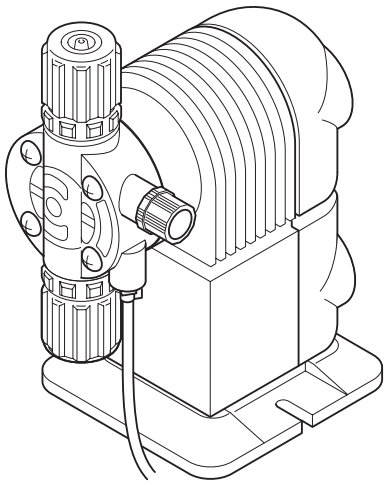
TACMINA

## 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-30R

**Applicable Models**

PZ-30R/60R/100R/
30/60/100
CLPZ-30R/60R/100R/
30/60/100
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.
- Additional information on this product and manuals in other languages may be found on our website.

www.tacmina.com

CE

# 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 chemical 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.**

**⚠ ϟ 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 an IP65 or equivalent construction, but install it in a location where it is not exposed to direct sunlight, wind, or rain and where there is no chance of the pump being submerged in water. Failing to follow this instruction may damage the pump or shorten its service life. If you will install the pump outdoors, we recommend installing a cover over the pump.**
- **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.
- In general, when the hoses become very hot, their ability to withstand pressure deteriorates. When using hoses, ensure that they are resistant to chemicals and can withstand the operating temperatures and pressures. Failure to do so may damage the hoses or cause the chemicals to spray out.
- 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.
- Simple relief valves are used to protect the pump. Depending on the worksite or operating conditions, use of an external relief valve is recommended.
- Do not operate the pump with the relief valve or simple relief valve activated. Doing so may lead to damage.
- When the relief valve or simple relief valve is activated, stop the pump immediately and eliminate the problem as it could cause an accident.
- The hose durability varies greatly depending on factors such as the chemical used, temperature, pressure, ultraviolet rays. Inspect the parts and replace any that have deteriorated.

## Other Precautions

**⚠ CAUTION**

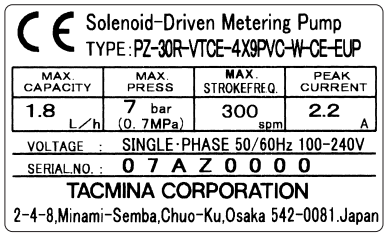
- **Do not attempt to remodel the pump.**
- **Install a protective barrier or other preventive action to cope with a chemical spill just in case one occurs. Also take steps to ensure that the pump will not get wet from the chemical.**
- **When it comes time to dispose of the pump, entrust its disposal 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 w/ relief-valve function for injection of general chemicals: PZ

| Liquid-end Material | VTCE/VTCF | | |
|---|---|---|---|
| Model | 30R | 60R | 100R |
| Hose/tube (3m) | PVC braided hose (4×9)<br>PE tube (6×8 or 1/4×3/8) | PVC braided hose (6×11)<br>PE tube (6×8 or 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 ✻ Only when PE tube is selected. | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Operation manual | 1 copy | | |

| Liquid-end Material | FTCE/FTCF | | |
|---|---|---|---|
| Model | 30R | 60R | 100R |
| Tube (3m) | PE tube (6×8 or 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 | FTCT | | |
|---|---|---|---|
| Model | 30R | 60R | 100R |
| Tube (3m) | FEP tube (6×8 or 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 w/o relief-valve function for injection of general chemicals: PZ

| Liquid-end Material | VTCE/VTCF | | |
|---|---|---|---|
| Model | 30 | 60 | 100 |
| Hose/tube (3m) | PVC braided hose (4×9)<br>PE tube (6×8 or 1/4×3/8) | PVC braided hose (6×11)<br>PE tube (6×8 or 1/4×3/8) | |
| Air-release hose (1m) | Soft PVC hose (4×6) | | |
| Anti-siphon check valve | 1 set (R1/2) | | |
| Foot valve | 1 set | | |
| Ceramic weight | 1 set ✻ Only when PE tube is selected. | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Operation manual | 1 copy | | |

| Liquid-end Material | FTCE/FTCF | | |
|---|---|---|---|
| Model | 30 | 60 | 100 |
| Tube (3m) | PE tube (6×8 or 1/4×3/8) | | |
| Air-release hose (1m) | Soft PVC hose (4×6) | | |
| 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 | FTCT | | |
|---|---|---|---|
| Model | 30 | 60 | 100 |
| Tube (3m) | FEP tube (6×8 or 1/4×3/8) | | |
| Air-release hose (1m) | Soft PVC hose (4×6) | | |
| 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 | | |

| Liquid-end Material | 6TCT | | |
|---|---|---|---|
| Model | 30 | 60 | 100 |
| Tube (3m) | PTFE tube (6×8) | | |
| Anti-siphon check valve | 1 set (R1/2 or R3/8) | | |
| Foot valve | 1 set | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Hose pump for air-release | 1 set | | |
| Operation manual | 1 copy | | |

# Accessories list

**Model w/ relief-valve function for injection of boiler chemicals: PZ**

| Liquid-end Material | VTCET |
|---|---|
| Model | 30R |
| Tube for discharge side (2m) | Nylon tube (4×6) |
| Hose for suction side (1m) | PVC braided hose (4×9) |
| 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 |

**Model w/o relief-valve function for injection of boiler chemicals: PZ**

| Liquid-end Material | VTCET |
|---|---|
| Model | 30 |
| Tube for discharge side (2m) | Nylon tube (4×6) |
| Hose for suction side (1m) | PVC braided hose (4×9) |
| Air-release hose (1m) | Soft PVC hose (4×6) |
| Anti-siphon check valve | 1 set (R1/2) |
| Foot valve | 1 set |
| Pump-mounting nuts/bolts | 2 sets (M5×30) |
| Operation manual | 1 copy |

**Model w/ relief-valve function for injection of sodium hypochlorite: CLPZ**

| Liquid-end Material | ATCF | | |
|---|---|---|---|
| Model | 30R | 60R | 100R |
| Hose/tube (3m) | PVC braided hose (4×9)<br>PE tube (6×8 or 1/4×3/8) | PVC braided hose (6×11)<br>PE tube (6×8 or 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 w/ duck-bill cap | 1 set (R1/2) | | |
| Foot valve | 1 set | | |
| Ceramic weight | 1 set ✻ Only when PE tube is selected. | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Operation manual | 1 copy | | |

**Model w/o relief-valve function for injection of sodium hypochlorite: CLPZ**

| Liquid-end Material | ATCF | | |
|---|---|---|---|
| Model | 30 | 60 | 100 |
| Hose/tube (3m) | PVC braided hose (4×9)<br>PE tube (6×8 or 1/4×3/8) | PVC braided hose (6×11)<br>PE tube (6×8 or 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 | | |
| Ceramic weight | 1 set ✻ Only when PE tube is selected. | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Operation manual | 1 copy | | |

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

| Liquid-end Material | CL | | |
|---|---|---|---|
| Model | 31 | 61 | 12 |
| Hose/tube (3m) | PVC braided hose (4×9)<br>PE tube (6×8 or 1/4×3/8) | PVC braided hose (6×11)<br>PE tube (6×8 or 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 | | |
| Ceramic weight | 1 set ✻ Only when PE tube is selected. | | |
| Pump-mounting nuts/bolts | 2 sets (M5×30) | | |
| Operation manual | 1 copy | | |

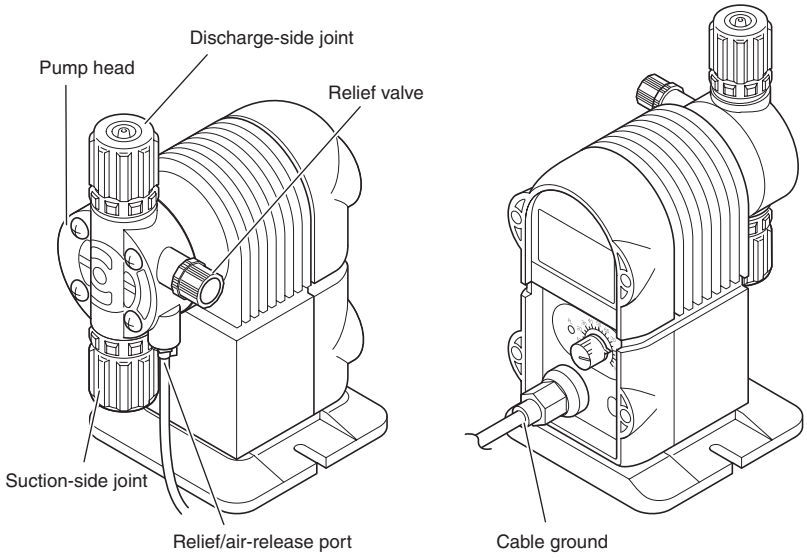
# Description of product

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.

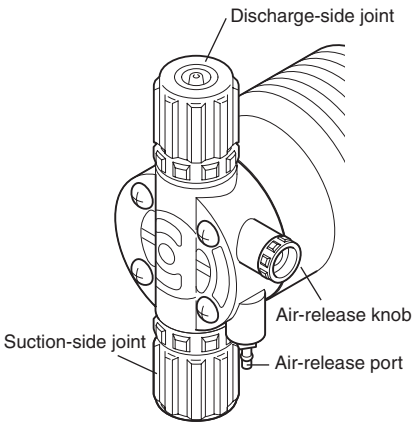
# Names of the parts

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

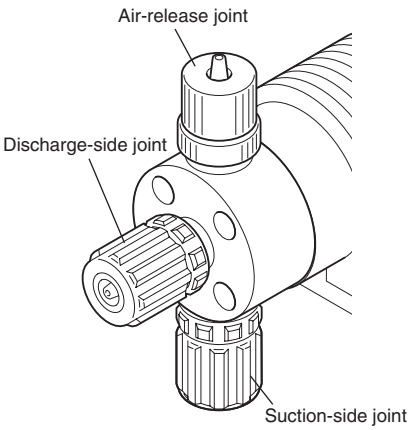
## Model w/ relief-valve function




## Model w/o relief-valve function




## Model w/ automatic air-release function



# 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.**

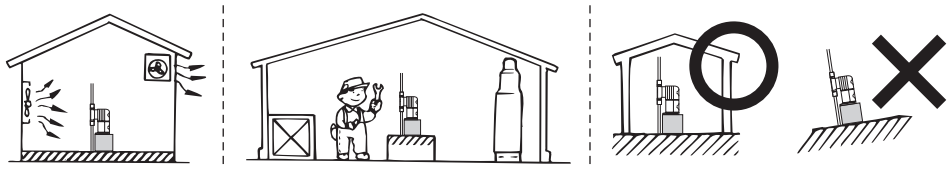
**⚠ CAUTION**

- **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 an IP65 or equivalent construction, but install it in a location where it is not exposed to direct sunlight, wind, or rain and where there is no chance of the pump being submerged in water. Failing to follow this instruction may damage the pump or shorten its service life. If you will install the pump outdoors, we recommend installing a cover over the pump.**
- **For models with a simple relief valve, always install a relief hose and return the end of the piping to the tank or other container.**
- **The operation panel cover is made of plastic. Do not apply excessive force. Doing so could cause damage.**



## Installation location

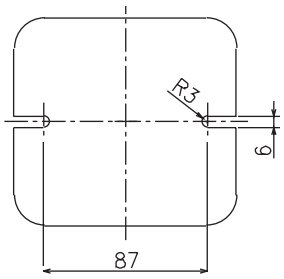
- Install the pump in a location where it is not exposed to direct sunlight, wind, or rain. Also, if you will install the pump outdoors, we recommend installing a cover over the pump.
- Install the pump in a location where the ventilation is good and where the chemical will not freeze.
- Provide adequate 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 64.**

# Piping

## ■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 3-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 | Relief-valve function | Series | Page |
|---|---|---|---|
| Model for injection of general chemicals | Yes | PZ-30R/60R/100R | 13 |
| | No | PZ-30/60/100 | 14 |
| Model for injection of boiler chemicals | Yes | PZ-30R | 15 |
| | No | PZ-30 | 16 |
| Model for injection of sodium hypochlorite | Yes | CLPZ-30R/60R/100R | 17 |
| | No | CLPZ-30/60/100 | 18 |
| Model w/ automatic air-release function for injection of sodium hypochlorite | No | ARPZ-31/61/12 | 19 |

# Piping



## Model w/ relief-valve function for injection of general chemicals: PZ-30R/60R/100R

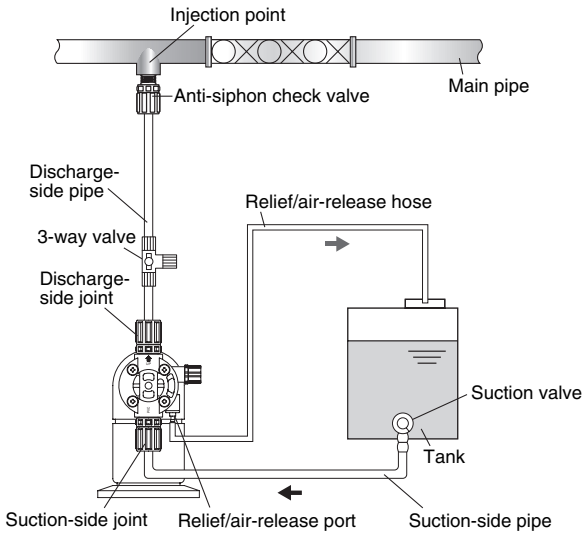
Installation is described with an example using PZ-30R (VTCE type) and TACMINA tank.

- 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 hose/tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the hose/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.

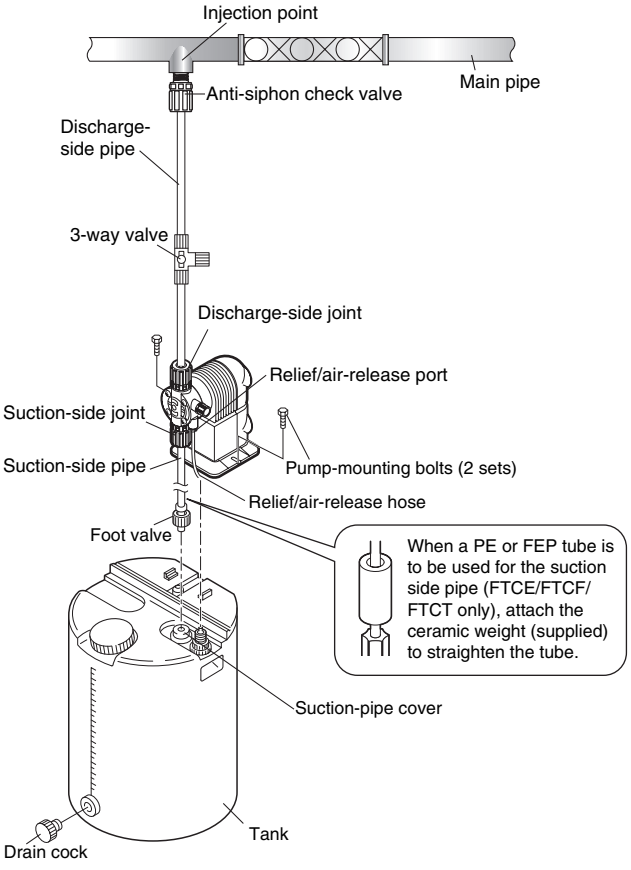
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.




### ■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 hose/tube. When doing this, attach the anti-siphon check valve at the injection-point side end of the hose/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 w/o relief-valve function for injection of general chemicals: PZ-30/60/100

✻ No air-release hose is needed for 6TCT type.

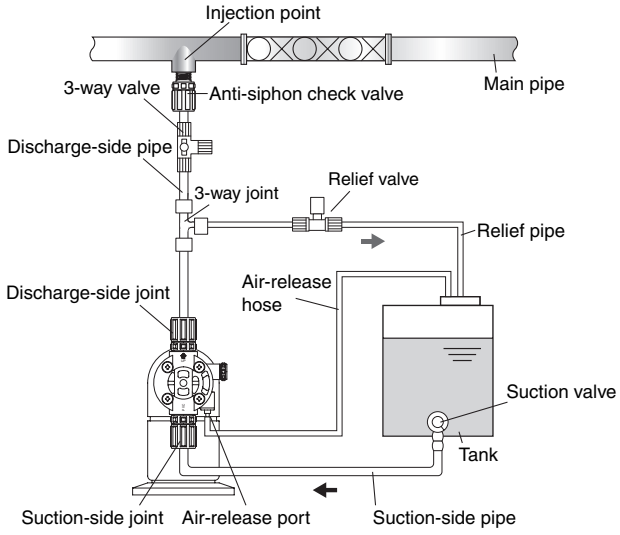
Installation is described with an example using PZ-30 (VTCE type) and TACMINA tank.

- 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.

### ■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 hose/tube to the discharge-side joint of the pump.
(3) Attach a 3-way joint to the discharge-side hose/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 hose/tube extending from the 3-way joint to the main pipe (injection point). When doing this, attach the anti-siphon check valve 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.

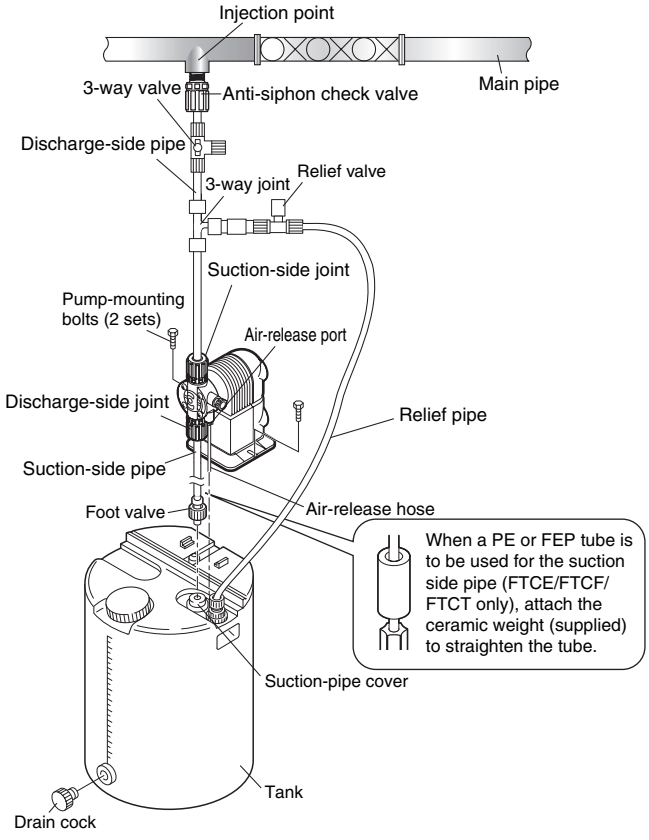
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.




### ■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 hose/tube to the discharge-side joint of the pump.
(4) Attach a 3-way joint to the discharge-side hose/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.
(5) Connect the end of the other discharge-side hose/tube extending from the 3-way joint to the main pipe (injection point). When doing this, attach the anti-siphon check valve at the injection-point side end of the hose/tube.
(6) Attach the air-release hose to the air-release port.
(7) Drill a hole in the suction-pipe cover of the tank, and return the end of the air-release hose to the tank.

✻ 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 w/ relief-valve function for injection of boiler chemicals: PZ-30R

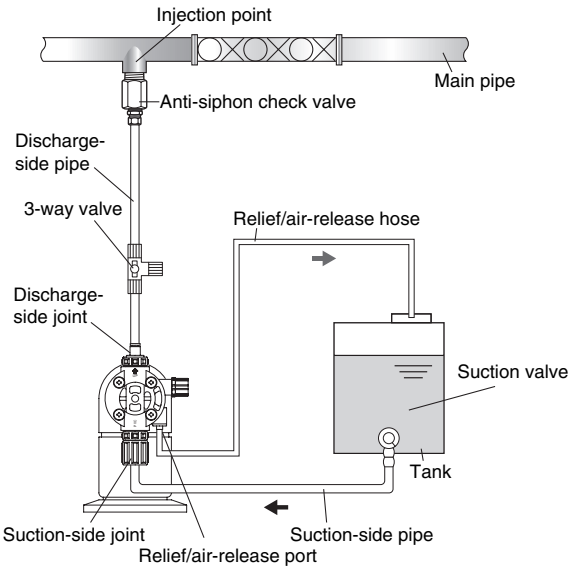
Installation is described with an example using PZ-30R (VTCE type) and TACMINA tank.

- 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.
(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.

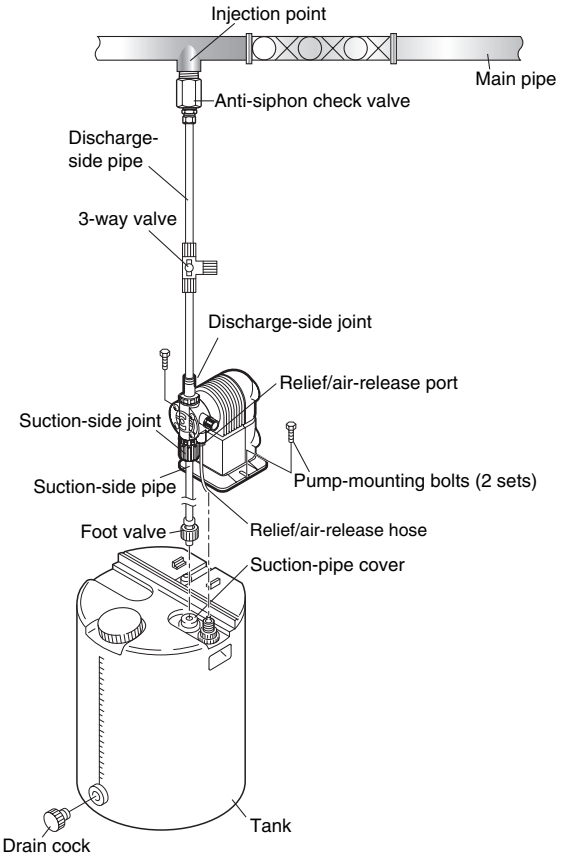
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.




### ■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 with foot valve 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 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 –0.8 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 w/o relief-valve function for injection of boiler chemicals: PZ-30

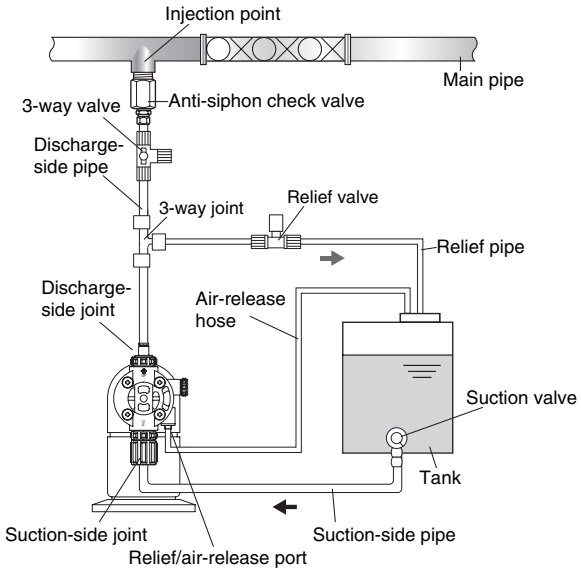
Installation is described with an example using PZ-30 (VTCE type) and TACMINA tank.

- 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.

### ■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.
(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 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.

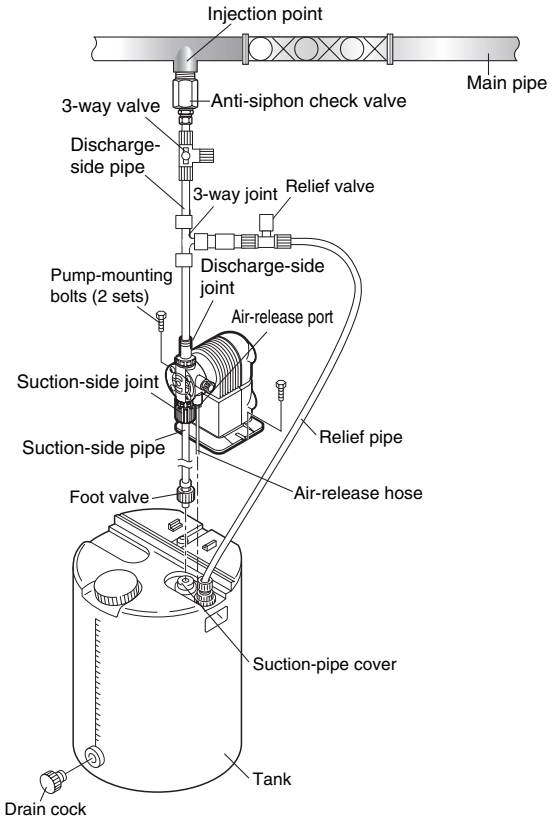
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.




### ■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 with foot valve 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 or cut it so that the foot valve is 30 mm above the bottom of the tank.
(3) Connect the tube to the discharge-side joint of the pump.
(4) 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.
(5) 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 at the injection-point side end of the tube.
(6) Attach the air-release hose to the air-release port.
(7) Drill a hole in the suction-pipe cover of the tank, and return the end of the air-release hose to the tank.

✻ 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 –0.8 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 w/ relief-valve function for injection of sodium hypochlorite: CLPZ-30R/60R/100R

Installation is described with an example using CLPZ-30R 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.
- 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.

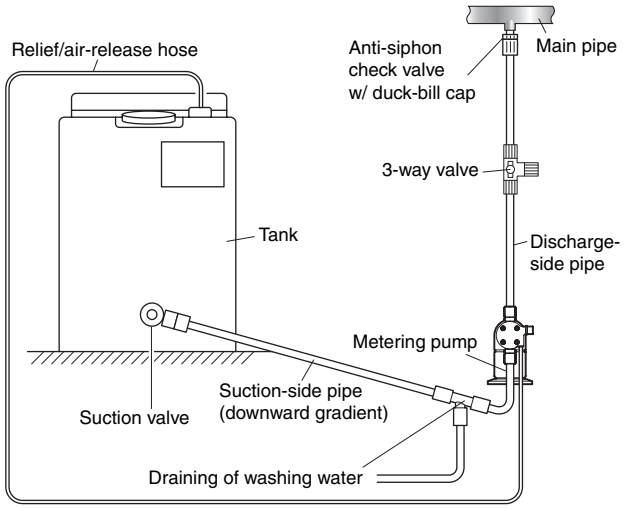
(1) Connect the suction valve of the tank and the suction-side joint of the pump using the hose/tube. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

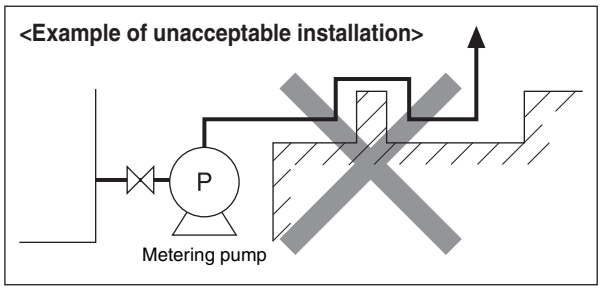
(2) Connect the discharge-side joint of the pump to the main pipe (injection point) using the hose/tube. When doing this, attach the anti-siphon check valve with duck-bill cap at the injection-point side end of the hose/tube.

(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.

✻ 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/tube 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/o relief-valve function for injection of sodium hypochlorite: CLPZ-30/60/100

Installation is described with an example using CLPZ-30 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/tube. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

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

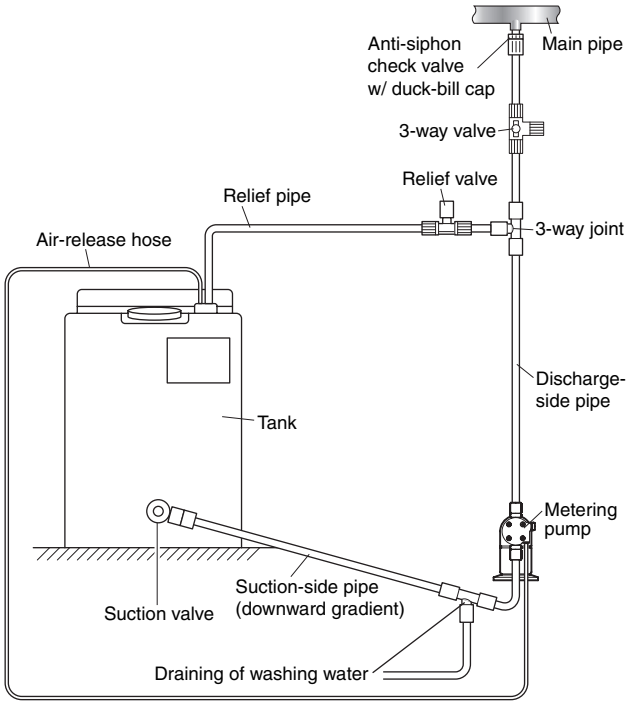
(3) Attach a 3-way joint to the discharge-side hose/tube (near the pump's discharge-side joint), and install a relief valve. Return the end of the relief pipe to the tank or other container.

(4) Connect the end of the other discharge-side hose/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.

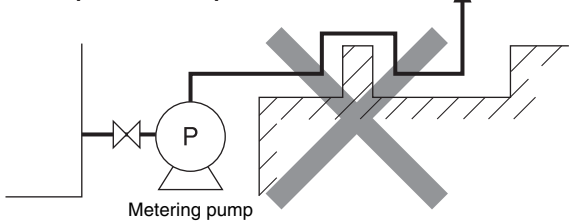
(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ 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/tube 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.**

# 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/tube. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

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

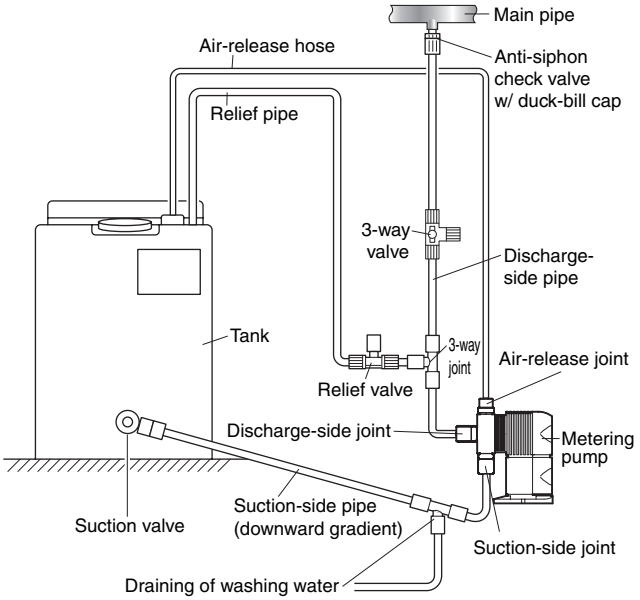
(3) Attach a 3-way joint to the discharge-side hose/tube (near the pump's discharge-side joint), and install a relief valve. Return the end of the relief pipe to the tank or other container.

(4) Connect the end of the other discharge-side hose/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.

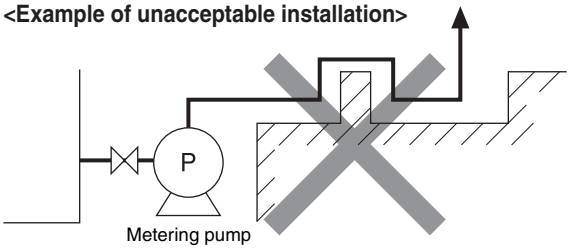
(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ 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/tube 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 | VTCE/VTCF | PVC braided hose/PE tube | 20 |
| | FTCE/FTCF/FTCT | PE/FEP tube | 22 |
| | 6TCT | PTFE tube | 24 |
| Model for injection of boiler chemicals | VTCET | Discharge side: Nylon tube<br>Suction side: PVC braided hose | 25 |
| Model for injection of sodium hypochlorite | ATCF | PVC braided hose/PE tube | 27 |
| Model w/ automatic air-release function for injection of sodium hypochlorite | CL | PVC braided hose/PE tube | 28 |

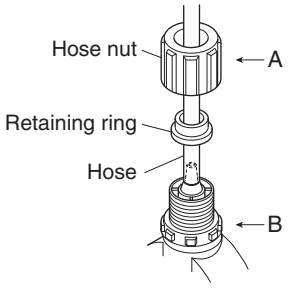


## Model for injection of general chemicals (VTCE/VTCF)

### ■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.
- 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 3-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 a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.

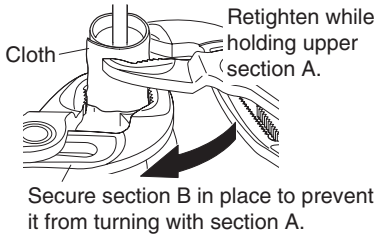
(1) Insert the hose fully to prevent it from falling out.




(2) Fully tighten the hose nut by hand.

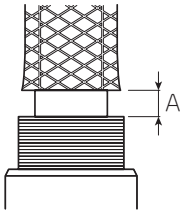
(3) Wrap the nut with a cloth to prevent damage.

(4) Use two water pump pliers to retighten one more rotation as shown in the figure below.




✻After starting operation, retighten the nut as needed.

| Hose type | Hose diameter | Dimension A |
|---|---|---|
| PVC braided hose | $\phi$4×$\phi$9 | 5.5 mm or less |
| | $\phi$6×$\phi$11 | 1 mm or less |
| Hose/Tube | $\phi$6×$\phi$8 | 3 mm or less |
| | 1/4×3/8 | |



# Connecting

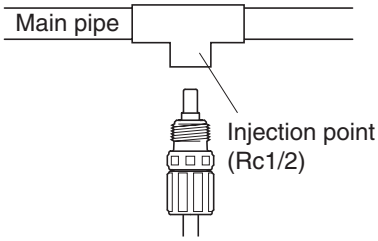


## ■Anti-siphon check valve

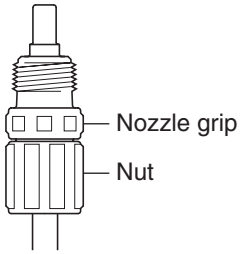
This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- 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 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.
- Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 20.

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

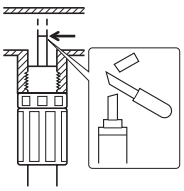



(2) Wind sealing tape around the external thread of the anti-siphon check valve, and screw the valve into the injection point.
  ✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
  ✻ When connecting the hose/tube with the anti-siphon 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.

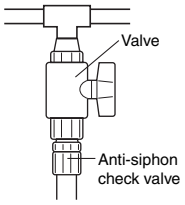



**NOTE**

**<When injecting liquid into a pipe with a small diameter>**
**Install the valve so that the end of the injection nozzle is positioned at the center of the main pipe.**
**If the nozzle is too long, use a saw or other tool to cut off its end, use a file or other means to finish the cut-off surface, and discard the metal scraps.**



**<For maintenance>**
**It is recommended that the hose/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

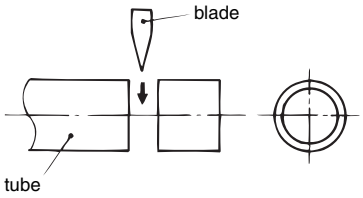


## Model for injection of general chemicals (FTCE/FTCF/FTCT)

### ■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 3-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 a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.
- Operating the pump when the discharge-side piping is blocked due to closed valves or clogging with foreign matter is dangerous as it would cause abnormal pressure to be generated inside the piping. For safety, take the applicable measure I or II below.
  - I. Pumps with a simple relief valve Install a relief hose on the air relief port and return the end of the hose to the chemical tank, then secure it in place.
  - II. Pumps without a simple relief valve Install a relief pipe and relief valve on the discharge-side piping and return the end to the chemical tank, then secure it in place.
- Install a valve for releasing the pressure in the discharge-side piping. The 3-way valve on the cleaning water line may be used instead.
- The suction capability may decrease when the valve seats inside the pump head are dry. If the pump does not suction the liquid, wet the valve seat with the liquid.

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



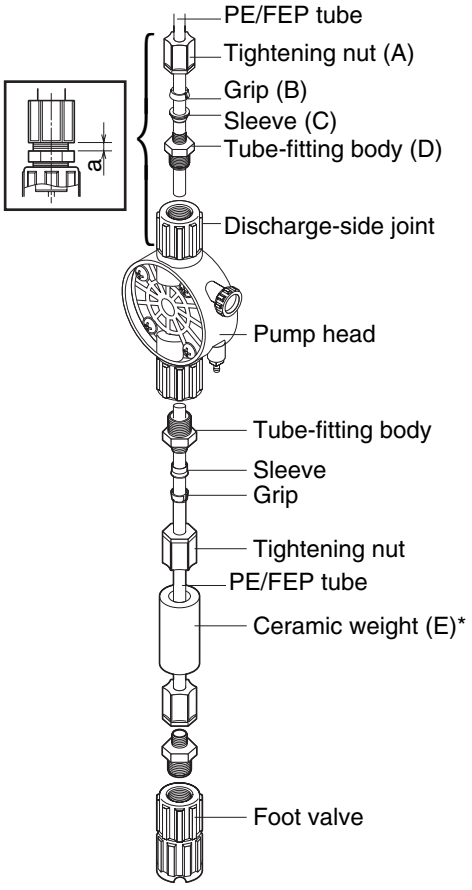

(2) Wrap sealing tape around the tube-fitting body (D), and screw the body into the discharge-side joint using a tool. (The tube-fitting body is already mounted in place before shipment.)

(3) Pass the tube through the tightening 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 tightening nut (A) by hand.

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

✻ Bear in mind that the joint may break if tightening 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



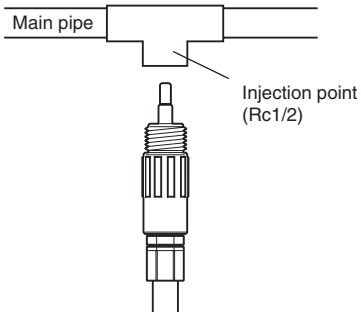
## ■Anti-siphon check valve

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.

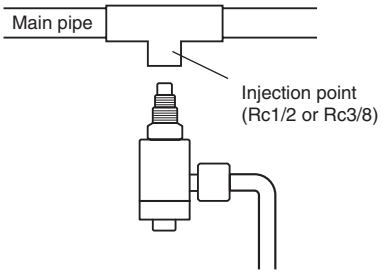
- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe, 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 FTCE/FTCF type has an R1/2 external thread whereas the FTCT 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.

**FTCE/FTCF (w/ PE tube)**



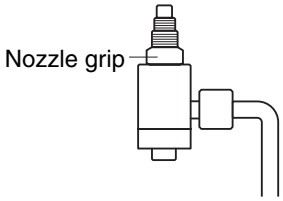

**FTCT (w/ FEP tube)**




(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 cap nut. If the cap nut is turned without holding the body, the threaded part on the nozzle may be damaged.

**FTCE/FTCF (w/ PE tube)**


**FTCT (w/ FEP tube)**

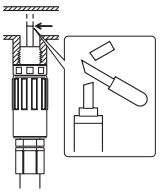



**NOTE**

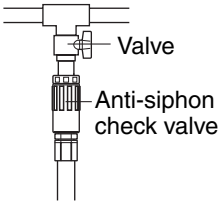
**<When injecting liquid into a pipe with a small diameter>**
**If the end of the anti-siphon check valve is too long, cut it off so that the end will be positioned at the center of the main pipe where the chemical is to be injected prior to use.**
**If the nozzle is too long, use a saw or other tool to cut off its end, use a file or other means to finish the cut-off surface, and discard the metal scraps.**

**<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: FTCE/FTCF**



**Example: FTCE/FTCF**



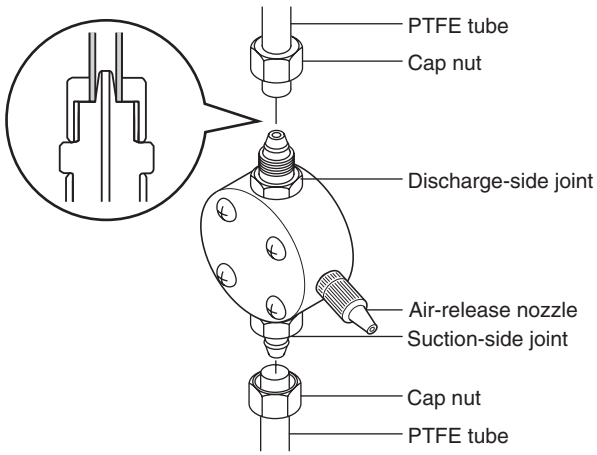
# Connecting



## Model for injection of general chemicals (6TCT)

### ■PTFE 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 cap nuts securely. Do not excessively tighten the cap 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 cap nuts as appropriate.
- When tightening the cap 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 3-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 a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.



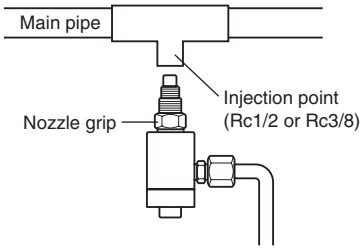

### ■Anti-siphon check valve

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 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 R1/2 and R3/8 external threads. Provide an Rc1/2 or Rc3/8 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 cap nut. If the cap nut is turned without holding the body, the threaded part on the nozzle may be damaged.



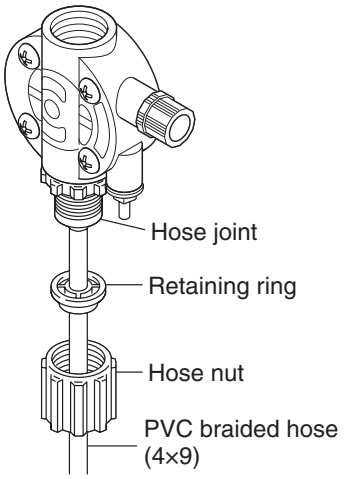
# Connecting



**Model for injection of boiler chemicals (VTCET)**

## ■PVC braided hose (1m, suction side)

- When bending the hose, provide sufficient leeway in the bending so that the hose will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the hose firmly so that it will not become disconnected, and tighten the hose nuts securely. Do not excessively tighten the hose 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 may become disconnected. After operation has started, tighten up the hose nuts as appropriate.
- When tightening the hose nuts, hold the hose to prevent it from being twisted. The joints and other areas may be loosened by the return force of the hose.
- The pump comes with a 1-meter long hose for the suction side. When longer hose is used, the pressure loss may exceed the pump's maximum discharge pressure so thicker hose 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 size.
- When disconnecting a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.

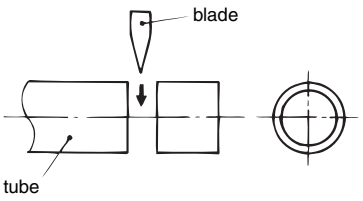



## ■Nylon tube (2m, discharge side)

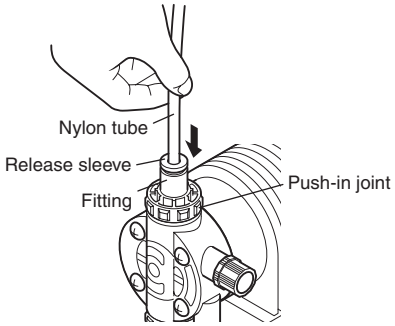
- When bending the tube, provide sufficient leeway in the bending so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- The pump comes with a 2-meter long tube for the discharge side, but make the distance between the pump and injection point as short as possible, and cut off the excess part of the tube.
- Insert the tube firmly so that it will not become disconnected.
- When disconnecting a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.

### ●Connecting

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




(2) Insert the end of the tube straight into the fitting body of the push-in joint until it touches the back end.
✻ Pull the tube gently by hand, and check that it does not come free.




### ●Disconnecting & re-connecting

**⚠ CAUTION**

**• Before disconnecting the tube, make absolutely sure that no pressure is being applied inside the tube.**

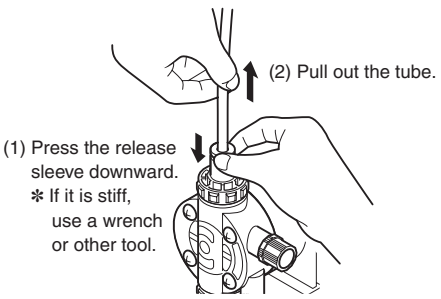
- Using your thumb and forefinger, press the release sleeve against the body side, and pull the tube straight out without twisting it.

✻ If the fitting tab is biting deeply into the tube, making it difficult for the tube to be pulled out, use a wrench or other tool to push the release sleeve down firmly.

✻ As a guideline, the tube may be mounted in place and removed five times.

✻ When the tube has been connected, pull it up gently, and check that it is secured firmly. If it appears that the tube can be pulled out, it means that the joint tab has been damaged, in which case replace the joint.

✻ Use the tube supplied. Use of any other tube may damage the joint.



# Connecting



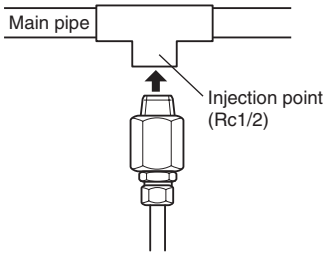
## ■Anti-siphon check valve

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.

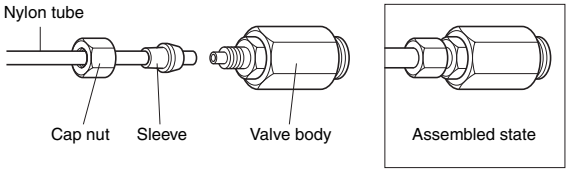
- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)

✻ 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) Remove the cap nut and sleeve, and attach only the valve body to the main pipe (injection point).
(3) Pass the nylon tube through the cap nut and sleeve, and firmly insert its end until it touches the back end of the groove in the valve body.




(4) In this state, tighten the cap nut by hand as far as it can be turned.
(5) After tightening the cap nut by hand, use a wrench to tighten the cap nut two or three more turns.

**IMPORTANT**

- **Be sure to securely connect the nylon tube and anti-siphon check valve as well as the anti-siphon check valve and injection point.**
- **The anti-siphon check valve will be corroded by some chemicals, and so such chemicals cannot be used. For special chemicals, consult with a TACMINA representative separately.**

# Connecting

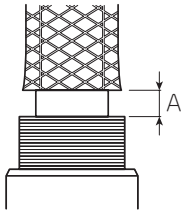


**Model for injection of sodium hypochlorite (ATCF)**

## ■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 3-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 a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.
- Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 20.

| Hose type | Hose diameter | Dimension A |
|---|---|---|
| PVC braided hose | $\phi$4×$\phi$9 | 5.5 mm or less |
| | $\phi$6×$\phi$11 | 1 mm or less |
| Hose/Tube | $\phi$6×$\phi$8 | 3 mm or less |
| | 1/4×3/8 | |

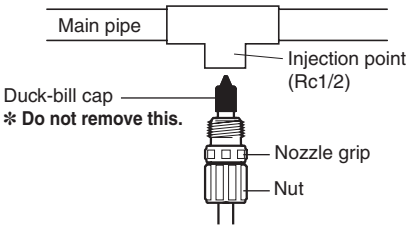



## ■Anti-siphon check valve w/ duck-bill cap

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 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.
- Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 20.

(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 hose/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.

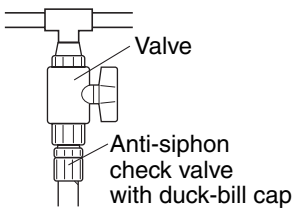



**NOTE**

**<For maintenance>**

**It is recommended that the hose/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.**



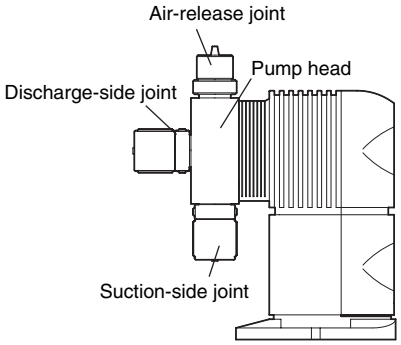
# Connecting



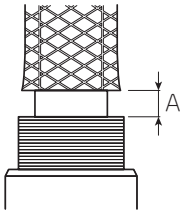
**Model w/ automatic air-release function for injection of sodium hypochlorite (CL)**

## ■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 3-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 a hose for maintenance or other purposes and then reconnecting the same hose, cut about 10 mm off the end of the hose so that the end surface is flush before inserting.
- Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 20.

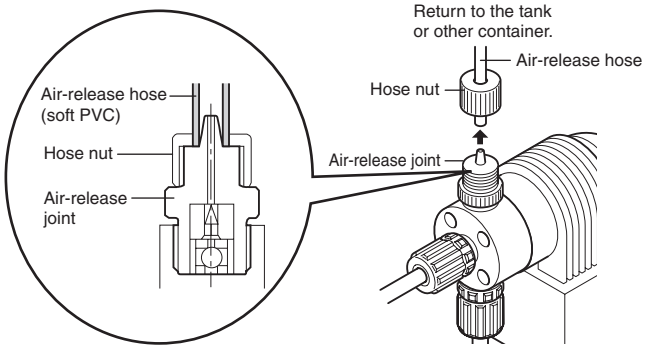



| Hose type | Hose diameter | Dimension A |
|---|---|---|
| PVC braided hose | $\phi$4×$\phi$9 | 5.5 mm or less |
| | $\phi$6×$\phi$11 | 1 mm or less |
| Hose/Tube | $\phi$6×$\phi$8 | 3 mm or less |
| | 1/4×3/8 | |




## ■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 hose nut so that the hose will not become disconnected.
(3) Return the other end of the hose to the tank or other container.



# Connecting



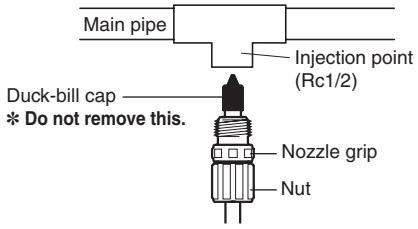
## ■Anti-siphon check valve w/ duck-bill cap

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 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.
- Connect securely to prevent loosening by following the same procedure as "Precautions for piping" on page 20.

(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 hose/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.

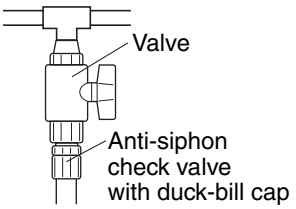



**NOTE**

**<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.**

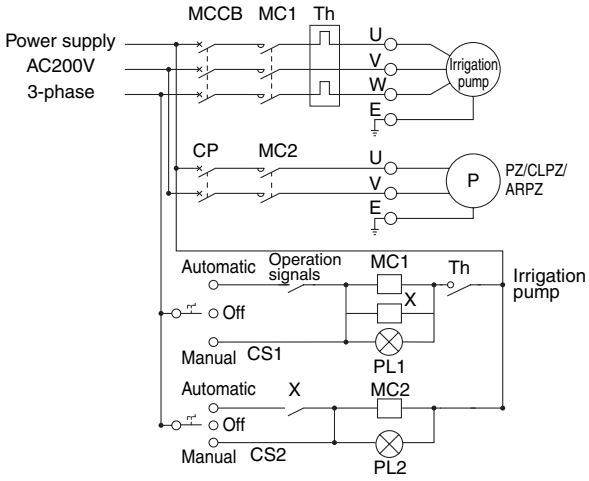
**CAUTION**

- **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.**

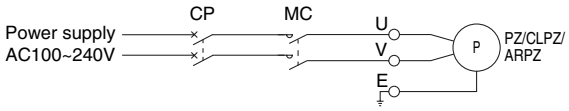
Power cord (2m) is already attached.

## Example of wiring

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




### ●When running the pump on its own




MCCB : Molded case circuit breaker
MC1, 2: Electromagnetic contactor
Th : Thermal relay
CP : Circuit protector
CS1, 2 : Changeover switch
X : Auxiliary relay
PL : Pilot lamp

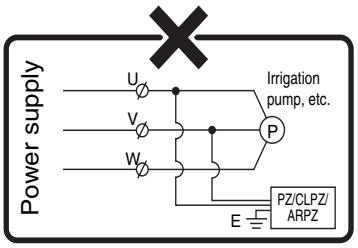
**IMPORTANT**

- **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**

- **When receiving power via a transformer, be sure to use a transformer with a capacity of at least three times the maximum power consumption.**
- **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**

- **When installing an overcurrent protection device for this pump, always install a circuit protector (CP) in consideration of the operating time and the breaking current characteristics.**
- **The circuit protector (CP) shown as the recommended protection device can also be used as the power switch, thus simplifying the wiring connections.**
- **A thermal relay (TH) is used to protect against heat generation due to motor overload, which makes it suitable for motor pumps or other equipment that are operated continuously, but it is unsuitable for this solenoid-driven pump, which is operated non-continuously. In this case, the pump may not operate properly.**
- **To prevent malfunctions due to noise, separate the power supply line from the signal line when wiring.**

# Electrical wiring



## Recommended protection devices

(1) Circuit protectors
(Protects the main power supply in the event of the pump problem)

| Manufacturer | Model |
|---|---|
| Mitsubishi Electric | CP30-BA2P1-M3A |
| Fuji Electric | CP32D/3 |
| Panasonic | 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 | RSHN-2003 |

(4) EMC filter

| Manufacturer | Model |
|---|---|
| TDK | ZAC2205-00U |

(5) Relay

| Manufacturer | Model |
|---|---|
| OMRON | G3F |

✻ When using a contact relay to turn the power on/off, use a relay whose contact capacity is 5 A or more. The contact may be welded if the contact capacity is less than 5 A. Also, if the relay is affected by devices other than the pump, use a relay whose contact capacity is 10 A or more.
✻ If controlling ON/OFF occurs frequently, controlling with external signals is recommended.

# 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 |
|---|---|---|
| Pump head Joints | Check for looseness. If the joints are loose, retighten them. | When first operating the pump after maintenance, retighten in the same manner. |
| 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 33 to 36).**

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

→ **Discharge-volume setting (page 37).**

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

→ **Procedure for prolonged shutdown of operation (page 38)**

# 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.**

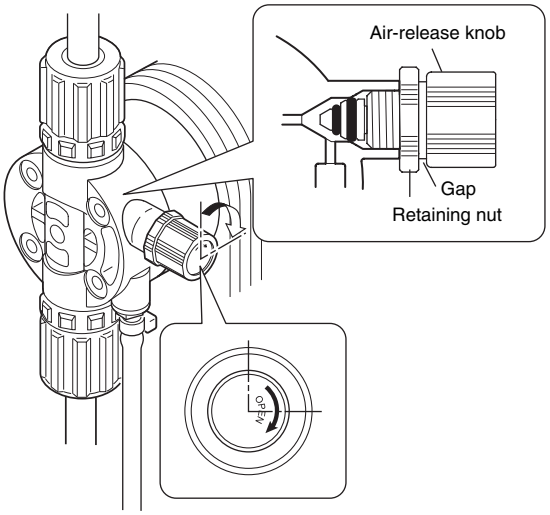
The air-releasing procedure will be described by pump type.

| Type | | Page |
|---|---|---|
| Model w/ relief-valve function | PZ-30R/60R/100R<br>CLPZ-30R/60R/100R | 34 |
| Model w/o relief-valve function<br>✻ excluding 6TCT type | PZ-30/60/100<br>CLPZ-30/60/100 | 35 |
| 6TCT type | PZ-30/60/100 | 36 |
| Model w/ automatic air-release function | ARPZ-31/61/12 | 36 |

# Air releasing

## Model w/ relief-valve function

(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 37)
(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.**

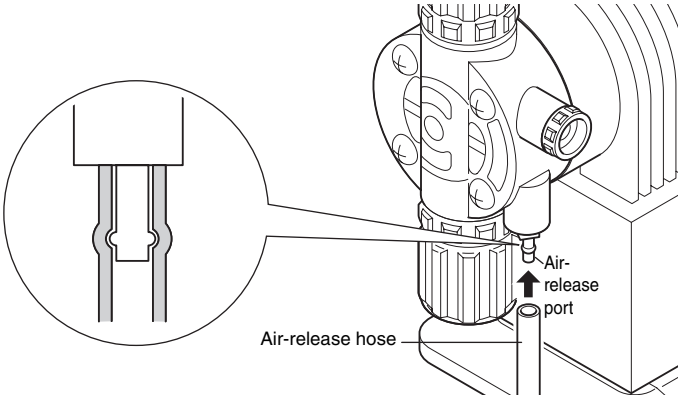
**NOTE**

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

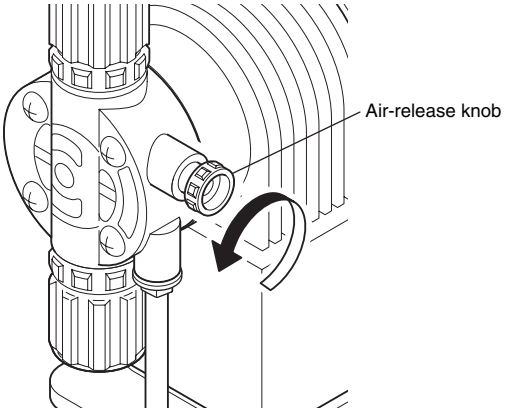
# Air releasing

## Model w/o relief-valve function ✻ excluding 6TCT type

(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) Turn on the pump's power to start operating the pump.
(5) Set the discharge volume to the maximum level. (See page 37)
(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.

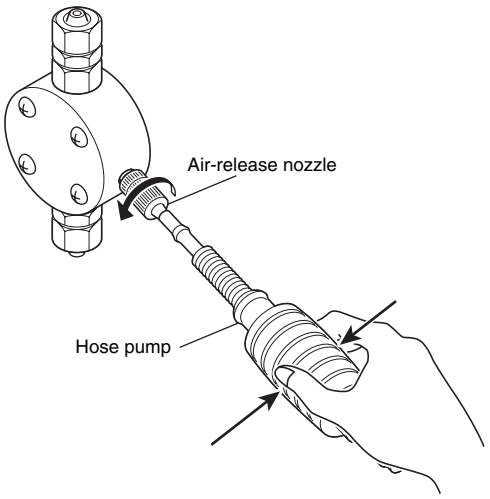
**NOTE**

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

# Air releasing

## 6TCT type

(1) Turn off the pump's power, and release the pressure inside the discharge-side pipe.
(2) Loosen slightly the air-release nozzle at the bottom right of the pump head by turning it counterclockwise.
(3) Insert the hose pump provided, operate the pump, and draw up the chemical until all the air in the pump head comes out.
(4) Close the air-release nozzle by turning it clockwise.




**IMPORTANT**

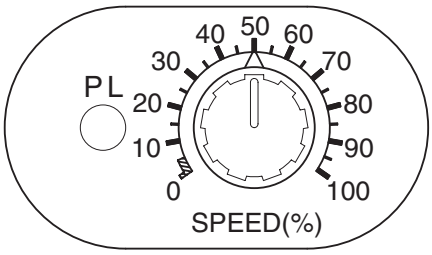
- **If the air-release nozzle is loosened too much, it will fall off, damaging the packing. Take care not to loosen the nozzle too much.**

## Model w/ automatic air-release function

(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 37)
(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) Remove the clean water or cleaning solution and stop the pump, then completely turn the power off.
(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 32.

# 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

→ **Refer to "Replacing the diaphragm" (see the page 40 to 41).**

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

→ **Refer to "Replacing the valve seats and check balls" (see the page 42 to 45).**

## When trouble has occurred

- When the relief-valve function has been activated

→ **Refer to "Replacing the relief valve" (see the page 46).**

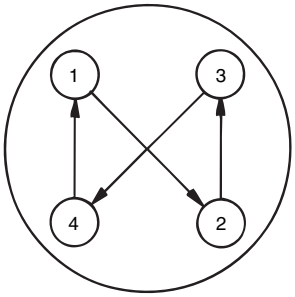
- When trouble has occurred during operation

→ **Refer to "Troubleshooting" (see the page 47 to 48).**

# Replacing the diaphragm

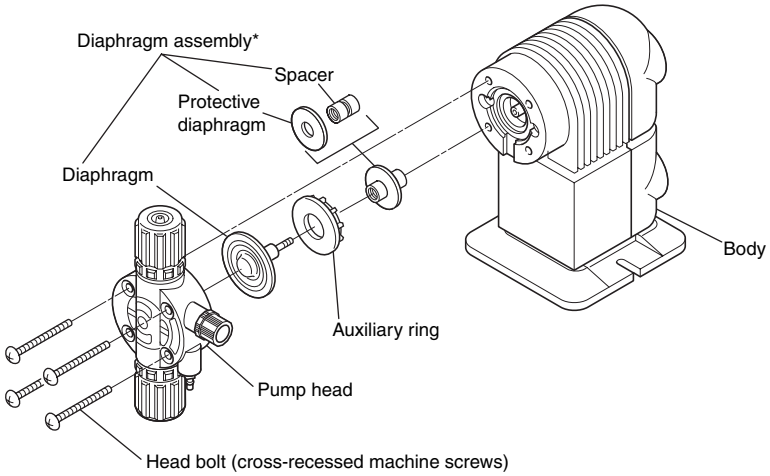
**IMPORTANT**

- **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 62 to 63.

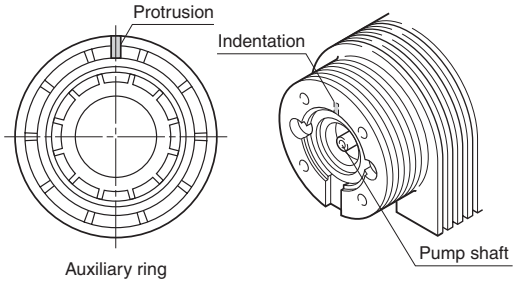
# Replacing the diaphragm

**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.

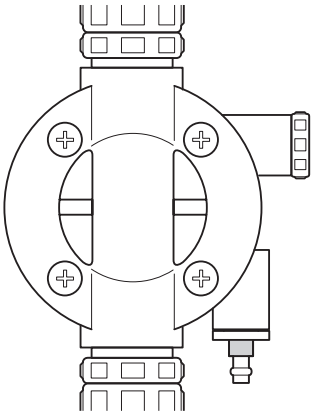
(4) Install the new diaphragm by turning it clockwise until it becomes stiff.
✻ If it is loose, it will make contact with the pump head, possibly causing malfunctions and/or damage.
(5) Install the pump head, and secure it using the head bolts.

# Replacing the air-release nozzle

## Replacing the air-release nozzle

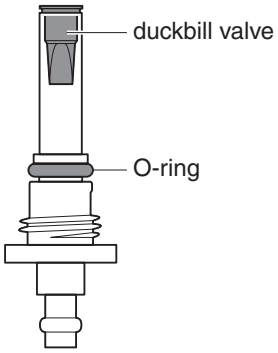
(1)If a relief hose or air-release hose is connected, remove the hose.

(2)Remove the air-release nozzle.
Use a wrench (span: 7 mm) to hold the colored section in the figure in place, and turn the nozzle in the counterclockwise direction to remove.

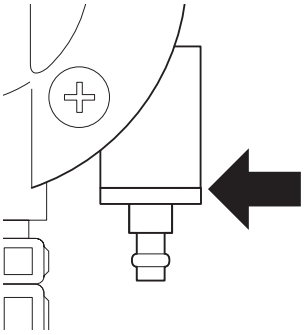


(3)Attach a new air-release nozzle.

- Before attaching a new air-release nozzle, check that the duckbill valve is inserted into the end of the air-release nozzle (side that attaches onto the pump head). The air-bleeding effect will not be obtained unless the duckbill valve is used.
- Check that an O-ring (P6) is mounted on the new air-bleeding valve.




- Turn the nozzle in the clockwise direction until the two sections come together (as shown by the arrow).



**NOTE**

- **The duckbill valve can sometimes come out from the air-release nozzle. Be careful not to lose the duckbill valve when handling it.**

(4)Attach the pump head.

(5)Attach the relief hose if using a pump with simple relief valve.

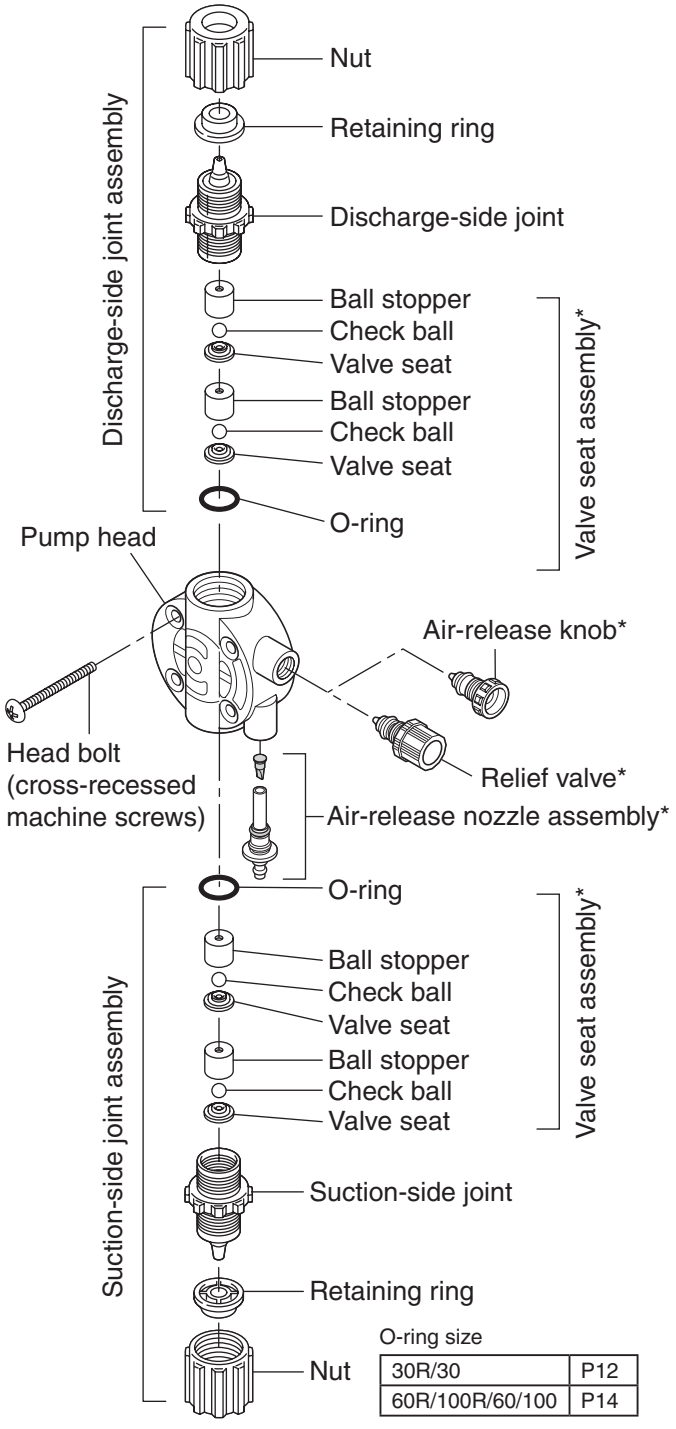
# Replacing the valve seats and check balls

**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

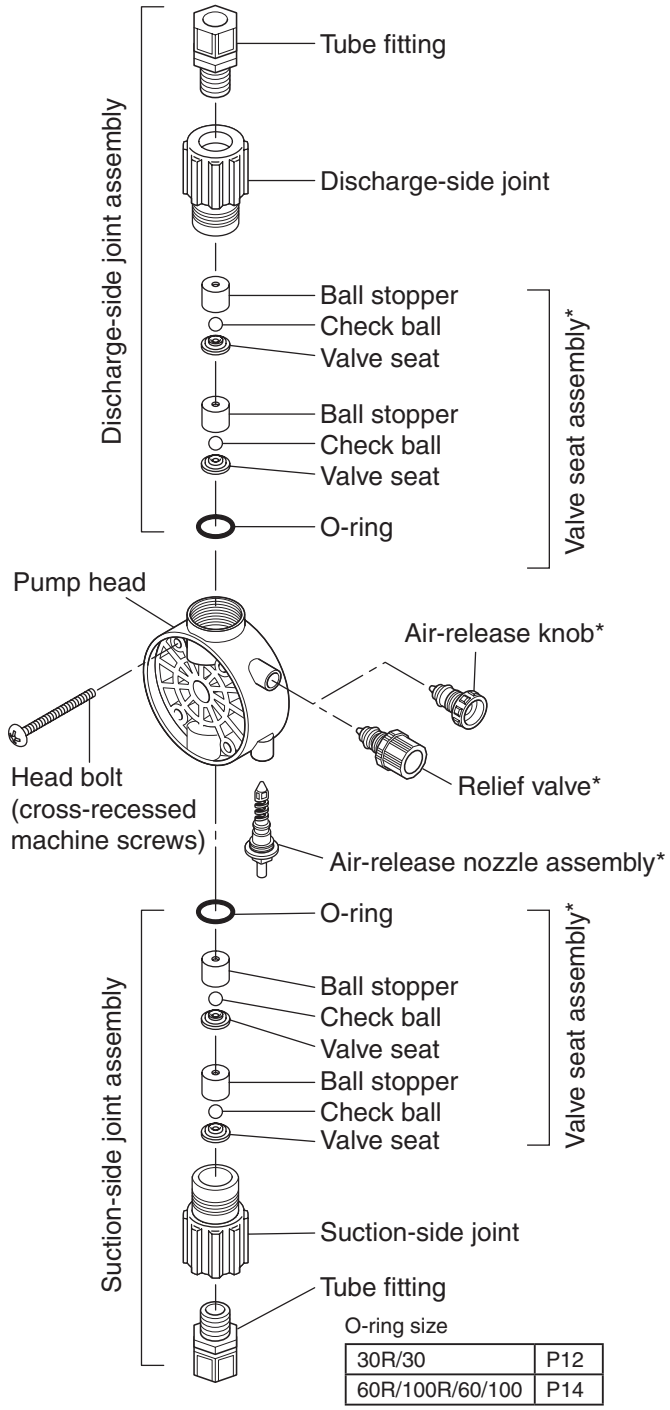
Series: PZ
Model : 30R/60R/100R/30/60/100
Liquid-end material: VTCE/VTCF




O-ring size

| | |
|---|---|
| 30R/30 | P12 |
| 60R/100R/60/100 | P14 |

Series: PZ
Model : 30R/60R/100R/30/60/100
Liquid-end material: FTCE/FTCF



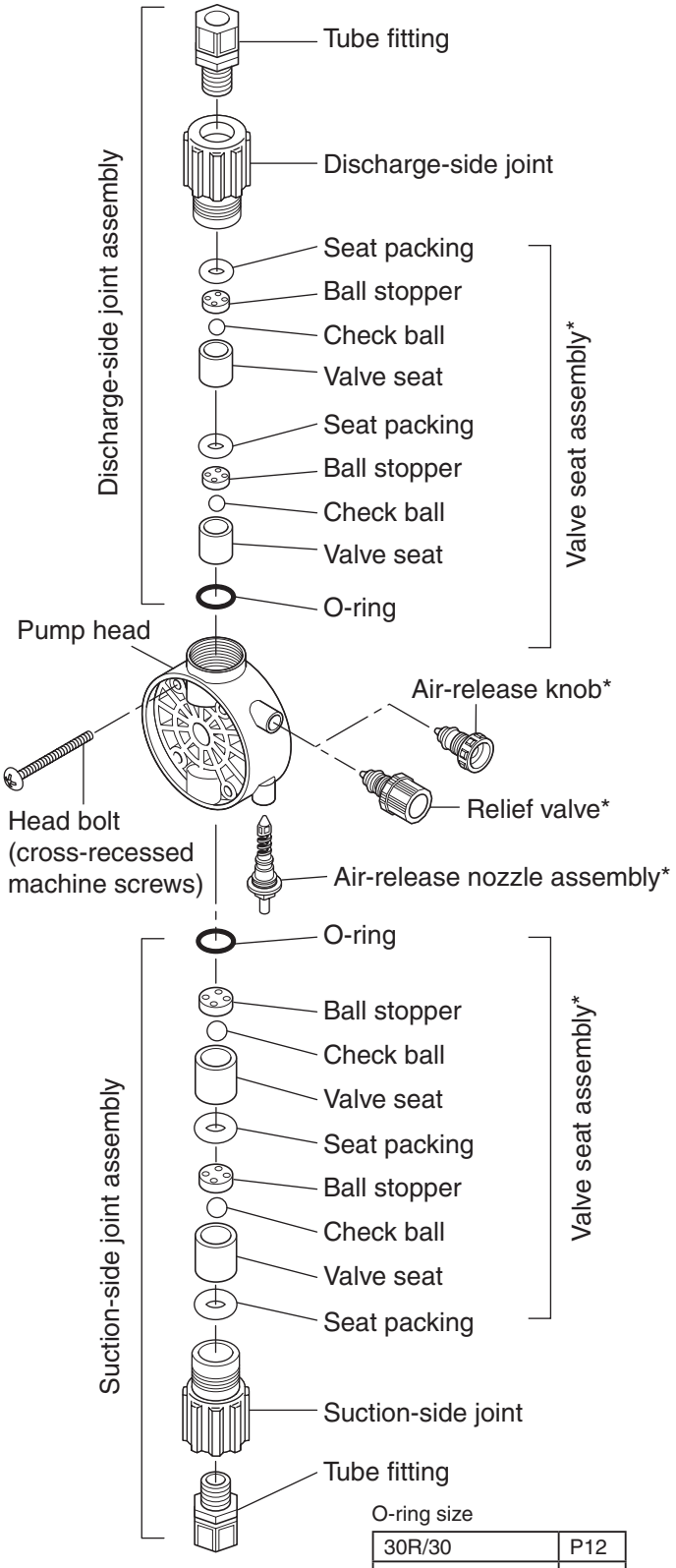

O-ring size

| | |
|---|---|
| 30R/30 | P12 |
| 60R/100R/60/100 | P14 |

* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 62 to 63.
✻ Also available is “Pump head assembly” containing all of the above parts.

# Replacing the valve seats and check balls

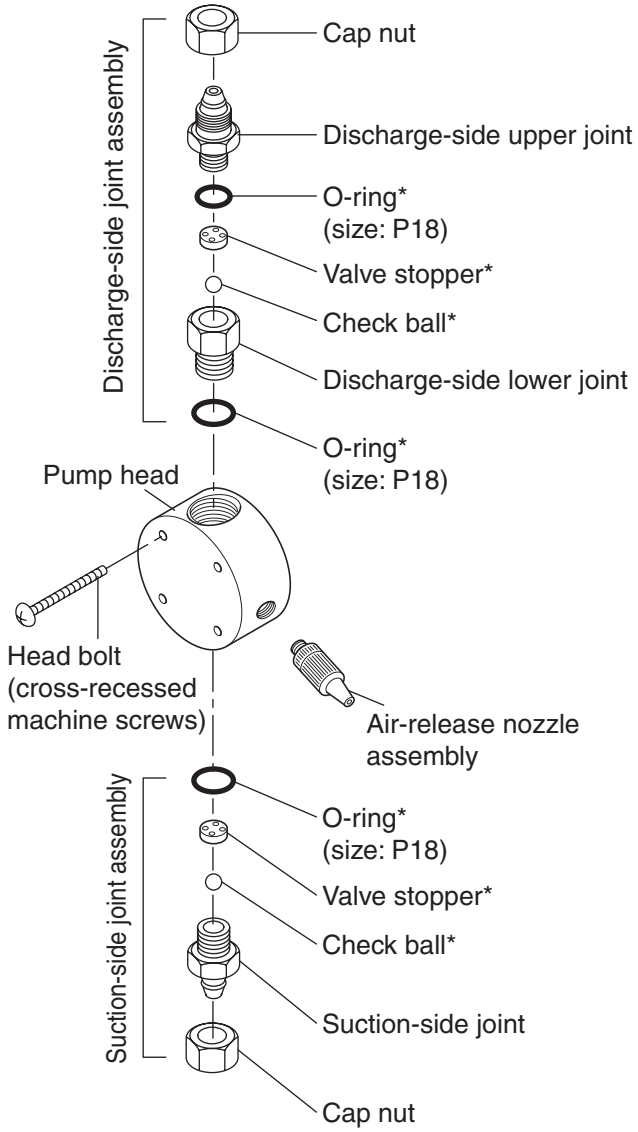
Series: PZ
Model : 30R/60R/100R/30/60/100
Liquid-end material: FTCT




O-ring size

| | |
|---|---|
| 30R/30 | P12 |
| 60R/100R/60/100 | P14 |

Series: PZ
Model : 30/60/100
Liquid-end material: 6TCT



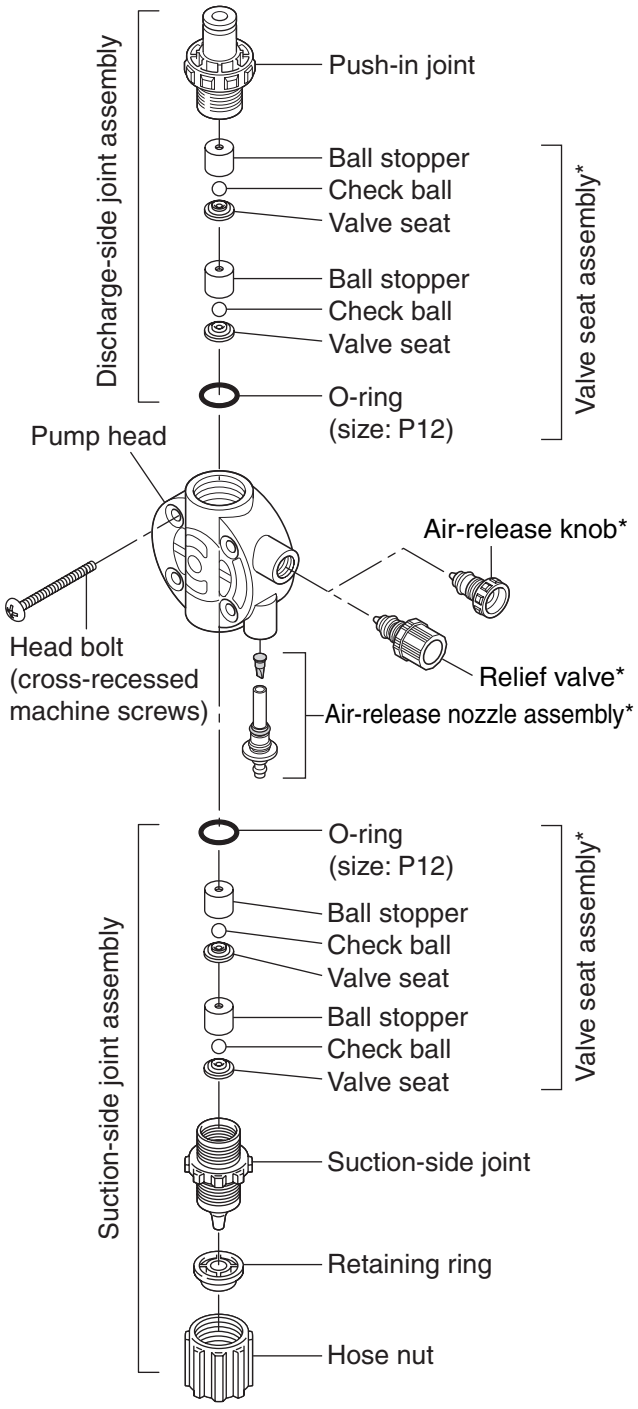

* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 62 to 63.
✻ Also available is “Pump head assembly” containing all of the above parts.

Maintenance

# Replacing the valve seats and check balls

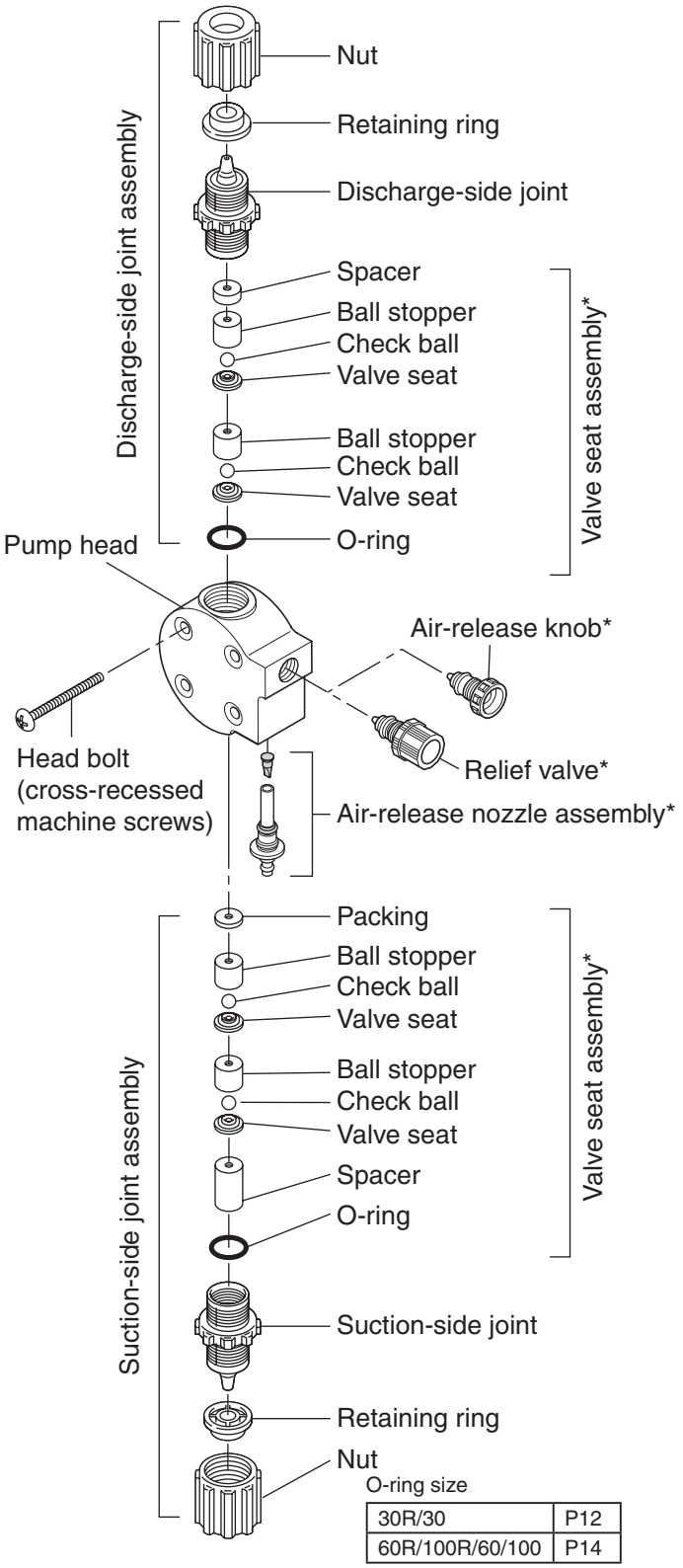
## Model for injection of boiler chemicals

Series: PZ
Model : 30R/30
Liquid-end material: VTCET




## Model for injection of sodium hypochlorite

Series: CLPZ
Model : 30R/60R/100R/30/60/100
Liquid-end material: ATCF




O-ring size

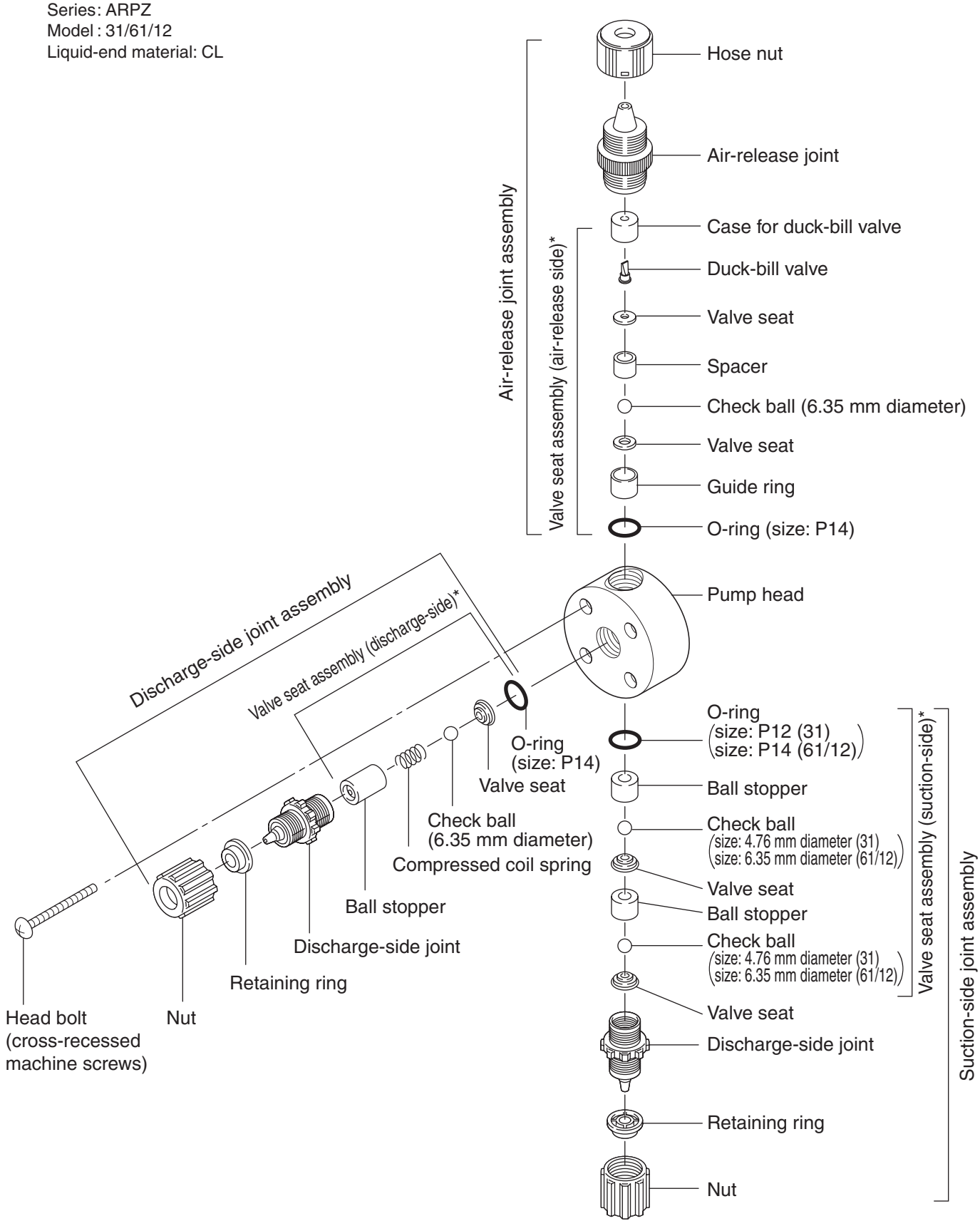
| | |
|---|---|
| 30R/30 | P12 |
| 60R/100R/60/100 | P14 |

* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 62 to 63.
✻ 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

Series: ARPZ
Model : 31/61/12
Liquid-end material: CL




* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 62 to 63.
✻ Also available is “Pump head assembly” containing all of the above parts.

# Replacing the relief valve

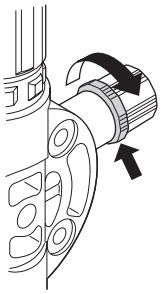
**IMPORTANT**

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

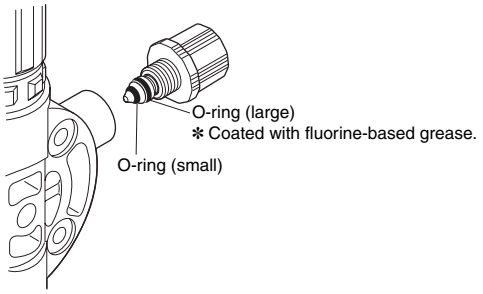
- **Shut down the pump immediately, remove the cause of the trouble, and take steps to prevent its recurrence.**
- **The relief valve is a consumable. Replace it once it has been activated.**

## Replacing the relief valve

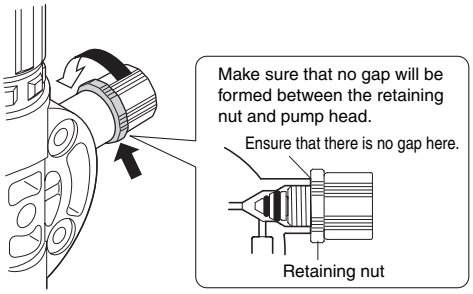
(1) Hold the retaining nut (the part shown by the arrow), and turn it counterclockwise.



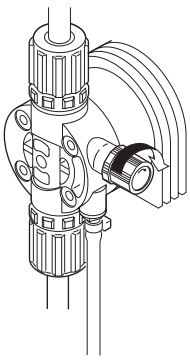
(2) Check the O-ring of the new relief valve for dirt or foreign matter.
✻ The large O-ring comes coated with fluorine-based grease. Use it as is.




(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 64.**

# Troubleshooting

## During operation

| Description of trouble 1 | Description of trouble 2 | Cause | Remedial action |
|---|---|---|---|
| The pump does not turn on. (The display does not light.) | | (1) Power supply or voltage trouble.<br>(2) Problem in the wiring connections to the pump.<br>(3) Broken power cable.<br>(4) Main power supply disconnection.<br>(5) The breaker has tripped.<br>(6) Circuit malfunction. | (1) Check the power supply and the voltage, and then connect the pump to the correct power supply.<br>(2) Inspect the wiring connections, and connect the wires properly.<br>(3) Check the power cable.<br>(4) Position the switch on the correct side.<br>(5) Investigate why the breaker has tripped, and then reset it.<br>(6) Replace the circuit. |
| The pump operates. | No chemical liquid is discharged. (The chemical liquid is not pumped up.) | (1) The chemical liquid is too viscous.<br>(2) The hose or valve is clogged.<br>(3) The hose aperture is too small or the pipe is too long.<br>(4) The valve seats are clogged with dirt or deformed.<br>(5) The amount of chemical liquid remaining in the tank is low.<br>(6) The foot valve or the strainer is clogged.<br>(7) The pump is gas locked.<br>(8) The valve seat area has been assembled in the wrong direction. | (1) Lower the viscosity of the chemical liquid.<br>(2) Clean the hose and valve.<br>(3) Make the hose aperture larger or the pipe shorter.<br>(4) Clean the valve seats or replace them. If the valve seats become deformed in a short period of time, use valve seats of a different material.<br>(5) Replenish the chemical liquid.<br>(6) Clean the foot valve, strainer, and tank.<br>(7) Release the air.<br>(8) Disassemble the valve seat area, and then re-assemble it correctly. |
| | Air enters into the pump. | (1) Gas is generated due to the properties of the chemical liquid.<br>(2) There is a leak in the joints, seal areas, or other parts.<br>(3) The chemical liquid tank is empty. | (1) Dilute the chemical liquid.<br>(2) Tighten the joints, seal areas, or other parts that are leaking.<br>(3) Replenish the chemical liquid, and then release the air. |
| The pump does not operate at the maximum discharge pressure. (The drive sound registers weakly.) | | (1) The power supply is not appropriate or the supply voltage is too low.<br>(2) A thermal relay has been used as a protection device. | (1) Connect the pump to the correct power supply.<br>(2) Change the thermal relay to a circuit protector. |
| Chemical liquid leaks from the chemical liquid escape port. | | (1) The relief valve was not replaced after it was used.<br>(2) An abnormal pressure has been generated. | (1) Replace the relief valve.<br>(2) Check the pressure and the specifications. |
| Chemical liquid is leaking. | Chemical liquid is leaking from the joints. | (1) The hose and nuts are not tight enough.<br>(2) The discharge-side pipe is clogged with dirt or other foreign material, which has caused the pressure to increase.<br>(3) The hose connections have deteriorated. | (1) Tighten the hose and nuts.<br>(2) Clean inside the pipe.<br>(3) Replace the hose. |
| | Chemical liquid is leaking from the pump head. | (1) The head bolts are not tight enough.<br>(2) The discharge-side pipe is clogged with dirt or other foreign material, which has caused the pressure to increase.<br>(3) The diaphragm has suffered damage due to fatigue. | (1) Tighten the head bolts.<br>(2) Clean inside the pipe.<br>(3) Replace the diaphragm. |
| The discharge capacity is too small. | | (1) Air has entered into the pump head.<br>(2) The diaphragm has deteriorated or has been damaged.<br>(3) The valve seat area has deteriorated or is clogged.<br>(4) The pipe is clogged.<br>(5) The suction height is outside of the specified range.<br>(6) The chemical liquid is too viscous.<br>(7) The discharge pressure is too high.<br>(8) The suction-side hose or valve is clogged.<br>(9) The foot valve or the strainer is clogged. | (1) Release the air.<br>(2) Replace the diaphragm.<br>(3) Clean the valve seats or replace them.<br>(4) Clean inside the pipe.<br>(5) Set the suction height to a value within the specified range.<br>(6) Reduce the viscosity of the chemical liquid or change the joints to high-viscosity type joints.<br>(7) Check the pressure and the specifications.<br>(8) Clean the suction-side hose and valve or replace them.<br>(9) Clean the foot valve, strainer, and chemical liquid tank. |
| The discharge capacity is too large. | | (1) An overfeed has occurred.<br>(2) A negative pressure has occurred on the discharge side.<br>(3) The push pressure is too high. | (1, 2) If the pump is equipped with an anti-siphonal check valve, clean it. If the pump is not equipped with an anti-siphonal check valve, attach one to the pump.<br>(3) Set the discharge-side pressure to a value that is higher than the push pressure. |

# Model code

Not all model combinations are possible. When selecting the pump model, first check "Liquid-end material" and "Specification".

## Model for injection of general chemicals

PZ - 30R (1) - VTCE (2) - 4×9PVC (3) - W (4) - S (5) - JPL (6)

(1) Model (discharge volume standard)

| Model | Discharge volume |
|---|---|
| 30R | 30 mL/min (w/ relief-valve function) |
| 60R | 60 mL/min (w/ relief-valve function) |
| 100R | 100 mL/min (w/ relief-valve function) |
| 30 | 30 mL/min |
| 60 | 60 mL/min |
| 100 | 100 mL/min |

(2) Liquid-end material

| Type | Applicable models |
|---|---|
| VTCE | 30R/60R/100R/30/60/100 |
| VTCF | 30R/60R/100R/30/60/100 |
| FTCE | 30R/60R/100R/30/60/100 |
| FTCF | 30R/60R/100R/30/60/100 |
| FTCT | 30R/60R/100R/30/60/100 |
| 6TCT | 30/60/100 |

(3) Hose standard

| Size | Material |
|---|---|
| 4×9 | PVC |
| 6×11 | PVC |
| 6×8 | PE/FEP |
| 1/4×3/8 | PE/FEP |

(4) Joint specification

| Code | Type |
|---|---|
| W | Standard |

(5) Applicable standard

| Code | Type |
|---|---|
| S | Standard |
| CE | CE marking-compatible |

(6) Power plug

| Code | Type |
|---|---|
| EUP | Euro plug |
| ULP | UL plug |
| AUP | Australia plug |
| UKP | UK plug |
| JPL | Japan lead wire |

## Model for injection of boiler chemicals

PZ - 30R (1) - VTCET - 4×6PA (2) - BW (3) - S (4) - JPL (5)

(1) Model (discharge volume standard)

| Model | Discharge volume |
|---|---|
| 30R | 30 mL/min (w/ relief-valve function) |
| 30 | 30 mL/min |

(2) Hose standard

| Size | Material |
|---|---|
| 4×6 | PA |

(3) Joint specification

| Code | Type |
|---|---|
| BW | Boiler |

(4) Applicable standard

| Code | Type |
|---|---|
| S | Standard |
| CE | CE marking-compatible |

(5) Power plug

| Code | Type |
|---|---|
| EUP | Euro plug |
| ULP | UL plug |
| AUP | Australia plug |
| UKP | UK plug |
| JPL | Japan lead wire |

# Model code

## Model for injection of sodium hypochlorite

CLPZ - [30R] - ATCF - [4×9PVC] - [W] - [S] - [JPL]
(1) (2) (3) (4) (5)

(1) Model (discharge volume standard)

| Model | Discharge volume |
|---|---|
| 30R | 30 mL/min (w/ relief-valve function) |
| 60R | 60 mL/min (w/ relief-valve function) |
| 100R | 100 mL/min (w/ relief-valve function) |
| 30 | 30 mL/min |
| 60 | 60 mL/min |
| 100 | 100 mL/min |

(2) Hose standard (size/material)

| Size | Material |
|---|---|
| 4×9 | PVC |
| 6×11 | PVC |
| 6×8 | PE |
| 1/4×3/8 | PE |

(3) Joint specification

| Code | Type |
|---|---|
| W | Standard |

(4) Applicable standard

| Code | Type |
|---|---|
| S | Standard |
| CE | CE marking-compatible |

(5) Power plug

| Code | Type |
|---|---|
| EUP | Euro plug |
| ULP | UL plug |
| AUP | Australia plug |
| UKP | UK plug |
| JPL | Japan lead wire |

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

ARPZ - [31] - CL - [4×9PVC] - [W] - [S] - [JPL]
(1) (2) (3) (4) (5)

(1) Model (discharge volume standard)

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

(2) Hose standard (size/material)

| Size | Material |
|---|---|
| 4×9 | PVC |
| 6×11 | PVC |
| 6×8 | PE |
| 1/4×3/8 | PE |

(3) Joint specification

| Code | Type |
|---|---|
| W | Standard |

(4) Applicable standard

| Code | Type |
|---|---|
| S | Standard |
| CE | CE marking-compatible |

(5) Power plug

| Code | Type |
|---|---|
| EUP | Euro plug |
| ULP | UL plug |
| AUP | Australia plug |
| UKP | UK plug |
| JPL | Japan lead wire |

# 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 |
|---|---|---|---|---|---|---|---|---|---|
| | VTCE | VTCF | FTCE | FTCF | FTCT | 6TCT | VTCET | ATCF | CL |
| Pump head | PVC | | PVDF | | | SUS316 | PVC | Acrylic (PMMA) | |
| Diaphragm | PTFE | | | | | | | | |
| Check ball | Ceramic | | | | | | | | |
| O-ring | EPDM | Fluoro-rubber | EPDM | Fluoro-rubber | Special fluoro-rubber Pafulo® | PTFE | EPDM | Fluoro-rubber | |
| Valve seat | EPDM | Special fluoro-rubber | EPDM | Special fluoro-rubber | PTFE | – | PTFE | Special fluoro-rubber | |
| Joint | PVC | | PVDF | | | SUS316 | PVC | | |
| Ball stopper | PVC | | PVDF | PTFE (valve stopper) | | | PVC | | |
| Compressed coil spring | – | | | | | | | | Hastelloy C |

Specifications

# Specification

## Model w/ relief-valve function for injection of general chemicals: PZ

| Specification \ Model | | 30R | | | | | 60R | | | | | 100R | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VTCE | VTCF | FTCE | FTCF | FTCT | VTCE | VTCF | FTCE | FTCF | FTCT | VTCE | VTCF | FTCE | FTCF | FTCT |
| Max. discharge volume*1 | mL/min | 30 | | | | | 60 | | | | | 100 | | | | |
| | L/h | 1.8 | | | | | 3.6 | | | | | 6.0 | | | | |
| | US G/h | 0.47 | | | | | 0.95 | | | | | 1.58 | | | | |
| Max. discharge pressure*1*3 | MPa | 0.7*2 | | | | | | | | | | 0.4 | | | | |
| | Bar | 7*2 | | | | | | | | | | 4 | | | | |
| | psi | 101.5*2 | | | | | | | | | | 58 | | | | |
| Capacity Adjustment Storoke Speed | | MAX. 300 spm<br>Volume adjustment range 5 to 100% | | | | | | | | | | | | | | |
| Stroke length | | Fixed at 1.0 mm | | | | | | | | | | | | | | |
| Connection (hose/tube: I.D×O.D) | Discharge side | 4×9 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (FEP) or 1/4×3/8 (FEP) | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (FEP) or 1/4×3/8 (FEP) | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (FEP) or 1/4×3/8 (FEP) |
| | Suction side | | | | | | | | | | | | | | | |
| | Relief valve/ air release | 4×6<br>(soft PVC hose) | | | | | | | | | | | | | | |
| 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 (dust-&water-resistance) | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | |

*1 Conditions: Clean water, room temperature

*2 Though the max. discharge pressure of the 30R/60R models is 1.0 MPa (10 bar), the relief-valve function operates when 0.7 MPa (7 bar) is exceeded. In applications requiring a discharge pressure of 0.7 MPa (7 bar) or more, ask for a model without the relief-valve function, and install a separate relief valve for extra safety.

*3 The Start-to-discharge pressure and closing pressure of the simple relief valve are 0.7 to 1.3 MPa. The pressure fluctuates depending on the pH of the liquid and operating conditions.

# Specification

## Model w/o relief-valve function for injection of general chemicals: PZ

| Specification \ Model | | 30 | | | | | | 60 | | | | | | 100 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | VTCE | VTCF | FTCE | FTCF | FTCT | 6TCT | VTCE | VTCF | FTCE | FTCF | FTCT | 6TCT | VTCE | VTCF | FTCE | FTCF | FTCT | 6TCT |
| Max. discharge volume* | mL/min | 30 | | | | | 27 | 60 | | | | | 55 | 100 | | | | | 95 |
| | L/h | 1.8 | | | | | 1.62 | 3.6 | | | | | 3.3 | 6.0 | | | | | 5.7 |
| | US G/h | 0.47 | | | | | 0.42 | 0.95 | | | | | 0.87 | 1.58 | | | | | 1.5 |
| Max. discharge pressure* | MPa | 1.0 | | | | | 0.5 | 0.8 | | | | | 0.5 | 0.4 | | | | | 0.4 |
| | Bar | 10 | | | | | 5 | 8 | | | | | 5 | 4 | | | | | 4 |
| | psi | 145 | | | | | 72.5 | 116 | | | | | 72.5 | 58 | | | | | 58 |
| Capacity Adjustment Storoke Speed | | MAX. 300 spm<br>Volume adjustment range 5 to 100% | | | | | | | | | | | | | | | | | |
| Stroke length | | Fixed at 1.0 mm | | | | | | | | | | | | | | | | | |
| Connection (hose/tube: I.D×O.D) | Discharge side | 4×9 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | 6×8 (FEP) or 1/4x3/8 (FEP) | 6×8 (PTFE) | | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | 6×8 (FEP) or 1/4x3/8 (FEP) | 6×8 (PTFE) | | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 6×8 (PE) or 1/4×3/8 (PE) | 6×8 (FEP) or 1/4x3/8 (FEP) | 6×8 (PTFE) | |
| | Suction side | | | | | | | | | | | | | | | | | | |
| | Air release | 4×6 (soft PVC hose) | | | | | | | | | | | | | | | | | |
| 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 (dust-&water-resistance) | | | | | | | | | | | | | | | | | |
| 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 | | 30R | 30 |
|---|---|---|---|
| | | VTCET | VTCET |
| Max. discharge volume*1 | mL/min | 28 | |
| | L/h | 1.68 | |
| | US G/h | 0.44 | |
| Max. discharge pressure*1*2 | MPa | 1.5 | |
| | Bar | 15 | |
| | psi | 217.5 | |
| Capacity Adjustment Storoke Speed | | MAX. 300 spm<br>Volume adjustment range 5 to 100% | |
| Stroke length | | Fixed at 1.0 mm | |
| Connection (hose/tube: I.D×O.D) | Discharge side | 4×6<br>(nylon tube) | |
| | Suction side | 4×9<br>(PVC braided hose) | |
| | Relief valve/ air release | 4×6<br>(soft PVC hose) | |
| 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 (dust-&water-resistance) | |
| 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 | |

*1 Conditions: Clean water, room temperature

*2 The Start-to-discharge pressure and closing pressure of the simple relief valve are 1.9 to 2.3 MPa. The pressure fluctuates depending on the pH of the liquid and operating conditions.

# Specification

## Model for injection of sodium hypochlorite: CLPZ

| Specification \ Model | | 30R | 60R | 100R | 30 | 60 | 100 |
|---|---|---|---|---|---|---|---|
| Max. discharge volume*1 | mL/min | 30 | 60 | 100 | 30 | 60 | 100 |
| | L/h | 1.8 | 3.6 | 6.0 | 1.8 | 3.6 | 6.0 |
| | US G/h | 0.47 | 0.95 | 1.58 | 0.47 | 0.95 | 1.58 |
| Max. discharge pressure*1*3 | MPa | 0.7*2 | | 0.4 | 1.0 | 0.8 | 0.4 |
| | Bar | 7*2 | | 4 | 10 | 8 | 4 |
| | psi | 101.5 | | 58 | 145 | 116 | 58 |
| Capacity Adjustment Storoke Speed | | MAX. 300 spm<br>Volume adjustment range 5 to 100% | | | | | |
| Stroke length | | Fixed at 1.0 mm | | | | | |
| Connection (hose/tube: I.D×O.D) | Discharge side | 4×9 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | | 4×9 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | 6×11 (PVC braided hose), 6×8 (PE) or 1/4×3/8 (PE) | |
| | Suction side | | | | | | |
| | Relief valve/ air release | 4×6 (soft PVC hose) | | | | | |
| 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 (dust-&water-resistance) | | | | | |
| 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 | | 2.2 A | 2.5 A | |
| | Power consumption | Max.: 220 VA/ Ave.: 16 W | Max.: 250 VA/Ave.: 18 W | | Max.: 220 VA/ Ave.: 16 W | Max.: 250 VA/Ave.: 18 W | |
| Weight | | 1.7 kg | 1.8 kg | | 1.7 kg | 1.8 kg | |

*1 Conditions: Clean water, room temperature

*2 Though the max. discharge pressure of the 30R/60R models is 1.0 MPa (10 bar), the relief-valve function operates when 0.7 MPa (7 bar) is exceeded. In applications requiring a discharge pressure of 0.7 MPa (7 bar) or more, ask for a model without the relief-valve function, and install a separate relief valve for extra safety.

*3 The Start-to-discharge pressure and closing pressure of the simple relief valve are 0.7 to 1.3 MPa.The pressure fluctuates depending on the pH of the liquid and operating conditions.

# Specification

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

| Specification \ Model | | 31 | 61 | 12 |
|---|---|---|---|---|
| Max. discharge volume* | mL/min | 27 | 54 | 93 |
| | L/h | 1.62 | 3.24 | 5.58 |
| | US G/h | 0.42 | 0.85 | 1.47 |
| Max. discharge pressure* | MPa | 1.0 | 0.8 | 0.4 |
| | Bar | 10 | 8 | 4 |
| | psi | 145 | 116 | 58 |
| Capacity Adjustment Storoke Speed | | MAX. 300 spm<br>Volume adjustment range 5 to 100% | | |
| Stroke length | | Fixed at 1.0 mm | | |
| Connection (hose/tube: I.D×O.D) | Discharge side | 4×9<br>(PVC braided hose),<br>6×8<br>(PE)<br>or<br>1/4×3/8<br>(PE) | 6×11<br>(PVC braided hose),<br>6×8<br>(PE)<br>or<br>1/4×3/8<br>(PE) | |
| | Suction side | | | |
| | Air release | 4 x 8 (soft PVC hose) | | |
| 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 (dust-&water-resistance) | | |
| 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 | |

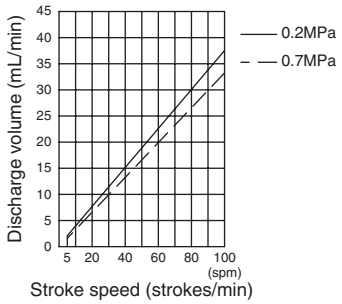
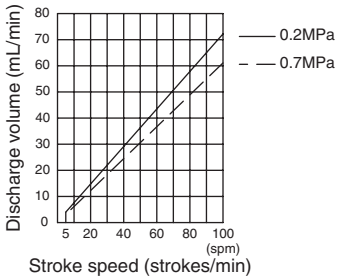
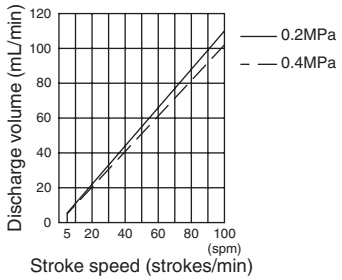
* Conditions: Clean water, room temperature

# Performance curve

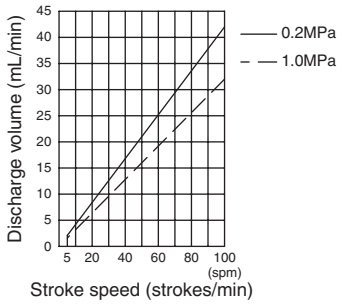
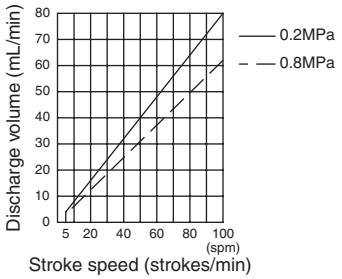
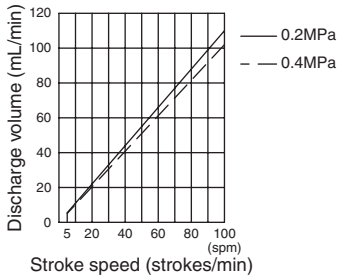
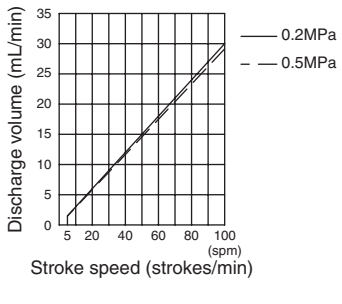
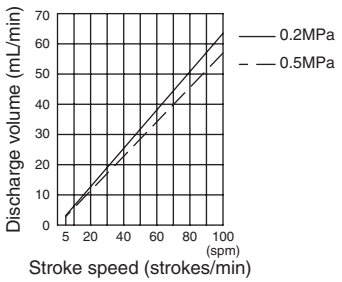
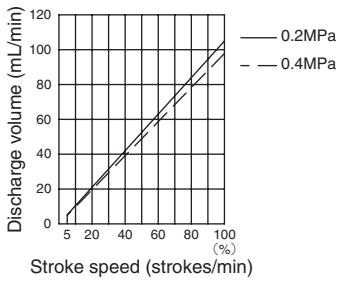
- The performance curves below represent the measurements taken under the conditions prevailing at TACMINA's test facilities, and are provided here as examples.
- The individual conditions prevailing on-site and differences between models may produce minor variations from these curves.
- Measure the 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

### ■Model w/ relief-valve function

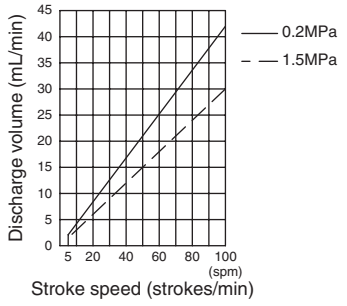
| PZ–30R–<br>VTCE/VTCF/FTCE/FTCF/FTCT | PZ–60R–<br>VTCE/VTCF/FTCE/FTCF/FTCT | PZ–100R–<br>VTCE/VTCF/FTCE/FTCF/FTCT |
|---|---|---|
| Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  |

### ■Model w/o relief-valve function

| PZ–30–<br>VTCE/VTCF/FTCE/FTCF/FTCT | PZ–60–<br>VTCE/VTCF/FTCE/FTCF/FTCT | PZ–100–<br>VTCE/VTCF/FTCE/FTCF/FTCT |
|---|---|---|
| Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  |
| PZ–30–<br>6TCT | PZ–60–<br>6TCT | PZ–100–<br>6TCT |
| Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  | Conditions: clean water, room temperature<br>  |

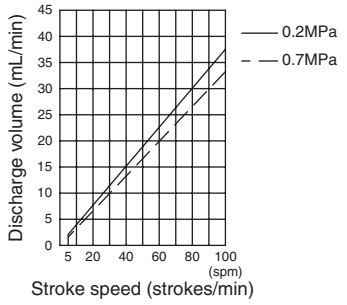
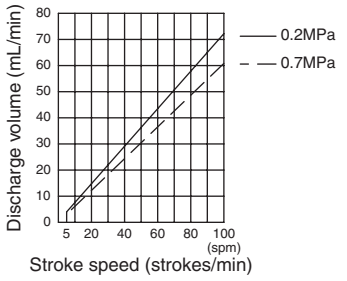
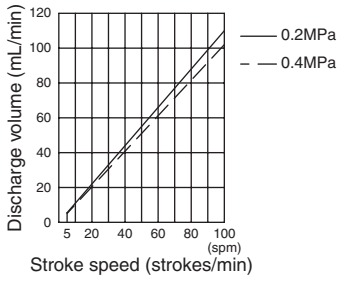
# Performance curve

## Model for injection of boiler chemicals: PZ

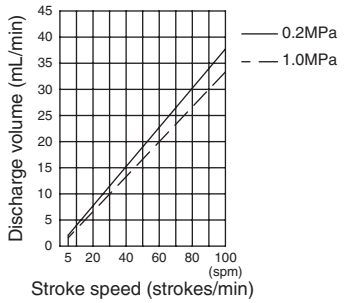
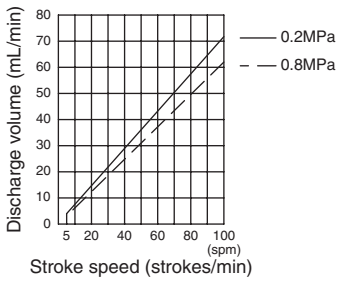
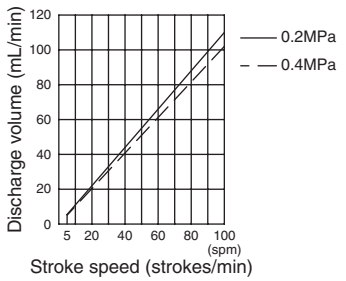
| PZ–30R/30–<br>VTCET |
|---|
| Conditions: clean water, room temperature<br>  <br> |

## Model for injection of sodium hypochlorite: CLPZ

### ■Model w/ relief-valve function

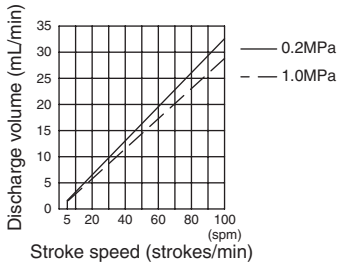
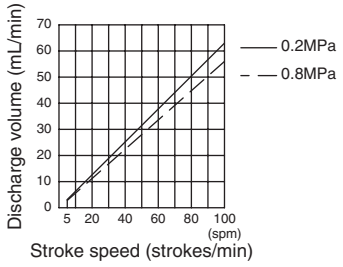
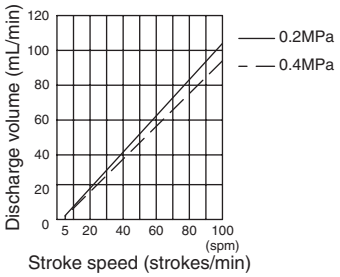
| CLPZ–30R–<br>ATCF | CLPZ–60R–<br>ATCF | CLPZ–100R–<br>ATCF |
|---|---|---|
| Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> |

### ■Model w/o relief-valve function

| CLPZ–30–<br>ATCF | CLPZ–60–<br>ATCF | CLPZ–100–<br>ATCF |
|---|---|---|
| Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> |

# Performance curve

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

| ARPZ–31–<br>CL | ARPZ–61–<br>CL | ARPZ–12–<br>CL |
|---|---|---|
| Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> | Conditions: clean water, room temperature<br>  <br> |

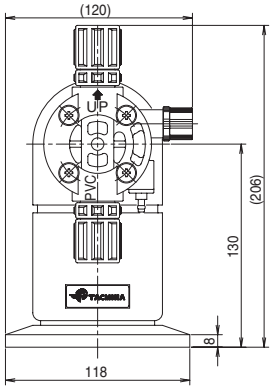
Specifications

# External dimension

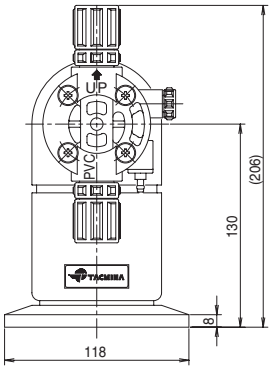
## Model for injection of general chemicals: PZ

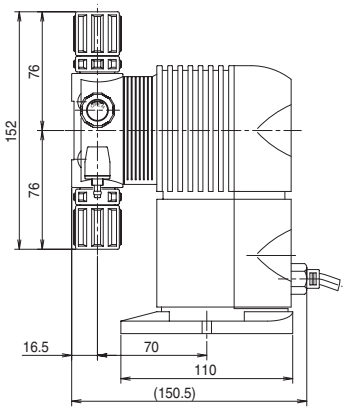
### PZ–30R/60R/100R/30/60/100–VTCE/VTCF

Model w/ relief-valve function



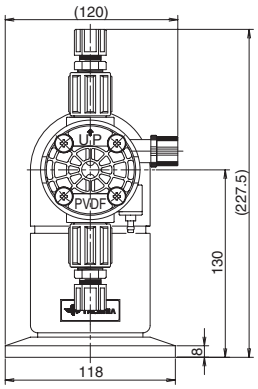

Model w/o relief-valve function



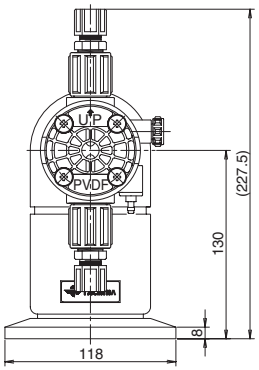



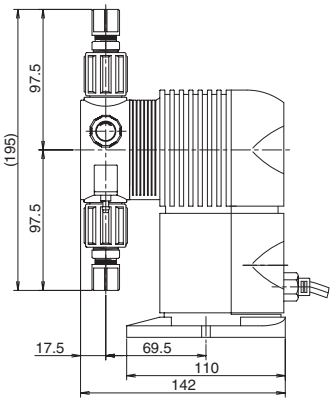

### PZ–30R/60R/100R/30/60/100–FTCE/FTCF/FTCT

Model w/ relief-valve function

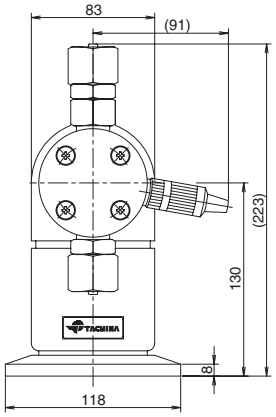


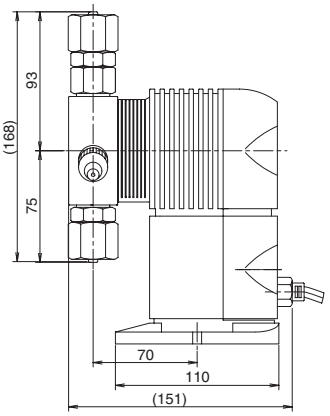

Model w/o relief-valve function




### PZ–30/60/100–6TCT



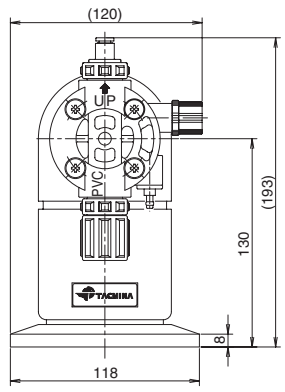

Specifications

# External dimension

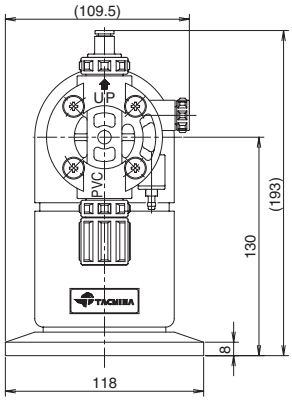
## Model for injection of boiler chemicals: PZ

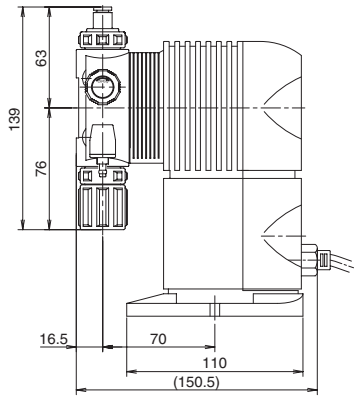
PZ–30R/30–VTCET

Model w/ relief-valve function




Model w/o relief-valve function

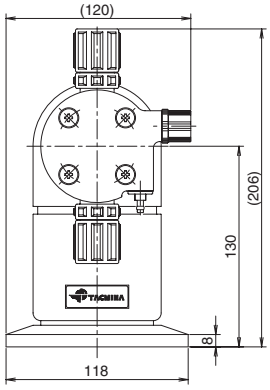


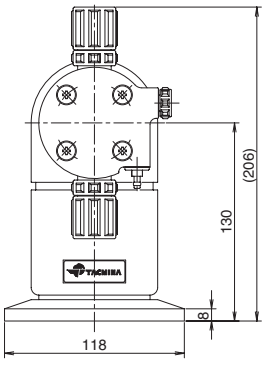

## Model for injection of sodium hypochlorite: CLPZ

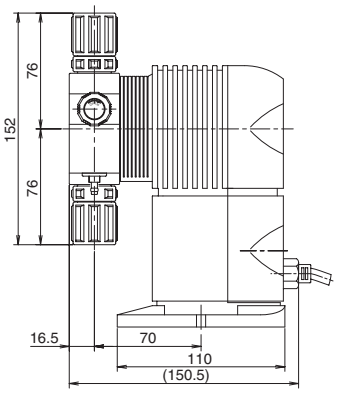
CLPZ–30R/60R/100R/30/60/100–ATCF

Model w/ relief-valve function



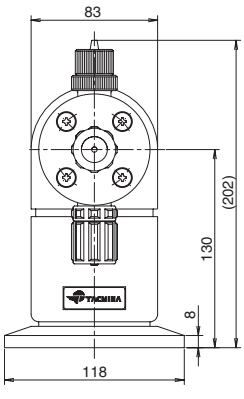

Model w/o relief-valve function

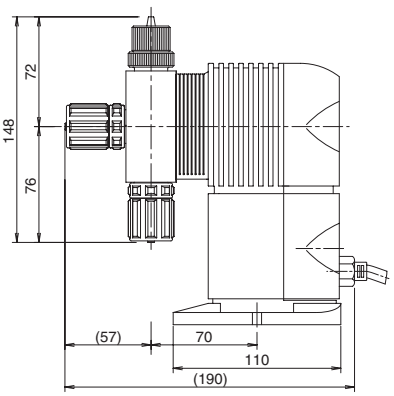



## Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZ

ARPZ–31/61/12–CL




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/relief valve/anti siphonal check valve/foot valve/air-release hose/ differs significantly depending on the chemicals with which it is used, such as on the temperatures and pressures and on the presence of ultraviolet rays. Inspect them, 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 40 to 46).

## Model for injection of general chemicals: PZ

### PZ–30R/60R/100R/30/60/100–VTCE/VTCF

| Part | Quantity per pump | | Recommended replacement timeframe |
|---|---|---|---|
| | 30R/60R/100R | 30/60/100 | |
| Valve seat assembly | 2 | | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | | 10,000 hours after start of operation |
| Relief valve | 1 | – | 10,000 hours after start of operation |
| Air-release knob | – | 1 | 10,000 hours after start of operation |
| Air-release nozzle assembly | 1 | | 10,000 hours after start of operation |

### PZ–30R/60R/100R/30/60/100–FTCE/FTCF/FTCT

| Part | Quantity per pump | | Recommended replacement timeframe |
|---|---|---|---|
| | 30R/60R/100R | 30/60/100 | |
| Valve seat assembly | 2 | | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | | 10,000 hours after start of operation |
| Relief valve | 1 | – | 10,000 hours after start of operation |
| Air-release knob | – | 1 | 10,000 hours after start of operation |
| Air-release nozzle assembly | 1 | | 10,000 hours after start of operation |

### PZ–30/60/100–6TCT

| Part | Quantity per pump | Recommended replacement timeframe |
|---|---|---|
| O-ring | 3 | 10,000 hours after start of operation |
| Check ball | 2 | 10,000 hours after start of operation |
| Valve stopper | 2 | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | 10,000 hours after start of operation |
| Air-release valve assembly | 1 | 10,000 hours after start of operation |

# Consumables

## Model for injection of boiler chemicals

**PZ**

| Part | Quantity per pump | | Recommended replacement timeframe |
|---|---|---|---|
| | 30R | 30 | |
| Valve seat assembly | 2 | | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | | 10,000 hours after start of operation |
| Relief valve | 1 | – | 10,000 hours after start of operation |
| Air-release knob | – | 1 | 10,000 hours after start of operation |
| Air-release nozzle assembly | 1 | | 10,000 hours after start of operation |

## Model for injection of sodium hypochlorite

**CLPZ**

| Part | Quantity per pump | | Recommended replacement timeframe |
|---|---|---|---|
| | 30R/60R/100R | 30/60/100 | |
| Valve seat assembly (discharge side) | 1 | | 10,000 hours after start of operation |
| Valve seat assembly (suction side) | 1 | | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | | 10,000 hours after start of operation |
| Relief valve | 1 | – | 10,000 hours after start of operation |
| Air-release knob | – | 1 | 10,000 hours after start of operation |
| Air-release nozzle assembly | 1 | | 10,000 hours after start of operation |

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

**ARPZ**

| Part | Quantity per pump | Recommended replacement timeframe |
|---|---|---|
| Valve seat assembly (discharge side) | 1 | 10,000 hours after start of operation |
| Valve seat assembly (suction side) | 1 | 10,000 hours after start of operation |
| Diaphragm assembly (diaphragm, protective diaphragm, spacer) | 1 | 10,000 hours after start of operation |
| Valve seat assembly (Air-release side) | 1 | 10,000 hours after start of operation |

# 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 for-eign 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**

When this sensor detects the low chemical level in the tank, it stops pump operation and emits an alarm to notify the operator that it is time to fill up 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.

**• PTS-30/50/120**

These are chemical injection units consisting of a metering pump and PE tank (with a capacity of 30, 50 or 120 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 mount-ed on top.

**• Parts kit**

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

# Explanation of terms

**• Overfeeding**

A phenomenon where liquid continues flowing from the piping due to the discharge momentum (inertia), even when the pump is stopped. For a flow with pulsation in particular, this phenomenon appears prominently, and the liquid is discharged at a volume larger than the rated 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 dis-charge 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 shall be one year from the date of dispatch from TACMINA's factory.
(2) If, during the warranty period, the product sustains malfunctions or damages as a result of design, manufacturing, or material defect, or if the product does not meet its specifications, TACMINA will arrange for repairs, provide replacement components, or replace the product, at TACMINA's discretion, at no charge to the customer. However, this warranty only covers direct damage to the product. Any consequential losses or damages, including, but not limited to, profit losses and any secondary damages, caused by malfunctions, breakage, or impaired performance of this product shall not be covered by this warranty. The limitation of TACMINA's liability shall not exceed the sales value of the defective product.
(3) If a malfunction or damage is found, notice shall be given to distributor or TACMINA with documents that prove the malfunction or damage is caused by improper design, manufacturing failure or material defect within 14 days after awareness of such malfunction or damage. If the distributor or TACMINA does not receive such notice within aforementioned period, even though the warranty period is still in effect, TACMINA shall not be liable for any malfunction and damage.
Please note that TACMINA may request to give further information or to return the product for investigation. If the cause is attributable to TACMINA's action, the shipping fees, cost of investigation and checks performed by TACMINA shall be borne by TACMINA.
(4) Even in the warranty period, the cost of repairs in the following conditions shall be paid to the distributor or TACMINA.
1) Damages and deterioration of consumables.
2) Damages or malfunctions of the warranted product caused by carelessness in handling or incorrect use.
3) Damages or malfunctions of the warranted product caused by the failure to perform maintenance such as periodic inspections and repairs and replacements of consumables.
4) Damages or malfunctions of the warranted product caused by falls or impacts.
5) Damages or malfunctions of the warranted product resulting from the use of parts other than the ones supplied by TACMINA.
6) Damages or malfunctions of the warranted product resulting from product repairs or remodeling undertaken by individuals other than TACMINA employees or personnel of businesses authorized by TACMINA.
7) Damages or malfunctions of the warranted product resulting from fires, natural disasters, geological calamities, and force majeures.
8) Damages or malfunctions of the warranted product resulting from loose bolts or nuts or from defective hose connections.
9) Discoloration, deterioration, damages, or malfunctions of the warranted product resulting from ultraviolet rays, corrosive gases, or flooding.
10) Damages or malfunctions of the warranted product resulting from corrosion, swelling, or melting caused by the adhesion or chemical effect of the used liquid.
11) Damages or malfunctions of the warranted product resulting from damages to products other than those made by TACMINA.
12) Damages or malfunctions of the warranted product resulting from usage outside of the range of the usage conditions listed in the operation manual.
(5) The judgment of damages, malfunctions, and impaired performance as well as the judgment of whether the cause is the design of the product and product defects shall be performed by TACMINA's technical department.

## Repairs

**■Before requesting repairs**
Please read this operation manual carefully and inspect the product again.

**■Who to request repairs from**
Ask your vendor to take care of the repairs. If you are not sure of who your vendor is, contact TACMINA.

**■Precautions when sending the product for repairs**
Be sure to observe the following items to protect worker safety and to protect the environment:
- If any chemicals have affixed to the product, wash it clean.
- Attach the safety data sheet (SDS) to the product.
- If a "maintenance data" page is present at the end of the operation manual, fill in this page and attach it to the product.

✻ The product may not be repaired if the necessary materials are not attached.
✻ Even when the necessary materials are attached, TACMINA may send the product back if it is determined that repairing the product 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.

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

# TACMINA CORPORATION

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