TACMINA

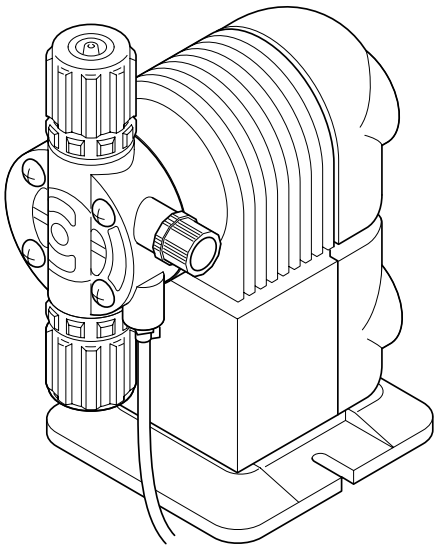
Neptune CHEMICAL PUMP CO., INC.

Solenoid-driven Diaphragm Metering Pump

PZ Series

OPERATION MANUAL

**Please read this OPERATION MANUAL carefully before use.
Operating the pump incorrectly in disregard of these instructions may lead to death, injury and/or cause property damage.**



This illustration is for PZ-31

Applicable Models

PZ-31/61/12

ARPZ-31/61/12

- Thank you for purchasing this TACMINA product. Please read this OPERATION MANUAL carefully in order to ensure that you will use the product safely and correctly.
- Be sure to keep this OPERATION MANUAL in a place where it will be easily available for reference.
- If the product you purchased conforms to special specifications not described in this OPERATION MANUAL, handle the product according to details of separate meetings, drawings and approved documents.

- TACMINA accepts no liability whatsoever for any damage caused by malfunction of this product and other damage caused by use of this product.

www.tacmina.com

How to operate the pump safely

In order to ensure that the pump will be operated correctly and safely, this OPERATION MANUAL contains some guidelines for the user in the form of important safety precautions and considerations which, depending on their seriousness, are categorized as set forth below. Be absolutely sure to heed these precautions and considerations.

⚠ WARNING

• This is used to indicate a condition or action which may result in death or serious injury if the instructions given are ignored and the operations are performed incorrectly.

⚠ CAUTION

• This is used to indicate a condition or action which may result in injury and/or damage to personal property if the instructions given are ignored and the operations are performed incorrectly.

IMPORTANT

• This is used to indicate a condition or action which must be established or carried out in order to maintain the performance and service life of the equipment.

NOTE

• This is used to indicate supplementary information.

Conditions of Use

⚠ WARNING

• This pump cannot be used in explosion-proof regions or in explosive or combustible atmospheres.

⚠ CAUTION

• This pump must be used for the purpose of transferring or injecting liquids only. Using it for any other purpose may result in accidents and/or malfunctions.
• This pump cannot be used to transfer or inject any liquids containing slurry.
• This pump's discharge volume cannot be adjusted by operating the valve on its discharge pipe.
• The characteristics of this pump are such that pulsation will arise. If pulsation threatens to be a problem, install an air chamber or some other device for reducing the effects of pulsation.
• Do not use the pump outside the following usage ranges. Doing so may cause malfunctions.

Ambient temperature	0 to 40 °C*
Ambient humidity	35 to 85%RH
Temperature of liquid	0 to 40 °C (no freezing)
Viscosity of liquid	Less than 50 mPa • s
Altitude of installation location	Less than 1,000 m

* Transport and store the pump at temperatures within the –10°C to +50°C range. Do not subject the pump to strong impacts.

✻ Install the tank at a position higher than the pump (so that the pipe is connected to force the chemicals downward).

✻ The volume and viscosity of the liquids that can be pumped differ according to the conditions under which the pipes are connected and the properties of the chemicals to be pumped.

Installation, Piping & Connections

⚠ WARNING

• This pump does not have explosion-proof specifications. Do not install it in explosion-proof regions or in explosive or combustible atmospheres.
• Install the pump in a location that cannot be accessed by anyone but control personnel.

⚠ CAUTION

• If this pump has been dropped or damaged, consult your vender or a TACMINA representative. Using a dropped or damaged pump may result in accidents and/or malfunctions.
• Do not install the pump where there is a risk of flooding or where there are high levels of moisture or dust. Doing so may cause electric shocks and/or malfunctions.
• This pump has a water-proof construction (equivalent to IP65 under IEC standards). However, it is made of plastic so make every attempt to avoid installing it in a position that will shorten its service life (such as a position where it will be exposed to direct sunlight, wind or rain).
• Connect the pipes to the pump properly.
• Do not connect the pipes above a passageway. Do not install the pipes where the chemical may splash onto people even if the hose/tube should break.
• When using a pump with a relief-valve function, always attach a hose for relief purposes, and lead the end of the pipe back to a tank or other container.

- When using a pump without a relief-valve function, be absolutely sure to install a relief valve on the pipe right outside the pump on the discharge side. If the user has forgotten to open the valve or foreign matter is clogged inside the pump's discharge-side pipe, this may cause the pressure to rise above the pump's specifications range, liquid to gush out, the pipes to become damaged and/or the pump to malfunction, all of which are dangerous.
- When using the pump in cold regions, the chemical may freeze inside the pump head or pipes, possibly damaging the pump and its surroundings. Be absolutely sure to install a heating unit or heat-insulating unit.
- The water used for the shipment tests may be left on the liquid-end parts (the parts that come into contact with the liquid) of the pump. If the pump is to be used for chemical that may harden or give off gas if it reacts with water, be absolutely sure to dry off the liquid-end parts prior to use.
- When the hoses/tubes become very hot, their ability to withstand pressure will deteriorate. When using hoses/tubes available on the market, be absolutely sure to use the ones which are resistant to chemical and which can withstand the temperatures and pressures under which the pump will be used.
- The durability of a hose/tube differs significantly depending on the chemicals with which it is used, on the temperatures and pressures and on the presence of ultraviolet rays. Inspect the hoses/tubes, and replace them if they have deteriorated.

Electrical Wiring

⚠ WARNING

- This pump cannot be used in explosion-proof regions or in explosive or combustible atmospheres.
- Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.
- Do not operate the pump with wet hands. Doing so may result in electric shocks.
- Securely ground the protective earth terminal, and be absolutely sure to install a ground fault circuit interrupter. Otherwise, you may receive electric shocks.
- Do not attempt to disassemble the pump body or the circuit parts.

⚠ CAUTION

- The wiring must be done by a qualified electrician or somebody with electrical knowledge.
- Connect the wires after checking the supply voltage. Do not connect the wires to a power supply that is not within the rated voltage range.

Operation & Maintenance

⚠ WARNING

- Ensure that nobody other than the operators and control personnel will operate the pump.
- Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.
- Do not operate the pump with wet hands. Doing so may result in electric shocks.
- When trouble has occurred (such as when smoke appears or there is a smell of burning), shut down the pump's operation immediately, and contact your vender or a TACMINA representative. Otherwise, a fire, electric shocks and/or malfunctions may result.
- Do not attempt to disassemble the pump body or the circuit parts.
- During the air releasing, chemical may suddenly gush out from the pipes and other parts. Lead the end of the air-release hose bank to the tank or other container, and secure it so that it will not become disconnected.
- A situation in which the valve inside the pipe at the discharge side of the pump is shut off or becomes blocked with foreign matter is dangerous in that it may lead to an excessive rise in pressure that will exceed the pump's specification range, causing liquid to gush out, the pipe to be damaged and the pump itself to malfunction. Prior to operating the pump, check the valves and pipes, etc.

⚠ CAUTION

- When working on the liquid-end parts of the pump, wear protective gear suited to the chemical concerned (such as rubber gloves, a mask, protective goggles and work overalls that are resistant to chemical).
- Before attempting to maintain or repair the pump, release the pressure in the discharge pipe, discharge the liquid in the pump head, and clean the liquid-end parts.
- The vibration of the pump may cause the hoses/tubes to become loose and disconnected. Before starting operation, secure the hoses/tubes and check their tightness.
- While the pump is operating, the pump's surfaces may become hot, reaching a temperature of 60°C or more.
- Idling the pump for prolonged periods of time can lead to malfunctions.

Other Precautions

⚠ CAUTION

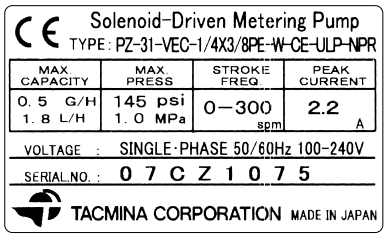
- Do not attempt to remodel the pump.
- Install a protective barrier or other preventive action to cope with a chemical spill just in case one occurs. Also take steps to ensure that the pump will not get wet from the chemical.
- When it comes time to dispose of the pump, entrust its disposal to an industrial waste disposal company whose operations have been authorized in accordance with applicable laws and regulations.

Contents

Checking out the product

After unpacking the pump, check the following.
- Is the pump the one that was ordered?
- Do the details on the pump's nameplate match what was ordered?
- Is all the accessories supplied?
  ✻ Check the supplied accessories against the "Accessories list" below.
- Has the pump sustained any damage from vibration or impact during transit?
- Have any of the screws come loose or fallen out?

Every care is taken by TACMINA in the shipment of its pumps, but if you come across anything untoward, please contact your vender or a TACMINA representative.



Accessories list

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

Liquid-end Material		VEC/VFC		
Model		31	61	12
Hose/tube	Discharge side (3m)	PE tube (1/4"×3/8")		
	Suction side (2m)	PVC braided hose (1/4"×3/8")		
Relief/air-release hose (1m, installed)		Soft PVC hose (4×6)		
INSULOK (spare) for relief/air-release hose		1 piece		
Anti-siphon check valve		1 set (R1/2)		
Foot valve		1 set		
Pump-mounting nuts/bolts		2 sets (M5×30)		
Operation manual		1 copy		

Liquid-end Material	FEC/FFC		
Model	31	61	12
Tube (5m)	PE tube (1/4"×3/8")		
Relief/air-release hose (1m, installed)	Soft PVC hose (4×6)		
INSULOK (spare) for relief/air-release hose	1 piece		
Anti-siphon check valve	1 set (R1/2)		
Foot valve	1 set		
Ceramic weight	1 set		
Pump-mounting nuts/bolts	2 sets (M5×30)		
Operation manual	1 copy		

Liquid-end Material	FTC		
Model	31	61	12
Tube (5m)	FEP tube (1/4"×3/8")		
Relief/air-release hose (1m, installed)	Soft PVC hose (4×6)		
INSULOK (spare) for relief/air-release hose	1 piece		
Anti-siphon check valve	1 set (R1/2 or R3/8)		
Foot valve	1 set		
Ceramic weight	1 set		
Pump-mounting nuts/bolts	2 sets (M5×30)		
Operation manual	1 copy		

Accessories list

Model for injection of boiler chemicals: PZ-31-FEC (PP)

Liquid-end Material		FEC (PP)
Model		31
Tube	Discharge side (3m)	PP tube (1/8"×1/4")
	Suction side (2m)	PE tube (1/4"×3/8")
Relief/air-release hose (1m, installed)		Soft PVC hose (4×6)
INSULOK (spare) for Relief/air-release hose		1 piece
Anti-siphon check valve		1 set (R1/2)
Foot valve		1 set
Ceramic weight		1 set
Pump-mounting nuts/bolts		2 sets (M5×30)
Operation manual		1 copy

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

Liquid-end Material		CL		
Model		31	61	12
Hose/tube	Discharge side (3m)	PE tube (1/4"×3/8")		
	Suction side (2m)	PVC braided hose (1/4"×3/8")		
Air-release hose (1m)		Soft PVC hose (4×6)		
Anti-siphon check valve w/ duck-bill cap		1 set (R1/2)		
Foot valve		1 set		
Pump-mounting nuts/bolts		2 sets (M5×30)		
Operation manual		1 copy		

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

Liquid-end Material		CL		
Model		31	61	12
Hose/tube	Discharge side (3m)	PE tube (1/4"×3/8")		
	Suction side (2m)	PVC braided hose (1/4"×3/8")		
Air-release hose (1m)		Soft PVC hose (4×6)		
Anti-siphon check valve w/ duck-bill cap		1 set (R1/2)		
Foot valve		1 set		
Pump-mounting nuts/bolts		2 sets (M5×30)		
Operation manual		1 copy		

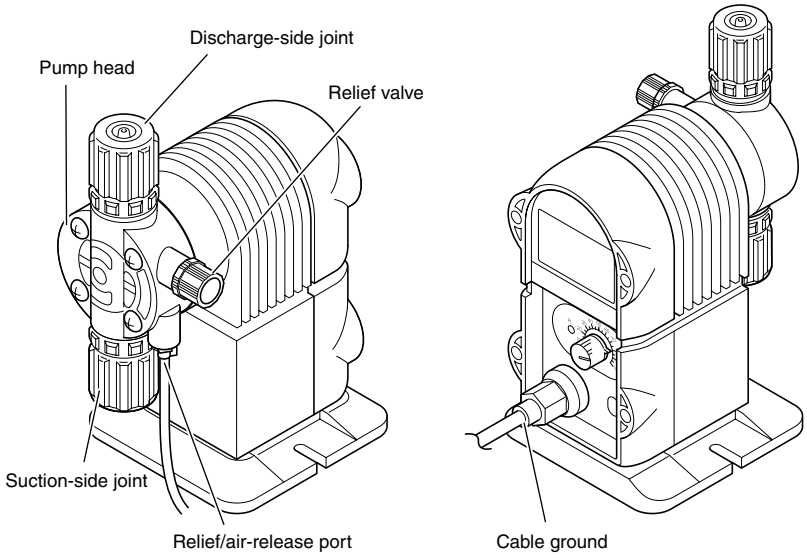
Description of product

This is a solenoid-driven diaphragm metering pump with liquid-end parts which are resistant to chemicals and with a compact body. It can be operated on any supply voltage from AC 100V to AC 240V (±10%). Its discharge capacity has been adjusted so that it will remain constant over the supply voltage range.

Names of the parts

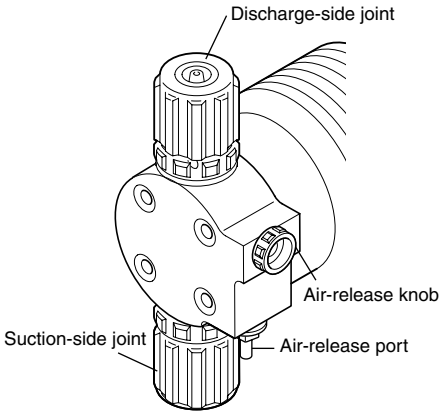
Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

Model for injection of boiler chemicals: PZ-31-FEC (PP)

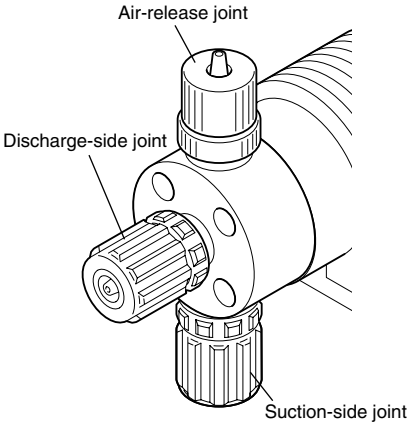


✻ The shapes of pump heads and joints differ slightly depending on the liquid-end material and connection type.

Model for injection of sodium hypochlorite: PZ-31/61/12-CL



Model w/ automatic air-release funtion for injection of sodium hypochlorite: ARPZ-31/61/12



Installing the product

⚠ WARNING

- **This pump does not have explosion-proof specifications. Do not install it in explosion-proof regions or in explosive or combustible atmospheres.**
- **Install the pump in a location that cannot be accessed by anyone but control personnel.**

⚠ CAUTION

- **Do not install the pump where there is a risk of flooding or where there are high levels of moisture or dust. Doing so may cause electric shocks and/or malfunctions.**
- **This pump has a water-proof construction (equivalent to IP65 under IEC standards). However, it is made of plastic so make every attempt to avoid installing it in a position that will shorten its service life (such as a position where it will be exposed to direct sunlight, wind or rain).**

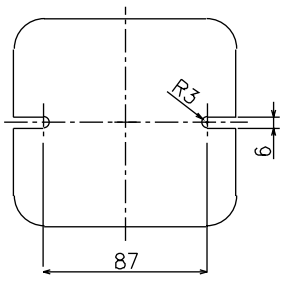
Installation location

- Avoid installing the pump in a location exposed to direct sunlight or wind and rain. Although it features a water-proof construction (equivalent to IP65 under the IEC standards), direct sunlight may cause the temperature of the metal parts to rise, ultraviolet rays may cause the plastic parts to deteriorate, and sand, dust, and rainwater may damage or corrode the pump body. When installing the pump outdoors, it is recommended that an awning or cover be installed to protect the pump from the elements and extend its service life.
- Install the pump in a location where the ventilation is good and where the chemical will not freeze.
- Provide adequate space around the pump to facilitate maintenance and inspections.
- Place the pump in a level location, and secure it so that it will not vibrate. Installing the pump at an angle may result in discharge trouble or in the inability of pump to discharge.

Mounting bolt positions

Use the pump-mounting bolts (×2) provided to secure the pump.

✻ The pump can be installed at any pitch ranging from 87 to 110 mm.



Piping

⚠ CAUTION

- **Connect the pipes to the pump properly.**
- **Do not connect the pipes above a passageway. Do not install the pipes where the chemical may splash onto people even if the hose/tube should break.**
- **When using a pump with a relief-valve function, always attach a hose for relief purposes, and lead the end of the pipe back to a tank or other container.**
- **When using a pump without a relief-valve function, be absolutely sure to install a relief valve on the pipe right outside the pump on the discharge side. If the user has forgotten to open the valve or foreign matter is clogged inside the pump's discharge-side pipe, this may cause the pressure to rise above the pump's specifications range, liquid to gush out, the pipes to become damaged and/or the pump to malfunction, all of which are dangerous.**
- **When using the pump in cold regions, the chemical may freeze inside the pump head or pipes, possibly damaging the pump and its surroundings. Be absolutely sure to install a heating unit or heat-insulating unit.**
- **When the hoses/tubes become very hot, their ability to withstand pressure will deteriorate. When using hoses/tubes available on the market, be absolutely sure to use the ones which are resistant to chemical and which can withstand the temperatures and pressures under which the pump will be used.**
- **The durability of a hose/tube differs significantly depending on the chemicals with which it is used, on the temperatures and pressures and on the presence of ultraviolet rays. Inspect the hoses/tubes, and replace them if they have deteriorated.**

IMPORTANT

- **Install a pressure gauge on the discharge-side pipe in order to measure the pressure at the discharge side of the pump.**
- **Install the pump as close as possible to the tank. If the suction-side pipe is too long, cavitation* may occur, possibly making it impossible to maintain the pump's metering capability.**

* **Refer to the "Explanation of terms" on page 53.**

■Pulsation

- The occurrence of pulsation will cause the pump's hoses/tubes to vibrate. Secure the hoses/tubes so that they will not swing about.
- In order to reduce pulsation, the installation of a damper is recommended. Ask a TACMINA representative for more information.

■Pipe length

- An excessively long hose/tube may result in increased pressure loss, may cause the pressure to exceed the pump's allowable pressure, or may give rise to overfeed and/or cause pipe vibration.
- The pump comes with a 5-meter-long hose/tube for both the discharge side and suction side. If the pressure loss exceeds the pump's maximum discharge pressure, thicker pipes will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative.

■During maintenance

- When disconnecting the hose/tube for maintenance or other purposes and then reconnecting the same hose/tube, cut about 10 mm off the end of the hose/tube before reconnecting.
- When conducting maintenance, release the pressure of the discharge hose/tube.

■When curving a hose/tube

- Provide a sufficient margin so that the hose/tube will not bend instead of curve round.
- Take steps to ensure that the hose/tube will not bend, rub against other parts, be cut or stepped on. Such actions can damage the hose/tube.
- Take steps to minimize the number of tight curves in the pipes, joints and other parts that may restrict the flow.

The piping procedure will be described by pump type.

Model	Series	Page
Model for injection of general chemicals	PZ-31/61/12-VEC/VFC/FEC/FFC/FTC	10
Model for injection of boiler chemicals	PZ-31-FEC (PP)	11
Model for injection of sodium hypochlorite	PZ-31/61/12-CL	12
Model w/ automatic air-release function for injection of sodium hypochlorite	ARPZ-31/61/12	13

Piping

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

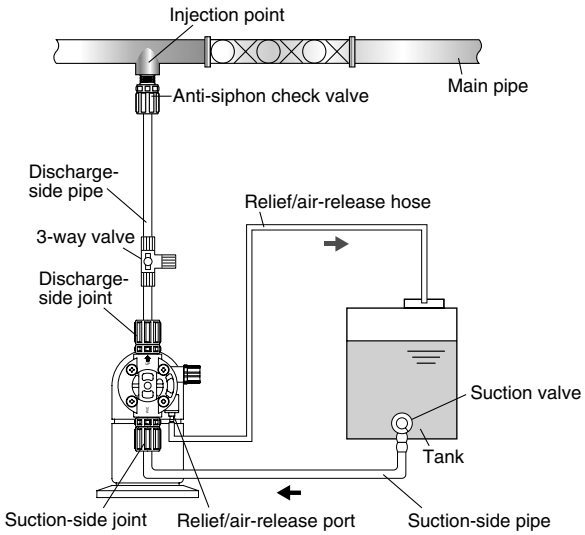
Installation is described with an example using PZ-31-VEC and TACMINA tank.

- If the valve has not been opened or clogging by foreign matter has occurred inside the pipe at the discharge side of the pump, the chemical will gush out from the relief/air-release port. Therefore, always have a relief/air-release hose installed, and lead its end back into the tank or other container.
- Install a valve for releasing abnormal pressure that has built up inside the discharge-side pipe. The 3-way valve on the washing water line may be used instead.

■When installing the pump below the tank

(1) Connect the suction valve of the tank and the suction-side joint of the pump using the hose/tube.
(2) Connect the discharge-side joint of the pump and main pipe (injection point) using the tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the tube.
(3) Return the end of the relief/air-release hose which has already been attached to the relief/air-release port to the tank or other container.

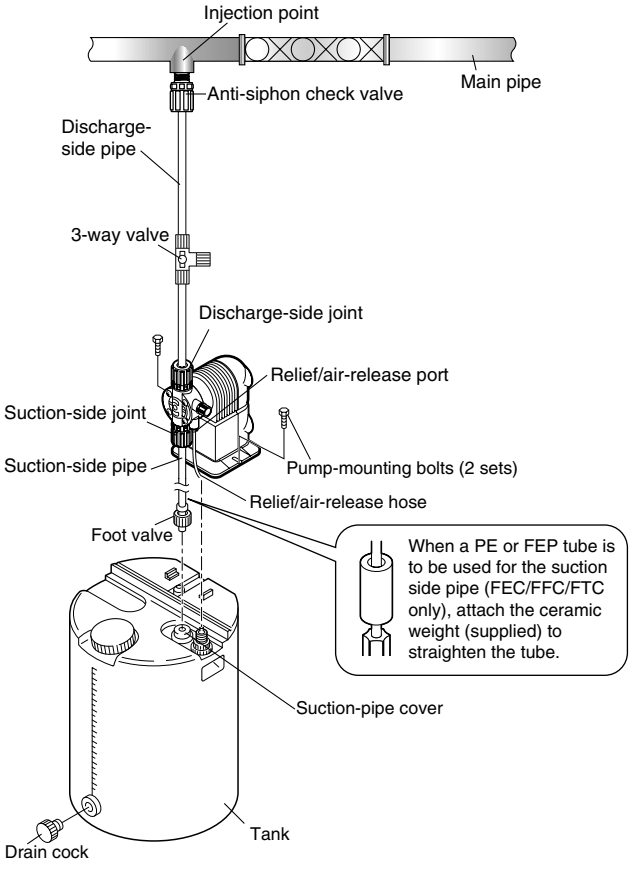
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



■When installing the pump above the tank

(1) Using the pump-mounting bolts provided, secure the pump to the prescribed position on top of the tank.
(2) Pass the suction-side hose/tube with foot valve and ceramic weight (tube only) attached through the hole in the suction-pipe cover on top of the tank, and connect it to the suction-side joint of the pump. At this time, adjust the length of the hose/tube and cut it so that the foot valve is 30 mm higher than the bottom of the tank.
(3) Connect the discharge-side joint of the pump and main pipe (injection point) using the tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the tube.
(4) Return the end of the relief/air-release hose which has already been attached to the relief/air-release port to the tank or other container.

✻ Installing the pump above the tank is not recommended for chemicals in which air bubbles tend to form.
✻ This pump's static suction head is −1.5 m for water. Its suction capability may decrease when the valve seats inside the pump head are dry.
✻ Be absolutely sure to connect the foot valve provided to the end of the suction-side hose/tube to prevent dirt or foreign matter from entering the pump head and valve seat area.
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



Piping

Model for injection of boiler chemicals: PZ-31-FEC (PP)

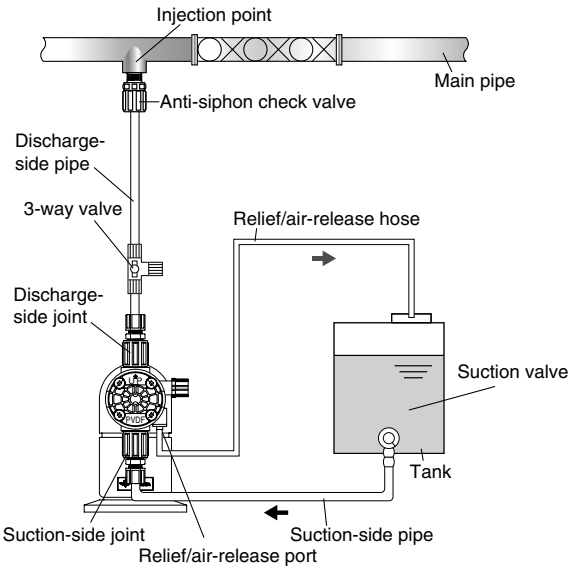
Installation is described with an example using PZ-31-FEC (PP) and TACMINA tank.

- If the valve has not been opened or clogging by foreign matter has occurred inside the pipe at the discharge side of the pump, the chemical will gush out from the relief/air-release port. Therefore, always have a relief/air-release hose installed, and lead its end back into the tank or other container.
- Install a valve for releasing abnormal pressure that has built up inside the discharge-side pipe. The 3-way valve on the washing water line may be used instead.

■When installing the pump below the tank

(1) Connect the suction valve of the tank and the suction-side joint of the pump using the tube.
(2) Connect the discharge-side joint of the pump and main pipe (injection point) using the tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the tube.
(3) Return the end of the relief/air-release hose which has already been attached to the relief/air-release port to the tank or other container.

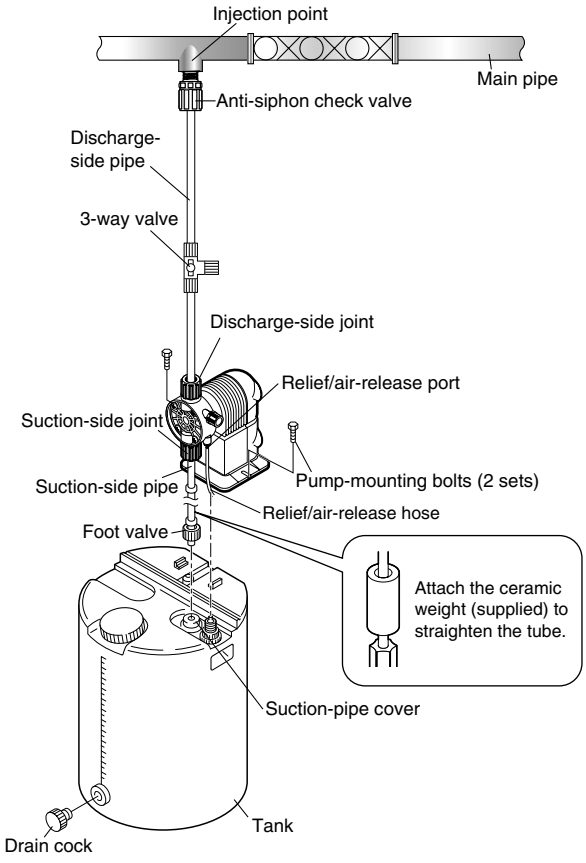
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



■When installing the pump above the tank

(1) Using the pump-mounting bolts provided, secure the pump to the prescribed position on top of the tank.
(2) Pass the suction-side tube with foot valve and ceramic weight attached through the hole in the suction-pipe cover on top of the tank, and connect it to the suction-side joint of the pump. At this time, adjust the length of the tube and cut it so that the foot valve is 30 mm higher than the bottom of the tank.
(3) Connect the discharge-side joint of the pump and main pipe (injection point) using the tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the tube.
(4) Return the end of the relief/air-release hose which has already been attached to the relief/air-release port to the tank or other container.

✻ Installing the pump above the tank is not recommended for chemicals in which air bubbles tend to form.
✻ This pump's static suction head is –1.5 m for water. Its suction capability may decrease when the valve seats inside the pump head are dry.
✻ Be absolutely sure to connect the foot valve provided to the end of the suction-side hose to prevent dirt or foreign matter from entering the pump head and valve seat area.
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



Piping

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

Installation is described with an example using PZ-31-CL and TACMINA tank.

- It is extremely dangerous for the user to forget to open the valve or for there to be the clogging of foreign matter inside the pump's discharge-side pipe. Be absolutely sure to install a relief valve, which will automatically release abnormally high pressure levels, on the discharge-side pipe.
- Install a valve for releasing abnormal pressure that has built up inside the discharge-side pipe. The 3-way valve on the washing water line may be used instead.
- To prevent gas lock and other such types of trouble, be absolutely sure to use the pump with a push-in pipe (when the pump is to be placed lower than the tank).
- In order to prevent gas lock caused by gases generated and building up inside the pipes, make the pipe connections as short as possible.

■When installing the pump below the tank

✻ Do not install the pump above the tank.

(1) Connect the suction valve of the tank and the suction-side joint of the pump using the hose. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

(2) Connect the tube to the discharge-side joint of the pump.

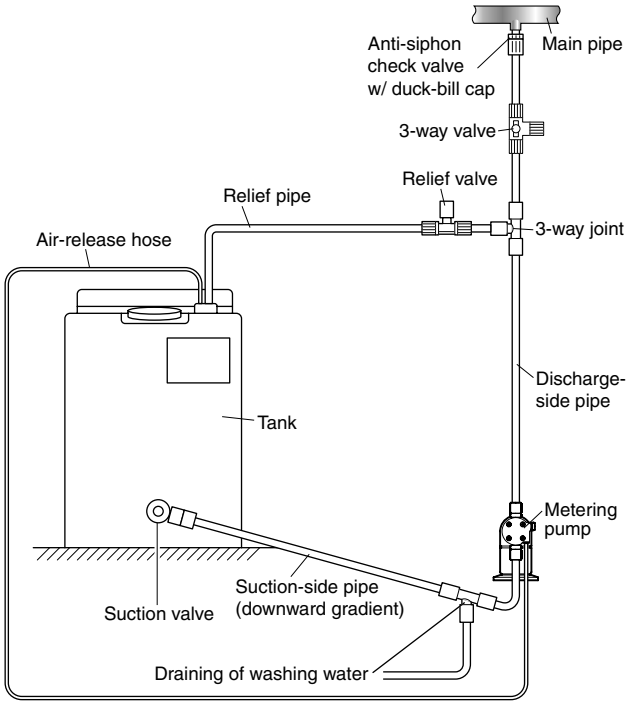
(3) Attach a 3-way joint to the discharge-side tube (near the pump's discharge-side joint), and install a relief valve. Return the end of the relief pipe to the tank or other container.

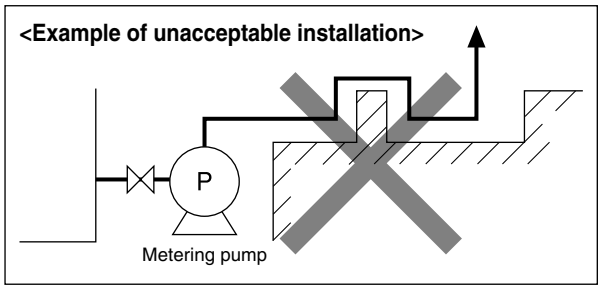
(4) Connect the end of the other discharge-side tube extending from the 3-way joint to the main pipe (injection point). When doing this, attach the anti-siphon check valve with duck-bill cap at the injection-point side end of the tube.

(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ If it is unavoidable for the pump to be placed higher than the tank, be absolutely sure to connect the foot valve supplied to the end of the suction-side hose to ensure that no dirt or foreign matter will be mixed inside the pump head or valve seat.

✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.





IMPORTANT

<Washing water line>

- **It is recommended that a washing water line be provided in the piping. (A 3-way valve for releasing abnormally high pressure levels may be used instead.)**

<Sodium hypochlorite>

- **Take steps to use up the sodium hypochlorite in as short a period as possible (10 to 20 days in hot weather).**
- **When diluting sodium hypochlorite, use (1) pure water (purified water), (2) water that has been passed through a water softener or (3) city water that has been purified.**

Piping

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

Installation is described with an example using ARPZ-31 and TACMINA tank.

- Unlike other models, this pump has a discharge-side joint at the front of the pump head and an air-release side joint on its top.
- It is extremely dangerous for the user to forget to open the valve or for there to be the clogging of foreign matter inside the pump's discharge-side pipe. Be absolutely sure to install a relief valve, which will automatically release abnormally high pressure levels, on the discharge-side pipe.
- Install a valve for releasing abnormal pressure that has built up inside the discharge-side pipe. The 3-way valve on the washing water line may be used instead.
- To prevent gas lock and other such types of trouble, be absolutely sure to use the pump with a push-in pipe (when the pump is to be placed lower than the tank).
- In order to prevent gas lock caused by gases generated and building up inside the pipes, make the pipe connections as short as possible.

■When installing the pump below the tank

✻ Do not install the pump above the tank.

(1) Connect the suction valve of the tank and the suction-side joint of the pump using the hose. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

(2) Connect the tube to the discharge-side joint of the pump.

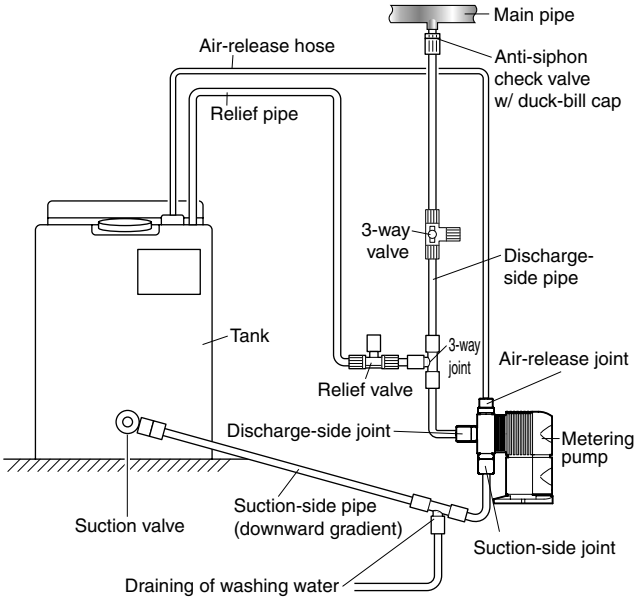
(3) Attach a 3-way joint to the discharge-side tube (near the pump's discharge-side joint), and install a relief valve. Return the end of the relief pipe to the tank or other container.

(4) Connect the end of the other discharge-side tube extending from the 3-way joint to the main pipe (injection point). When doing this, attach the anti-siphon check valve with duck-bill cap at the injection-point side end of the hose/tube.

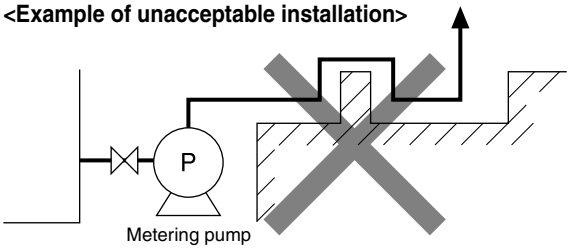
(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ If it is unavoidable for the pump to be placed higher than the tank, be absolutely sure to connect the foot valve supplied to the end of the suction-side hose to ensure that no dirt or foreign matter will be mixed inside the pump head or valve seat.

✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



<Example of unacceptable installation>



IMPORTANT

<Washing water line>

- **It is recommended that a washing water line be provided in the piping. (A 3-way valve for releasing abnormally high pressure levels may be used instead.)**

<Sodium hypochlorite>

- **Take steps to use up the sodium hypochlorite in as short a period as possible (10 to 20 days in hot weather).**
- **When diluting sodium hypochlorite, use (1) pure water (purified water), (2) water that has been passed through a water softener or (3) city water that has been purified.**

Connecting

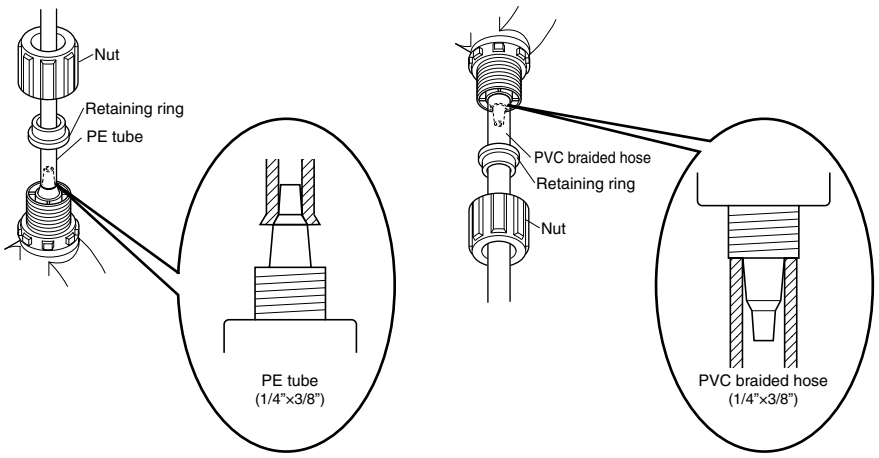
The connection procedure will be described by pump type.

Model	Liquid-end material	Hose/tube	Page
Model for injection of general chemicals	PZ-31/61/12-VEC/VFC	Discharge side: PE tube Suction side : PVC braided hose	14
	PZ-31/61/12-FEC/FFC	PE tube	16
	PZ-31/61/12-FTC	FEP tube	
Model for injection of boiler chemicals	PZ-31-FEC (PP)	Discharge side: PP tube Suction side : PE tube	18
Model for injection of sodium hypochlorite	PZ-31/61/12-CL	Discharge side: PE tube Suction side : PVC braided hose	20
Model w/ automatic air-release function for injection of sodium hypochlorite	ARPZ-31/61/12	Discharge side: PE tube Suction side : PVC braided hose	21

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC

■PVC braided hose/PE tube

- When bending the hose/tube, provide sufficient leeway in the bending so that the hose/tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the hose/tube firmly so that it will not become disconnected, and tighten the nuts securely. Do not excessively tighten the nuts. Doing so may damage or break the joint.
- If the temperature of a liquid or ambient temperature is higher than room temperature, the tightening force will be reduced, and the hose/tube may become disconnected. After operation has started, tighten up the nuts as appropriate.
- When tightening the nuts, hold the hose/tube to prevent it from being twisted. The joints and other areas may be loosened by the return force of the hose/tube.
- The pump comes with a 5-meter long hose/tube for both the discharge side and suction side. When longer hose/tube is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker hose/tube will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative who will select the appropriate hose/tube size.
- When disconnecting the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.



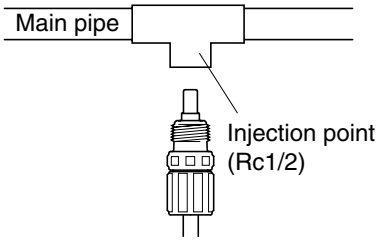
Connecting

■Anti-siphon check valve

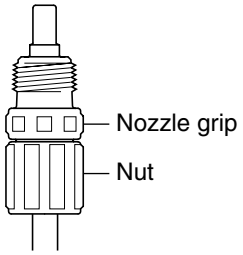
This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When the liquid is to be injected inside the suction-side pipe of a volute pump, etc.
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe, overfeed may occur if the pipe is too long.

(1) The anti-siphon check valve has an R1/2 external thread. Provide an Rc1/2 internal thread at the injection point.

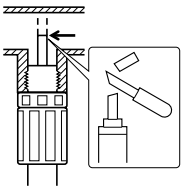


(2) Wind sealing tape around the external thread of the anti-siphon check valve, and screw the valve into the injection point.
  ✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
  ✻ When connecting the tube with the anti-siphon check valve already mounted on it to the main pipe, be absolutely sure to hold the valve body and turn the nut. If the nut is turned without holding the body, the threaded part on the nozzle may be damaged.

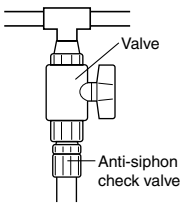


NOTE

<When injecting liquid into a pipe with a small diameter>
If the end of the anti-siphon check valve is too long, cut it off so that the end will be positioned at the center of the main pipe where the chemical is to be injected prior to use.



<For maintenance>
It is recommended that the tube be attached to the main pipe through a valve to enable the anti-siphon check valve to be replaced or cleaned, etc.
✻ Use a valve made of materials which will resist any corrosion resulting from the chemical used.



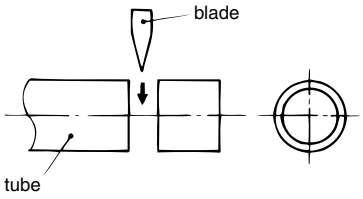
Connecting

Model for injection of general chemicals: PZ-31/61/12-FEC/FFC/FTC

■PE/FEP tube

- When bending the tube, provide sufficient leeway in the bending so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the tube firmly so that it will not become disconnected, and tighten the nuts securely. Do not excessively tighten the nuts. Doing so may damage or break the joint.
- If the temperature of a liquid or ambient temperature is higher than room temperature, the tightening force will be reduced, and the tube may become disconnected. After operation has started, tighten up the nuts as appropriate.
- When tightening the nuts, hold the tube to prevent it from being twisted. The joints and other areas may be loosened by the return force of the tube.
- The pump comes with a 5-meter long tube for both the discharge side and suction side. When longer tube is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker tube will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative who will select the appropriate tube size.
- When disconnecting the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using it.

(1) Cut the end of the tube at right angles using a sharp blade.



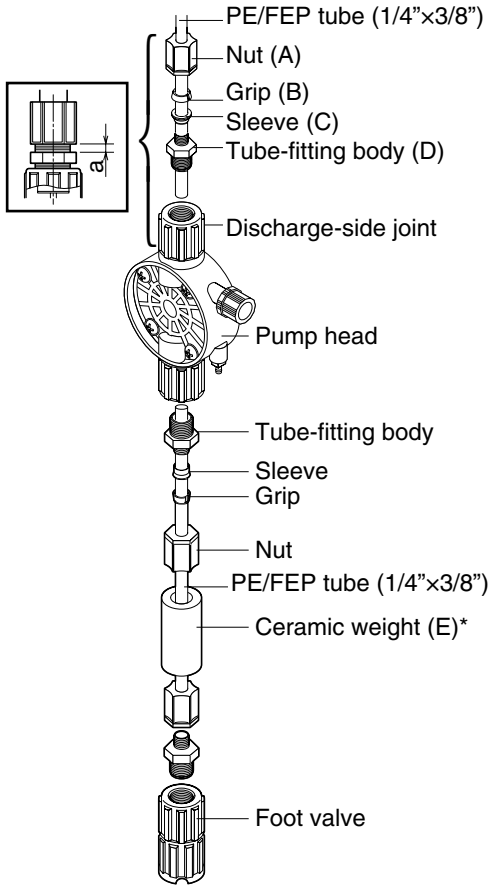
(2) Wrap sealing tape around the tube-fitting body (D), and screw the body into the discharge-side joint using a tool. (The tube-fitting body is already mounted in place before shipment.)

(3) Pass the tube through the nut (A), grip (B) and sleeve (C), and insert its end until it touches the back end of the tube-fitting body (D) on the inside.

(4) Tighten the nut (A) by hand.

(5) Using the tool, tighten the nut (A) in such a way that the gap (area "a" in the figure) between the tube-fitting body (D) and nut (A) is approximately 1.5 mm.

✻ Bear in mind that the joint may break if the nut (A) is tightened too much.



* The tube is packed in the form of a coil. Attach the ceramic weight (E) and straighten out the tube so that the liquid inside the tank will be sucked up through it.

Connecting

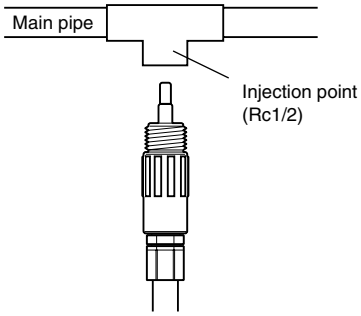
■Anti-siphon check valve

This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

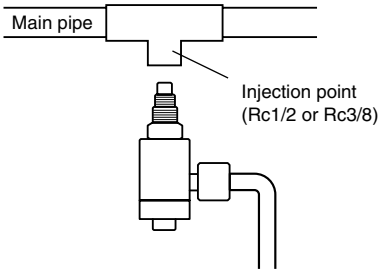
- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When the liquid is to be injected inside the suction-side pipe of a volute pump, etc.
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe, overfeed may occur if the pipe is too long.
- Take care when handling an anti-siphon check valve which is made of PVDF since it is fragile in the face of impact.

(1) The anti-siphon check valve for the FEC/FFC type has an R1/2 external thread whereas the FTC type has R1/2 and R3/8 external threads. Provide an Rc1/2 or Rc3/8 internal thread at the injection point that fits the anti-siphon check valve.

FEC/FFC (w/ PE tube)

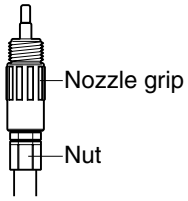


FTC (w/ FEP tube)

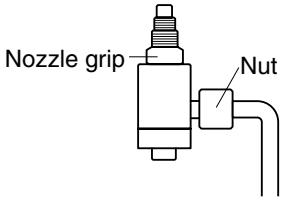


(2) Wind sealing tape around the external thread of the anti-siphon check valve, and screw the valve into the injection point.
  ✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
  ✻ When connecting the tube with the anti-siphon check valve already mounted on it to the main pipe, be absolutely sure to hold the valve body and turn the nut. If the nut is turned without holding the body, the threaded part on the nozzle may be damaged.

FEC/FFC (w/ PE tube)



FTC (w/ FEP tube)

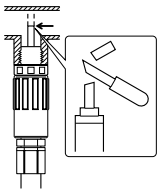


NOTE

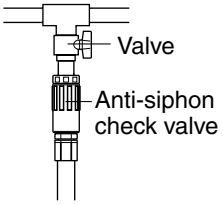
<When injecting liquid into a pipe with a small diameter>
If the end of the anti-siphon check valve is too long, cut it off so that the end will be positioned at the center of the main pipe where the chemical is to be injected prior to use.

<For maintenance>
It is recommended that the tube be attached to the main pipe through a valve to enable the anti-siphon check valve to be replaced or cleaned, etc.
✻ Use a valve made of materials which will resist any corrosion resulting from the chemical used.

Example: FEC/FFC



Example: FEC/FFC



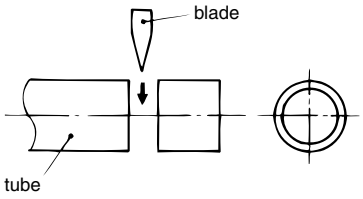
Connecting

Model for injection of boiler chemicals: PZ-31-FEC(PP)

■PP/PE tube

- When bending the tube, provide sufficient leeway in the bending so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the tube firmly so that it will not become disconnected, and tighten the nuts securely. Do not excessively tighten the nuts. Doing so may damage or break the joint.
- If the temperature of a liquid or ambient temperature is higher than room temperature, the tightening force will be reduced, and the tube may become disconnected. After operation has started, tighten up the nuts as appropriate.
- When tightening the nuts, hold the tube to prevent it from being twisted. The joints and other areas may be loosened by the return force of the tube.
- The pump comes with a 5-meter long tube for both the discharge side and suction side. When longer tube is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker tube will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative who will select the appropriate tube size.
- When disconnecting the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using it.

(1) Cut the end of the tube at right angles using a sharp blade.



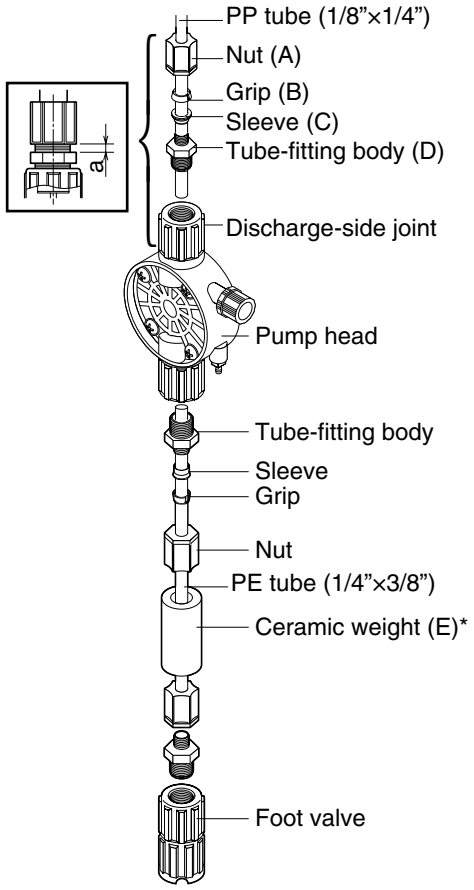
(2) Wrap sealing tape around the tube-fitting body (D), and screw the body into the discharge-side joint using a tool. (The tube-fitting body is already mounted in place before shipment.)

(3) Pass the tube through the nut (A), grip (B) and sleeve (C), and insert its end until it touches the back end of the tube-fitting body (D) on the inside.

(4) Tighten the nut (A) by hand.

(5) Using the tool, tighten the nut (A) in such a way that the gap (area "a" in the figure) between the tube-fitting body (D) and nut (A) is approximately 1.5 mm.

✻ Bear in mind that the joint may break if the nut (A) is tightened too much.



* The tube is packed in the form of a coil. Attach the ceramic weight (E) and straighten out the tube so that the liquid inside the tank will be sucked up through it.

Connecting

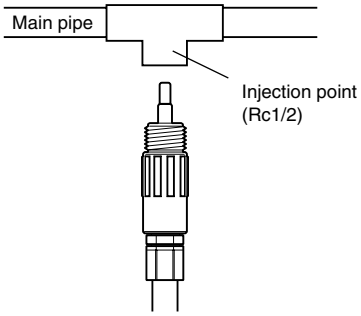
■Anti-siphon check valve

This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When the liquid is to be injected inside the suction-side pipe of a volute pump, etc.
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe, overfeed may occur if the pipe is too long.
- Take care when handling an anti-siphon check valve which is made of PVDF since it is fragile in the face of impact.

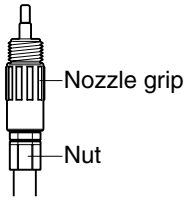
(1) The anti-siphon check valve for the FEC(PP) type has an R1/2 external thread. Provide an Rc1/2 internal thread at the injection point that fits the anti-siphon check valve.

FEC (w/ PP tube)



(2) Wind sealing tape around the external thread of the anti-siphon check valve, and screw the valve into the injection point.
  ✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
  ✻ When connecting the tube with the anti-siphon check valve already mounted on it to the main pipe, be absolutely sure to hold the valve body and turn the nut. If the nut is turned without holding the body, the threaded part on the nozzle may be damaged.

FEC (w/ PP tube)

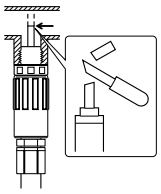


NOTE

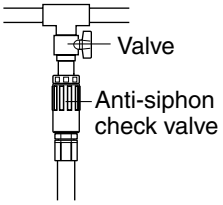
<When injecting liquid into a pipe with a small diameter>
If the end of the anti-siphon check valve is too long, cut it off so that the end will be positioned at the center of the main pipe where the chemical is to be injected prior to use.

<For maintenance>
It is recommended that the tube be attached to the main pipe through a valve to enable the anti-siphon check valve to be replaced or cleaned, etc.
✻ Use a valve made of materials which will resist any corrosion resulting from the chemical used.

Example: FEC (w/PP tube)



Example: FEC (w/PP tube)

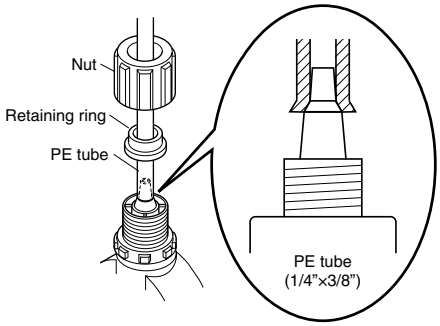


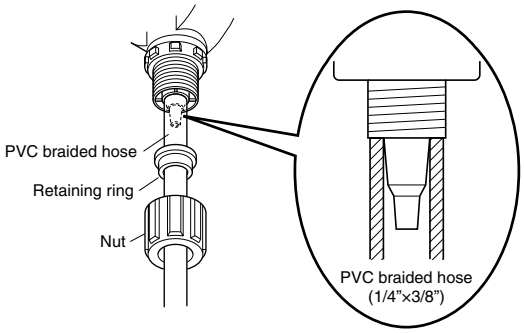
Connecting

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

■PVC braided hose/PE tube

- When bending the hose/tube, provide sufficient leeway in the bending so that the hose/tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the hose/tube firmly so that it will not become disconnected, and tighten the nuts securely. Do not excessively tighten the nuts. Doing so may damage or break the joint.
- If the temperature of a liquid or ambient temperature is higher than room temperature, the tightening force will be reduced, and the hose/tube may become disconnected. After operation has started, tighten up the nuts as appropriate.
- When tightening the nuts, hold the hose/tube to prevent it from being twisted. The joints and other areas may be loosened by the return force of the hose/tube.
- The pump comes with a 5-meter long hose/tube for both the discharge side and suction side. When longer hose/tube is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker hose/tube will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative who will select the appropriate hose/tube size.
- When disconnecting the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.



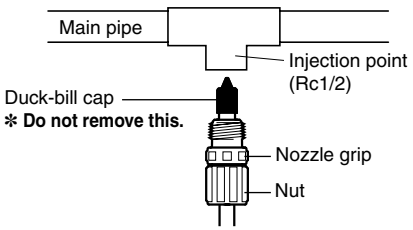


■Anti-siphon check valve w/ duck-bill cap

This pump is provided with an anti-siphon check valve with duck-bill cap. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When the liquid is to be injected inside the suction-side pipe of a volute pump, etc.
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe, overfeed may occur if the pipe is too long.

(1) The anti-siphon check valve with duck-bill cap has an R1/2 external thread. Provide an Rc1/2 internal thread at the injection point.
(2) Wind sealing tape around the external thread of the anti-siphon check valve with duck-bill cap, and screw the valve into the injection point.
  ✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
  ✻ When connecting the tube with the anti-siphon check valve with duck-bill cap already mounted on it to the main pipe, be absolutely sure to hold the valve body and turn the nut. If the nut is turned without holding the body, the threaded part on the nozzle may be damaged.

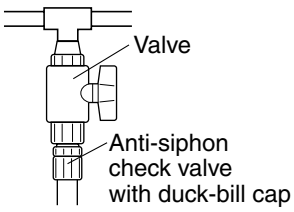


NOTE

<For maintenance>

It is recommended that the tube be attached to the main pipe through a valve to enable the anti-siphon check cap with duck-bill cap to be replaced or cleaned, etc.

✻ Use a valve made of materials which will resist any corrosion resulting from the chemicals used.

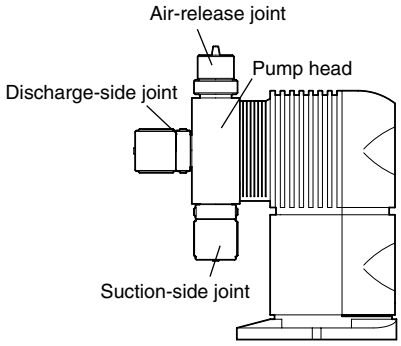


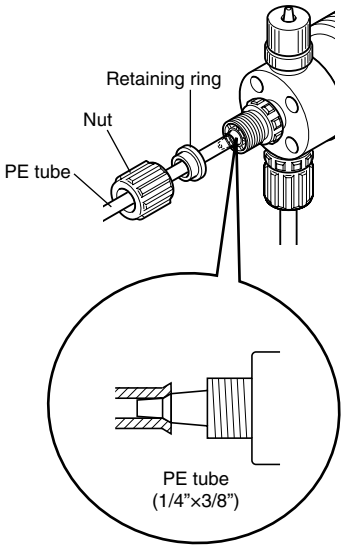
Connecting

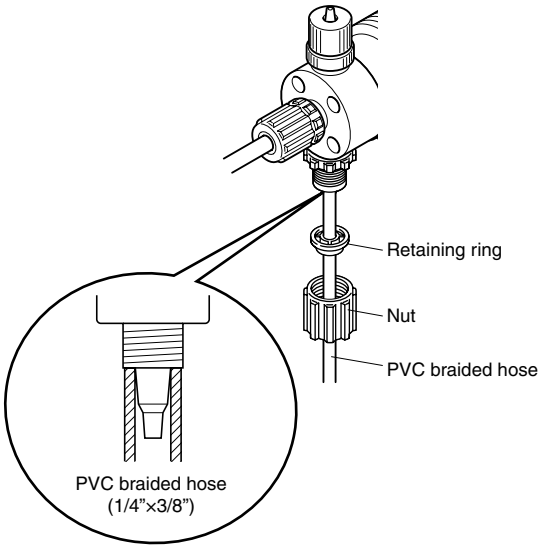
Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

■PVC braided hose/PE tube

- Unlike other models, this model has a discharge-side joint at the front side of the pump head and an air-release joint on its top.
- When bending the hose/tube, provide sufficient leeway in the bending so that the hose/tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the hose/tube firmly so that it will not become disconnected, and tighten the nuts securely. Do not excessively tighten the nuts. Doing so may damage or break the joint.
- If the temperature of a liquid or ambient temperature is higher than room temperature, the tightening force will be reduced, and the hose/tube may become disconnected. After operation has started, tighten up the nuts as appropriate.
- When tightening the nuts, hold the hose/tube to prevent it from being twisted. The joints and other areas may be loosened by the return force of the hose/tube.
- The pump comes with a 5-meter long hose/tube for both the discharge side and suction side. When longer hose/tube is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker hose/tube will be required. Provide details on the (1) viscosity of the liquid, (2) length of the pipes (how they are positioned) and (3) specific gravity of the liquid to a TACMINA representative who will select the appropriate hose/tube size.
- When disconnecting the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.

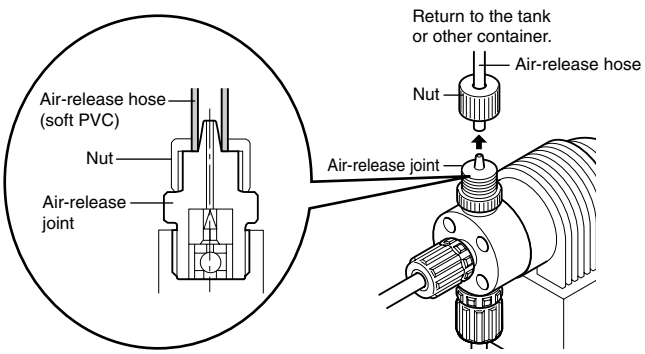






■Soft PVC hose (for air release)

(1) Firmly insert the supplied soft PVC air-release hose as far as the base of the air-release joint on the top of the pump head.
(2) Firmly tighten up the nut so that the hose will not become disconnected.
(3) Return the other end of the hose to the tank or other container.



Connecting

■Anti-siphon check valve w/ duck-bill cap

This pump is provided with an anti-siphon check valve with duck-bill cap. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When the liquid is to be injected inside the suction-side pipe of a volute pump, etc.
- When chemicals greatly exceeding the pump's rated discharge volume are being fed (prevention of overfeed)

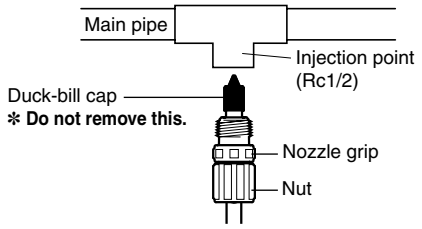
✻ Even with a rising pipe, overfeed may occur if the pipe is too long.

(1) The anti-siphon check valve with duck-bill cap has an R1/2 external thread. Provide an Rc1/2 internal thread at the injection point.

(2) Wind sealing tape around the external thread of the anti-siphon check valve with duck-bill cap, and screw the valve into the injection point.

✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.

✻ When connecting the tube with the anti-siphon check valve with duck-bill cap already mounted on it to the main pipe, be absolutely sure to hold the valve body and turn the nut. If the nut is turned without holding the body, the threaded part on the nozzle may be damaged.

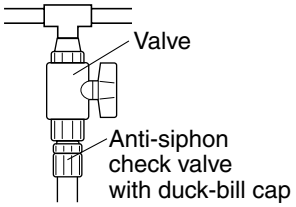


NOTE

<For maintenance>

It is recommended that the tube be attached to the main pipe through a valve to enable the anti-siphon check valve with duck-bill cap to be replaced or cleaned, etc.

✻ Use a valve made of materials which will resist any corrosion resulting from the chemicals used.



Electrical wiring

WARNING

- **This pump cannot be used in explosion-proof regions or in explosive or combustible atmospheres.**
- **Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **Securely ground the protective earth terminal, and be absolutely sure to install a ground fault circuit interrupter. Otherwise, you may receive electric shocks.**
- **Do not attempt to disassemble the pump body or the circuit parts.**

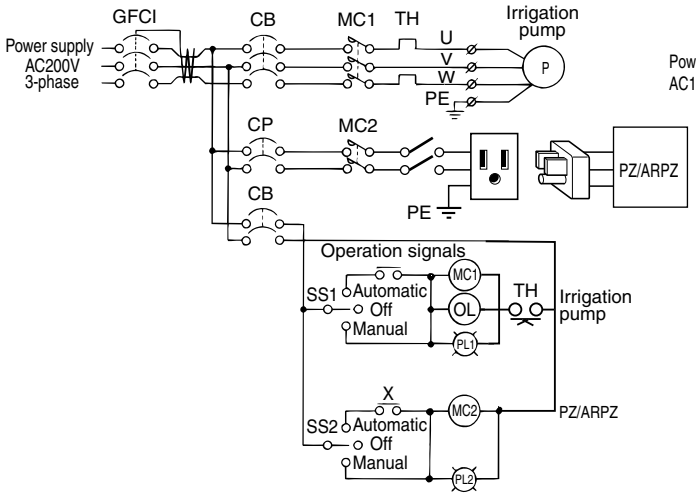
CAUTION

- **The wiring must be done by a qualified electrician or somebody with electrical knowledge.**
- **Connect the wires after checking the supply voltage. Do not connect the wires to a power supply that is not within the rated voltage range.**

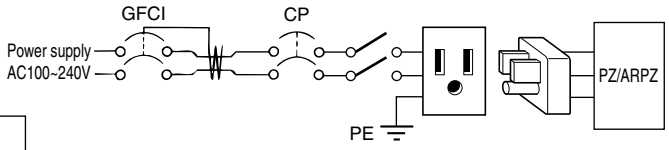
Power cable (2m) is already attached.

Example of wiring

●When operating the pump in tandem with an irrigation pump, etc.



●When running the pump on its own



GFCI : Ground fault circuit interrupter
CB : Circuit breaker
MC1, 2: Electromagnetic contactor
TH : Thermal relay
CP : Circuit protector
SS1, 2 : Selector switch
OL : Overload relay
PL : Pilot lamp

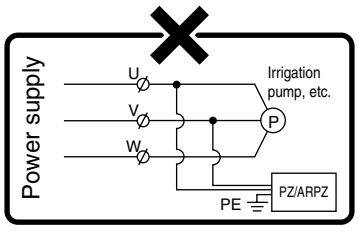
IMPORTANT

- **Be absolutely sure to use a commercial power source (the power supplied by an electric power company) for supplying the power.**

<Power sources that cannot be used>

Power sources in which an AC power regulator is installed
Power sources on the output side of an inverter

- **Since a high voltage is generated when the power is cut off or in other such circumstances and this may result in trouble, do not take the power from the same terminals as the induction motor of an irrigation pump, etc.**



NOTE

- **A circuit protector (CP) is ideal as the injection pump's overcurrent protection device from the standpoint of its operating duration and breaking current characteristics. (5A, medium-speed type)**
- **The circuit protector (CP) shown as the recommended protection device can also be used as the power switch, thus simplifying the wiring connections.**
- **The thermal relay (TH) used for the motor is not appropriate for protecting the pump from the standpoint of its characteristics.**

Electrical wiring

Recommended protection devices

(1) Circuit protectors

Manufacturer	Model
Mitsubishi Electric	CP30-BA2P1-M3A
Fuji Electric	CP32D/3
Matsushita Electric Works	BAC201305

(2) Lightning arrestors

Manufacturer	For AC 100V	For AC 200V
M-System Co.	MA-100	MA-200

(3) Line filters, sealed transformers

Manufacturer	Model
TDK	ZMB2202-11 noise filter
Aihara Electric Co.	SPB-300E sealed transformer

(4) EMC filter

Manufacturer	Model
TDK	ZAC2205-00U

Operating precautions

WARNING

- **Ensure that nobody other than the operators and control personnel will operate the pump.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **When trouble has occurred (such as when smoke appears or there is a smell of burning), shut down the pump's operation immediately, and contact your vender or a TACMINA representative. Otherwise, a fire, electric shocks and/or malfunctions may result.**
- **A situation in which the valve inside the pipe at the discharge side of the pump is shut off or becomes blocked with foreign matter is dangerous in that it may lead to an excessive rise in pressure that will exceed the pump's specification range, causing liquid to gush out, the pipe to be damaged and the pump itself to malfunction. Prior to operating the pump, check the valves and pipes, etc.**

CAUTION

- **When working on the liquid-end parts of the pump, wear protective gear suited to the chemical concerned (such as rubber gloves, a mask, protective goggles and work overalls that are resistant to chemical).**
- **The vibration of the pump may cause the hoses/tubes to become loose and disconnected. Before starting operation, secure the hoses/tubes and check their tightness.**
- **While the pump is operating, the pump's surfaces may become hot, reaching a temperature of 60°C or more.**
- **Idling the pump for prolonged periods of time can lead to malfunctions.**

Check the following points.

Before operation

Check location	Details of check	Notes
Tank	Check whether the amount of liquid is sufficient. If it is not, replenish it.	Take special care in cases where the chemicals or processes involved would be adversely affected if air were sucked in.
Pipes	Check whether any pipes have become disconnected or damaged. If so, re-connect or make repairs.	–
Valves	Check that the valves are open. If a valve is closed, open it.	Closed valves can cause dangerous situations in which the pressure rises excessively, liquid gushes out and/or the pipes are damaged.
Power supply	Check that the pump is connected properly to the prescribed power supply.	If it is not, the electronic circuits and solenoids may burn out.

During operation

Check location	Details of check	Notes
Pump head	Check whether any liquid is leaking from the hole underneath the auxiliary ring at the back of the pump head.	If liquid is leaking, it may mean that the diaphragm is damaged. Inspect the diaphragm.
Joints/pipes	Check for liquid leaks and looseness.	If liquid is leaking or there is a loose joint, replace or tighten it. If liquid still leaks, inspect the O-rings in the joint concerned.
Discharge-side pressure	Check the pressure gauge on the discharge side.	If the gauge shows an abnormal value, a pipe or valve may be blocked. Inspect the pipes.

- When using the pump for the first time
- When resuming operation after a prolonged shutdown of operation
- When the pump is gas-locked
- When the tank is empty

→ **Air releasing (page 26)**

- When using the pump for the first time
- When changing the discharge volume

→ **Discharge-volume setting (page 28)**

- When shutting down operation for a prolonged period
- When resuming operation after a prolonged shutdown of operation

→ **Procedure for prolonged shutdown of operation (page 28)**

Air releasing

⚠ WARNING

- **During the air releasing, chemical may suddenly gush out from the pipes and other parts. Lead the end of the relief/air-release hose bank to the tank or other container, and secure it so that it will not become disconnected.**

IMPORTANT

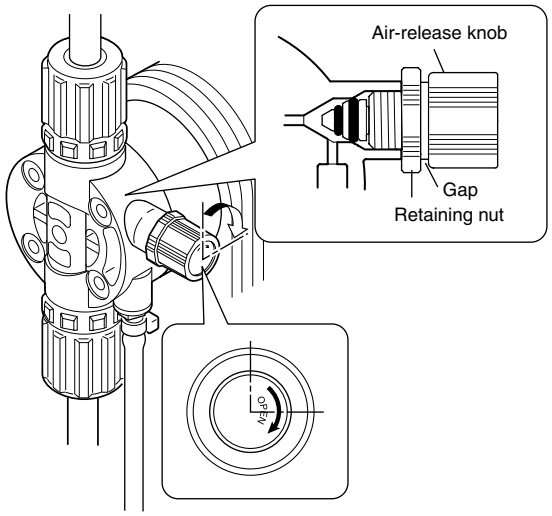
- **When using the pump for the first time or when the chemical container has been replaced, proceed with the task of air releasing prior to operating the pump.**

Type		Page
Model for injection of general chemicals	PZ-31/61/12-VEC/VFC/FEC/FFC/FTC	26
Model for injection of boiler chemicals	PZ-31-FEC (PP)	
Model for injection of sodium hypochlorite	PZ-31/61/12-CL	27
Model w/ automatic air-release function for injection of sodium hypochlorite	ARPZ-31/61/12	27

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

Model for injection of boiler chemicals: PZ-31-FEC (PP)

(1) Before proceeding with the air releasing, check that the end of the relief/air-release hose has been led back to the tank or other container.
(2) Turn off the pump's power, and release the pressure inside the discharge-side pipe.
(3) Set the discharge volume to the maximum level. (See page 28)
(4) Turn on the pump's power to start operating the pump.
(5) Rotate the air-release knob clockwise by about 90 degrees.
The presence of a gap between the knob and retaining nut is now visible.



(6) After a few moments air will exit from the relief/air-release port together with the liquid.
(7) After all the air has been released, turn the air-release knob further in the clockwise direction until a clicking sound is heard.
(8) Shut down the pump.

IMPORTANT

- **Under no circumstances must the air-release knob be turned counterclockwise.**

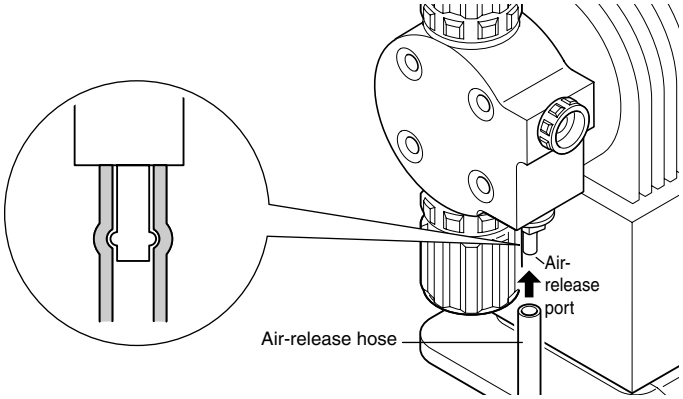
NOTE

- **If it is difficult to release the air, keep turning the air-release knob clockwise until a clicking sound is heard repeatedly.**

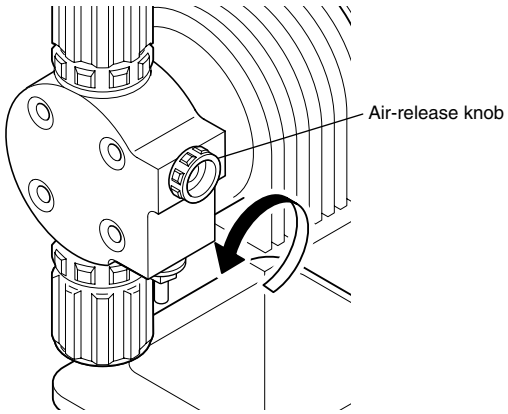
Air releasing

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

(1) Insert the air-release hose provided into the air-release port.
(2) Return the other end of the air-release hose to the tank or other container, and secure it firmly.



(3) Turn off the pump's power, and release the pressure inside the discharge-side pipe.
(4) Set the discharge volume to the maximum level. (See page 28)
(5) Turn on the pump's power to start operating the pump.
(6) While operating the pump, turn the air-release knob counterclockwise for 1 to 1-1/2 turns.



(7) After a few moments air will exit from the air-release port together with the liquid.
(8) After all the air has been released, turn the air-release knob clockwise, and tighten it securely.
(9) Shut down the pump.

NOTE

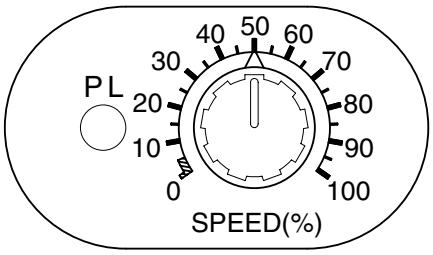
• If it is difficult to release the air completely, repeatedly open and close the air-release knob.

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

(1) Before proceeding with the air releasing, check that the end of the air-release hose has been led back to the tank or other container.
(2) Turn off the pump's power, and release the pressure inside the discharge-side pipe.
(3) Set the discharge volume to the maximum level. (See page 28)
(4) Turn on the pump's power to start operating the pump.
(5) After a few moments air will exit from the air-release port together with the liquid.
(6) After all the air has been released, shut down the pump.

Discharge-volume setting

• The stroke speed can be adjusted by turning the stroke-speed adjustent dial located at the back of the pump.



Adjustable range of stroke speed: 15 to 300 strokes/min

✻ When the dial is moved while the pump is stopped, the dial setting may shift during pump operation. If this happens, adjust the dial again.

Procedure for prolonged shutdown of operation

Follow the steps below when shutting down the pump for a prolonged period.

To shut down the pump

(1) Operate the pump so that clean water or cleaning fluid is sucked in and discharged for about 30 minutes to clean the inside of the pump head.
(2) Turn off the power completely.
(3) Place the cover over the pump to protect the pump from the build-up of dust and corrosive environments.

To resume operation

(1) Check the inside of the tank for any sediment that may have accumulated, and check for signs of trouble such as cloudy liquid. If the liquid quality has deteriorated, clean the inside of the tank, and replace all the existing liquid with fresh chemical.
(2) Check the valve seat areas and check balls inside the joints for dirt and other foreign matter.
(3) Check the items in the section “Before operation” on page 25.

Maintenance precautions

WARNING

- **Ensure that nobody other than the operators and control personnel will operate the pump.**
- **Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **When trouble has occurred (such as when smoke appears or there is a smell of burning), shut down the pump's operation immediately, and contact your vender or a TACMINA representative. Otherwise, a fire, electric shocks and/or malfunctions may result.**
- **Do not attempt to disassemble the pump body or the circuit parts.**

CAUTION

- **When working on the liquid-end parts of the pump, wear protective gear suited to the chemical concerned (such as rubber gloves, a mask, protective goggles and work overalls that are resistant to chemical).**
- **Before attempting to maintain or repair the pump, release the pressure in the discharge pipe, discharge the liquid in the pump head, and clean the liquid-end parts.**

Check the following points.

Routine inspections

- Check whether the level of the chemical in the tank is high enough.
- Check the pump for chemical leakage.
- Check that the pressure gauge on the pump discharge side indicates a normal value.

Periodic inspections

- At the 10,000-hour mark after starting the pump operation
- When discharge trouble has occurred (reduced discharge volume)
- When chemical is leaking from around the pump head

→ **Replacing the diaphragm (see the page 30)**

- At the 10,000-hour mark after starting the pump operation
- When discharge trouble has occurred (reduced discharge volume)

→ **Replacing the valve seats and check balls (see the page 31 to 34)**

When trouble has occurred

- When the relief-valve function has been activated

→ **Replacing the relief valve (see the page 35)**

- When trouble has occurred during operation

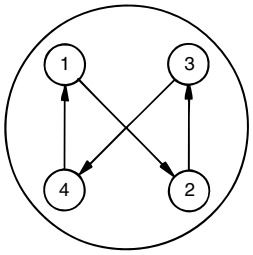
→ **Troubleshooting (see the page 37 to 38)**

Replacing the diaphragm

✻ This instruction is described with an example using PZ-31 (VEC type).

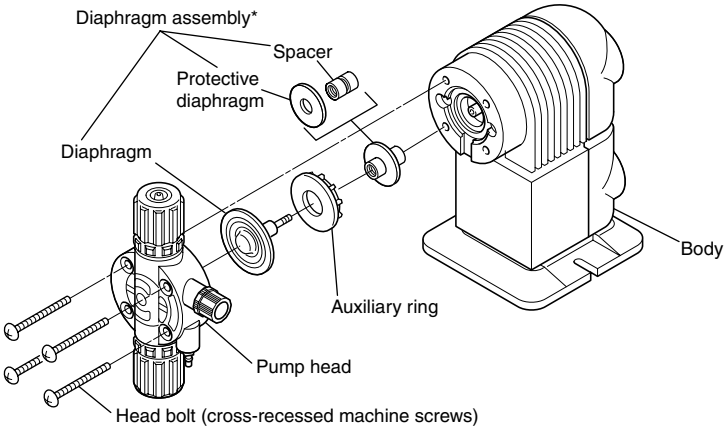
IMPORTANT

- **When securing the pump head using the head bolts, tighten them up evenly a little at a time in the sequence shown in the figure on the right. If, for instance, the bolts are tightened up in the sequence of 1 → 3 → 2 → 4, the bolts will be tightened unevenly, possibly causing the chemical to leak from the pump head.**



Removing the diaphragm

(1) Remove the head bolts.
(2) Remove the pump head.
(3) Take hold of the outer circumference part of the diaphragm, and remove the diaphragm while turning it counter-clockwise.
(4) Remove the auxiliary ring, and remove the protective diaphragm.
(5) Pull out the spacer from the protective diaphragm.



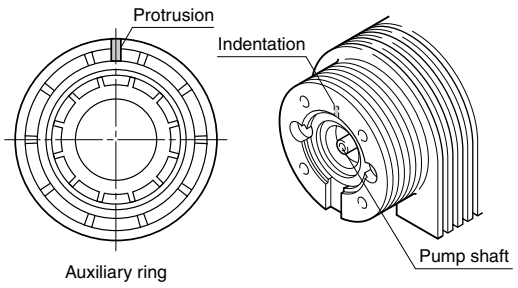
* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 51 to 52.

IMPORTANT

- **Replace the protective diaphragm at the same time as the diaphragm.**

Installing the diaphragm

(1) Align the groove in the spacer with the new protective diaphragm, and assemble them properly.
(2) Fit the new protective diaphragm with spacer into the pump shaft.
(3) Align the auxiliary ring at the fixed position shown below, and install it.



Align the indentation in the pump body with the protrusion of the auxiliary ring.

(4) Install the new diaphragm by turning it clockwise until it becomes stiff.
✻ If it is loose, it will make contact with the pump head, possibly causing malfunctions and/or damage.
(5) Install the pump head, and secure it using the head bolts.

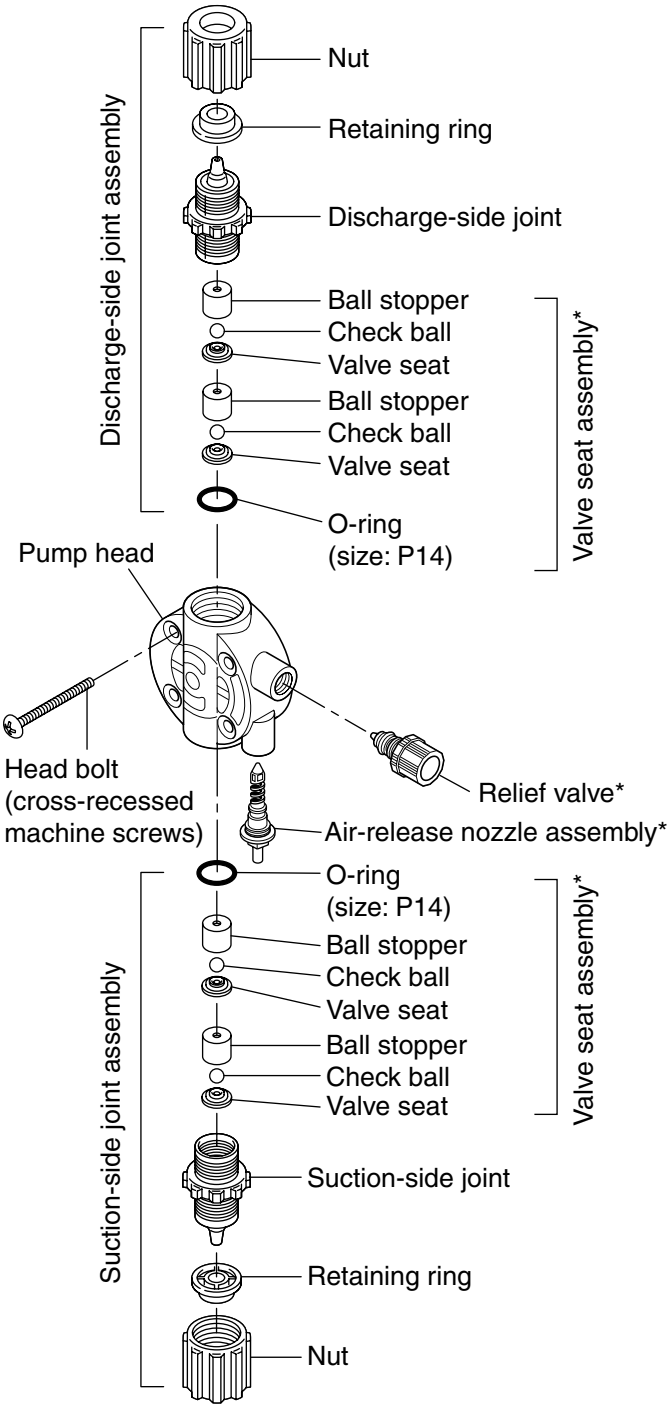
Replacing the valve seats and check balls

IMPORTANT

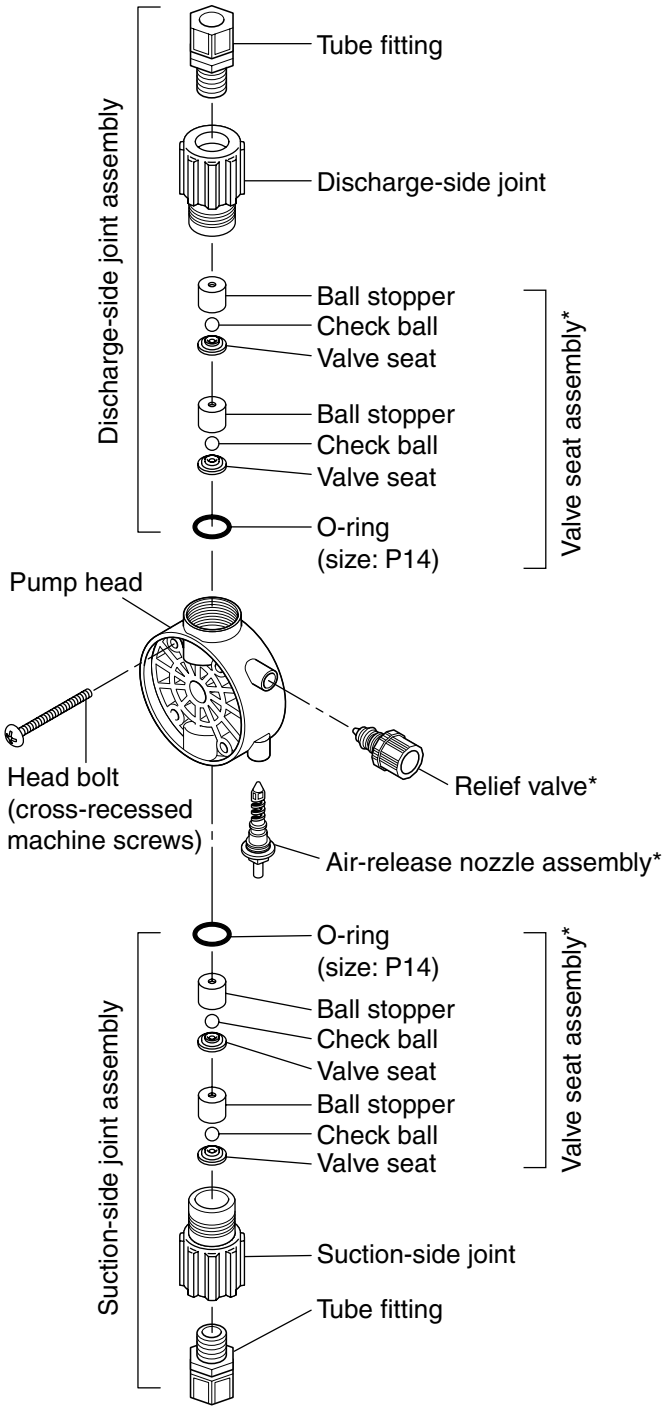
- **Install the parts in the correct sequence and correct directions.**
- **Pay special attention to the sequence and directions for the joints and valve seat assemblies.**
- **Check the O-ring, check balls and valve seats for damage and dirt.**

Model for injection of general chemicals: PZ-31/61/12

■Liquid-end material: VEC/VFC



■Liquid-end material: FEC/FFC

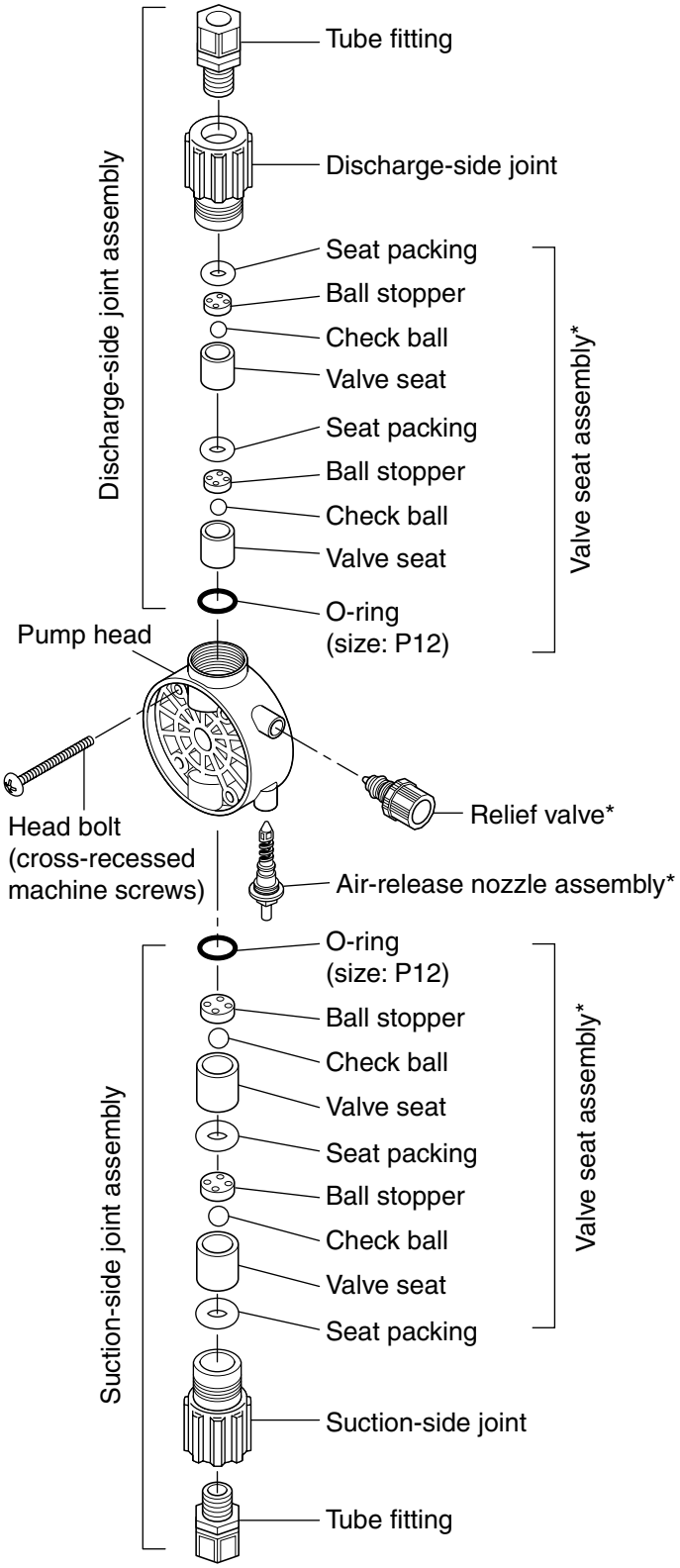


* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 51 to 52.

✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

■Liquid-end material: FTC



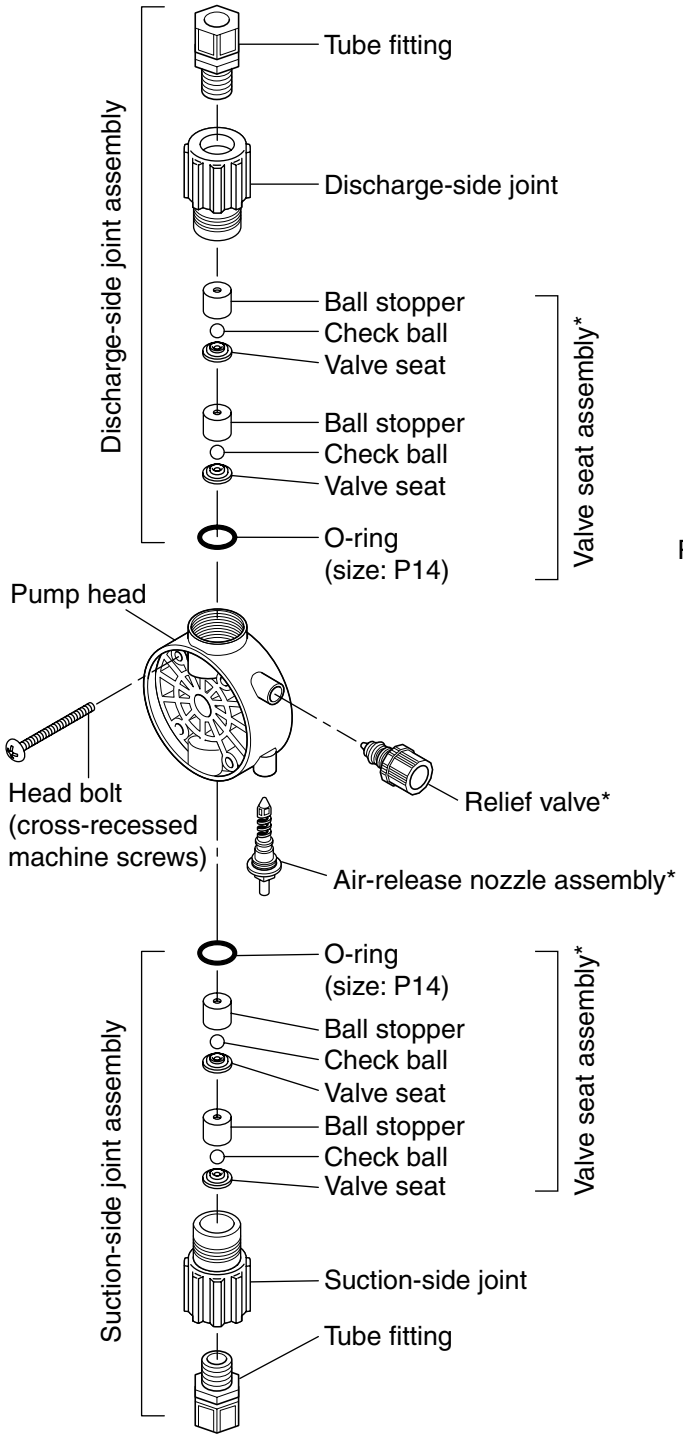
* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 51 to 52.

✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

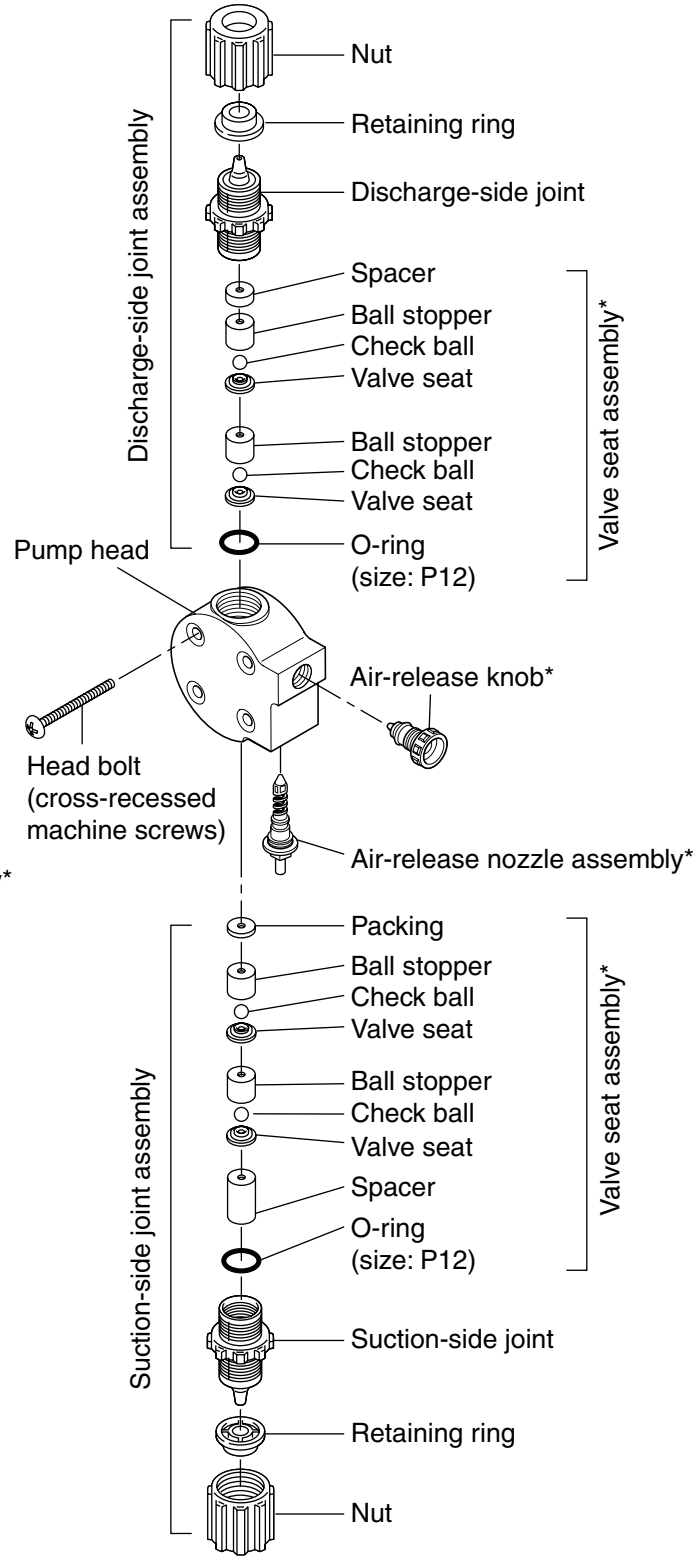
Model for injection of boiler chemicals: PZ-31

■Liquid-end material: FEC (PP)



Model for injection of sodium hypochlorite: PZ-31/61/12-CL

■Liquid-end material: CL



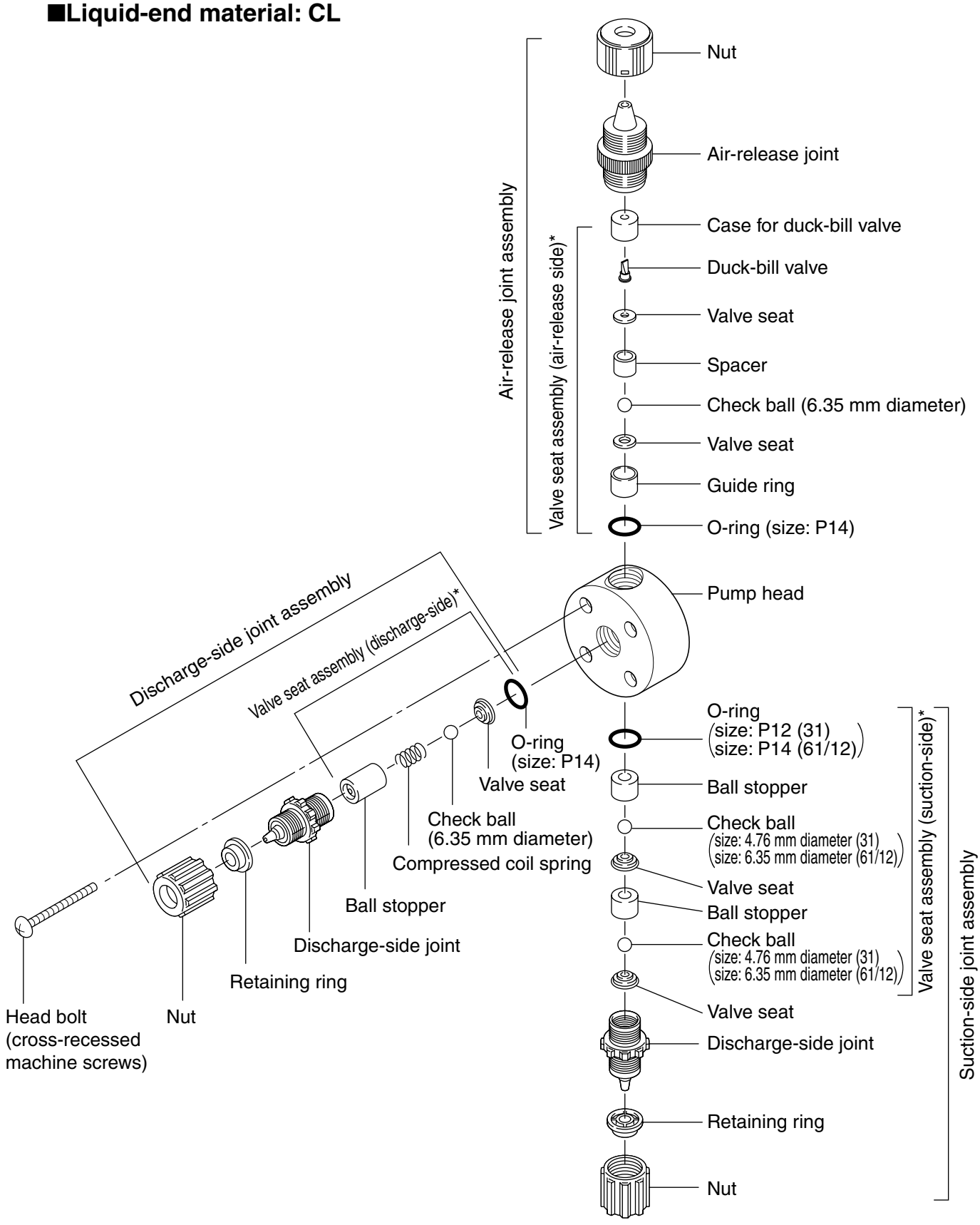
* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 51 to 52.

✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

■Liquid-end material: CL



* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 51 to 52.

✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the relief valve

✻ This instruction is described with an example using PZ-31 (VEC type).

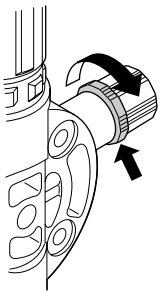
IMPORTANT

Take the following action when the relief-valve function has been activated by clogging of the discharge-side pipe, for instance.

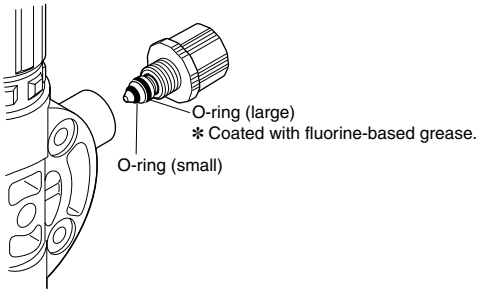
- **Shut down the pump immediately, remove the cause of the trouble, and take steps to prevent its recurrence.**
- **The relief valve is a consumable. Replace it once it has been activated.**

Replacing the relief valve

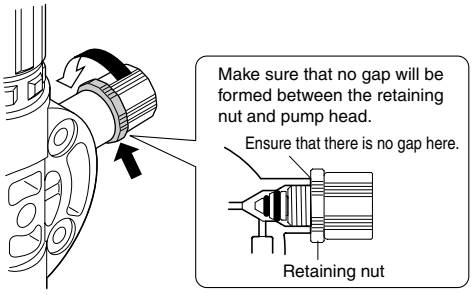
(1) Hold the retaining nut (the part shown by the arrow), and turn it counterclockwise.



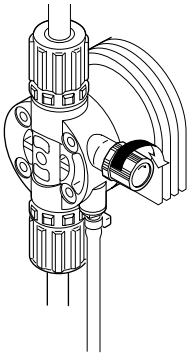
(2) Check the O-ring of the new relief valve for dirt or foreign matter.
✻ The large O-ring comes coated with fluorine-based grease. Use it as is.



(3) Hold the retaining nut (the part shown by the arrow), turn it clockwise, and install it on the pump head.



(4) After installing the relief valve, rotate the air-release knob by two turns in the clockwise direction to ensure that the O-ring is seated properly.



Troubleshooting

WARNING

- **Ensure that nobody other than the operators and control personnel will operate the pump.**
- **Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **When trouble has occurred (such as when smoke appears or there is a smell of burning), shut down the pump's operation immediately, and contact your vender or a TACMINA representative. Otherwise, a fire, electric shocks and/or malfunctions may result.**
- **Do not attempt to disassemble the pump body or the circuit parts.**
- **During the air releasing, chemical may suddenly gush out from the pipes and other parts. Lead the end of the relief/air-release hose bank to the tank or other container, and secure it so that it will not become disconnected.**
- **A situation in which the valve inside the pipe at the discharge side of the pump is shut off or becomes blocked with foreign matter is dangerous in that it may lead to an excessive rise in pressure that will exceed the pump's specification range, causing liquid to gush out, the pipe to be damaged and the pump itself to malfunction. Prior to operating the pump, check the valves and pipes, etc.**

CAUTION

- **When working on the liquid-end parts of the pump, wear protective gear suited to the chemical concerned (such as rubber gloves, a mask, protective goggles and work overalls that are resistant to chemical).**
- **Before attempting to maintain or repair the pump, release the pressure in the discharge pipe, discharge the liquid in the pump head, and clean the liquid-end parts.**
- **The vibration of the pump may cause the hoses/tubes to become loose and disconnected. Before starting operation, secure the hoses/tubes and check their tightness.**

NOTE

- **Use of a flow indicator is recommended as a method to detect discharge trouble.**
  ✻ Refer to "Spare parts & options" on page 53.

Troubleshooting

Trouble		Cause	Remedy
The pump runs, but no liquid is pumped.	Air has found its way inside.	(1) A liquid which easily vaporize is being used. (2) Air has entered from a joint or seal to become mixed with the liquid. (3) The tank is empty.	(1) Dilute the liquid. (2) Tighten the parts from which the liquid is leaking. (3) After replenishing the liquid, proceed with air releasing.
	No liquid is sucked in.	(1) The strainer is clogged. (2) The pump is gas-locked. (3) The valve seat area has been assembled the wrong way round.	(1) Clean the strainer and the tank. (2) Proceed with air releasing. (3) Disassemble the valve seat area, and then re-assemble it properly.
	The pressure fails to rise.	(1) The supply voltage is low or the power supply used is not a commercial one.	(1) Connect the pump to the proper power supply.
	No liquid is discharged.	(1) The viscosity of the liquid is too high. (2) The pressure loss (pipe resistance) is too high.	(1) Reduce the viscosity of the liquid. (2) Install an air chamber at the discharge side, or use a pipe with a larger diameter.
Liquid is leaking.		(1) The pressure is increased due to clogging by dirt, etc. (2) Damage has resulted from fatigue of the pipes, diaphragm or other parts. (3) The nuts have not been adequately tightened.	(1) Disassemble and clean. (2) Replace the defective parts with new parts. (3) Tighten the nuts.
Liquid is coming out of the relief/air-release port.		(1) The relief valve was not replaced after it was activated. (2) Abnormal pressure has been generated.	(1) Replace the relief valve. (2) Remove the cause of the abnormal pressure, and replace the relief valve.
The pump fails to run.	The pilot lamp does not blink.	(1) Something is wrong with the power supply or supply voltage. (2) The wiring connections for the pump were not performed correctly. (3) The power cable is broken. (4) The main power switch is off. (5) The circuit breaker (CB) has been tripped. (6) The built-in protective fuse has blown.	(1) Check the power supply and supply voltage, and connect the pump to the correct power supply. (2) Check the wiring connections, and connect the wires correctly. (3) Repair or replace the power cable. (4) Turn on the main power switch. (5) After investigating the cause, reset the circuit breaker (CB). (6) Ask manufacturer for repair.
	The solenoid fails to work.	(1) The ground fault circuit interrupter (GFCI) has been tripped. (2) The electromagnetic contactor (MC) is defective.	(1) Ask manufacturer for repair. (2) Replace the electromagnetic contactor (MC).
There is a significant difference in the set discharge volume and the actual discharge volume.		(1) The discharge-volume setting is not correct. (2) The pipe connection conditions are different from the ones that were used to obtain the actually measured value.	(1) Set the correct value. (2) Conduct the measurements again under actual conditions, and then set the discharge volume accordingly.

Model code

✻ When selecting the pump model, first check the "Liquid-end material" and "Specification".

Model for injection of general chemicals

PZ - 31 - VEC - 1/4×3/8PE - W - S - ULP - NPR
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min
61	60 mL/min
12	100 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
VEC	PVC	PTFE	Ceramic	EPDM
VFC	PVC	PTFE	Ceramic	Fluoro-rubber

(3) Hose standard

Code	Size (I. D. X. O. D.)	Material
1/4×3/8 PE	1/4"×3/8"	Discharge side: PE tube
		Suction side: PVC braided hose

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

PZ - 31 - FEC/FFC - 1/4×3/8PE - W - S - ULP - NPR
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min
61	60 mL/min
12	100 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
FEC	PVDF	PTFE	Ceramic	EPDM
FFC	PVDF	PTFE	Ceramic	Fluoro-rubber

(3) Hose standard

Code	Size (I. D. X. O. D.)	Material
1/4×3/8 PE	1/4"×3/8"	PE tube

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

Model code

✻ When selecting the pump model, first check the "Liquid-end material" and "Specification".

PZ - 31 - FTC - 1/4×3/8FEP - W - S - ULP - NPR
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min
61	60 mL/min
12	100 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
FTC	PVDF	PTFE	Ceramic	Super fluoro-rubber pafulo®

(3) Hose standard

Code	Size	Material
1/4×3/8 FEP	1/4"×3/8"	FEP tube

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

Model for injection of boiler chemicals

PZ - 31 - FEC - 1/8×1/4PP - W - S - ULP - NPR
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
FEC	PVDF	PTFE	Ceramic	EPDM

(3) Hose standard

Code	Size (I. D. X. O. D.)	Material
1/8×1/4 PP	Discharge side: 1/8"×1/4"	PP tube
	Suction side: 1/4"×3/8"	PE tube

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

Model code

✻ When selecting the pump model, first check the "Liquid-end material" and "Specification".

Model for injection of sodium hypochlorite

PZ - 31 - CL - 1/4×3/8PE - W - S - ULP - NP
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min
61	60 mL/min
12	100 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
CL	Acrylic (PMMA)	PTFE	Ceramic	Fluoro-rubber

(3) Hose standard (size/material)

Code	Size (I. D. X. O. D.)	Material
1/4×3/8 PE	1/4"×3/8"	Discharge side: PE tube
		Suction side: PVC braided hose

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

Model w/ automatic air-release function for injection of sodium hypochlorite

ARPZ - 31 - CL - 1/4×3/8PE - W - S - ULP - NP
(1) (2) (3) (4) (5) (6)

(1) Model (discharge volume standard)

Model	Discharge volume
31	30 mL/min
61	60 mL/min
12	100 mL/min

(2) Liquid-end material

Type	Pump head	Diaphragm	Check ball	O-ring
CL	Acrylic (PMMA)	PTFE	Ceramic	Fluoro-rubber

(3) Hose standard (size/material)

Code	Size (I. D. X. O. D.)	Material
1/4×3/8 PE	1/4"×3/8"	Discharge side: PE tube
		Suction side: PVC braided hose

(4) Joint specification

Code	Type
W	Standard

(5) Applicable standard

Code	Type
S	Standard
CE	CE marking-compatible

(6) Power plug

Code	Type
ULP	UL plug

Liquid-end material

Model / Part	Model for injection of general chemicals					Model for injection of boiler chemicals	Model for injection of sodium hypochlorite	Model w/ automatic air-release function for injection of sodium hypochlorite
	PZ							ARPZ
	VEC	VFC	FEC	FFC	FTC	FEC (PP)	CL	CL
Pump head	PVC		PVDF				Acrylic (PMMA)	
Diaphragm	PTFE							
Check ball	Ceramic							
O-ring	EPDM	Fluoro-rubber	EPDM	Fluoro-rubber	Special fluoro-rubber Pafulo®	EPDM	Fluoro-rubber	
Valve seat	EPDM	Special fluoro-rubber	EPDM	Special fluoro-rubber	PTFE	EPDM	Special fluoro-rubber	
Joint	PVC		PVDF				PVC	
Ball stopper	PVC		PVDF	PTFE (valve stopper)		PVDF	PVC	
Compressed coil spring	–							Hastelloy C

Specification

Model for injection of general chemicals: PZ

Specification \ Model		31					61					12				
		VEC	VFC	FEC	FFC	FTC	VEC	VFC	FEC	FFC	FTC	VEC	VFC	FEC	FFC	FTC
Max. discharge volume*	G/h	0.5					1.0					1.6				
	L/h	1.8					3.6					6.0				
Max. discharge pressure*	MPa	1.0					0.8					0.4				
	psi	145					116					58				
Stroke speed		15 to 300 strokes/min (dial setting)														
Stroke length		Fixed at 1.0 mm														
Connection (hose/tube: I.D×O.D)	Discharge side	PE tube (1/4"×3/8", 3m)		PE tube (1/4"×3/8", 5m)		FEP tube (1/4" ×3/8", 5m)	PE tube (1/4"×3/8", 3m)		PE tube (1/4"×3/8", 5m)		FEP tube (1/4" ×3/8", 5m)	PE tube (1/4"×3/8", 3m)		PE tube (1/4"×3/8", 5m)		FEP tube (1/4" ×3/8", 5m)
	Suction side	PVC braided hose (1/4"×3/8", 2m)					PVC braided hose (1/4"×3/8", 2m)					PVC braided hose (1/4"×3/8", 2m)				
	Relief/ air-release	Soft PVC hose (4×6, 1 m)														
Max. allowable viscosity		50 mPa.s														
Allowable temperature		Ambient temperature: 0 to 40˚C / Transferring liquid: 0 to 40˚C (no freezing allowed)														
Ambient humidity		35 to 85% RH														
Environmental protection		IEC standard: IP65 or equivalent (water- and dust-proof)														
Altitude of installation location		Less than 1,000 m														
Noise level		Less than 85 dB														
Power supply	Rated voltage	AC 100 to 240 V (±10%)														
	No. of phases/ Frequency	1-phase/50 or 60 Hz														
	Maximum current	2.2 A														
	Power consumption	Max.: 220 VA/Ave.: 16 W														
Weight		1.7 kg														

* Conditions: Clean water, room temperature

Specification

Model for injection of boiler chemicals: PZ

Specification \ Model		31
		FEC (PP)
Max. discharge volume*	G/h	0.44
	L/h	1.68
Max. discharge pressure*	MPa	1.5
	psi	217
Stroke speed		15 to 300 strokes/min (dial setting)
Stroke length		Fixed at 1.0 mm
Connection (hose/tube: I.D×O.D)	Discharge side	PP tube (1/8"×1/4", 3m)
	Suction side	PE tube (1/4"×3/8", 2m)
	Relief/ air-release	Soft PVC hose (4×6, 1 m)
Max. allowable viscosity		50 mPa.s
Allowable temperature		Ambient temperature: 0 to 40˚C / Transferring liquid: 0 to 40˚C (no freezing allowed)
Ambient humidity		35 to 85% RH
Environmental protection		IEC standard: IP65 or equivalent (water- and dust-proof)
Altitude of installation location		Less than 1,000 m
Noise level		Less than 85 dB
Power supply	Rated voltage	AC 100 to 240 V (±10%)
	No. of phases/ Frequency	1-phase/50 or 60 Hz
	Maximum current	2.2 A
	Power consumption	Max.: 220 VA/Ave.: 16 W
Weight		1.7 kg

* Conditions: Clean water, room temperature

Specification

Model for injection of sodium hypochlorite: PZ

Specification \ Model			31	61	12
Max. discharge volume*		G/h	0.5	1.0	1.6
		L/h	1.8	3.6	6.0
Max. discharge pressure*		MPa	1.0	0.8	0.4
		psi	145	116	58
Stroke speed			15 to 300 strokes/min (dial setting)		
Stroke length			Fixed at 1.0 mm		
Connection (hose/tube: I.D×O.D)	Discharge side		PE tube (1/4"×3/8", 3m)		
	Suction side		PVC braided hose (1/4"×3/8", 2m)		
	Air-release		Soft PVC hose (4×6, 1 m)		
Max. allowable viscosity			50 mPa.s		
Allowable temperature			Ambient temperature: 0 to 40˚C / Transferring liquid: 0 to 40˚C (no freezing allowed)		
Ambient humidity			35 to 85% RH		
Environmental protection			IEC standard: IP65 or equivalent (water- and dust-proof)		
Altitude of instrallation location			Less than 1,000 m		
Noise level			Less than 85 dB		
Power supply	Rated voltage		AC 100 to 240 V (±10%)		
	No. of phases/ Frequency		1-phase/50 or 60 Hz		
	Maximum current		2.2 A	2.5 A	
	Power consumption		Max.: 220 VA/ Ave.: 16 W	Max.: 250 VA/Ave.: 18 W	
Weight			1.7 kg	1.8 kg	

* Conditions: Clean water, room temperature

Specification

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ

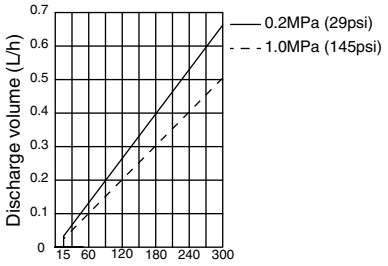
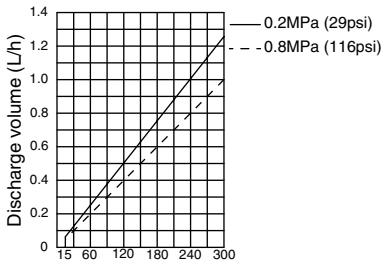
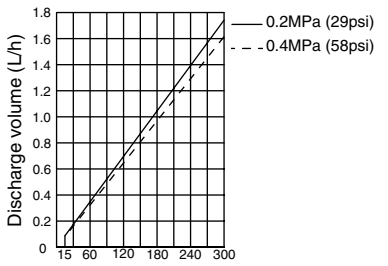
Specification \ Model		31	61	12
Max. discharge volume*	G/h	0.42	0.84	1.47
	L/h	1.6	3.2	5.6
Max. discharge pressure*	MPa	1.0	0.8	0.4
	psi	145	116	58
Stroke speed		15 to 300 strokes/min (dial setting)		
Stroke length		Fixed at 1.0 mm		
Connection (hose/tube: I.D×O.D)	Discharge side	PE tube (1/4"×3/8", 3m)		
	Suction side	PVC braided hose (1/4"×3/8", 2m)		
	Air-release	Soft PVC hose (4×8, 1 m)		
Max. allowable viscosity		50 mPa.s		
Allowable temperature		Ambient temperature: 0 to 40°C / Transferring liquid: 0 to 40°C (no freezing allowed)		
Ambient humidity		35 to 85% RH		
Environmental protection		IEC standard: IP65 or equivalent (water- and dust-proof)		
Altitude of installation location		Less than 1,000 m		
Noise level		Less than 85 dB		
Power supply	Rated voltage	AC 100 to 240 V (±10%)		
	No. of phases/ Frequency	1-phase/50 or 60 Hz		
	Maximum current	2.2 A	2.5 A	
	Power consumption	Max.: 220 VA/Ave.: 16 W	Max.: 250 VA/Ave.: 18 W	
Weight		1.7 kg	1.8 kg	

* Conditions: Clean water, room temperature

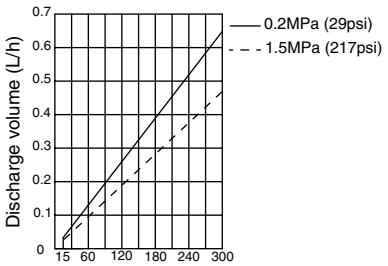
Performance curve

- The performance curves below represent the measurements taken under the conditions prevailing at TACMINA's test facilities, and are provided here as examples.
- The individual conditions prevailing on-site and differences between models may produce minor variations from these curves.
- Measure the discharge volume using the conditions under which the pump will actually be used, and set the stroke speed in accordance with the applicable performance curve.

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

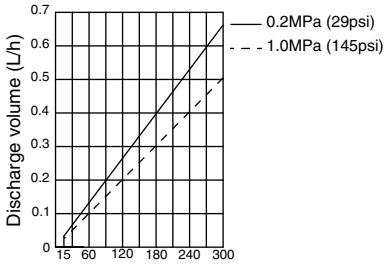
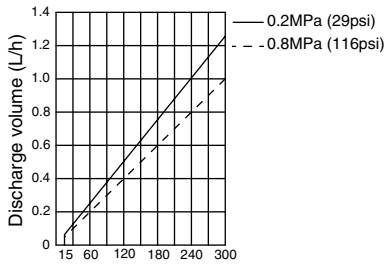
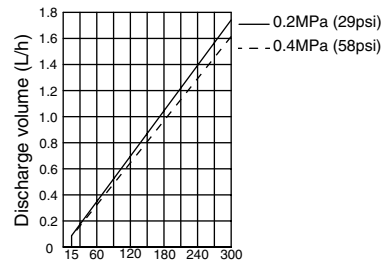
PZ–31– VEC/VFC/FEC/FFC/FTC	PZ–61– VEC/VFC/FEC/FFC/FTC	PZ–12– VEC/VFC/FEC/FFC/FTC
Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)

Model for injection of boiler chemicals: PZ-31-FEC (PP)

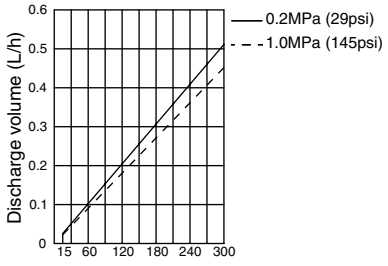
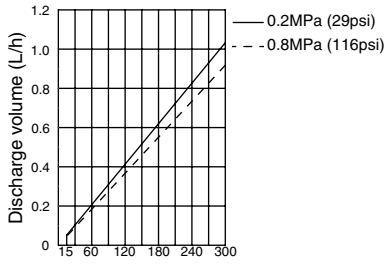
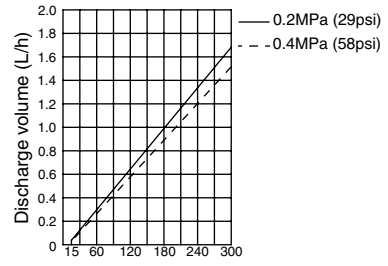
PZ–31–FEC (PP)
Conditions: clean water, room temperature    Stroke speed (strokes/min)

Performance curve

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

PZ–31–CL	PZ–61–CL	PZ–12–CL
Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)

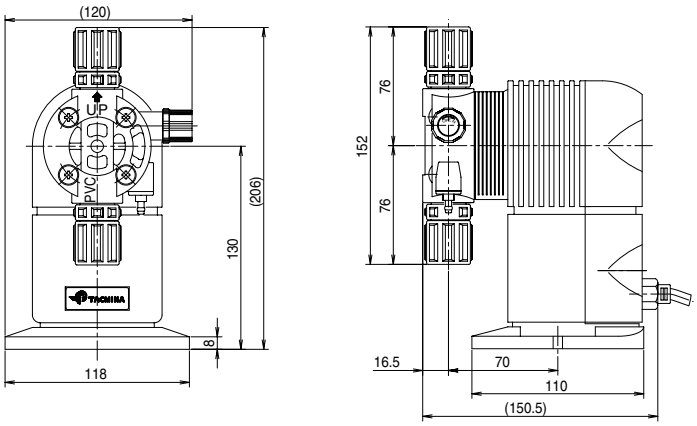
Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

ARPZ–31–CL	ARPZ–61–CL	ARPZ–12–CL
Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)

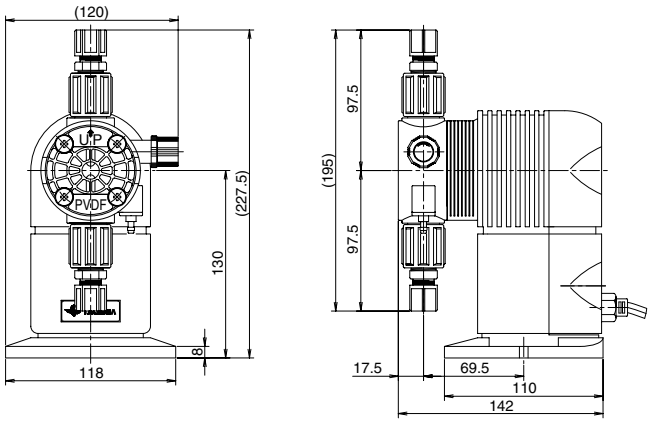
External dimension

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

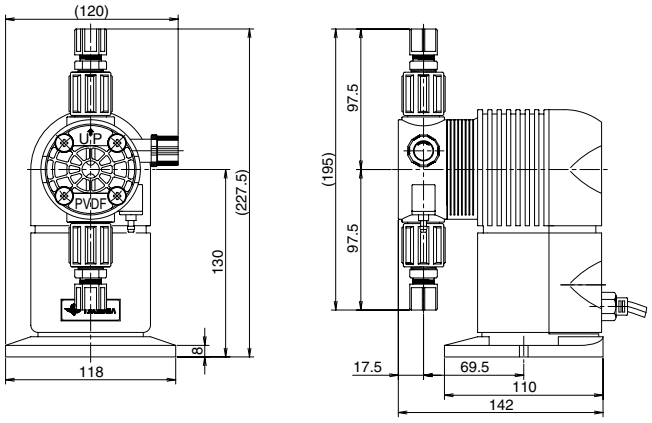
PZ–31/61/12-VEC/VFC



PZ–31/61/12-FEC/FFC/FTC



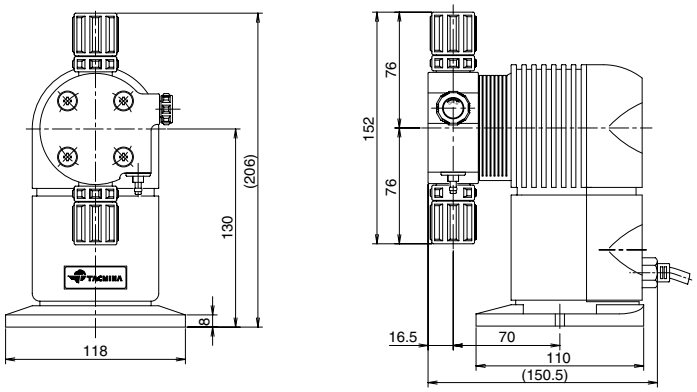
Model for injection of boiler chemicals: PZ-31-FEC (PP)



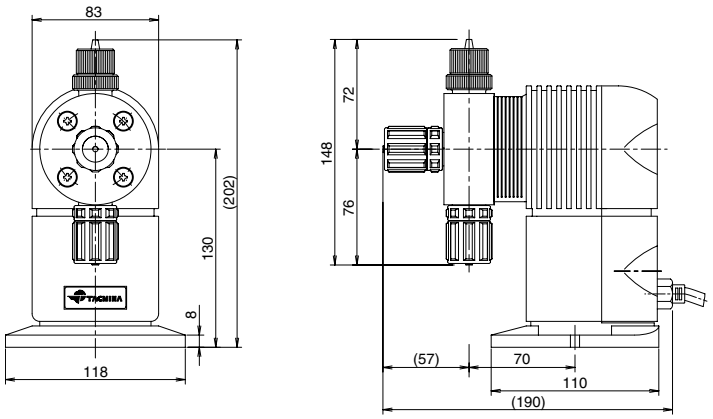
Specifications

External dimension

Model for injection of sodium hypochlorite: PZ-31/61/12-CL



Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12



Specifications

Consumables

- Failure to replace the consumables may cause discharge (or injection) trouble and/or malfunctions.
- The replacement timeframes of the consumables have been determined under the prescribed conditions (clean water, room temperature) prevailing at TACMINA's test facilities.
- Since these timeframes will differ under the individual conditions prevailing on-site, use them as a general guide, and replace the consumables at an earlier rather than later date.

⚠ CAUTION

- **The durability of a hose/tube differs significantly depending on the chemicals with which it is used, on the temperatures and pressures and on the presence of ultraviolet rays. Inspect the hoses/tubes, and replace them if they have deteriorated.**

NOTE

- **TACMINA will continue to supply consumables for its pumps for a period of eight (8) years after the manufacture of the pumps has been discontinued.**
- **"Parts kits" consisting of a complete set of consumables are available (except for some models).**

For details on how to replace the consumables, refer to "Replacing the diaphragm", "Replacing the valve seats and check balls" and" Replacing the relief valve" (on page 30 to 35).

Model for injection of general chemicals: PZ-31/61/12-VEC/VFC/FEC/FFC/FTC

PZ-31/61/12-VEC/VFC

Part	Quantity per pump	Recommended replacement timeframe
	31/61/12	
Valve seat assembly	2	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1	Every 10,000 hours
Relief valve	1	Every 10,000 hours*
Air-release nozzle assembly	1	Every 10,000 hours

* The timeframe applies when the relief-valve function has not been activated at all. If it has been activated, replace it regardless of how long it has been in use.

PZ-31/61/12-FEC/FFC/FTC

Part	Quantity per pump	Recommended replacement timeframe
	31/61/12	
Valve seat assembly	2	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1	Every 10,000 hours
Relief valve	1	Every 10,000 hours*
Air-release nozzle assembly	1	Every 10,000 hours

* The timeframe applies when the relief-valve function has not been activated at all. If it has been activated, replace it regardless of how long it has been in use.

Model for injection of boiler chemicals: PZ-31-FEC (PP)

Part	Quantity per pump	Recommended replacement timeframe
	31	
Valve seat assembly	2	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1	Every 10,000 hours
Relief valve	1	Every 10,000 hours*
Air-release nozzle assembly	1	Every 10,000 hours

* The timeframe applies when the relief-valve function has not been activated at all. If it has been activated, replace it regardless of how long it has been in use.

Consumables

Model for injection of sodium hypochlorite: PZ-31/61/12-CL

Part	Quantity per pump	Recommended replacement timeframe
	31/61/12	
Valve seat assembly (discharge side)	1	Every 10,000 hours
Valve seat assembly (suction side)	1	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1	Every 10,000 hours
Air-release nozzle assembly	1	Every 10,000 hours

Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ-31/61/12

Part	Quantity per pump	Recommended replacement timeframe
	31/61/12	
Valve seat assembly (discharge side)	1	Every 10,000 hours*
Valve seat assembly (suction side)	1	Every 10,000 hours*
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1	Every 10,000 hours*
Valve seat assembly (Air-release side)	1	Every 4,000 hours*

* The recommended timeframe for this assembly is the operation time (10,000 or 4,000 hours) or usage period (one year), whichever comes first.

Spare parts & options

■Spare parts

• Nuts • Retaining rings • Joints • Air-release nozzles

■Options

• Back pressure valve
This valve prevents overfeeding*1 and siphoning*2 phenomena by sealing the chemical outlet with a diaphragm and applying just the right amount of pressure (back pressure) to suppress the in-ertia force of the fluid.

• Relief valve
This valve automatically releases abnormal pressure that occurs in the discharge-side piping, due to blockage by foreign objects and tightening of the valve, to prevent accidents or possible damage to the pump and piping.

• Air chamber
Reciprocating pumps may develop pulsation, which causes pipe vibration and overfeed. If this is the case, use of an air chamber can regulate the chemical into a more continuous flow and alleviate the various problems associated with pulsation. When an air chamber is to be installed, be absolutely sure to provide the relief valve mentioned above.

• Accumulator
The accumulator is provided to reduce pulsation, and the principle behind its operation is the same as that of the air chamber. It is effective at high pressure levels above 0.5 MPa and when using liquids that are affected by air.

• Level Switch
This sensor detects the low chemical level in the tank. Two models, a 1-point (single-sensor) and a 2-point (double-sensor) model, are available.

• Flow checker
This highly acid- and alkali-resistant, low-cost flow meter allows you to monitor injection operation of the pump. It can be directly attached on the discharge side of the pump.

• Flow indicator
The discharge operation can be monitored at a glance by attaching this indicator at the discharge side of the pump. It also helps to prevent injection trouble.

• Deforming joint
Installed on the suction side of the pump, this joint separates air bubbles and fluid to prevent air bubbles from entering the pump head.

• PTU-25/50/100
These are chemical injection units consisting of a metering pump and PE tank (with a capacity of 25, 50 or 100 liters).

• Chemical tank
Tanks made of PE (with a capacity ranging from 25 to 100 liters) or of PVC (with a capacity ranging from 100 to 1,000 liters)

• Solution tank
These tanks (made of PE with a capacity ranging from 50 to 500 liters) can have a metering pump or agitator mounted on top.

• Parts kit
This kit contains a complete set of all required consumables.It is economical, and an easy way to store and managethe parts you need.

Explanation of terms

• Overfeed
The phenomenon that the force (inertia) of the discharge during chemical flow with pulsation causes chemicals to continue flowing when chemical flow should stop, resulting in excessive chemical discharge beyond the specified volume.

• Siphoning
The phenomenon that chemicals continue to be sucked out naturally and continue flowing when the tip of the pump's discharge-side piping is lower than the level of liquid in the suction-side tank.

• Cavitation
This phenomenon that the negative pressure inside the pump head causes air bubbles to form, diminishing the discharge volume and causing abnormal noises and vibration.

✻ For more detailed information, ask for “How to use metering pumps properly,” a technical document provided by TACMINA.

After-sales services

If any aspects of the terms and conditions of the after-sales service applying to the repairs to be provided during the warranty period and other such matters are not clear, consult your vender or a TACMINA representative.

Warranty

(1) The warranty period is one (1) year from the date of purchase.

(2) If, during the warranty period, the product sustains malfunctions or damages despite normal use and proper maintenance as a result of design or manufacturing defect, TACMINA will arrange for repair of the product at no charge to the customer.
However, the customer will be charged for the following expenses:
- Malfunctions or damages of the warranted product occurring after the warranty period has expired
- Malfunctions or damages of the warranted product caused by carelessness in handling or incorrect use or storage
- Malfunctions or damages of the warranted product resulting from the use of parts other than the ones designated by TACMINA
- Malfunctions or damages of the warranted product resulting from the repair or remodeling undertaken by individuals other than TACMINA employees or personnel of businesses authorized by TACMINA
- Malfunctions or damages of the warranted product stemming from changes in the specifications or remodeling of the warranted product instituted at the wishes of individuals (such as the user) other than TACMINA employees
- Malfunctions or damages of the warranted product resulting from fires, natural disasters, geological calamities and forces majeures
- Costs incurred by on-site service calls to remote areas

(3) Decisions on the causes of the malfunctions or damages of the warranted product shall be made in accordance with the outcome of the discussions held between the user and TACMINA's maintenance engineers.

(4) TACMINA accepts no liability whatsoever for any damage caused by malfunctions of the warranted product or for any damage incurred by use of the warranted product.

Repairs

Before requesting repairs, read this instruction manual carefully, and check again. If you then decide that there is trouble in your pump, ask your vender to take care of the repairs.

(1) During the warranty period
Ask your vender to take care of the repairs. Your vender will undertake the repairs in accordance with the terms and conditions set forth in the warranty.

(2) After the warranty period
Consult with your vender. If repairs will make it possible for the product to maintain its functions, repairs will be undertaken if the user requests them, and the user will be charged for those repairs.

(3) Precautions when returning products for repair
In order to ensure the safety of repair personnel and protect the environment, the user must wash the pump thoroughly, and return it with the safety data sheet (MSDS) attached.
- ✻ The product may not be repaired if the safety data sheet (MSDS) is not attached.
- ✻ Even when the safety data sheet (MSDS) is attached, TACMINA may send the pump back if it determines that repairing it will constitute risks or dangers.

■Minimum retention period for consumables

TACMINA will continue to supply consumables for its pumps for a period of eight (8) years after the manufacture of the pumps has been discontinued.

Neptune
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Product designs and specifications are subject to change without notice for product improvement.

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