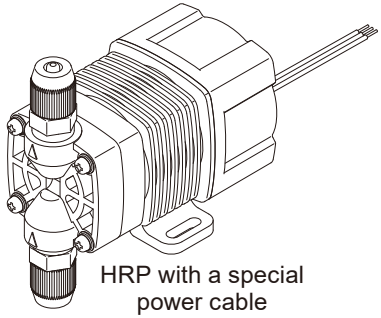
Spec label for any area other than the European market

b. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

c. Check for loose screws.

Delivery should include:



HRP with a special power cable



Instruction manual

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Safety instructions

Read through this section before use. This section describes important information for you to prevent personal injury or property damage.

■ Symbols

In this instruction manual, the degree of risk caused by incorrect use is noted with the following symbols. Please pay attention to the information associated with the symbols.

⚠ **WARNING**	Indicates mishandling could lead to a fatal or serious accident.
⚠ **CAUTION**	Indicates mishandling could lead to personal injury or property damage.

A symbol accompanies each precaution, suggesting the use of "Caution", "Prohibited actions" or specific "Requirements".

Caution marks		Prohibited mark		Requirement mark		
						
Caution	Electrical shock	Prohibited	Do not rework or alter	Requirement	Wear protection	Grounding

⚠ Export Restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control.

Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

⚠ WARNING

Turn off power before service

Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.


Electrical shock

Stop operation

If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.


Requirement

Do not use the pump in any condition other than its intended purpose

The use of the pump in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.


Prohibited

Do not modify the pump

Alterations to the pump carry a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the pump.


Do not remodel

Wear protective clothing

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.


Wear protectors

Do not damage the power cable

Do not pull, knot, or crush the power cable. Damage to the power cable could lead to a fire or electrical shock if cut or broken.


Prohibited

Do not operate the pump in a flammable atmosphere

Do not place explosive or flammable material near the pump.


Prohibited

⚠CAUTION

Qualified personnel only

The pump should be handled or operated by qualified personnel with a full understanding of the pump. Any person not familiar with the product should not take part in the operation or maintenance of the pump.


Requirement

Use specified power only

Do not apply power other than that specified on the nameplate. Otherwise, failure or fire may result. Ensure the pump is properly grounded.


Prohibited

Do not run pump dry

Do not run pump dry for more than 30 minutes (even when the pump runs for degassing). Otherwise, the pump head fixing screws may loosen and liquid may leak. Optimise your system. If the pump runs dry for a long period (for more than 30 minutes), the pump head and the valve guide may deform by friction heat and consequently leakage results.


Caution

Keep electric parts and wiring dry

Risk of fire or electric shock. Install the pump where it can be kept dry.


Prohibited

Ventilation

Fumes or vapours can be hazardous with certain solutions. Ensure proper ventilation at the operation site.


Caution

Do not install/store the pump:

- In a flammable atmosphere.
- In a dusty/humid environment.
- Where ambient temperature can exceed 0-40ºC.
- In direct sunlight or wind & rain.
- When ambient humidity can exceed 85%RH.

Protect the pump with a cover when installing it out of doors.


Prohibited

Spill precautions

Ensure protection and containment of solution in the event of plumbing or pump damage (secondary containment).


Requirement

Observe the correct polarity

Otherwise the pump may fail.


Caution

Do not use the pump in a wet location

The pump is not waterproof. Use of the pump in wet or extremely humid locations could lead to electric shock or short circuit.


Prohibited

Preventative maintenance

Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.


Requirement

Do not use a damaged pump

Use of a damaged pump could lead to an electric shock or death.


Prohibited

Disposal of a used pump

Dispose of any used or damaged pump in accordance with local rules and regulations. If necessary, consult a licensed industrial waste disposal company.


Requirement

Check pump head bolts

Liquid may leak if any of the pump head bolts become loose. Tighten the bolts diagonally and evenly by the following torque before initial operation and at regular intervals (once a three month).

Tightening torque: 0.7 N•m

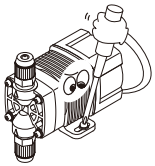

Caution

Precautions for use

- Electrical work should be performed by a qualified electrician. Otherwise, personal injury or property damage could result.

Caution

- Select a level location, free from vibration, that won't hold liquid. Anchor the pump with four M4 bolts so it doesn't vibrate. If the pump is not installed level, output may be affected.



- When two or more pumps are installed together, vibration may be significant, resulting in poor performance or failure. Select a solid foundation (concrete) and fasten anchor bolts securely to prevent vibration during operation.

Requirement

- Allow sufficient space around the pump for easy access and maintenance.

Caution

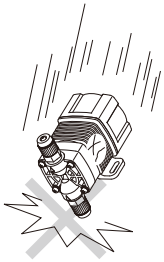
- Install the pump as close to the supply tank as possible.

Caution

- When handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution), install the pump in a cool and dark place. Flooded suction installation is strongly recommended.

Caution

- Use care handling the pump. Do not drop. An impact may affect pump performance. Do not use a pump that has been damaged to avoid the risk of electrical damage or shock.



- The pump has a rating of IP65 equivalent, but is not waterproof. Do not operate the pump while wet with solution or water. Failure or injury may result. Immediately dry off the pump if it gets wet.

Caution

- Do not close discharge line during operation. Solution may leak or piping may break. Install a relief valve to ensure safety and prevent damaged plumbing.

Caution

- Do not remove the control unit. Note that an applicable control unit differs with each drive unit. Do not attach a control unit to a different drive unit. Otherwise, an electrical circuit or the drive unit may fail.

Caution

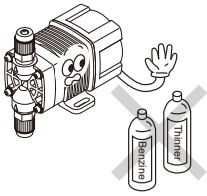
- Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.

Requirement

- Wear protective clothing when handling or working with pumps. Consult solution SDS for appropriate precautions. Do not come into contact with residual solution.

Caution

- Do not clean the pump or nameplate with a solvent such as benzine or thinner. This may discolour the pump or erase printing. Use a dry or damp cloth or a neutral detergent.



- In accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), this product features the crossed-out wheelie bin symbol. When this product is disposed of in household wastes, toxic components included in it can cause major environmental and human health problems. Use appropriate waste collection systems for recovery and recycling. Contact your local distributor or nearest Iwaki company for the detailed collection systems.



Overview

Pump characteristics, features and part names are described in this section.

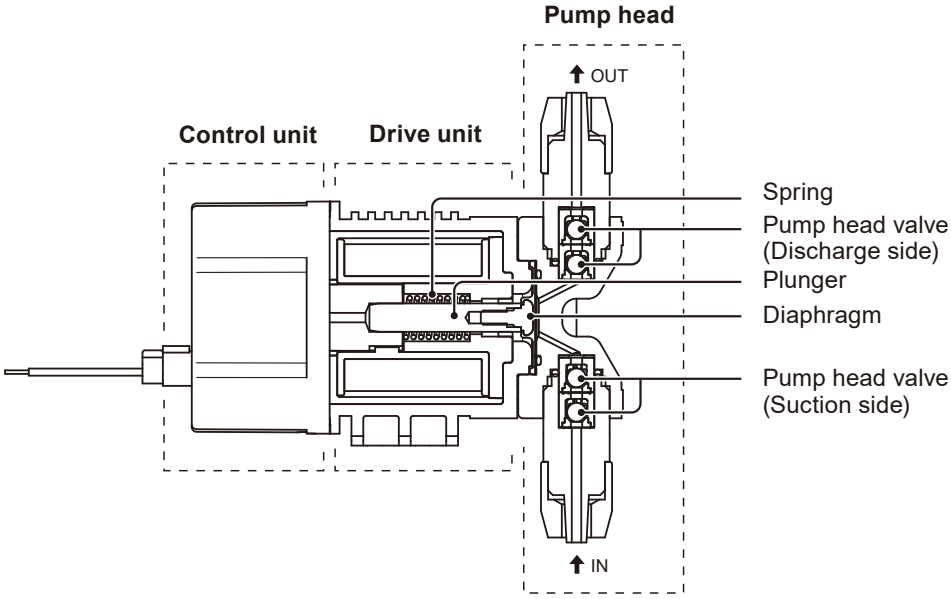
Introduction

Pump structure & Operating principle

The HRP series is a diaphragm metering pump which consists of a pump head, drive unit and control unit. A diaphragm is directly driven by electromagnetic force.

Principle of operation

The pulse signal controls the electromagnetic force and spring force in order to make reciprocating motion. The reciprocating motion is transferred to a diaphragm through a plunger and then volumetric change occurs in the pump head. This action transfers liquid along with pump head valve action.



Features

12/24VDC power voltage

The HRP series powered by 12VDC or 24VDC offers the best fit to the built-in application.

High resolution

Digitally-controlled spm range is 0-720spm. The minimum flow of 0.055ml per stroke offers a constant imperceptible injection.

*The operation speed of the stop control type is always fixed to 720spm and is not variable.

Waterproof and dustproof structure

The sealed drive unit and control unit assure IP65 equivalent.

*This pump is not waterproof. Protect the pump with a cover when installing it out of doors.

Operational function

The HRP pump is controlled by the external signal and falls into the following types.

Pulse control type (see page 27)

The input of the pulse signal controls the pump operation (stroke rate).
The pump makes one stroke per pulse synchronously.

*The signal input is required to make operation after power activation for this type.

*The pump can not run over 720spm even if the external signal is entered to run the pump beyond the maximum spm.

4-20mA control type (see page 27)

The input of 4-20mA proportionally controls the pump operation (stroke rate).

*The signal input is required to make operation after power activation for this type.

1-5V control type (see page 28)

The input of 1-5V proportionally controls the pump operation (stroke rate).

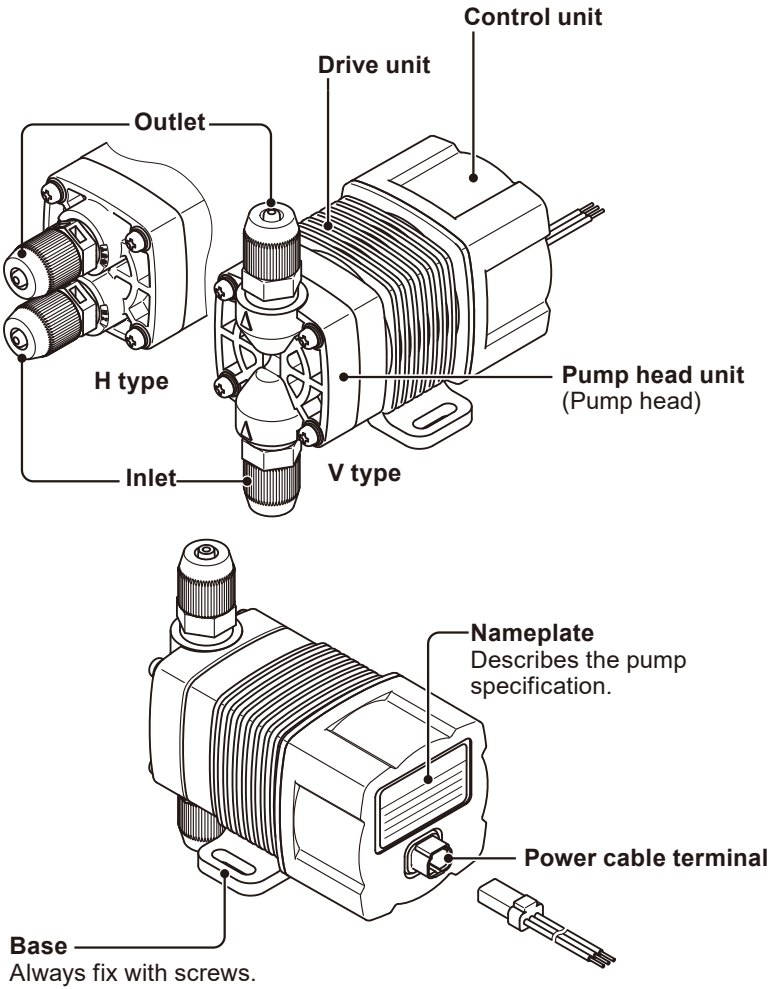
*The signal input is required to make operation after power activation for this type.

Stop control type (see page 28)

The input of the stop signal suspends the pump operation.

*This type of pump starts to run at 720spm upon power activation.

Part names


Control unit
Drive unit
Outlet
H type
Pump head unit
(Pump head)
Inlet
V type
Nameplate
Describes the pump specification.
Power cable terminal
Base
Always fix with screws.

Identification codes

The model code represents the following information.

HRP - 5 4 V - 1 P 1 - _ _
a b c d e f g h

a. Series name
HRP: High resolution pulse pump

b. Drive unit (average power consumption)
5: 5.6W

c. Discharge capacity
4: 38mL/min

d. Pump head
V: Vertically oriented H: Horizontally oriented

e. Power voltage
1: 12VDC
2: 24VDC

f. Control method
P: Pulse control A: 4-20mA control V: 1-5V control S: Stop control

g. Connection bore

No.	Tube connection bore
1	ø3×ø6mm
2	ø4×ø6mm
3	ø1/8"×ø1/4"

h. Special version

Wet end materials

Pump head	Valve	O ring	Valve seat	Valve spring	Gasket	Diaphragm
PVDF	Alumina ceramic	FKM	FKM	PEEK (H type only)	PTFE	PTFE (bonded to EPDM)

*Valve springs are equipped to the H type only.

Material code

PVDF: Polyvinylidene difluoride FKM: Fluorine-contained rubber
PTFE : Polytetrafluoroethylene PEEK: Polyetheretherketone

Installation

This section describes the installation of the pump, tubing and wiring. Read through this section before work.

Observe the following points when installing the pump.

- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.
- If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.
- Do not place explosive or flammable material near the pump.
- Do not use a damaged pump. Use of a damaged pump could lead to an electric shock or death.

Pump mounting

Select an installation location and mount the pump.

Necessary tools

- Two M4 screws (pump fixing)
- Two plate washers (pump fixing)
- Phillips screwdriver

*Use chemical resistant tools as necessary.

1 Select a suitable place.

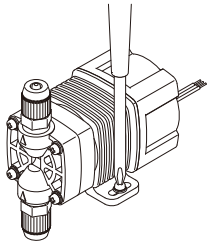
Always select a flat floor free of vibration. See page 9 for detail.
Flooded suction is recommended when handling a gaseous liquid such as sodium hypochlorite.

2 Fix the pump by M4 screws.

Be sure to fix the pump at two points.

NOTE

Select a level location. If the pump is not installed level, output may be affected.



Plumbing

Connect tubes to the pump and install a check valve.

Before operation

- Select proper chemical resistant tubes.
- The tubes should resist liquid temperature and pressure.
- Cut the tube ends flat.

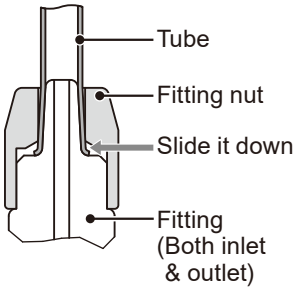
Tube end (side view)



Tube connection

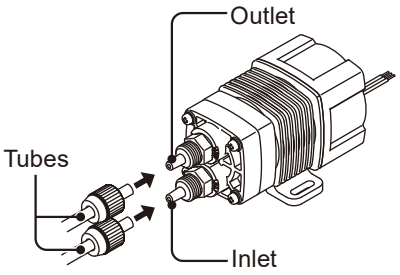
Pass a tube into the fitting nut and slide down the tube onto the fitting. Then hand tighten the fitting nut until it bottoms out.

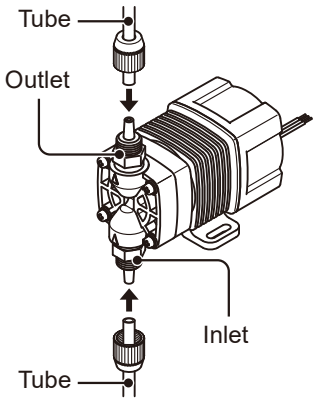
*The fitting nut is made by plastics and may be broken if it is tightened too much.



1 **Connect tubes into the inlet and outlet.**

*Be careful not to bend a tube completely.

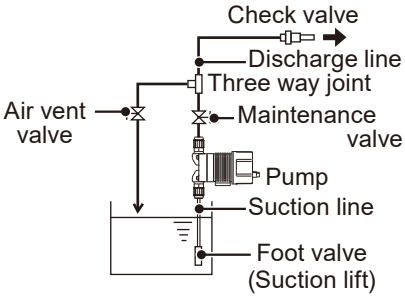




NOTE

Air vent valve mounting

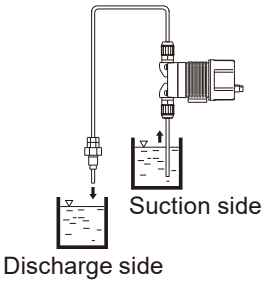
- Install valves on both suction and discharge lines for the convenience of maintenance.
- Install a three-way joint on the discharge line close to the pump to lay on an air vent line.
- Keep a distance between the suction tube end and the tank bottom.
- In the suction lift application, install a foot valve for the prevention of a back flow at pump stop. A filtering foot valve is also available to prevent deposits and foreign matters from entering.



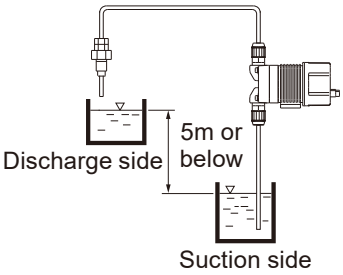
Check valve mounting

Install an optional check valve to the pump for the prevention of a back flow, siphon and overfeeding.

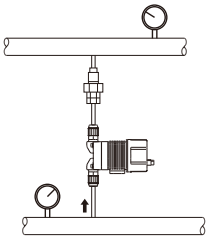
- A suction side liquid level is higher than a discharge side or an injection point at atmospheric pressure (siphon).



- A discharge side liquid level is higher than a suction side but the distance is 5m or below (overfeeding).



• Suction line pressure is higher than discharge line pressure (siphon or overfeeding).

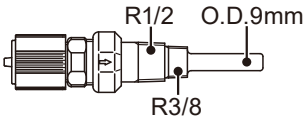


1 Mount the optional check valve at the discharge tube end.

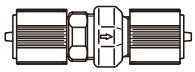
*The CA check valve has R1/2 and R3/8 thread connections as well as an O.D. 9 mm tube connection. Cut off an unused part and adjust the connection length as necessary.

*The CBN check valve (both ends tube connections) is optionally available. Contact us or your nearest distributor.

CA check valve



CB check valve

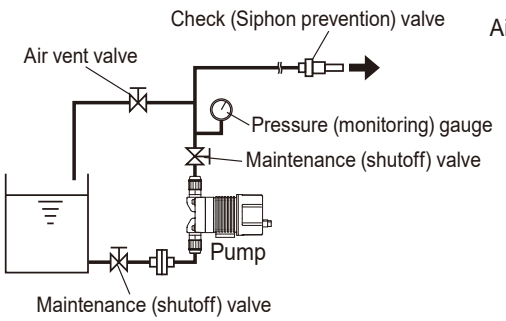


NOTE

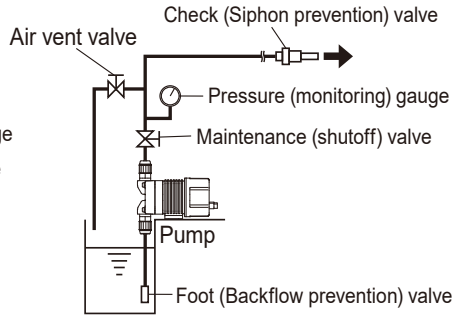
Periodically clean or replace a check valve with new one for the prevention of crystal clogging, especially when using sodium hypochlorite.

Tubing layout

Flooded suction application



Suction lift application



NOTE

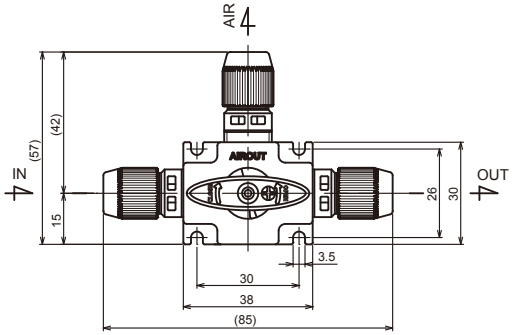
Flooded suction installation is strongly recommended when handling liquids that generate gas bubbles (sodium hypochlorite or hydrazine solution).

AVC check valve with an air vent (Option)

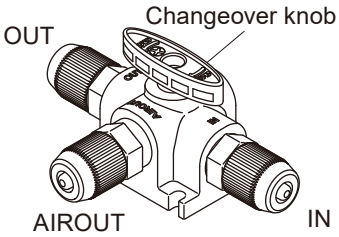
AVC check valve is designed for being used with the HRP and works for both back-flow check and bleeding.

■ Specification

Model	Set pressure	Tube connection bore
AVC-FC1	0.1MPa	ø3×ø6mm
AVC-FC2		ø4×ø6mm
AVC-FC3		1/8"×1/4"



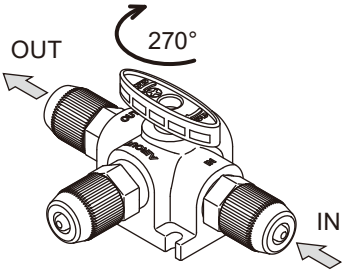
AVC air vent check valve



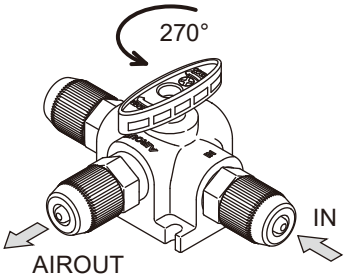
■ Back-flow check/Bleeding changeover

Select either function by rotating the changeover knob.

*The knob can rotate up to 270 degrees. A stopper is provided to determine the rotation limit of the knob.



Back-flow check



Bleeding



NOTE

Do not use excess force. The stopper screw may break.

Wiring

Wiring for the power source, earthing and external signal.

Observe the following points during wiring work.

- Electrical work should be performed by a qualified electrician. Always observe applicable codes or regulations.
- Observe the rated voltage range, or the electrical circuit in the control unit may fail.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.
- Replacement of the power cable should be conducted by a manufacturer, his agency or a skilled person. Otherwise, an accident may result.
- Observe the correct polarity.
- Always use the attached triplex cable.
- Do not extend cable length more than 10m.
- Do not lay on the cable out of doors.

Power & External signal cables

Before work

- Check that the main power is turned off.
- Wait for one minute to start wiring work. The internal pump is still electrically charged right after power is turned off.

Applicable power cable

Use the attached triplex cable.

Triplex cable: UL3265 AWG22

Pink: +12VDC/+24VDC

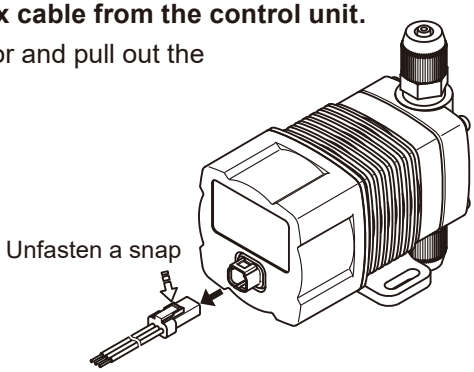
Black: GND

White: EXT

*The attached triplex cable is designed for the HRP. Do not use another cable.

1 Remove the attached triplex cable from the control unit.

Unfasten a snap-fit connector and pull out the cable.



2 Connect power and external signal wires.

Observe the correct polarity.

Allocate pink and black wires for the power, and white and black wires for the external signal.

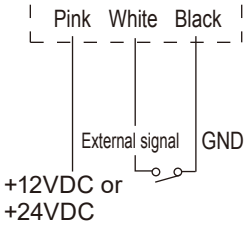
The black wire is common.

Wiring diagram

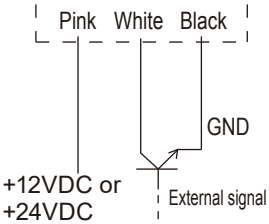
Pulse control type or Stop control type

The external signal should be either the no-voltage contact signal or open collector signal.

No-voltage contact signal



Open collector signal

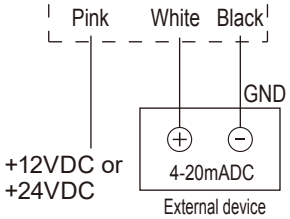


*Pulse width should be 10 - 50ms. The number of pulses should be 720 per minute or below.

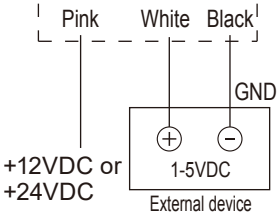
4-20mA control type or 1-5V control type

Note that white wire is positive and black wire is negative.

4-20mA control type



1-5V control type

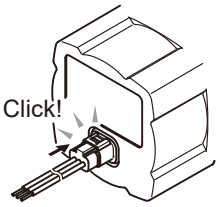


NOTE

- Secure correct polarity. Otherwise, pump failure may result.
- The external device for the 1-5V control type should have the current capacity of 25mA or more.

3 Attach the triplex cable to the control unit.

Push the snap-fit connector until it clicks one time.



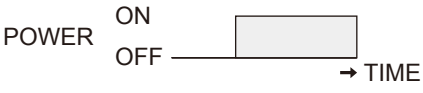
NOTE

- Always check the cable has been correctly secured to the control unit. Otherwise spilled chemicals may enter the inside of the pump.

NOTE

• Energize the pump with a power voltage via a mechanical relay or switch. Do not fluctuate the voltage, or CPU may malfunction.

Apply power sharply



Do not apply gradually



• Do not lay on these signal cables in parallel with a power cable. Otherwise the electromagnetic induction noise is generated and malfunction or failure may result.
• The following products are the recommended SSRs (Solid State Relays) for signal input. Any other SSRs may cause malfunction. See manufacturer's information for details on these SSRs.
  –OMRON G3FD-102S or G3FD-102SN
  –OMRON G3TA-IDZR02S or G3TA-IDZR02SM
• When using a mechanical relay for signal input, its minimum application load should be 5mA or below.

Precautions for ON-OFF control by a mechanical relay

The pump is equipped with a CPU. To ensure the CPU to work properly, always start/stop the pump by the STOP signal for ON-OFF control. Try not to turn on and off the main power. Otherwise, observe the following points:

• Ensure the minimum OFF time of 10 minutes.
• The contact capacity of a mechanical relay should be 5A or more. Or a contact point may break.
• If the contact capacity of a mechanical relay is 5A, the maximum allowable number of times the power is turned ON/OFF is limited to 150,000. Use the contact capacity of 10A or more when the actual number of times is over 150,000 or when sharing a power source with a large capacity equipment which may cause a surge voltage and damage a contact point.
• Use a solid state relay (SSR) as necessary (such as the OMRON G3F). See manufacturer's catalogues for detail.

Operation

This section describes pump operation and setting.
Run the pump after pipework and wiring is completed.

Before operation

Check a flow rate, tubing and wiring. And then perform degassing and flow rate adjustment before starting operation.

Points to be checked

Before operation, check if:

- Liquid level in a supply tank is enough.
- Tubing is securely connected and is free from leakage and clogging.
- Discharge/suction valves are opened.
- A power voltage is in the allowable range.
- Electrical wiring is correct and is free from the risk of short circuit and electrical leakage.

Retightening of pump head fixing bolts

Important

The pump head fixing bolts may loosen when plastic parts creep due to temperature change in storage or in transit, and this can lead to leakage. Be sure to retighten the bolts evenly to the specified tightening torque below in diagonal order before starting operation.

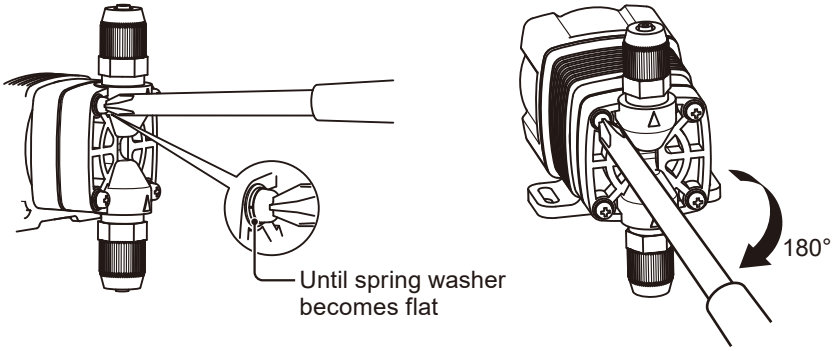
Tightening torque

Torque	Screw
0.7 N•m	M3 screw

*Tighten the fixing screws once every three months.

Use of a Phillips screwdriver instead of a torque driver

Hand tighten the fixing screws until the sprig washer becomes flat. Further turn the screws clockwise 180 degrees.



Degassing

The gas needs to be expelled from the pump and tubing by degassing. Expected performance can not be obtained with gas in the pump. Perform degassing in the following cases.

- When the pump starts to run for the first time
- When the flow rate is too low
- After liquid is replaced in the supply tank
- After a long period of stoppage
- After maintenance and inspection

NOTE

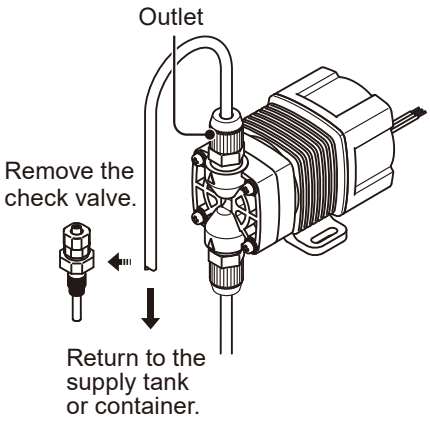
- Both gas and chemical come out together through an air bleed tube. Place the end of the tube in a supply tank or a container.
- Some chemicals may cause skin trouble or damage component parts. When your hand or component parts get wet with chemical liquid, wipe off immediately.

Install an air vent valve or AVC check valve on piping for degassing. Follow the procedure below to conduct degassing in case neither valve is available.

1 **Connect a discharge tube and place the tube end in the supply tank or another container.**

*Remove the check valve from the discharge tube if it is installed.

*When resuming the pump operation after liquid replacement in the supply tank or after a long period of stoppage, the internal pressure may remain in the pump or tubing. Removing the check valve at this state, liquid may gush out. Wrap a waste cloth around the check valve connection for the prevention of gushing.



2 **Turn on power.**

Run the pump by the external signal.

*Run the pump at 600spm or more. Otherwise it takes longer time for the pump to expel gas.

3 **Stop the pump.**

4 **Check that gas has been expelled from the pump head and liquid is pumped. Then reconnect the discharge tube to tubing system.**

5 **Check connections for leakage.**

Degassing has now been completed.

Operation

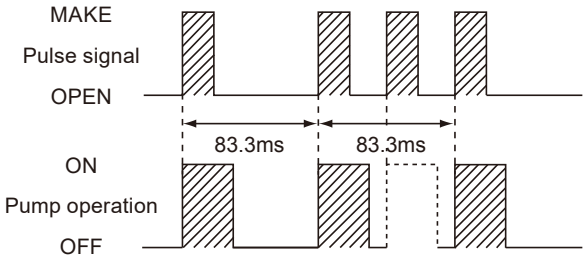
This pump is controlled by the external signal. Read through this section for proper operation.

■ Operation of the Pulse control type

The input of the pulse signal controls the pump operation (stroke rate).

The pump makes one stroke per pulse synchronously.

*The signal input is required to make operation after power activation for this type.
*The pump can not run over 720spm even if the signal is entered to run the pump beyond the maximum spm.
*Pulse width should be 10 - 50ms. Pulse period should be 83.3ms or more.

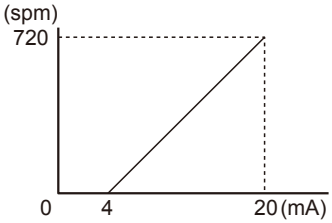


■ Operation of the 4-20mA control type

The input of 4-20mADC proportionally controls the pump operation (stroke rate).

A stroke rate decreases to 0spm at 4mADC and increases to 720spm at 20mADC.

*The signal input is required to make operation after power activation for this type.
*An input current should be in between 4 to 20mADC and should not exceed the range.

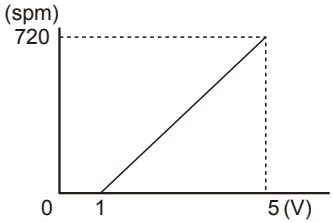


■ Operation of the 1-5V control type

The input of 1-5VDC proportionally controls the pump operation (stroke rate).

A stroke rate decreases to 0spm at 1VDC and increases to 720spm at 5VDC.

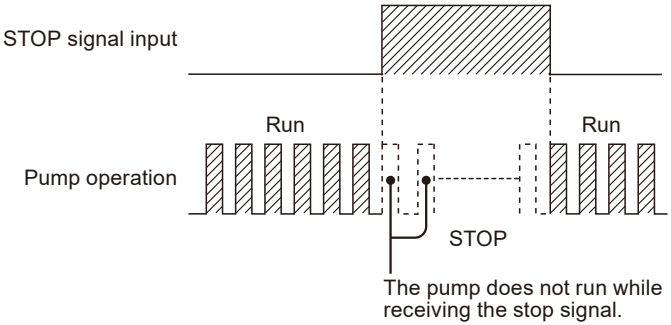
*The signal input is required to make operation after power activation for this type.
*An input voltage should be in between 1 to 5VDC and should not exceed the range.
*The external device for the 1-5V control type should have the current capacity of 25mA or more.



■ Operation of the Stop control type

The input of the stop signal suspends the pump operation.

*This type of pump starts to run at 720spm upon power activation.



Flow rate adjustment

The flow rate is adjusted by the stroke rate.

The stroke rate is indicated in spm (stroke per minutes).
A stroke rate is determined by the number of external signals.
Determine a suitable stroke rate, taking account of the pump operating condition and liquid characteristics.

The following procedure is recommended.

1 **Adjust a stroke rate to obtain a required flow rate.**

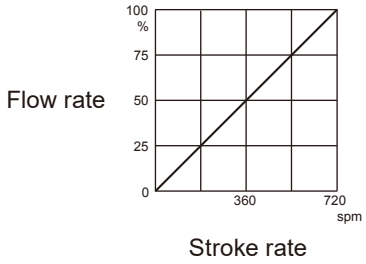
2 **Measure a flow rate.**

3 **If the flow rate is lower than a required level, increase a stroke rate and measure the flow again.**

4 **Measure the flow again to see the required flow rate is obtained.**
Repeat this procedure until it reaches the required flow rate.

■ **Relation between the flow rate & stroke rate**

0-720spm can be programmed to the HRP.
The relation between the flow rate and stroke rate is as shown below.



Maintenance

This section describes troubleshooting, inspection, wear part replacement, exploded views and specifications.

Important

- Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.

Troubleshooting

First check the following points. If the following measures do not help removing problems, contact us or your nearest dealer.

States	Possible causes	Solutions
The pump does not run.	Power voltage is too low.	• Recover the power voltage to a normal level. See page 43 for Allowable voltage deviation.
	The pump is not powered.	• Check the switch if it is installed. • Correct wiring. • Replace a breaking wire to new one.
	No signal input	• Check if the pump is receiving the external signal.
	The external signal is upset.	• See page 27.
	An electronic circuit in the control unit is failed.	• Replace the whole pump.
Liquid can not be sucked up.	Air lock in the pump	• Expel air. See page 25.
	Air ingress through a suction line.	• Correct tubing.
	A pump head unit is upside down.	• Correct its direction.

Liquid can not be sucked up.	Foreign matters are stuck in the pump head valves.	• Dismantle, inspect and clean the pump head unit. Replace as necessary.
	A ball valve is stuck on a valve seat.	
The flow rate fluctuates.	Air stays in the pump head.	• Expel air. See page 25.
	Overfeeding occurs.	• Mount a check valve. See page 17.
	Foreign matters are stuck in the pump head valves.	• Clean the pump head unit. Replace as necessary.
	A diaphragm is broken.	• Replace the whole pump.
	Pressure fluctuates at an injection point.	• Review tubing layout to maintain a pressure constant at an injection point or change an injection point in a constant pressure.
Liquid leaks.	Loose fit of the pump head unit.	• See page 24.
	A diaphragm is broken.	• Replace the whole pump.
	The discharge line pressure is too high.	• Check that a discharge line is not closed. • Check if tubing is not clogged.

Inspection

Perform daily and periodic inspection to keep pump performance and safety.

Daily inspection

Check the following points. If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.
When wear parts come to the life limit, replace them with new ones. Contact us or your nearest distributor for detail.

No.	States	Points to be checked	How to check
1	Pumping	• If liquid is pumped.	Check flow meter.
		• If the suction and discharge line pressures are normal.	Check specification.
		• If liquid is deteriorated, crystallized or settled?	Visual or audio inspection
2	Noise and vibration	• If abnormal noise or vibration occurs. They are signs of abnormal operation.	Visual or audio inspection
3	Air ingress from pump head joints or a suction line	• If leakage occurs. • If discharge liquid includes air bubbles, check lines for leakage and retighten as necessary.	Visual or audio inspection

Periodic inspection

Retighten the pump head mounting bolts every three months evenly to the following torque in diagonal order.

*Mounting bolts may loosen in operation. How fast the bolts start to loosen is depending on operating conditions.

Tightening torque

Torque	Screw
0.7 N•m	M3 screw

*A Phillips screwdriver can be used for a torque driver. See page 25.

Before a long period of stoppage (One month or more)

Clean the wet ends and tubing.

- Run the pump with clean water for about thirty minutes to rinse wet ends and tubing.
- Drain water or liquid from the pump after rinse is finished.

When the pump does not transfer liquid at resuming operation.

- Clean the wet ends by blowing air to remove foreign matters. Replace the pump head unit as necessary.
- If gas is in the pump head unit, expel gas and readjust the flow rate. See "Degassing" on page 25 and "Flow rate adjustment" on page 29 for detail.

NOTE

- Residual liquid may spatter when blowing air. Wear protective clothing as necessary.

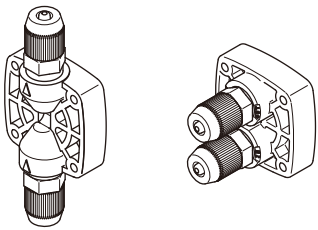
Wear part replacement

To run the pump for a long period, wear parts need to be replaced periodically. It is recommended that the following parts are always stocked for immediate replacement. Contact us or your nearest distributor for detail.

! Precautions

- Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.
- Rinse wet ends thoroughly with tap water.
- Each time wet ends are dismantled, replace the diaphragm and pump head unit with new ones.

Wear part list

	Parts		# of parts	Estimated life
Pump	Pump head unit		1	8000 hours
	O ring		1	
	Diaphragm		1	

*Wear part duration varies with the pressure, temperature and characteristics of the liquid.
*The estimated life is calculated based on the continuous operation with ambient clean water.
*The whole pump needs to be replaced once the diaphragm is broken or damaged.
*Replace the pump head unit, O ring and diaphragm at the same time.

Before replacement

First release the pressure from the pump and discharge line. Otherwise, liquid may gush out.

1 **Stop the pump operation.**

2 **Release the internal pressure.**

Open the air vent valve if it is installed. If not, see page 25.

3 **Check that liquid comes out from the air vent port and the internal pressure has been expelled.**

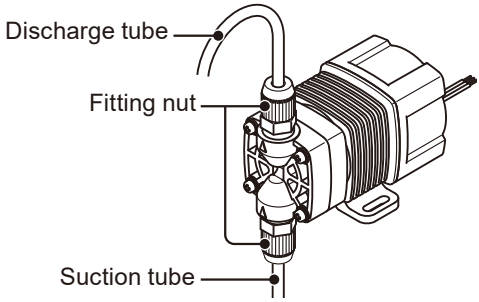
NOTE

The pressure may not be expelled completely as long as liquid does not come out. In this case run the pump until the pressure is released.

Pump head/Diaphragm replacement

Dismantlement

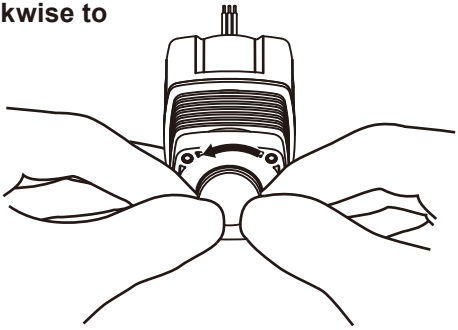
1 **Loosen the fitting nut and remove the discharge and suction tubes.**



2 **Detach the pump head unit.**

Use a Phillips screwdriver or torque driver to remove four M3 screws.

3 **Turn the diaphragm anticlockwise to detach it from the plunger.**



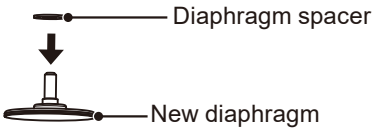
NOTE

Pay attention not to lose diaphragm spacers. Always apply a proper number of diaphragm spacers. 0 or a few diaphragm spacers are inserted between the retainer and plunger for the adjustment of diaphragm location. Note that the number of diaphragm spacers varies with pump model. Some pumps may use no spacer.

Assembly

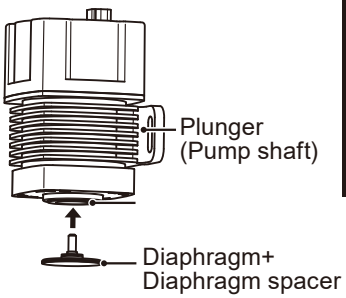
1 **Pass diaphragm spacers into the diaphragm shaft.**

Apply a proper number of diaphragm spacers.

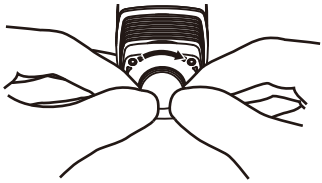


2 **Fit the new diaphragm into the plunger.**

Put the pump vertically downwards and screw the diaphragm into the plunger with the proper number of diaphragm spacers.

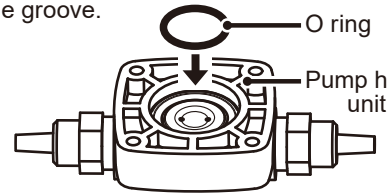


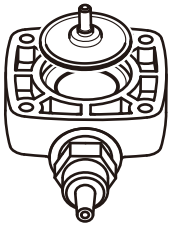
3 Turn the diaphragm clockwise to attach it to the plunger.



4 Place the O ring into the O ring groove on the pump head unit.

*Make sure the O ring does not stick out from the groove.





*When O ring can not fit in:
Place a used diaphragm on the O ring and push it down.

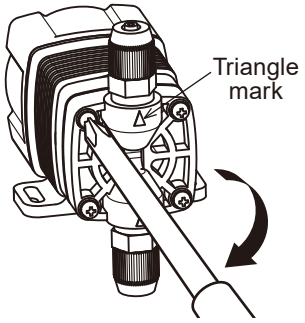
5 Attach the pump head unit.

Put a new pump head unit with a triangle mark upside. Tighten the four M3 screws to fasten the unit diagonally and evenly.

Tightening torque: 0.7N•m

*A Phillips screwdriver can be used for a torque driver. See page 25.

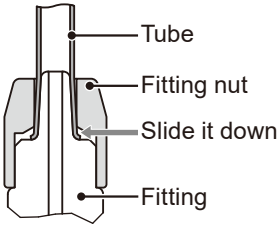
*Be careful not to strip the slot on screw heads.

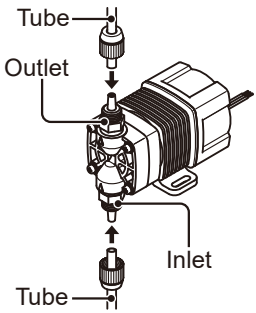


NOTE

Keep the pump head unit free from contaminations or foreign matters during work.

6 Attach the discharge and suction tubes and tighten the fitting nuts.



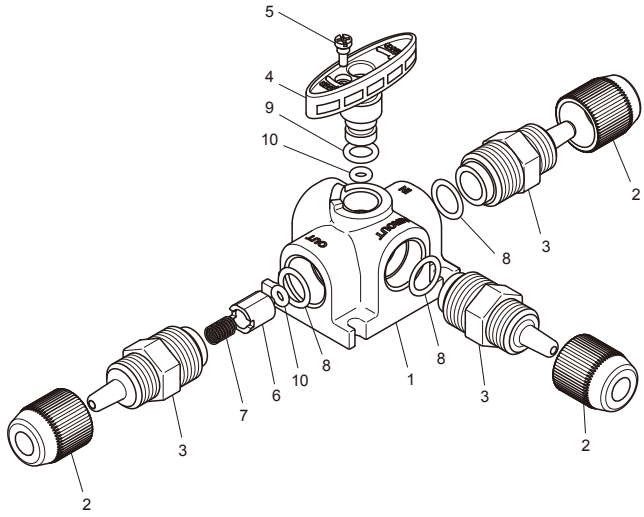


Maintenance (AVC check valve)

Precautions

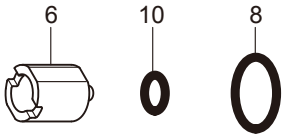
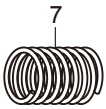
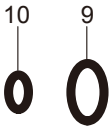
- When dismantling the check valve, pay attention to the residual liquid in the pump.
- Rinse wet ends thoroughly with water.

Exploded view (AVC check valve)



No	Part names	Q'ty
1	Body	1
2	Fitting nut	3
3	Fitting	3
4	Air vent valve	1
5	Stopper screw	1
6	Poppet valve	1
7	Spring	1
8	O ring	3
9	O ring	1
10	O ring	2

Wear part list (AVC check valve)

	Parts		# of parts	Estimated life
Pump	Poppet valve with O rings		1	8000 hours
	Spring		1	
	O rings		1	

*Wear part duration varies with the pressure, temperature and characteristics of liquid.
*The estimated life is calculated based on the continuous operation with clean water at ambient temperature.
*Replace the poppet valve, spring and O rings at the same time.

Wear parts replacement (AVC check valve)

Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.

1 **Stop the pump operation.**

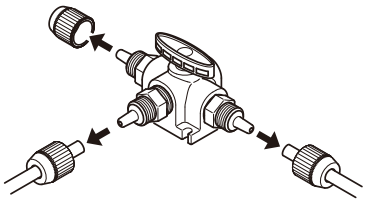
2 **Release the internal pressure.**
Turn the changeover knob and expel air from the air vent.

3 **Check that liquid comes out from the air vent port and the internal pressure has been expelled.**

Dismantlement

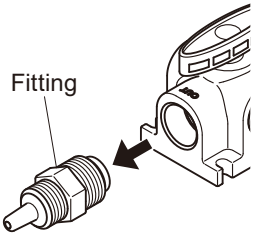
1 **Detach the AVC check valve.**

Loosen the fitting nut and remove tubes from the IN, OUT and AIROUT ports.



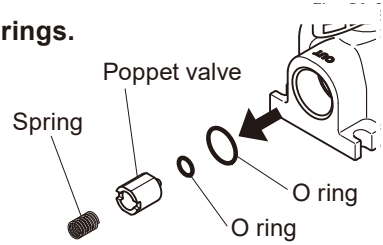
2 **Remove the fitting nut.**

Use an adjustable wrench or spanner to unscrew the fitting nut.



3 **Take out a spring, poppet valve and O rings.**

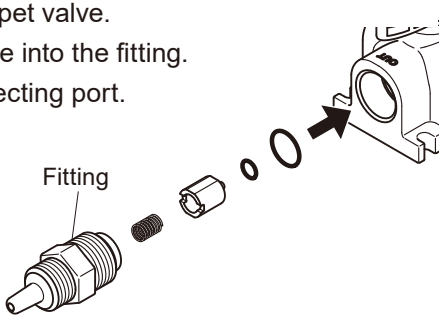
Use a pair of tweezers as necessary.



4 **Fit a spring, poppet valve and O rings.**

a. Place a small O ring into the poppet valve.
b. Insert the spring and poppet valve into the fitting.
c. Fit the large O ring into the connecting port.
d. Screw in the fitting.

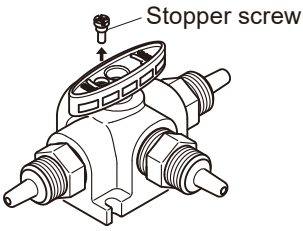
*Tighten the fitting by 2.5N•m. If a torque wrench is not available, tighten the fitting hand-tight and then further rotate it by 90 degrees, using an adjustable wrench or a spanner.



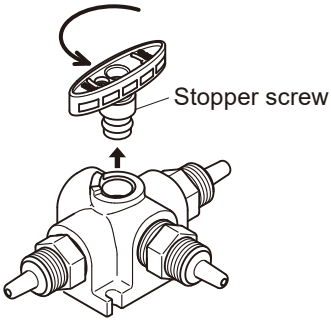
NOTE

- Do not insert poppet valve the other way around. Or a poor flow or a leak may result.
- Be careful not to forget to mount O rings.
- Keep the parts free from dust.

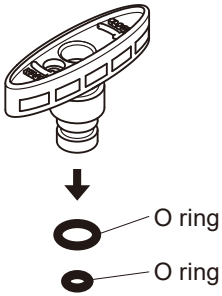
5 **Unscrew the stopper from the changeover knob.**



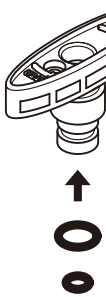
6 **Unscrew the changeover knob.**



7 **Detach O rings.**

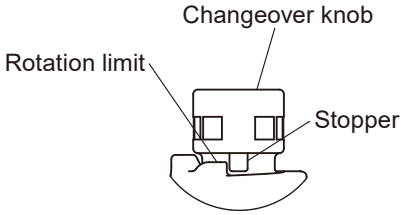


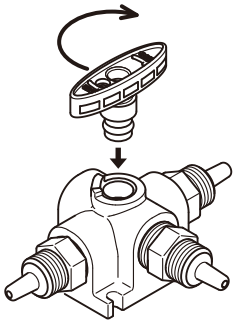
8 **Attach new O rings.**



9 **Screw in the changeover knob until it bottoms out.**

Do not tighten the knob too much so that the changeover knob stops at a rotation limit.



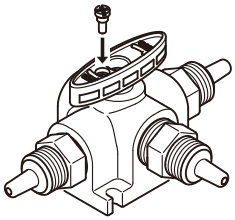


10 **Screw the stopper screw in the knob.**

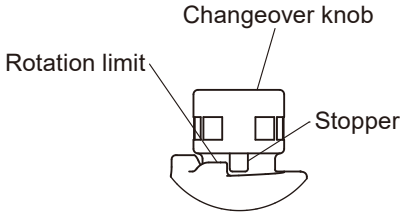
Use a precision screw driver.

NOTE

Do not tighten the stopper screw too much. Or it may break.



11 **Check the knob rotation is stopped by the rotation limit and stopper.**

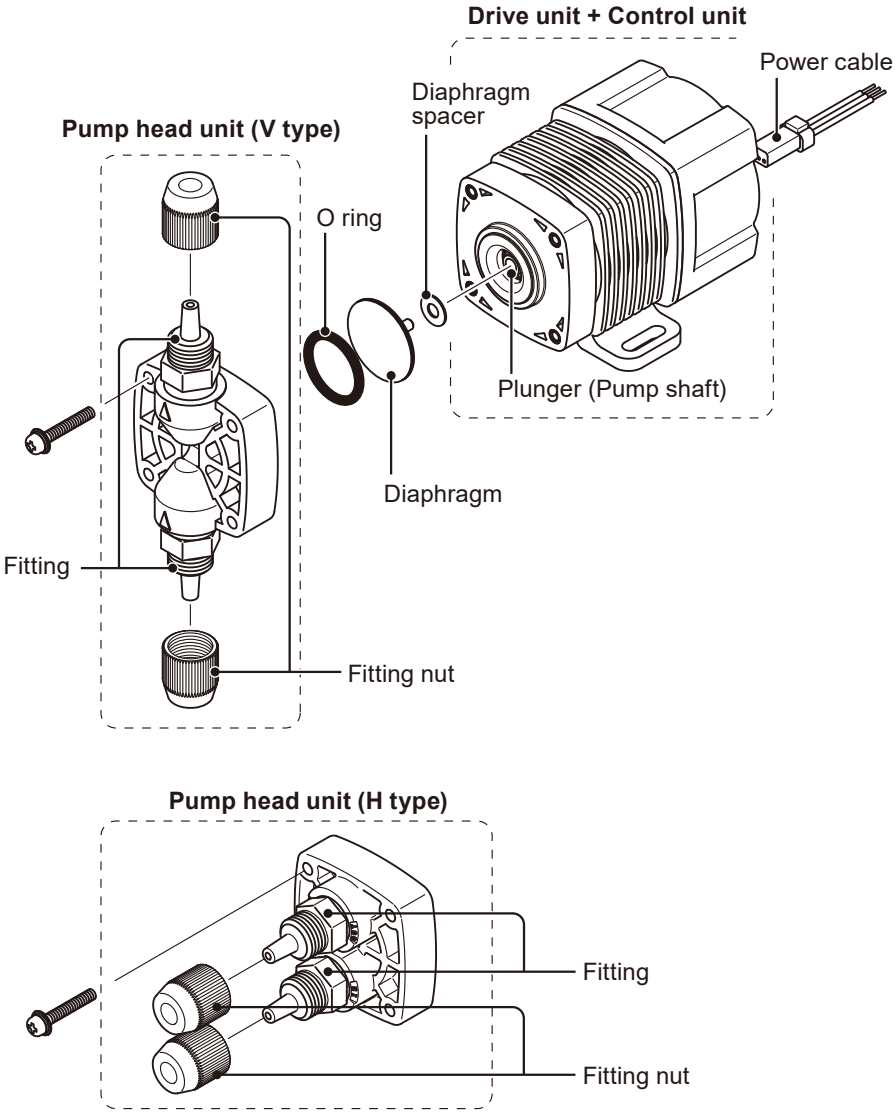


12 **Connect IN, OUT and AIROUT tubes to each port.**

Exploded view

Pump head, Drive unit & Control unit

Observe instructions in this manual to dismantle the pump.



Specification

■ Pump & Drive units

Model code	Max. output capacity	Max. discharge pressure	Stroke rate	Tube connection bore	Power voltage	Average power cons.	Average current	Weight
HRP-54V/H-1	38 mL/min	0.2MPa	0-720spm	ø3×ø6mm ø4×ø6mm ø1/8"×ø1/4"	12VDC	5.6W	1.5A	0.5kg
HRP-54V/H-2					24VDC		1.0A	

*Maximum output capacity is rated with clean water at ambient temperature at maximum discharge pressure (also, at 720spm and rated voltage). Output may increase as pressure decreases.
*Allowable room temperature: 0-40°C
*Allowable liquid temperature: 0-40°C
*Allowable voltage deviation: ±5% of the rated voltage
(12VDC: 11.4V-12.6V, 24VDC: 22.8V-25.2V)
*Maximum noise level: 60dB at 1m (A scale)

■ Control unit

Pulse control type	Upper limit spm	720spm
	Operation	One stroke per signal (Synchronous operation)*2
	Input signal	No-voltage contact or open collector*1
4-20mA control type	Upper limit spm	720spm
	Operation	4-20mADC proportional operation to 0-720spm
	Input signal	Current: 4-20mADC
1-5V control type	Upper limit spm	720spm
	Operation	1-5VDC proportional operation to 0-720spm
	Input signal	Voltage: 1-5VDC (Current capacity of 25mA or more)
Stop control type	Upper limit spm	720spm (Fixed)
	Operation	The pump stops during contact input.
	Input signal	No-voltage contact or open collector*1

*1 The maximum applied voltage is 12V at 5mA. The minimum application load should be 5mA or below when using a relay.
*2 When the external pulse signal is entered to run the pump over the upper limit spm, that signal is cancelled.

■ Power cable

Conduction section area	0.32 [mm^2] (Triplex cable)	Standard	UL3265
Length	600 [mm]	Terminal treatment	Bared

Option

■ Check valve with an air vent

Model code	Set pressure	Tube connection bore	Materials		
			Body	O ring	Spring
AVC-FC1	0.1MPa	ø3×ø6mm	PVDF	FKM	HC276
AVC-FC2		ø4×ø6mm			
AVC-FC3		ø1/8"×ø1/4"			

■ Check valve

Model code	Set pressure	Tube connection bore		Materials		
		IN	OUT	Body	O ring	Spring
CA-1VC-4×6	0.17MPa	ø4×ø6mm	R3/8", R1/2" (thread)	PVC	FKM	HC276
CB-1VC-4×6			ø4×ø6mm			

Material code

PVDF : Polyvinylidene difluoride

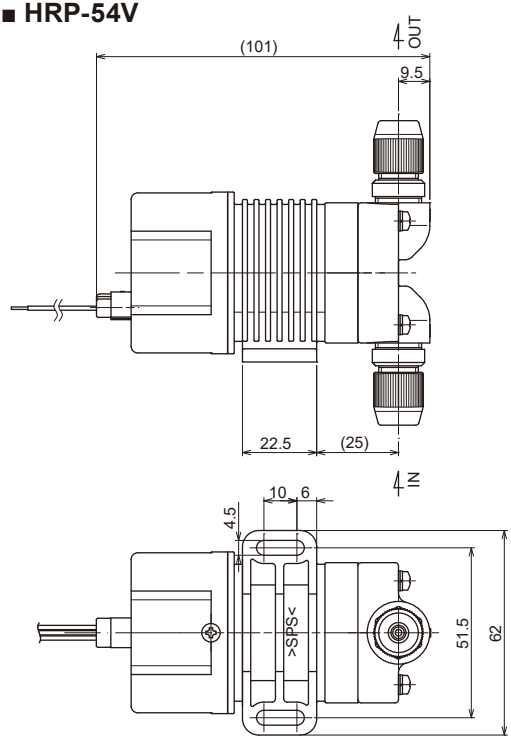
PVC : Transparent polyvinyl chloride

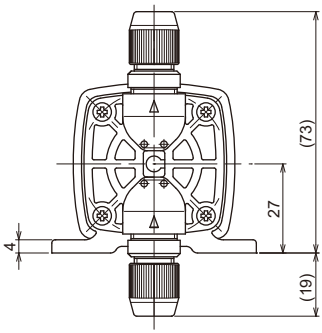
FKM : Fluorine-contained rubber

HC276 : HASTELLOY C276

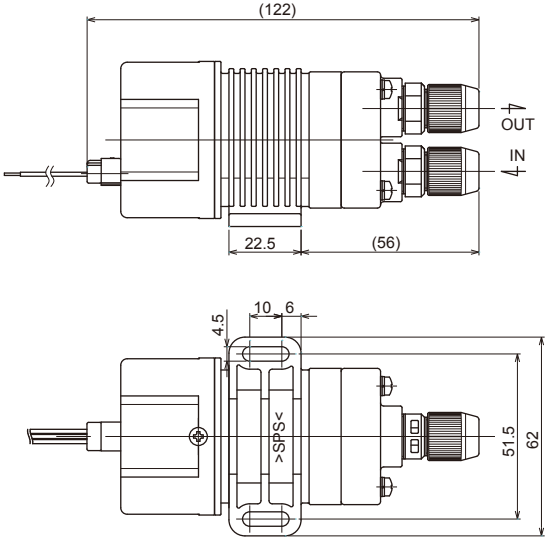
Outer dimensions

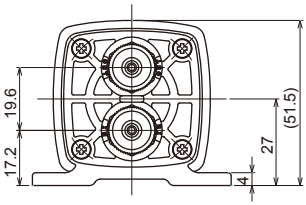
■ **HRP-54V**





■ **HRP-54H**





EC DECLARATION OF CONFORMITY

A copy of the original Declaration of Conformity

(SUPPLIER'S NAME)

WE

IWAKI CO.,LTD.

(ADDRESS)

6-6 2-CHOME KANDA-SUDACHO CHIYODA-KU TOKYO JAPAN

(PRODUCT)

DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE PRODUCTS

ELECTROMAGNETIC METERING PUMP

(MODEL NAME)

HRP SERIES

TO WHICH THIS DECLARATION RELATES ARE IN CONFORMITY
WITH THE FOLLOWING STANDARDS OR DIRECTIVES AS FAR AS APPLICABLE

(DIRECTIVES)

MACHINERY DIRECTIVE 2006/42/EC (ANNEX IIA)
EMC DIRECTIVE 2014/30/EU
RoHS DIRECTIVE 2011/65/EU

(STANDARDS)

EN ISO12100:2010 EN61000-6-2:2005 EN IEC63000:2018
EN809:1998+A1:2009 EN61000-6-3:2007+A1:2011

(A PERSON WHO IS AUTHORISED TO COMPILE THE TECHNICAL FILE
IN THE COMMUNITY)

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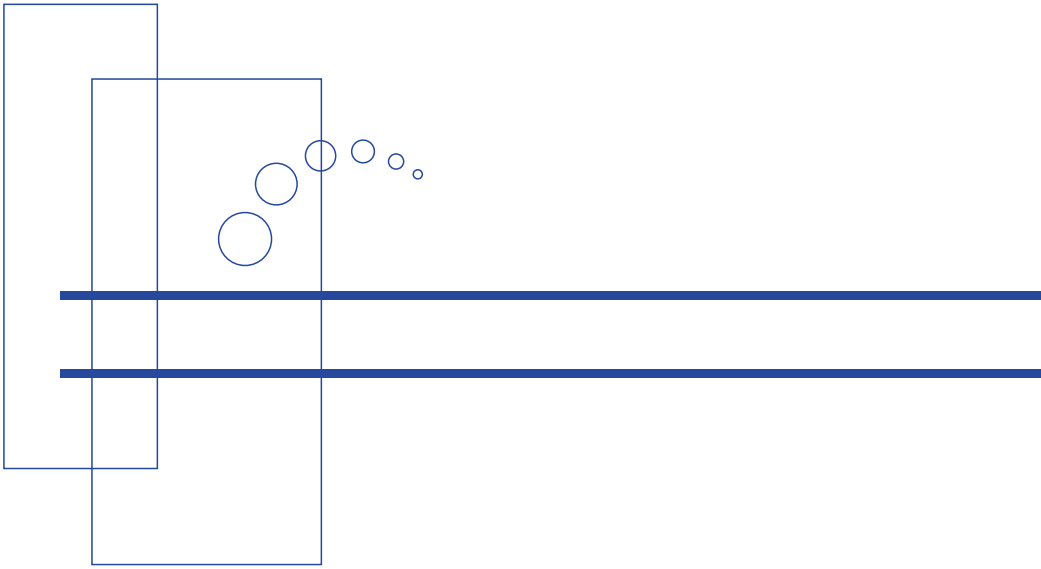
T. Sawada.

TSUTOMU SAWADA
DEPUTY SENIOR GENERAL MANAGER,
QUALITY ASSURANCE HEAD OFFICE

Tokyo, Sep. 13, 2021

(PLACE AND DATE OF ISSUE) **(NAME AND SIGNATURE OR EQUIVALENT MARKING OF AUTHORIZED PERSON)**

DOCUMENT NO. IS-51K-521-3



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