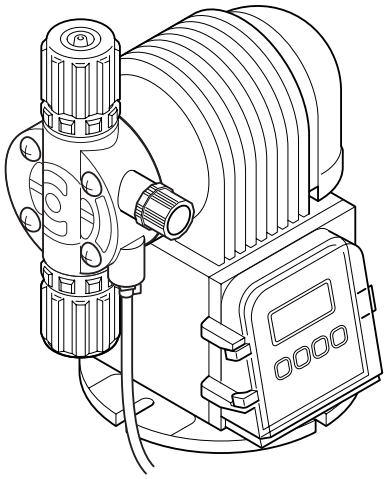
TACMINA

Solenoid-driven Diaphragm Metering Pump

PZD 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 the PZD-30R

Applicable Models

PZD-30R/60R/100R/
30/60/100/300/500
CLPZD-30R/60R/100R/
30/60/100
ARPZD-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
Environmental protection	IEC standard : IP65 or equivalent (dust-&water-resistance)

* 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.**

⚠ ⚠ 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.**
- **The control panel cover is made of plastic so do not subject it to excessive force. Otherwise, it may break or be damaged.**

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.**
- **Affixing electrical materials classified as cords in the Technical Standards of Electric Installation onto buildings is prohibited by law in Japan. When using a cord to connect this product, use a switch board, relay box, or other device to convert the cable to a cord. When using the product outside of Japan, follow the wiring standards for the installation country.**

Operation & Maintenance

WARNING

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

CAUTION

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

- **The vibration of the pump may cause the hoses/tubes to become loose and disconnected. Before starting operation, secure the hoses/tubes and check their tightness.**
- **While the pump is operating, the pump's surfaces may become hot, reaching a temperature of 60°C or more.**
- **Idling the pump for prolonged periods of time can lead to malfunctions.**

Other Precautions

⚠ CAUTION

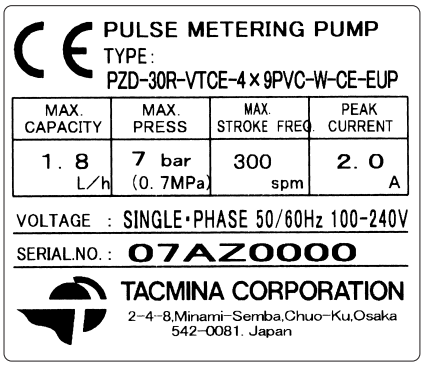
- **Do not attempt to remodel the pump.**
- **Install a protective barrier or other preventive action to cope with a chemical spill just in case one occurs. Also take steps to ensure that the pump will not get wet from the chemical.**
- **When it comes time to dispose of the pump, entrust its disposal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

Contents

Checking out the product

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

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



Accessories list

A signal cable is attached to chemical injection system "PTS series" which either PZDP or PZDM is installed.

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

Liquid-end Material	VTCE/VTCF		
Model	30R	60R	100R
Hose/tube (3m)	PVC braided hose (4×9) PE tube (6×8 or 1/4×3/8)	PVC braided hose (6×11) 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: PZD

Liquid-end Material	VTCE/VTCF				
Model	30	60	100	300	500
Hose/tube (3m)	PVC braided hose (4×9) PE tube (6×8 or 1/4×3/8)	PVC braided hose (6×11) PE tube (6×8 or 1/4×3/8)		PVC braided hose (12×18) PE tube (9×12 or 3/8×1/2)	
Air-release hose (1m)	Soft PVC hose (4×6)			-	
Anti-siphon check valve	1 set (R1/2)			1 set (R1/2 or R3/8)	
Foot valve	1 set			1 set	
Ceramic weight	1 set ✻ Only when PE tube is selected.				
Pump-mounting nuts/bolts	2 sets (M5×30)			2 sets (M5×30)	
Operation manual	1 copy			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	300	500
Tube (3m)	FEP tube (6×8 or 1/4×3/8)			PTFE tube (12×15)	
Air-release hose (1m)	Soft PVC hose (4×6)			-	
Anti-siphon check valve	1 set (R1/2 or R3/8)			- *1	
Foot valve	1 set			- *1	
Ceramic weight	1 set			-	
Pump-mounting nuts/bolts	2 sets (M5×30)			2 sets (M5×30)	
Operation manual	1 copy			1 copy	

*1 Please purchase these accessories separately.

Liquid-end Material	6TCT			STCT	
Model	30	60	100	300	500
Tube (3m)	PTFE tube (6×8)			PTFE tube (12×15)	
Air-release hose (1m)	Soft PVC hose (4×6)			-	
Anti-siphon check valve	1 set (R1/2 or R3/8)			1 set (R1/2)	
Foot valve	1 set			1 set	
Pump-mounting nuts/bolts	2 sets (M5×30)			2 sets (M5×30)	
Hose pump for air-release	1 set			-	
Operation manual	1 copy			1 copy	

Accessories list

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

Liquid-end Material	VTCE
Model	30R
Tube for discharge side (2m)	Nylon tube (4×6)
Tube 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: PZD

Liquid-end Material	VTCET
Model	30
Tube for discharge side (2m)	Nylon tube (4×6)
Tube 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: CLPZD

Liquid-end Material	ATCF		
Model	30R	60R	100R
Hose/tube (3m)	PVC braided hose (4×9) PE tube (6×8 or 1/4×3/8)	PVC braided hose (6×11) 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: CLPZD

Liquid-end Material	ATCF		
Model	30	60	100
Hose/tube (3m)	PVC braided hose (4×9) PE tube (6×8 or 1/4×3/8)	PVC braided hose (6×11) 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: ARPZD

Liquid-end Material	CL		
Model	31	61	12
Hose/tube (3m)	PVC braided hose (4×9) PE tube (6×8 or 1/4×3/8)	PVC braided hose (6×11) 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		

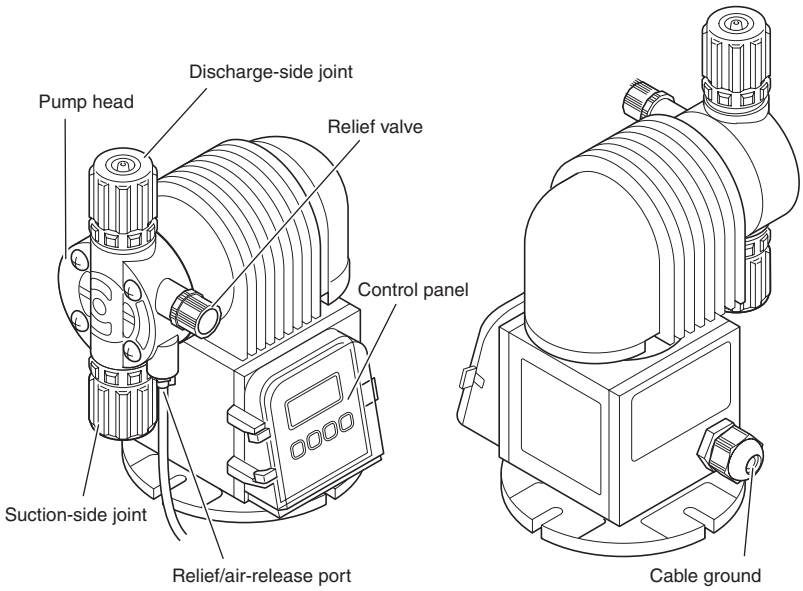
Description of product

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.

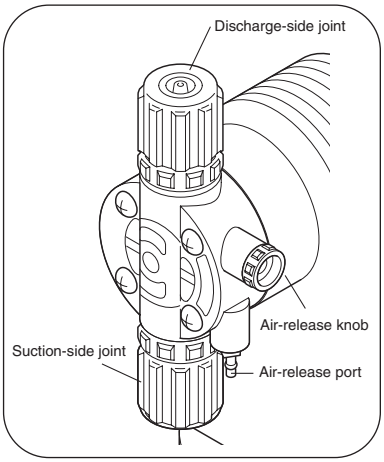
Names of the parts

Small type : 30/60/100/31/61/12

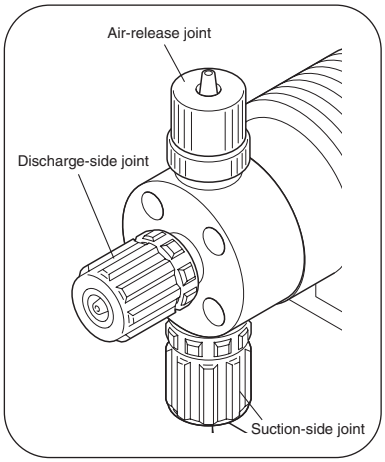
■Model w/ relief-valve function



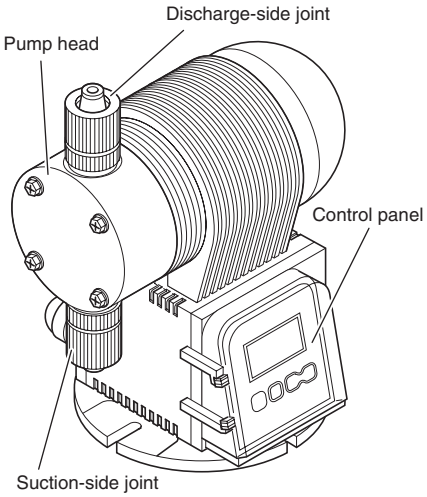
■Model w/o relief-valve function

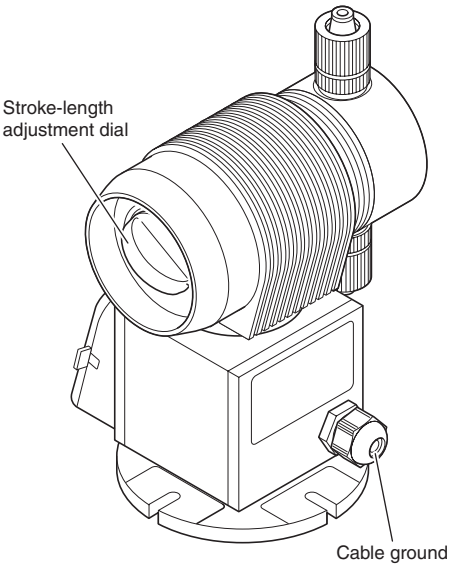


■Model w/ automatic air-release function



Large type : 300/500





Installing the product

⚠ WARNING

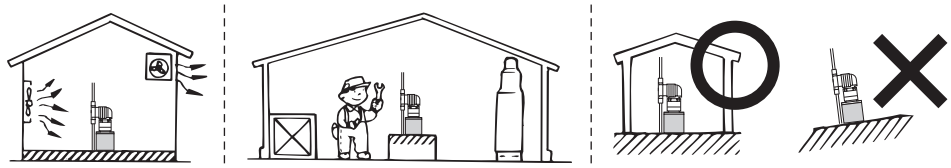
- **This pump does not have explosion-proof specifications. Do not install it in explosion-proof regions or in explosive or combustible atmospheres.**
- **Install the pump in a location that cannot be accessed by anyone but control personnel.**

⚠ 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.**

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.

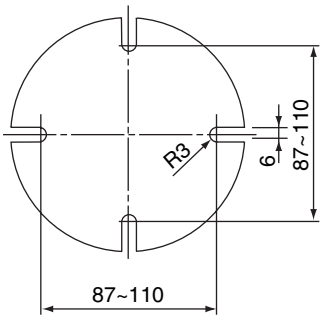


Mounting bolt positions

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

✻ Secure the pump in two places opposite each other among the four possible places.

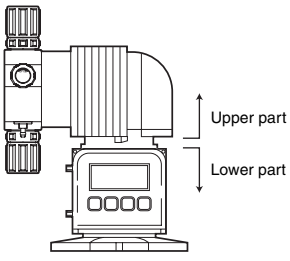
✻ The pump can be installed at any pitch ranging from 87 to 110 mm.



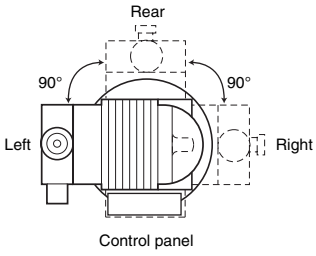
Assembling the pump

The direction in which the pump head and solenoid box part (upper part) and circuit box part (lower part) are assembled can be changed to one of three directions.

✻ If, due to restrictions on the pipe connections or other factors, the control panel is pointing in a direction in which it is difficult to operate the pump, change the direction by following the steps on the next page.

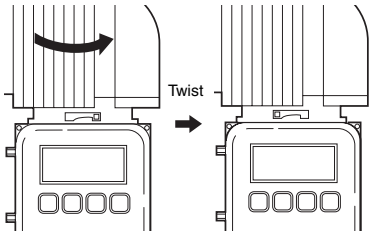


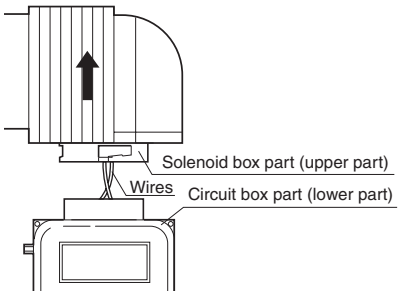
<View from above>
✻ at time of shipment



Installing the product

(1) Twist the pump head and solenoid-box part (upper part) counterclockwise by about 30 degrees, and lift slightly (by 2 to 3 cm).





(2) Twist the upper part in the desired direction, align the groove in the coupling of the upper part and the protrusion in the coupling of the lower part, and insert.
(3) Twist the upper part clockwise, and secure.

IMPORTANT

- **The upper part and lower part are connected by wires. When lifting the upper part, lift it until the upper part and lower part are separated just slightly (by a gap of 2 or 3 cm). The wires may be broken if the parts are separated too far.**
- **When twisting the upper part, do not apply pressure to the pump head and especially not to the joint area and operation panel cover. Otherwise, the parts may be damaged.**
- **The fixed part of the pump is made of plastic so refrain from applying excessive force to it. Doing so may damage it.**
- **Do not excessively twist the wires or pinch them between parts of the pump.**
- **The assembly directions are left, rear and right as seen from the control panel (only 90 degrees). The pump cannot be assembled at any midway points.**
- **During assembly, twist the upper part firmly until the protrusion touches the right end, and check that it is secured.**

NOTE

- **It is easier to twist the upper part if you press down on it.**
- **When the pump is shipped, it is assembled so that the pump head is facing the left side as seen from the control panel.**

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 81.**

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 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.
- 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.
- Keep the number of bends and joints that cause resistance to a minimum.

The piping procedure will be described by pump type.

Model	Relief-valve function	Series	Page
Model for injection of general chemicals	Yes	PZD-30R/60R/100R	13
	No	PZD-30/60/100/300/500	14
Model for injection of boiler chemicals	Yes	PZD-30R	15
	No	PZD-30	16
Model for injection of sodium hypochlorite	Yes	CLPZD-30R/60R/100R	17
	No	CLPZD-30/60/100	18
Model w/ automatic air-release function for injection of sodium hypochlorite	No	ARPZD-31/61/12	19

Piping

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

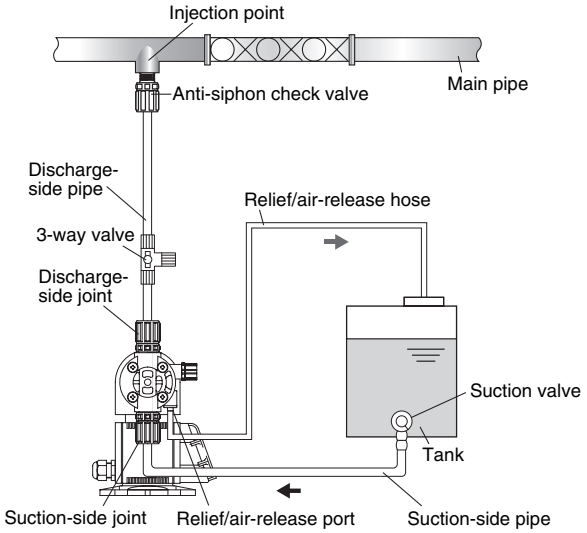
Installation is described with an example using a TACMINA tank.

- 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.

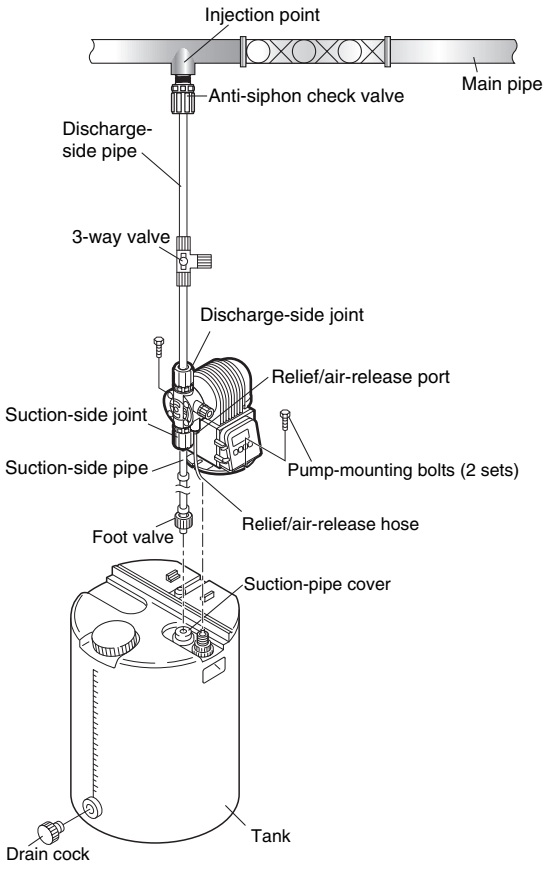
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



■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 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.
✻ Connect the foot valve and anti-siphon check valve securely to prevent loosening by following the same procedure as "PVC hose connection" on page 21.



Piping

Model w/o relief-valve function for injection of general chemicals: PZD-30/60/100/300/500

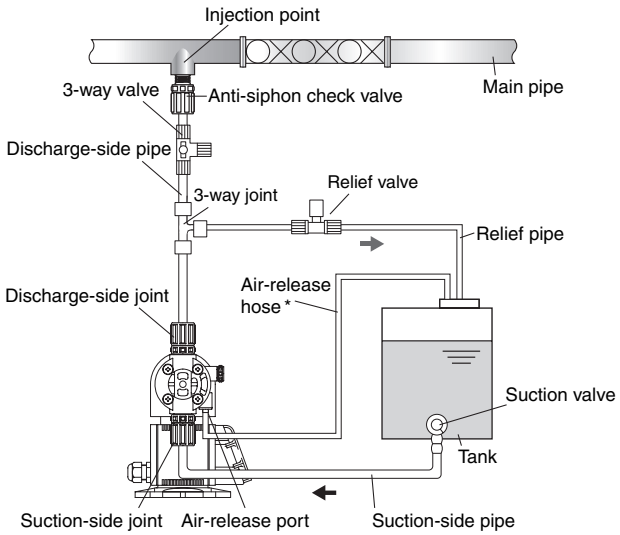
Installation is described with an example using a TACMINA tank.

- 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.



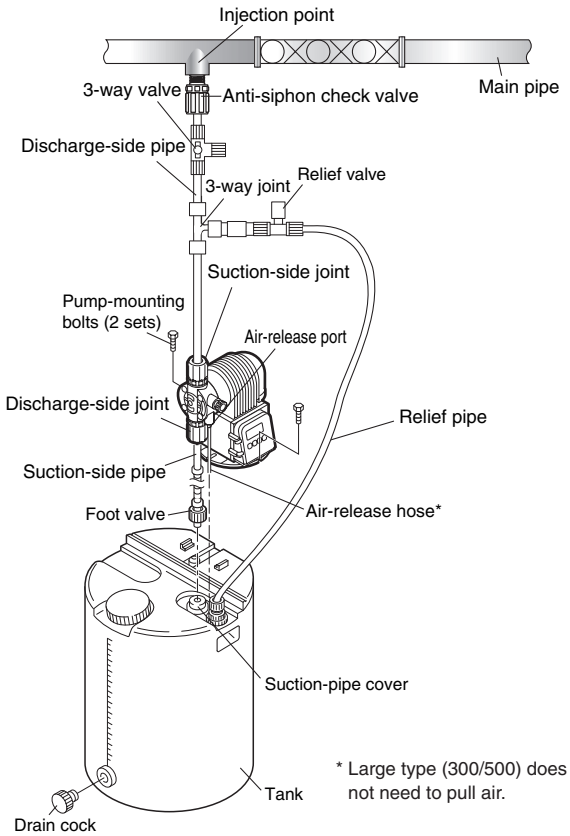
* Large type (300/500) does not need to pull air.

■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 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 or cut it so that the foot valve is 30 mm above 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.

✻ Connect the foot valve and anti-siphon check valve securely to prevent loosening by following the same procedure as "PVC hose connection" on page 21.



* Large type (300/500) does not need to pull air.

Piping

Model w/ relief-valve function for injection of boiler chemicals: PZD-30R

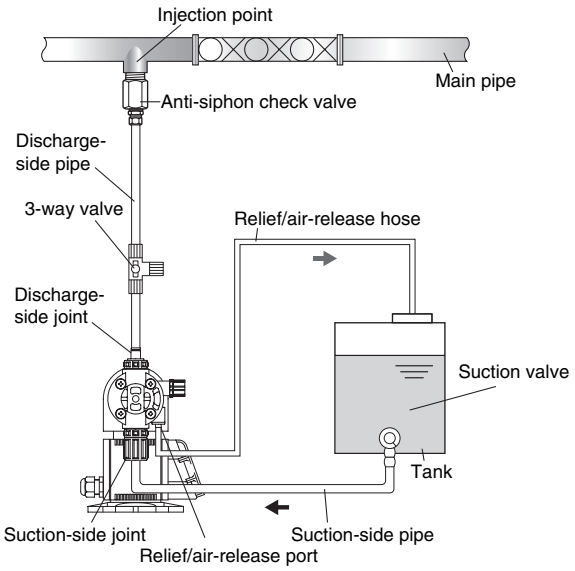
Installation is described with an example using a TACMINA tank.

- 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.

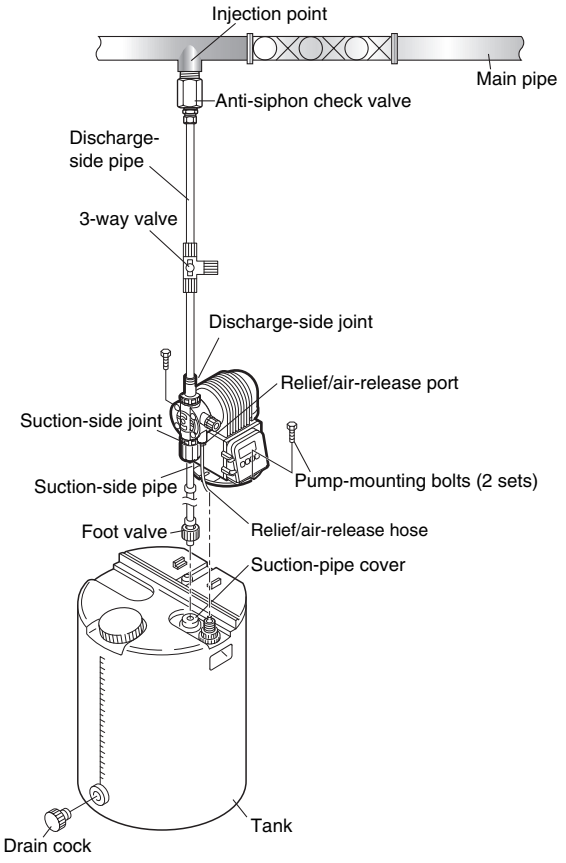
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



■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: PZD-30

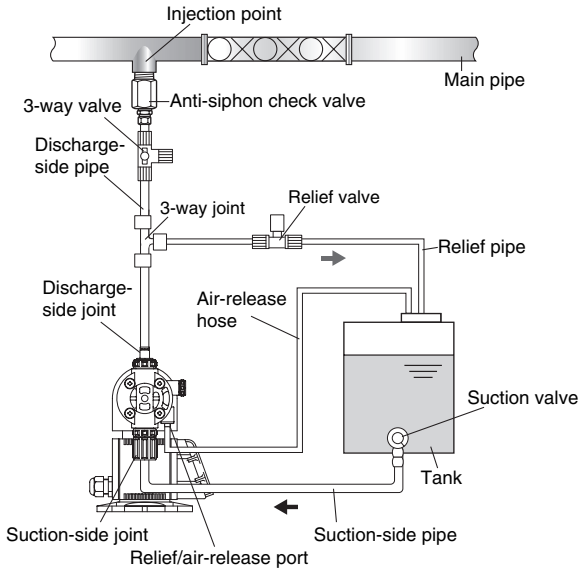
Installation is described with an example using a TACMINA tank.

- 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.

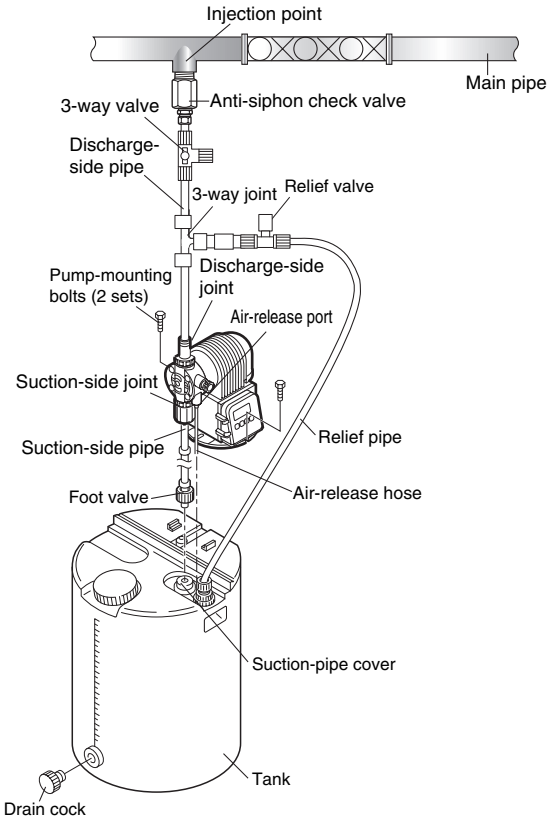
✻ It is also recommended that a valve, meter, etc. be installed to make it easy to carry out maintenance and other such jobs.



■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: CLPZD-30R/60R/100R

Installation is described with an example using a 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.

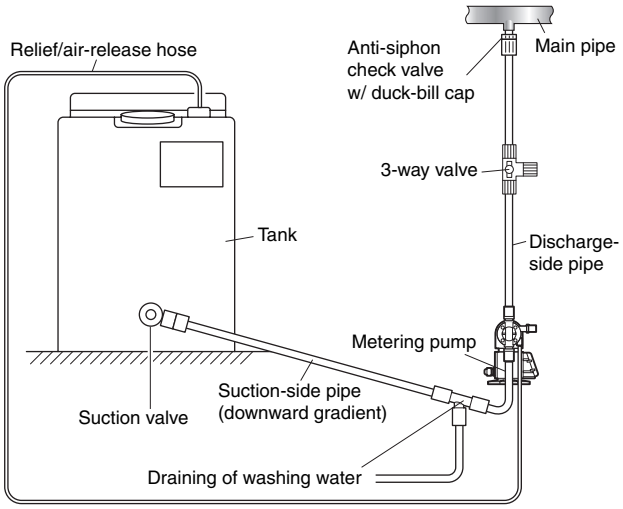
(1) Connect the suction valve of the tank and the suction-side joint of the pump using the hose/tube. When doing this, tilt the pipe at a downward gradient so that no air will be trapped inside the pipe.

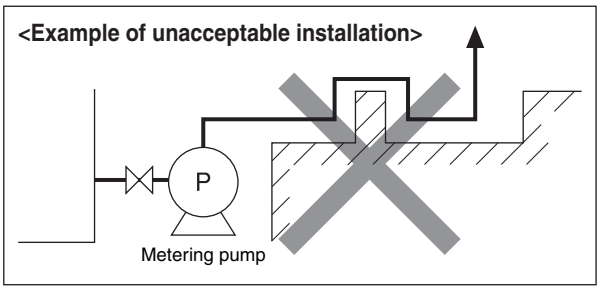
(2) Connect the discharge-side joint of the pump to the main pipe (injection point) using the hose/tube. When doing this, attach the anti-siphon check valve with duck-bill cap at the injection-point side end of the hose/tube.

(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: CLPZD-30/60/100

Installation is described with an example using a 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.

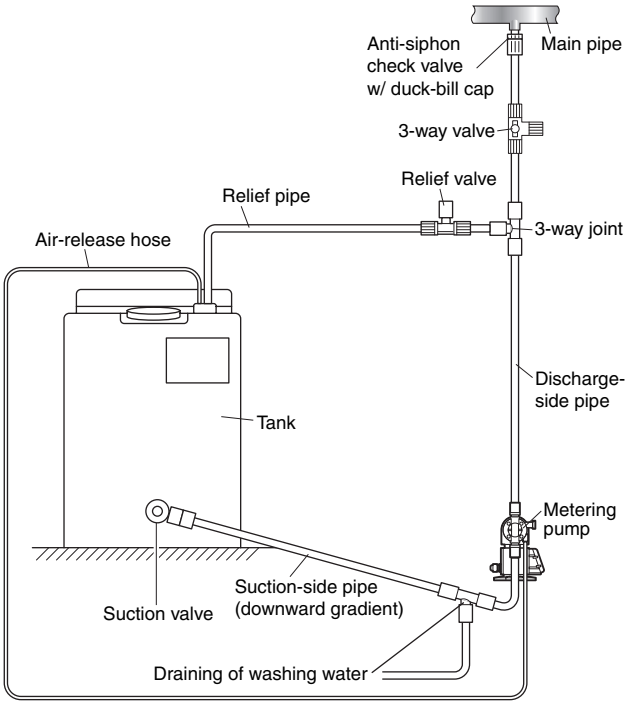
(3) Attach a 3-way joint to the discharge-side hose/tube (near the pump's discharge-side joint), and install a relief valve. Return the end of the relief pipe to the tank or other container.

(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.

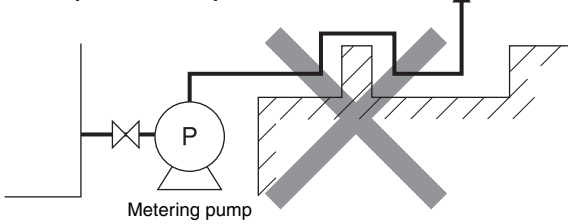
(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ 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: ARPZD-31/61/12

Installation is described with an example using a 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.

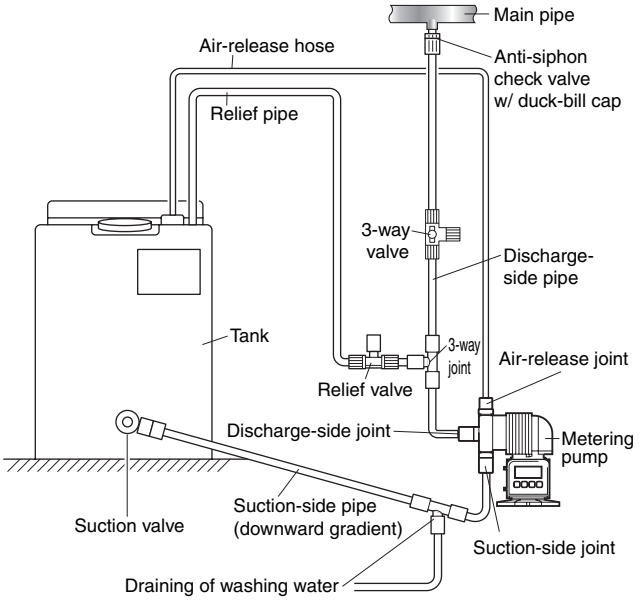
(4) Connect the end of the other discharge-side hose/tube extending from the 3-way joint to the main pipe (injection point). When doing this, attach the anti-siphon check valve with duck-bill cap at the injection-point side end of the hose/tube.

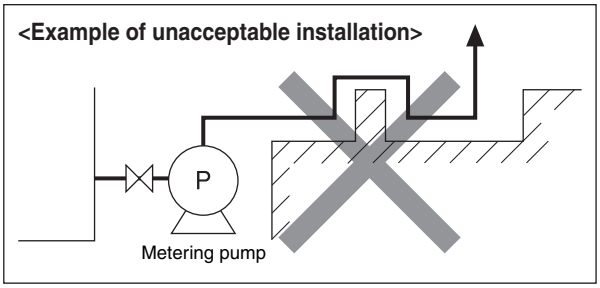
(5) Attach one end of the air-release hose to the air-release port, and return the other end to the tank or other container.

✻ 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.

✻ Connect the foot valve and anti-siphon check valve securely to prevent loosening by following the same procedure as "PVC hose connection" on page 21.





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	21
	FTCE/FTCF/FTCT (small type)	PE/FEP tube	23
	FTCT (large type)	PTFE tube	25
	6TCT (small type)	PTFE tube	27
	STCT (large type)	PTFE tube	28
Model for injection of boiler chemicals	VTCET	Discharge side: Nylon tube Suction side: PVC braided hose	29
Model for injection of sodium hypochlorite	ATCF	PVC braided hose/PE tube	31
Model w/ automatic air-release function for injection of sodium hypochlorite	CL	PVC braided hose/PE tube	32

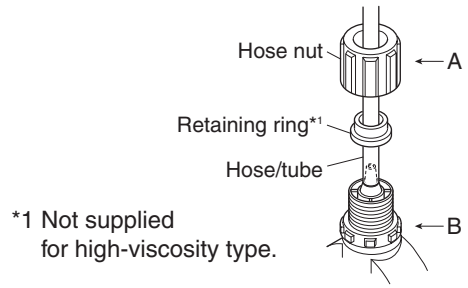
Connecting

Model for injection of general chemicals (VTCE/VTCF)

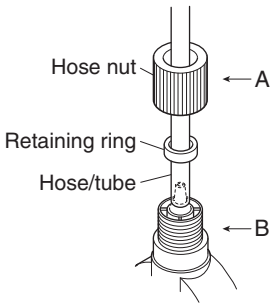
■PVC braided hose/PE tube

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

Small type: 30R/60R/100R/30/60/100/31/61/12



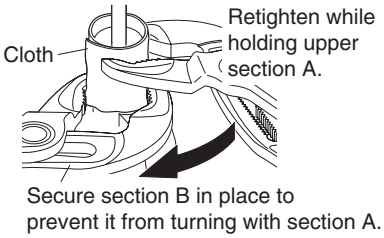
Large type: 300/500



(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.



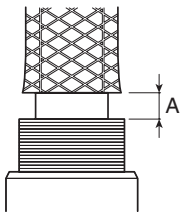
✻ After starting operation, retighten the nut as needed.

- 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 the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.

NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

Hose type	Hose diameter	Dimension A
PVC braided hose	4×9	5.5 mm or less
	6×11	1 mm or less
	12×18	2 mm or less
	19×26	3 mm or less
PE tube	6×8	5 mm or less
	9×12	0 mm
	1/4×3/8	2 mm or less



Connecting

■Anti-siphon check valve

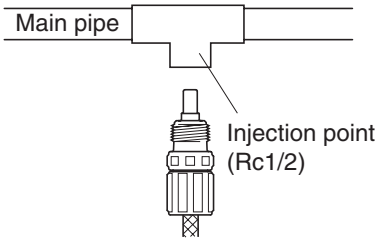
This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- 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)

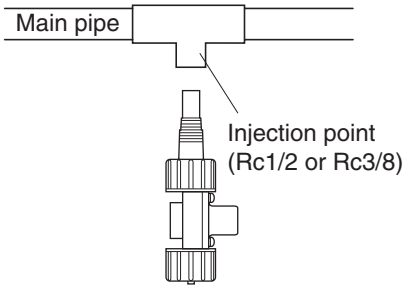
✻ Even with a rising pipe, overfeed may occur if the pipe is too long.

(1) The anti-siphon check valve for the small type has an R1/2 external thread whereas the large type (sold separately) 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.

Small type: 30R/60R/100R/30/60/100/31/61/12



Large type: 300/500



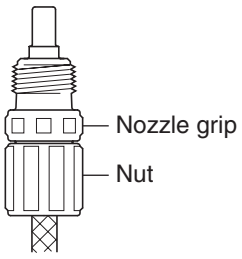
✻ Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 21.

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

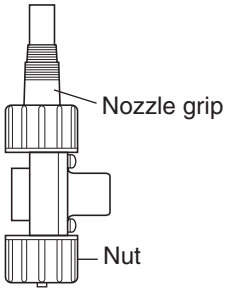
✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.

✻ 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.

Small type: 30R/60R/100R/30/60/100/31/61/12



Large type: 300/500

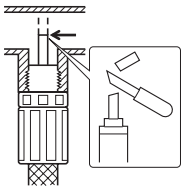


NOTE

<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.

Example: small type

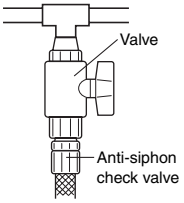


<For maintenance>

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.

Example: small type



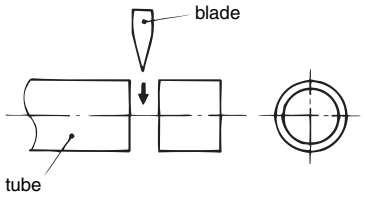
Connecting

Model for injection of general chemicals (small type: FTCE/FTCF/FTCT)

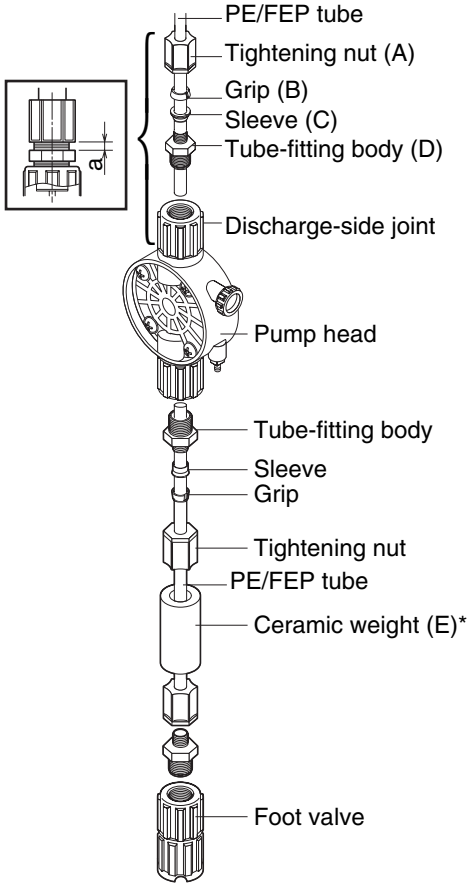
■PE/FEP tube

- When bending the tube, provide sufficient leeway in the bending (R100 or more) 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 the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using them.

(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

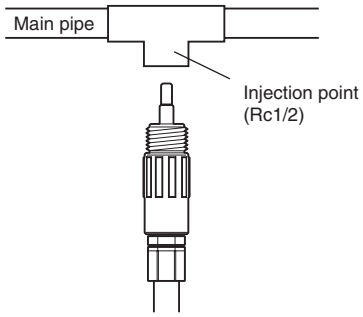
■Anti-siphon check valve

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.

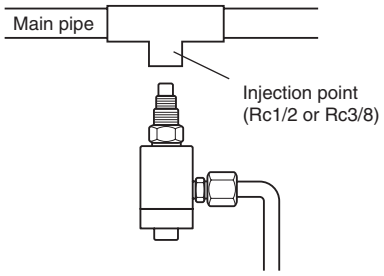
- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)
  ✻ Even with a rising pipe,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

Small type: FTCE/FTCF (w/ PE tube)

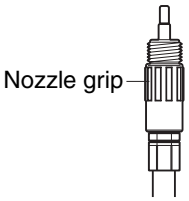


Small type: FTCT (w/ FEP tube)

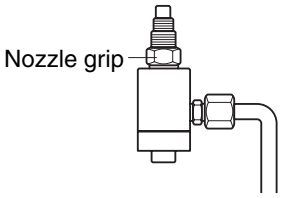


(2) Wind sealing tape around the external thread of the anti-siphon check valve, and screw the valve into the injection point.
✻ If it is hard to screw the valve in, grasp the nozzle grip using a tool such as pliers, and tighten the valve gently.
✻ When connecting the tube with the anti-siphon check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

Small type: FTCE/FTCF (w/ PE tube)



Small type: FTCT (w/ FEP tube)

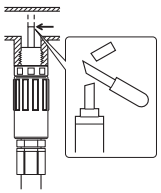


NOTE

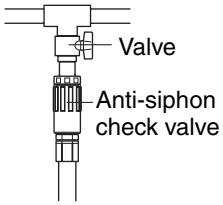
<When injecting liquid into a pipe with a small diameter>
If the end of the anti-siphon check valve is too long, cut it off so that the end will be positioned at the center of the main pipe where the chemical is to be injected prior to use.

<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: small type (FTCE/FTCF)



Example: small type (FTCE/FTCF)

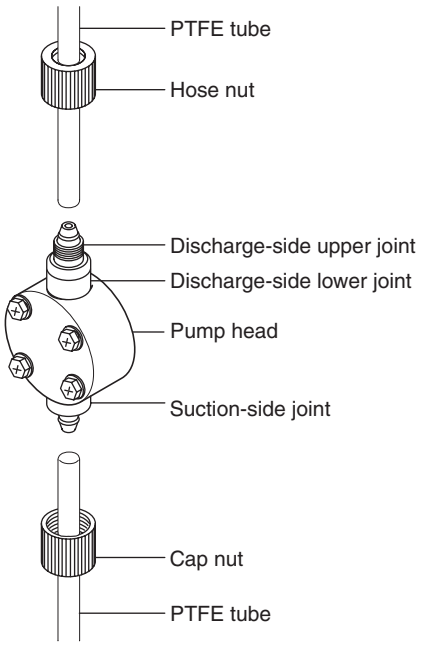


Connecting

Model for injection of general chemicals (large type: FTCT)

■PTFE tube

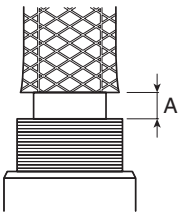
- When bending the tube, provide sufficient leeway in the bending (R100 or more) so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the tube firmly so that it will not become disconnected, and tighten the cap nuts securely. Do not excessively tighten 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 the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using them.



NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

Hose type	Hose diameter	Dimension A
PTFE tube	12×15	2 mm or less



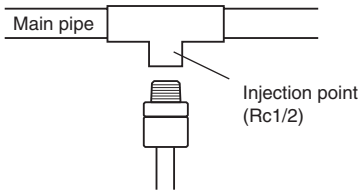
Connecting

■Anti-siphon check valve

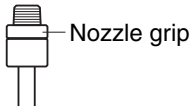
This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- 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 has an R1/2 external thread. Provide an Rc1/2 internal thread at the injection point .



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

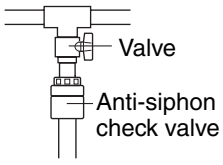


NOTE

<For maintenance>

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

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

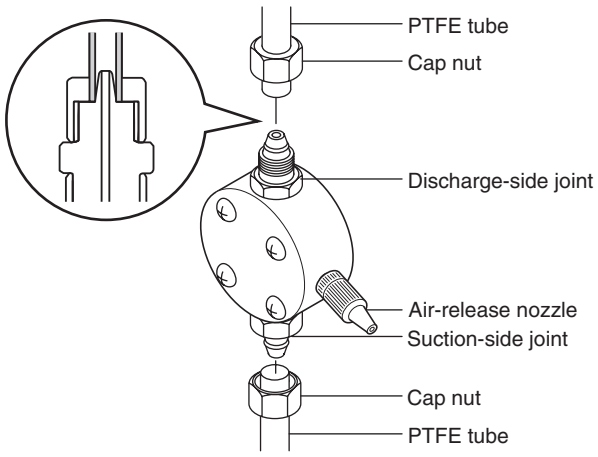


Connecting

Model for injection of general chemicals (small type: 6TCT)

■PTFE tube

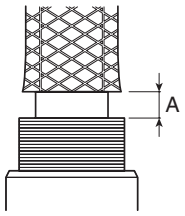
- When bending the tube, provide sufficient leeway in the bending (R100 or more) so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the tube firmly so that it will not become disconnected, and tighten the cap nuts securely. Do not excessively tighten 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 the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using them.



NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

Hose type	Hose diameter	Dimension A
PTFE tube	6×8	3 mm or less



Connecting

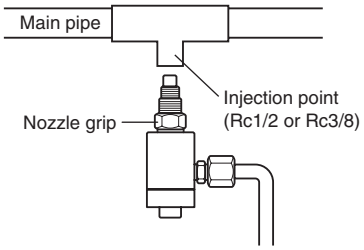
■Anti-siphon check valve

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 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.

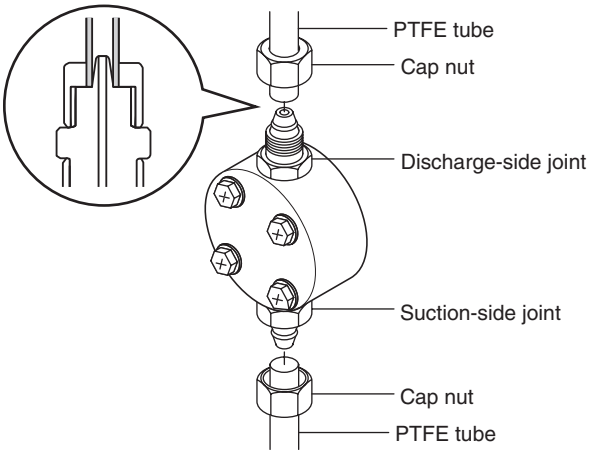


Connecting

Model for injection of general chemicals (large type: STCT)

■PTFE tube

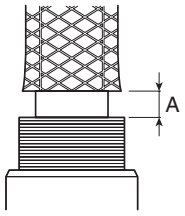
- When bending the tube, provide sufficient leeway in the bending (R100 or more) so that the tube will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the tube firmly so that it will not become disconnected, and tighten the cap nuts securely. Do not excessively tighten 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 the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using them.



NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  - ✻ Applying excessive force may damage the hose.
  - ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

Hose type	Hose diameter	Dimension A
PTFE tube	12×15	2 mm or less



■Anti-siphon check valve

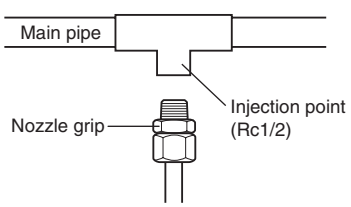
This pump is provided with an anti-siphon check valve. Use this valve at the injection point unless there is a good reason not to do so. Be absolutely sure to install it in the following cases.

- 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) 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.

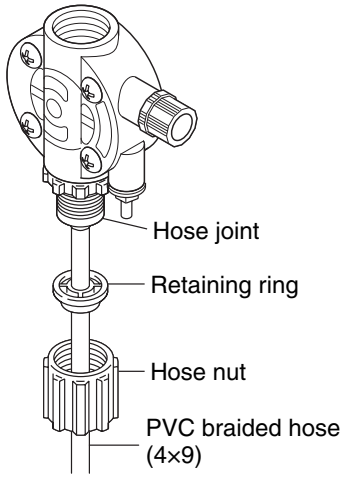


Connecting

Model for injection of boiler chemicals (VTCET)

■PVC braided hose (1m, suction side)

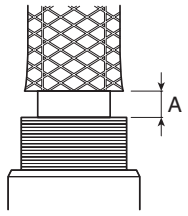
- When bending the hose, provide sufficient leeway in the bending (R100 or more) so that the hose will not break. Also ensure that it will not be rubbed against or trodden on.
- Insert the hose firmly so that it will not become disconnected, and tighten the hose nuts securely. Do not excessively tighten 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 the hose for jobs such as maintenance and then afterwards re-connecting the same hose, cut about 10 mm off the end of the hose before re-using them.



NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

Hose type	Hose diameter	Dimension A
PVC braided hose	4×9	5.5 mm or less



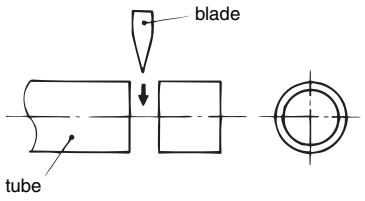
Connecting

■Nylon tube (2m, discharge side)

- When bending the tube, provide sufficient leeway in the bending (R100 or more) 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 the tube for jobs such as maintenance and then afterwards re-connecting the same tube, cut about 10 mm off the end of the tube before re-using them.

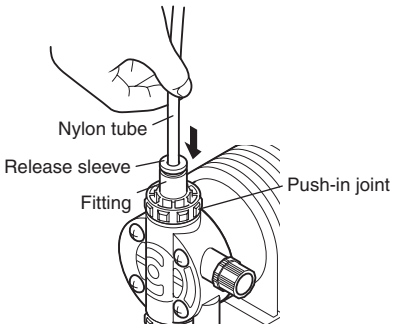
●Connecting

(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.

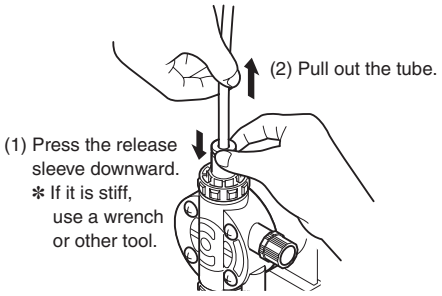
- Using your thumb and forefinger, press the release sleeve against the body side, and pull the tube straight out without twisting it.

✻ 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

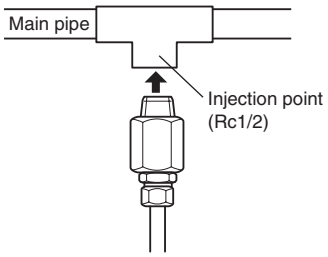
■Anti-siphon check valve

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.

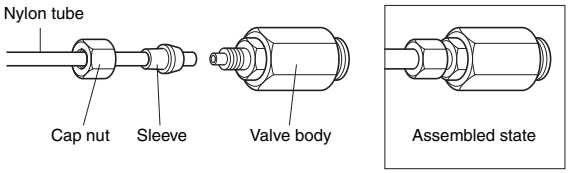
- When the injection point is open to the atmosphere and liquid is to be injected at a position lower than the level of the liquid in the tank (prevention of siphoning)
- When a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)

✻ 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

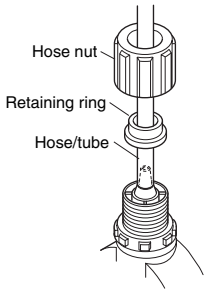
- **Be sure to securely connect the nylon tube and anti-siphon check valve as well as the anti-siphon check valve and injection point.**
- **The anti-siphon check valve will be corroded by some chemicals, and so such chemicals cannot be used. For special chemicals, consult with a TACMINA representative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

Connecting

Model for injection of sodium hypochlorite (ATCF)

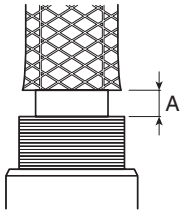
■PVC braided hose/PE tube

- Connect securely to prevent loosening by following the same procedure as "PVC braided hose/PE tube" on page 21.
- 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 the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.



NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.



Hose type	Hose diameter	Dimension A
PVC braided hose	4×9	5.5 mm or less
	6×11	1 mm or less
PE tube	6×8	5 mm or less
	1/4×3/8	2 mm or less

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 a chemical greatly exceeding the pump's rated discharge volume is being fed (prevention of overfeed)

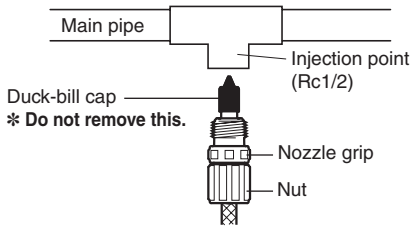
✻ Even with a rising pipe, overfeed may occur if the pipe is too long.

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

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

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

✻ When connecting the 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.

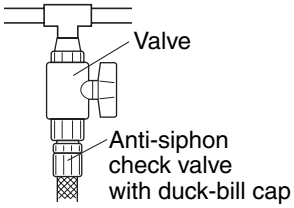


NOTE

<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.

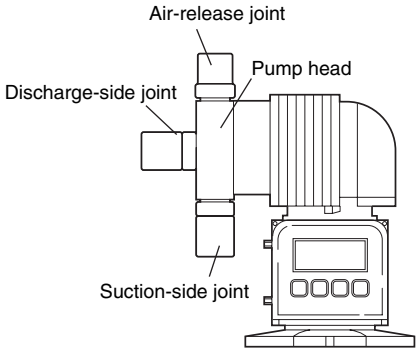


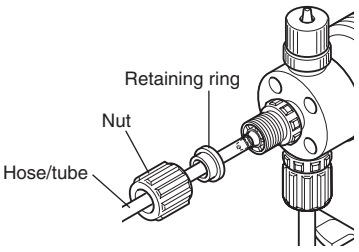
Connecting

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 (R100 or more) 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 the hose/tube for jobs such as maintenance and then afterwards re-connecting the same hose/tube, cut about 10 mm off the end of the hose/tube before re-using them.

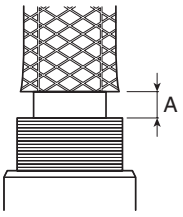




NOTE

- Use dimension A in the figure as a guideline to connect the hose to the joint.
  ✻ Applying excessive force may damage the hose.
  ✻ This dimension should be taken only as a guideline as it may vary depending on the usage conditions.

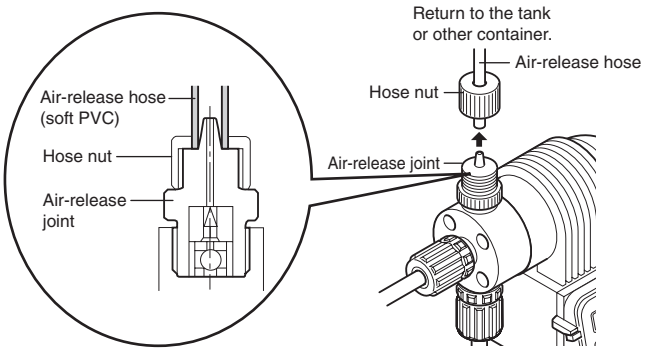
Hose type	Hose diameter	Dimension A
PVC braided hose	4×9	5.5 mm or less
	6×11	1 mm or less
PE tube	6×8	5 mm or less
	1/4×3/8	2 mm or less



Connecting

■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.

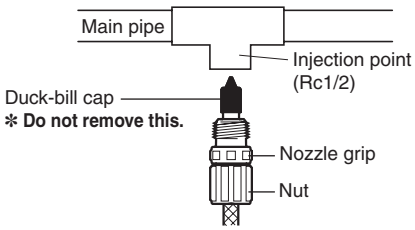


■Anti-siphon check valve w/ duck-bill cap

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.

(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.

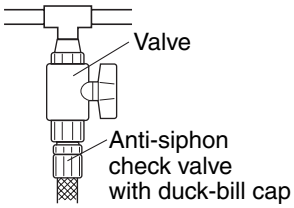


NOTE

<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

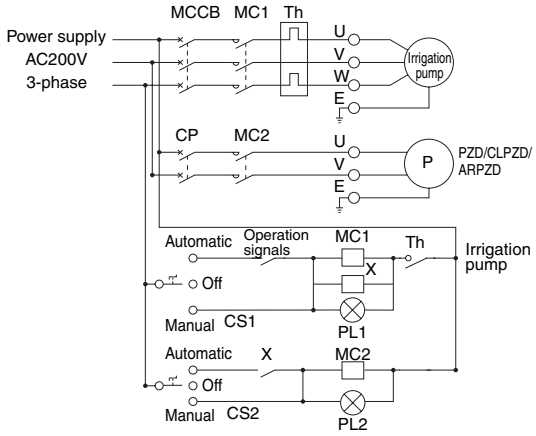
- **This pump cannot be used in explosion-proof regions or in explosive or combustible atmospheres.**
- **Take steps to ensure that the power will not be turned on during the course of work. Hang a sign on the power switch indicating that work is in progress.**
- **Do not operate the pump with wet hands. 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

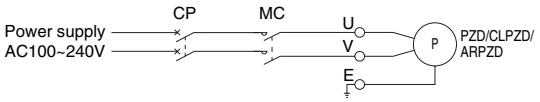
- **The wiring must be done by a qualified electrician or somebody with electrical knowledge.**
- **Connect the wires after checking the supply voltage. Do not connect the wires to a power supply that is not within the rated voltage range.**
- **Affixing electrical materials classified as cords in the Technical Standards of Electric Installation onto buildings is prohibited by law in Japan. When using a cord to connect this product, use a switch board, relay box, or other device to convert the cable to a cord. When using the product outside of Japan, follow the wiring standards for the installation country.**

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

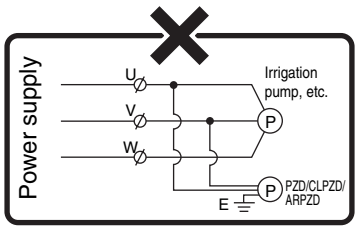
IMPORTANT

- **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

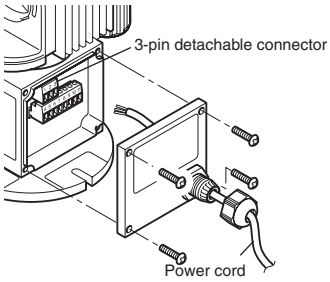
- **When installing an overcurrent protection device for this pump, always install a circuit protector (CP) in consideration of the operating time and the breaking current characteristics.**
- **The circuit protector (CP) shown as the recommended protection device can also be used as the power switch, 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 a pump that is operated non-continuously. In this case, the pump may not operate properly.**

Electrical wiring

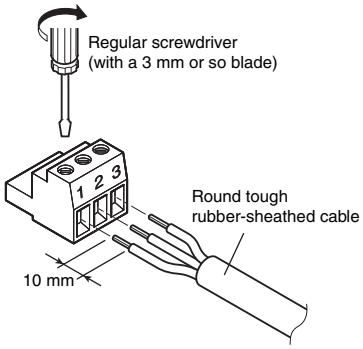
Connecting the power supply & protective earth

A 3-pin detachable connector (including the protective earth) is used to connect to the AC power supply.
Use a round tough rubber-sheathed cable as the power cable.
Select a power supply wire that has:
• a size of at least 0.75 mm² and
• an outside diameter of 5 to 10 mm.

(1) Remove the four screws at the back of the circuit box, and open the cover.

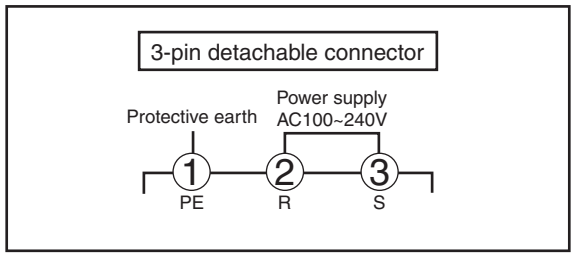


(2) Pull out the 3-pin detachable connector.
(3) Strip away about 10 mm of the covering over the conductors.
(4) Insert the conductors into the connector holes, and use a regular screwdriver to secure them firmly.



(5) After securing the conductors, pull them gently to check that they do not come free.
(6) Insert the connector back in its original position, and screw down the cover.

NOTE



✻ When you select a PZD/PZi model other than the power cord NON (No cord) model, a 2 m power cord is included.
✻ For details on the PZi signal cable, see the “Instructions and Key Operation Manual for Special Functions” of a PZi model.

Recommended protection devices

(1) Circuit protectors

Type / Manufacturer	Small type (30R/60R/100R/30/60/100/31/61/12)	Large type (300/500)
Mitsubishi Electric	CP30-BA2P1-M3A	CP30-BA2P1-M5A
Fuji Electric	CP32D/3	CP32D/5
Panasonic	BAC201305	BAC201505

(2) Lightning arrestors

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

(3) Line filters

Manufacturer	Model
TDK	RSHN-2003

(4) EMC filter

Manufacturer	Model
TDK	ZAC2205-00U

Operating precautions

WARNING

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

CAUTION

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

Check the following points.

Before operation

Check location	Details of check	Notes
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.
Hose connections	Check for twisted or disconnected hoses. Reconnect or repair any disconnected/damaged hoses.	The twisted section may become deformed, resulting in damage or cracks.
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 & calibration (pages 41 to 47).**

✻ An air-release function is not provided on the large type (300/500).

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

→ **Discharge-volume setting (pages 49 to 50).**

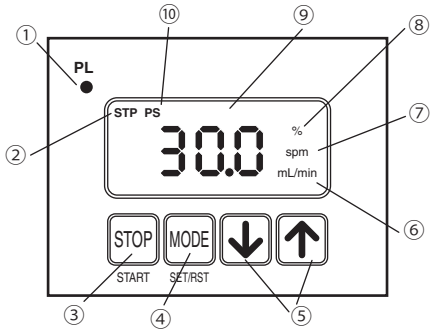
- When shutting down operation for a prolonged period
- When resuming operation after a prolonged shutdown of operation

→ **Procedure for prolonged shutdown of operation (page 51)**

Control panel

All models: PZD/CLPZD/ARPZD

The stroke speed (strokes/min), ratio (%) or discharge volume (mL/min) is set directly on the control panel.

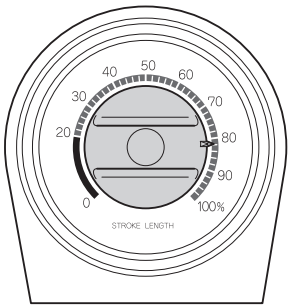


No.	Part & indicator	Description
①	[PL] lamp	This lights while the power is on, and blinks in synchronization with pump operation.
②	[STOP]	This appears when the pump is stopped.
③	[STOP/START] key	This is used to start and stop pump operation.
④	[MODE/SET/RESET] key	This is used to change the modes or to set the values.
⑤	[↓] [↑] keys	These are used to change the settings.
⑥	[mL/min]	This is displayed when the discharge-volume setting mode is established.
⑦	[spm]	This is displayed when the stroke-speed setting mode is established.
⑧	[%]	This is displayed when the ratio setting mode is established.
⑨	Display	The set values appear on this display.
⑩	[PS]	This is displayed while setting the maximum discharge amount.

Stroke-length adjustment dial

- This is provided only on the large type (300/500).
- The stroke length of the diaphragm can be adjusted by turning the stroke-length adjustment dial located at the back of the solenoid box.

Large type only



Adjustable range of stroke length: 20 to 100%

✻ 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.

IMPORTANT

- **The description in the section on "Discharge-volume setting" assumes that the stroke length is set to 100%. Therefore, when the stroke length has been changed, reduce the maximum discharge volume and discharge volume per stroke at the same ratio.**
- **Mainly use the stroke speed to adjust the discharge volume, and use the stroke length in an auxiliary capacity (for fine adjustments).**
- **Whenever possible, use the pump with a stroke length of 100%.**
- **Do not set the stroke length to a value between 0% and 20%.**

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.**

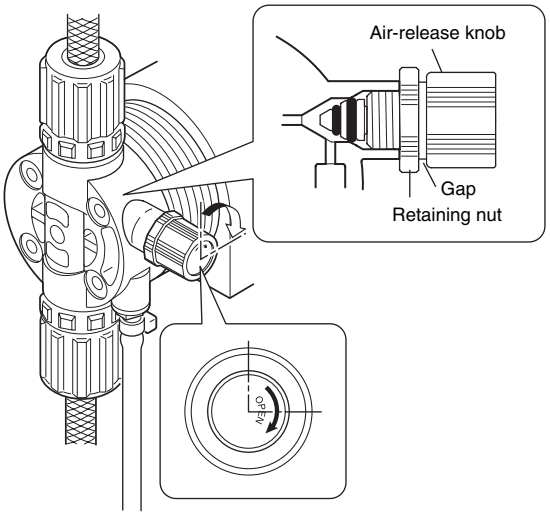
The air-releasing procedure will be described by pump type.

Type		Page
Small type w/ relief-valve function	PZD-30R/60R/100R CLPZD-30R/60R/100R	42
Small type w/o relief-valve function ✻ excluding 6TCT type	PZD-30/60/100 CLPZD-30/60/100	43
6TCT type	PZD-30/60/100	44
Large type	PZD-300/500	44
Small type w/ automatic air-release function	ARPZD-31/61/12	44

Air releasing

Small type 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) Turn on the pump's power.
(4) Set the discharge volume to the maximum level. (See page 45)
(5) Press the [STOP/START] key to start operating the pump.
(6) Rotate the air-release knob clockwise by about 90 degrees.
The presence of a gap between the knob and retaining nut is now visible.



(7) After a few moments air will exit from the relief/air-release port together with the liquid.
(8) After all the air has been released, turn the air-release knob further in the clockwise direction until a clicking sound is heard.
(9) Press the [STOP/START] key to shut down the pump.

IMPORTANT

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

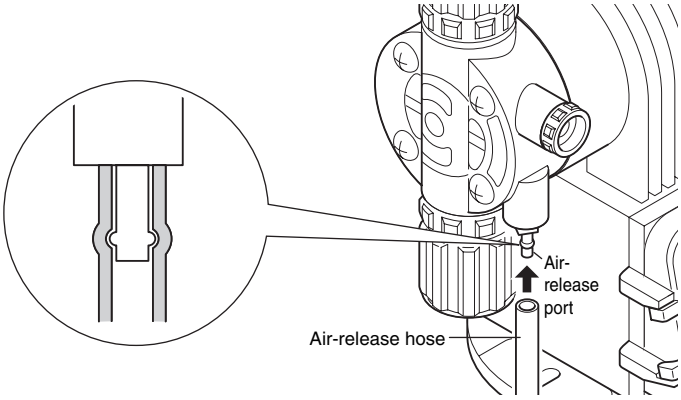
NOTE

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

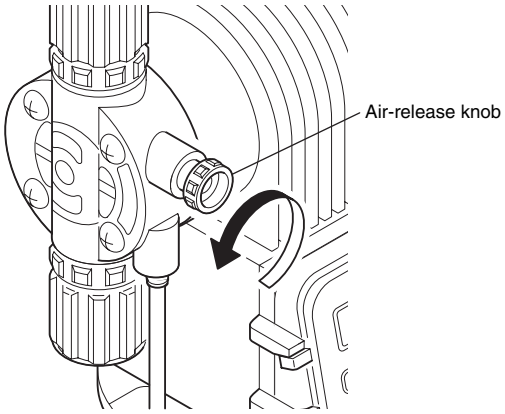
Air releasing

Small type 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.
(5) Set the discharge volume to the maximum level. (See page 45)
(6) Press the [STOP/START] key to start operating the pump.
(7) While operating the pump, turn the air-release knob counterclockwise for 1 to 1-1/2 turns.



(8) Discharge from the air-release nozzle any remaining air in the suction-side hose and pump head, check that the pump head is full of liquid, and then release the [↑] and [↓] keys.

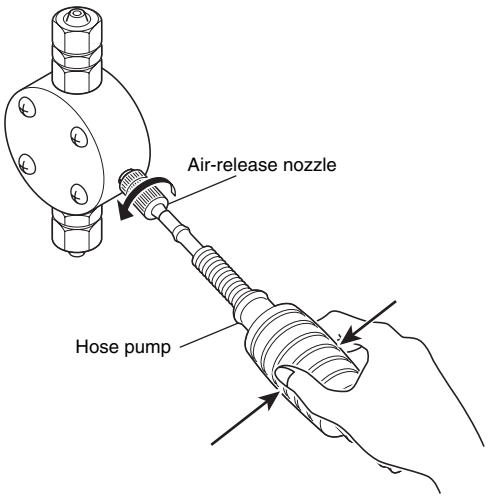
While this is happening, chemical liquid will emerge from the air-release port so tighten the air-release knob.
✻ If the air is not readily released, repeatedly open and close the air-release knob.

(9) Press the [STOP/START] key to shut down the pump.
(10) Return the stroke-length adjustment dial to the marking on the scale that it was previously set to.

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.

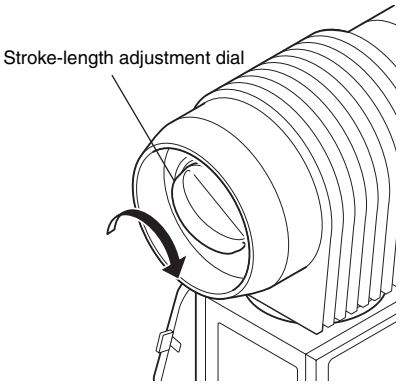


IMPORTANT

- **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.**

Large type

(1) Turn off the pump's power, and release the pressure inside the discharge-side pipe.
(2) Set the stroke-length adjustment dial to the 100% marking on the scale.
(3) Turn on the pump's power.
(4) Set the discharge volume to the maximum level. (See page 45)
(5) Press the [STOP/START] key to start operating the pump.
(6) After operating the pump for a while, press the [STOP/START] key to shut down the pump.



Small type 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) Turn on the pump's power.
(4) Set the discharge volume to the maximum level. (See page 45)
(5) Press the [STOP/START] key to start operating the pump.
(6) After a few moments air will exit from the air-release port together with the liquid.
(7) After all the air has been released, press the [STOP/START] key to shut down the pump.

Air releasing

Setting the discharge volume to its maximum level

The procedure for setting the discharge volume to its maximum level will be described in the each of the following modes: stroke-speed setting mode, ratio setting mode and discharge-volume setting mode.

■In the stroke-speed setting mode

(1) Press the [MODE/SET/RESET] key a number of times until the unit display is set to [spm] (strokes/min).
✻ The stroke speed was set to 300 spm (strokes/min) prior to shipment.

(2) Press the [↑] key to set the stroke speed to 300 spm (strokes/min).

■In the ratio setting mode

(1) Press the [MODE/SET/RESET] key a number of times until the unit display is set to [%].
✻ The ratio was set to 100% prior to shipment.

(2) Press the [↑] key to set the ratio to 100%.

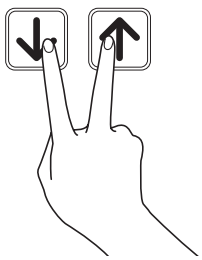
■In the discharge-volume setting mode

✻ The PZD-30R is used as an example to discribe the instruction.
(1) Press the [MODE/SET/RESET] key a number of times until the unit display is set to [mL/min].

(2) Press the [↑] key to set the discharge volume to its maximum level.

NOTE

When the [↑] and [↓] buttons are pressed at the same time, the pump will operate at its maximum speed (300 strokes/min) while the buttons are held down. As a result, the air can be released quickly.



When the liquid is not discharged even after air releasing

This may mean that the valve seat area (an area sealed by the check ball) on the discharge side or suction side is clogged with foreign matter. Turn off the pump's power, remove the joints, and wash the check balls and valve seats. While taking care not to mistake the discharge side parts for the suction side parts and vice versa, reassemble the parts while they are still wet into the pump head.
✻ Refer to the "Replacing the valve seats and check balls" on pages 55 to 60.

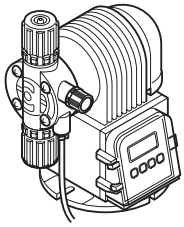
Calibration

About calibration

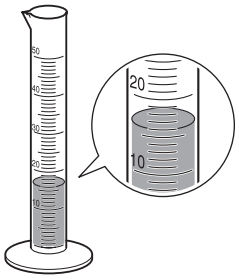
Calibration is a procedure that enables the discharge volume to be set accurately by measuring the maximum discharge volume under actual operating conditions at the user's and storing this volume in the pump's memory.

Example: Calibration is described below using the PZD-30R with a discharge-volume setting of 15 mL/min.

(1) Although the discharge volume is set to 15 mL/min, a volume of 16 mL /min will actually be discharged.

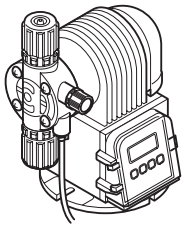


Set discharge volume:
15.0 mL/min



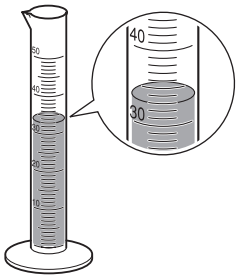
Actual discharge volume:
16.0 mL/min

(2) Operate the pump at the maximum stroke speed (300 strokes/min), and measure the actual maximum discharge volume.



Set maximum discharge volume:
30.0 mL/min

✻ The initial value (shipment setting) is the maximum discharge volume given in the "Specification" (see pages 67 to 72).



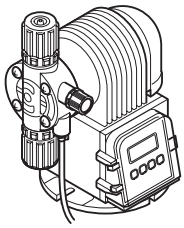
Actual maximum discharge volume:
33.0 mL/min

(3) Change the maximum discharge-volume setting from the initial value (30.0 mL/min) to the actual value (33.0 mL/min).

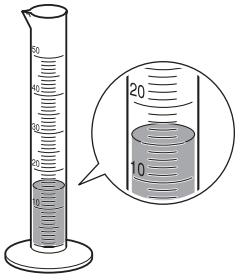
Change the value
using the ↓ and ↑ keys.

Calibration is completed.

(4) After the calibration, the chemical will be discharged in the exact volume which has been set.



Set discharge volume:
15.0 mL/min



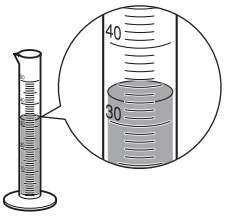
Actual discharge volume:
15.0 mL/min

Calibration

Calibration procedure

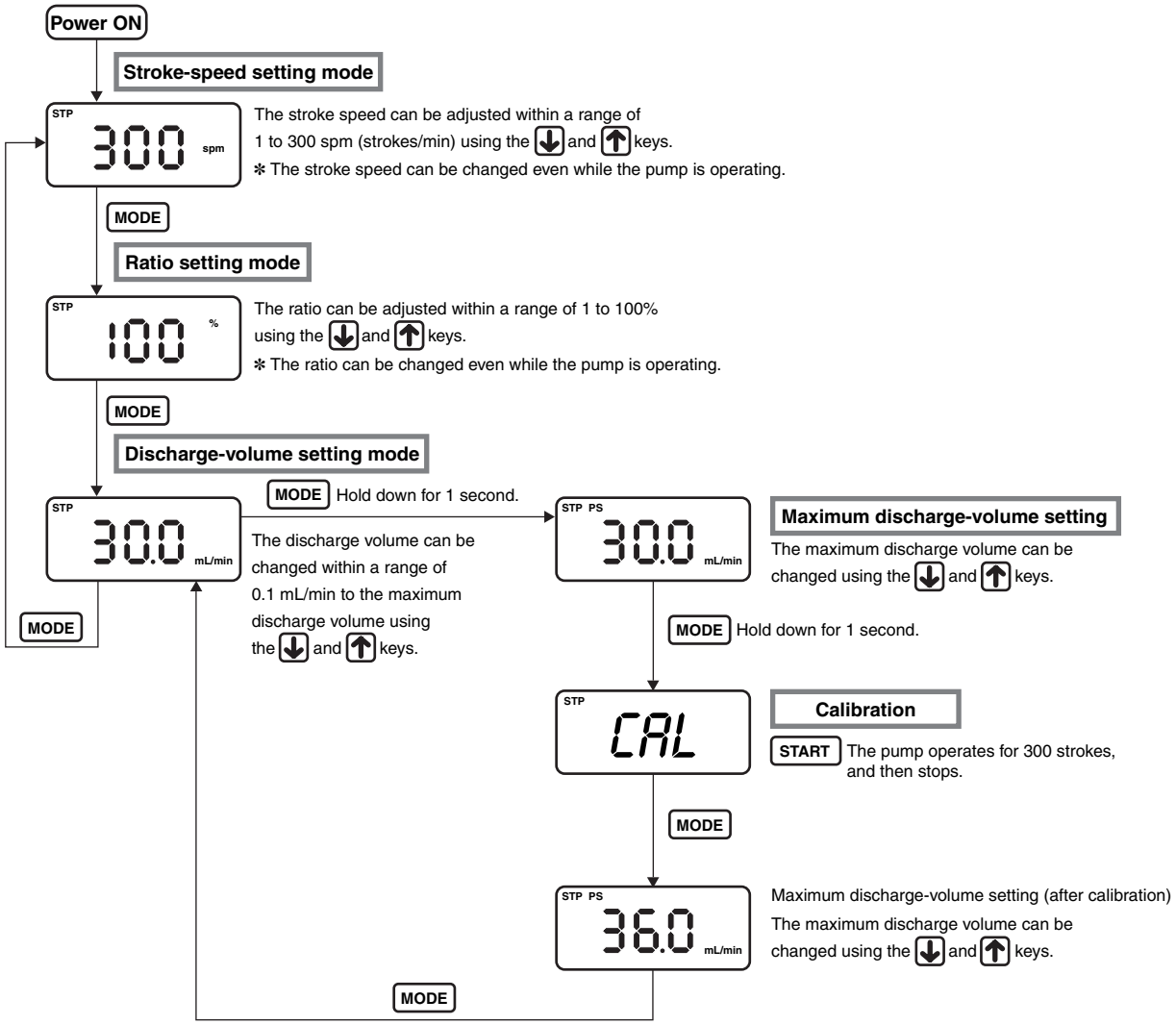
The procedure is described using the PZD-30R as an example.

(1) Install the pump and pipes to suit the actual pipe connection conditions for a trial run.
(2) Provide a measuring container (such as a graduated measuring cylinder) which can be used to obtain an accurate measurement of the pump's maximum discharge volume in one minute.
(3) Press the [STOP/START] key to stop the pump, and insert the pump's discharge-side pipe into the measuring container.

Display	Procedure	Description
STP MAN 15.0 mL/min	MODE SET/RST	Press the [MODE/SET/RESET] key a number of times until the unit display is set to [mL/min].
	MODE SET/RST Hold down for 1 second.	The maximum discharge-volume setting screen will appear when the [MODE/SET/RESET] key is held down for one second.
STP PS 30.0 mL/min		The figure for the maximum discharge volume which is currently set now blinks.
	MODE SET/RST Hold down for 1 second.	Hold the [MODE/SET/RESET] key down for another second to establish the calibration mode.
STP CAL		The calibration mode is established, and [CAL] is displayed.
	STOP START	When the [STOP/START] key is pressed, the pump operates for one minute (300 strokes), and then stops.
CAL		[CAL] blinks while the pump operates.
STP CAL		Check the amount of liquid in the measuring container. 
	MODE SET/RST	Press the [MODE/SET/RESET] key to return to the maximum discharge-volume setting screen.
STP PS 30.0 mL/min		The figure for the maximum discharge volume which is currently set now blinks.
	↓ ↑	Change the initial value (30.0 mL/min) to the actual value (33.0 mL/min), using the [↓] and [↑] keys.
STP PS 33.0 mL/min		
	MODE SET/RST	When the [MODE/SET/RESET] key is pressed, the discharge-volume setting screen is restored. (If no operations are performed for 5 seconds, the input will be canceled, and the discharge-volume setting screen will be restored.)
STP 15.0 mL/min		The discharge-volume setting (value displayed) is the same as before the maximum discharge-volume was changed.
		Turn off the power, and return the pipe to its original position.

Setting flow

All models: PZD/CLPZD/ARPZD



NOTE

- **When the power is turned on, the previously set value and operation statuses are retained.**
- **The mode can be changed only when the pump is stopped (when [STP] is displayed).**
- **If no operations are performed for 5 seconds on the maximum discharge-volume setting screen, the input will be canceled, and the discharge-volume setting screen will be restored.**

Discharge-volume setting

All models: PZD/CLPZD/ARPZD

The discharge volume can be set by one of the following methods.

■Stroke-speed setting mode

The stroke speed (1 to 300 strokes/min) range is set in 1-stroke increments.

Display	Procedure	Description
	STOP START	Stop the pump using the [STOP/START] key.
Stopped STP 300 spm MAN	MODE SET/RST	Press the [MODE/SET/RESET] key a few times, and when [spm] appears on the display, it is the stroke-speed setting that is indicated. ✻ The initial value: 300 spm (strokes/min)
↓	↓ ↑	Set the stroke speed (strokes/min) using the [↓] and [↑] keys.
STP 240 spm MAN		The stroke speed (strokes/min) blinks.
↓		
STP 240 spm MAN		The value is entered if no keys are operated for 2 seconds after completing the setting, and the stroke speed stops blinking and lights. **This completes the changing of the stroke speed.**
↓	STOP START	Press the [STOP/START] key.
Operating 240 spm MAN		The pump is set to the operating status, and "STP" is extinguished.

If the screen shown below is displayed, the stroke speed can be changed even while the pump is operating.

Display	Procedure	Description
Operating 240 spm MAN		
↓	↓ ↑	Change the stroke speed (strokes/min) using the [↓] and [↑] keys.
152 spm MAN		The stroke speed (strokes/min) blinks.
↓		
152 spm MAN		The value is entered if no keys are operated for 2 seconds after completing the setting, and the stroke speed stops blinking and lights.

■Ratio setting mode

The ratio (1 to 100%) range is set in increments of 1%.

Display	Procedure	Description
	STOP START	Stop the pump using the [STOP/START] key.
Stopped STP 100 % MAN	MODE SET/RST	Press the [MODE/SET/RESET] key a few times, and when [%] appears on the display, it is the percent setting that is indicated. ✻ The initial value: 100%
↓	↓ ↑	Set the ratio (%) using the [↓] and [↑] keys.
STP 60 % MAN		The ratio (%) blinks.
↓		
STP 60 % MAN		The value is entered if no keys are operated for 2 seconds after completing the setting, and the ratio stops blinking and lights. **This completes the changing of the ratio.**
↓	STOP START	Press the [STOP/START] key.
Operating 60 % MAN		The pump is set to the operating status, and "STP" is extinguished.

If the screen shown below is displayed, the ratio can be changed even while the pump is operating.

Display	Procedure	Description
Operating 60 % MAN		
↓	↓ ↑	Change the ratio (%) using the [↓] and [↑] keys.
85 % MAN		The ratio (%) blinks.
↓		
85 % MAN		The value is entered if no keys are operated for 2 seconds after completing the setting, and the ratio stops blinking and lights.

Discharge-volume setting

■Discharge-volume setting mode

The discharge volume (0.1 mL/min to maximum discharge volume) range is set in increments of 0.1 mL/min.

✻ Actual control is exercised using the stroke speed so the least increment in which the speed can be controlled is the discharge volume per stroke (maximum discharge volume divided by 300).

Display	Procedure	Description
	STOP START	Stop the pump using the [STOP/START] key.
Stopped 	MODE SET/RST	Press the [MODE/SET/RESET] key a few times, and when [mL/min] appears on the display, it is the discharge-volume setting that is indicated. ✻ The initial value differs from one model to another.
	↓ ↑	Set the discharge volume (mL/min) using the [↓] and [↑] keys.
		The discharge volume (mL/min) blinks.
		The value is entered if no keys are operated for 2 seconds after completing the setting, and the discharge volume stops blinking and lights. **This completes the changing of the discharge volume.**
	STOP START	Press the [STOP/START] key.
Operating 		The pump is set to the operating status, and “STP” is extinguished.

If the screen shown below is displayed, the discharge volume can be changed even while the pump is operating.

Display	Procedure	Description
Operating 		
	↓ ↑	Change the discharge volume (mL/min) using the [↓] and [↑] keys.
		The discharge volume (mL/min) blinks.
		The value is entered if no keys are operated for 2 seconds after completing the setting, and the discharge volume stops blinking and lights.

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 liquid-end parts for deterioration and for dirt and other foreign matter.
(3) Check the items in the section “Before operation” on page 39.

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 pages 53 to 54).

- 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 pages 55 to 60).

When trouble has occurred

- When the relief-valve function has been activated

Refer to "Replacing the relief valve" (see the page 61).

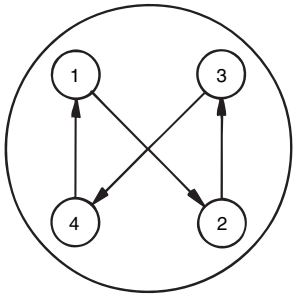
- When trouble has occurred during operation

Refer to "Troubleshooting" (see the pages 62 to 63).

Replacing the diaphragm

IMPORTANT

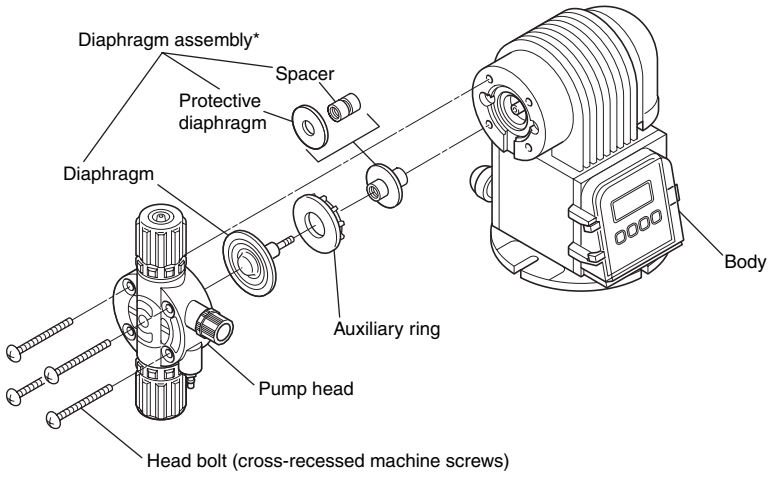
- **When securing the pump head using the head bolts, tighten them up evenly a little at a time in the sequence shown in the figure on the right. If, for instance, the bolts are tightened up in the sequence of 1 → 3 → 2 → 4, the bolts will be tightened unevenly, possibly causing the chemical to leak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



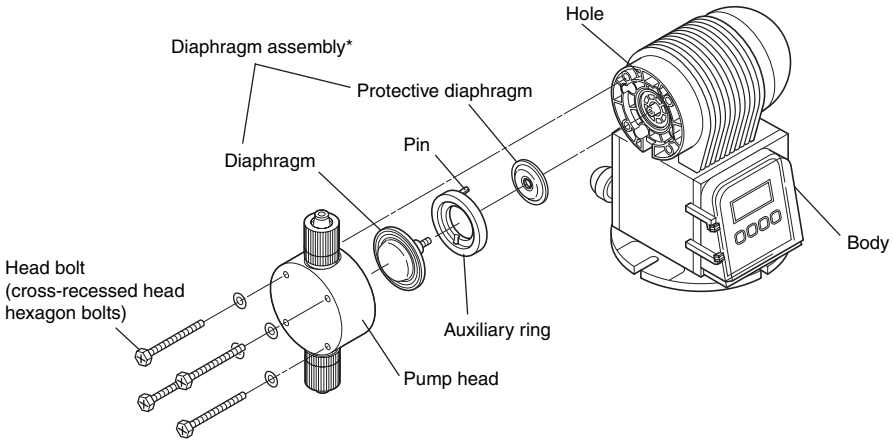
Removing the diaphragm

(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.
✻ In the case of a small type (30R/60R/100R/30/60/100/31/61/12), pull out the spacer from the protective diaphragm.

Small type: 30/60/100/31/61/12



Large type: 300/500



* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.

Replacing the diaphragm

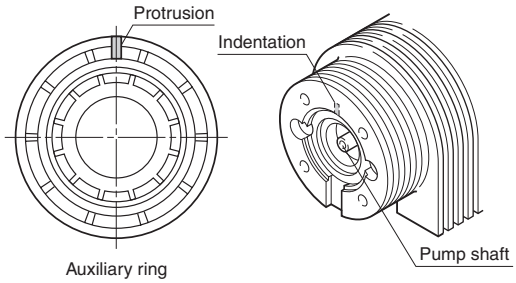
IMPORTANT

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

Installing the diaphragm

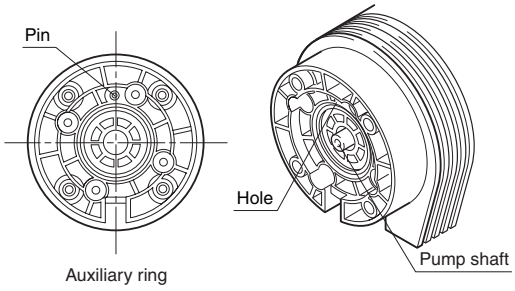
(1) Align the groove in the spacer with the new protective diaphragm, and assemble them properly. (small type only)
(2) Fit the new protective diaphragm (with spacer for the small type) into the pump shaft.
(3) Align the auxiliary ring at the fixed position shown below, and install it.

Small type: 30/60/100/31/61/12



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

Large type: 300/500



Align the pin on the back side of the auxiliary ring with the hole in the pump body.

(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

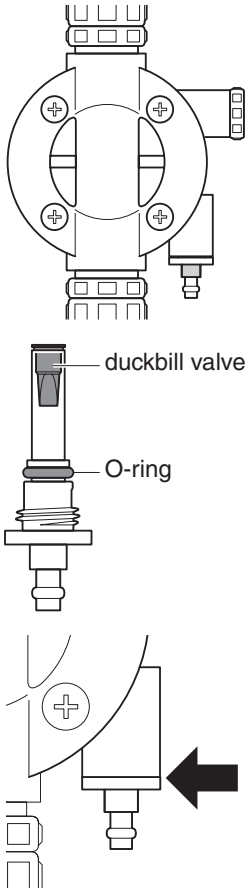
Replacing the air-release nozzle

(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.**



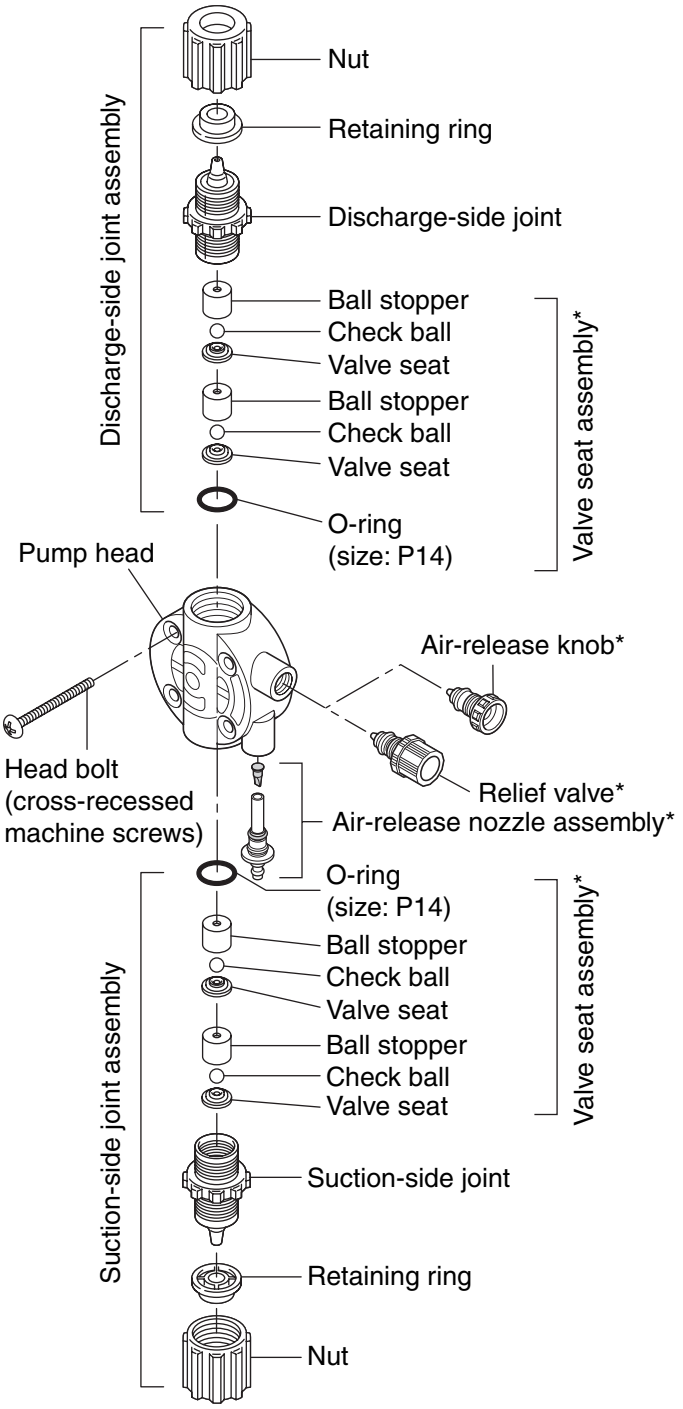
Replacing the valve seats and check balls

IMPORTANT

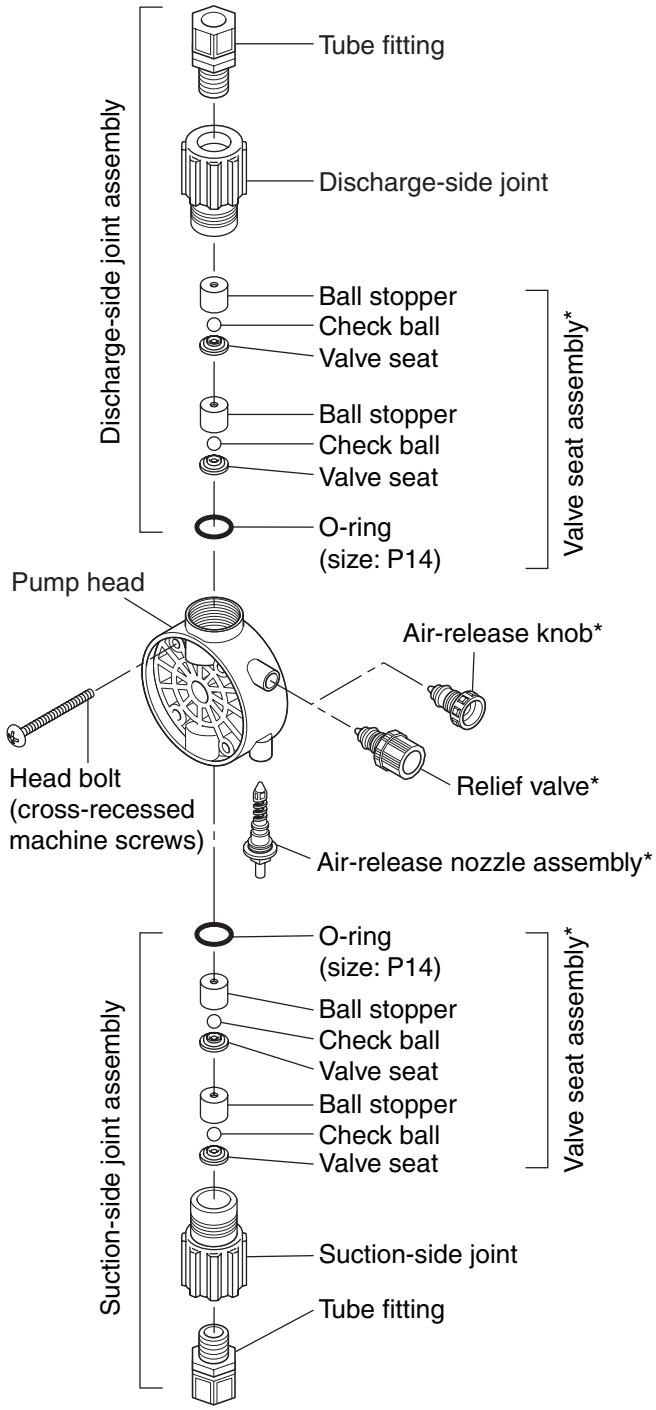
- **Install the parts in the correct sequence and correct directions.**
- **Pay special attention to the sequence and directions for the joints and valve seat assemblies.**
- **Check the O-ring, check balls and valve seats for damage and dirt.**

Model for injection of general chemicals (small type)

Series: PZD
Model : Small type (30R/60R/100R/30/60/100)
Liquid-end material: VTCE/VTCF



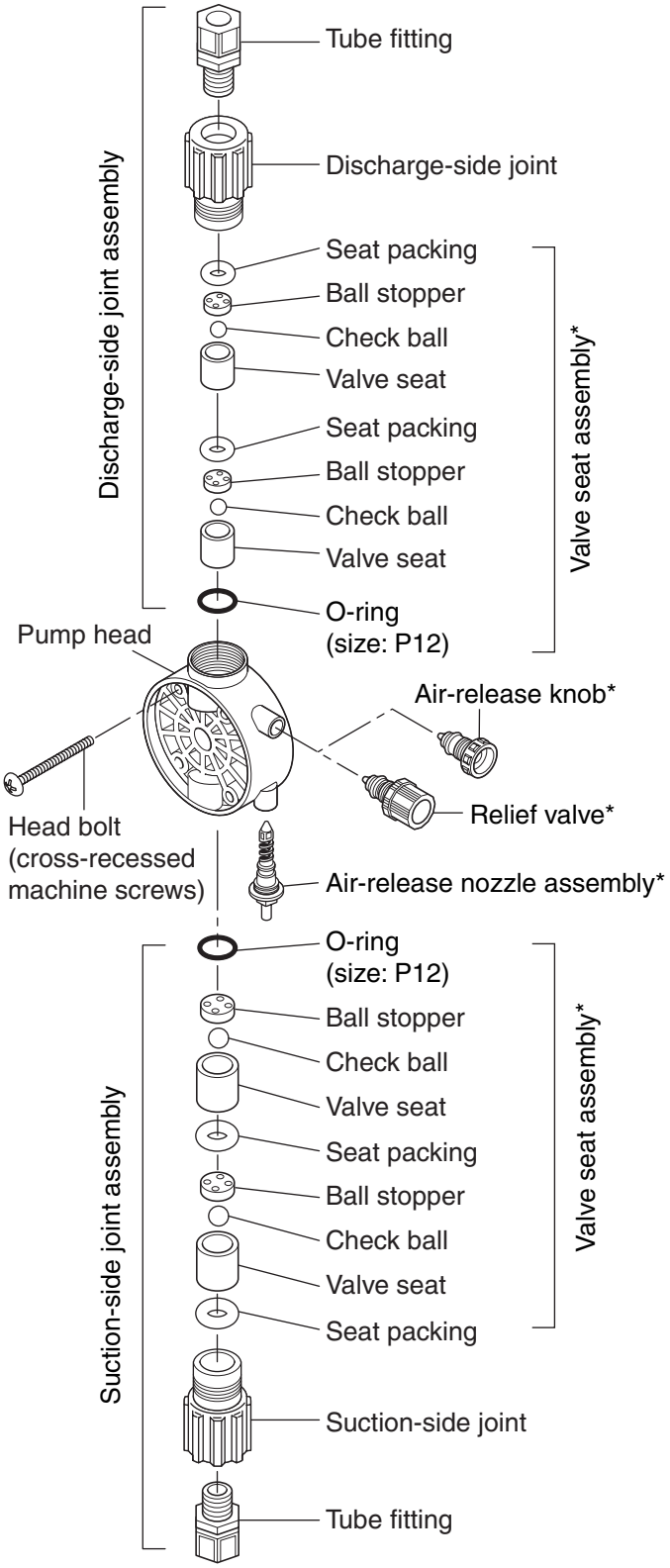
Series: PZD
Model : Small type (30R/60R/100R/30/60/100)
Liquid-end material: FTCE/FTCF



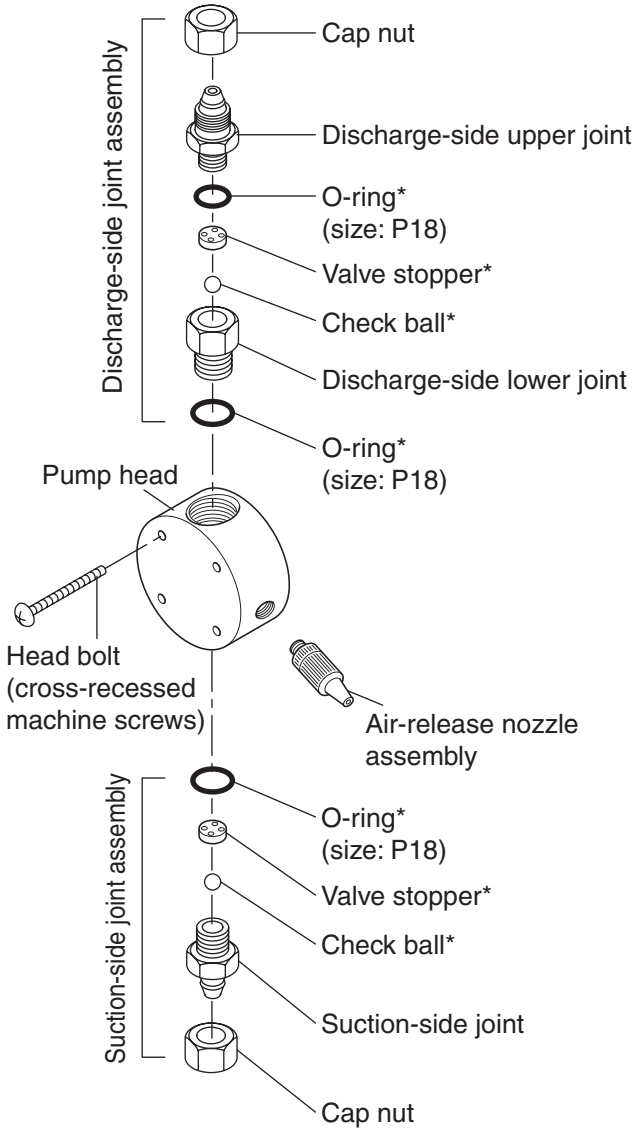
* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

Series: PZD
Model : Small type (30R/60R/100R/30/60/100)
Liquid-end material: FTCT



Series: PZD
Model : Small type (30/60/100)
Liquid-end material: 6TCT



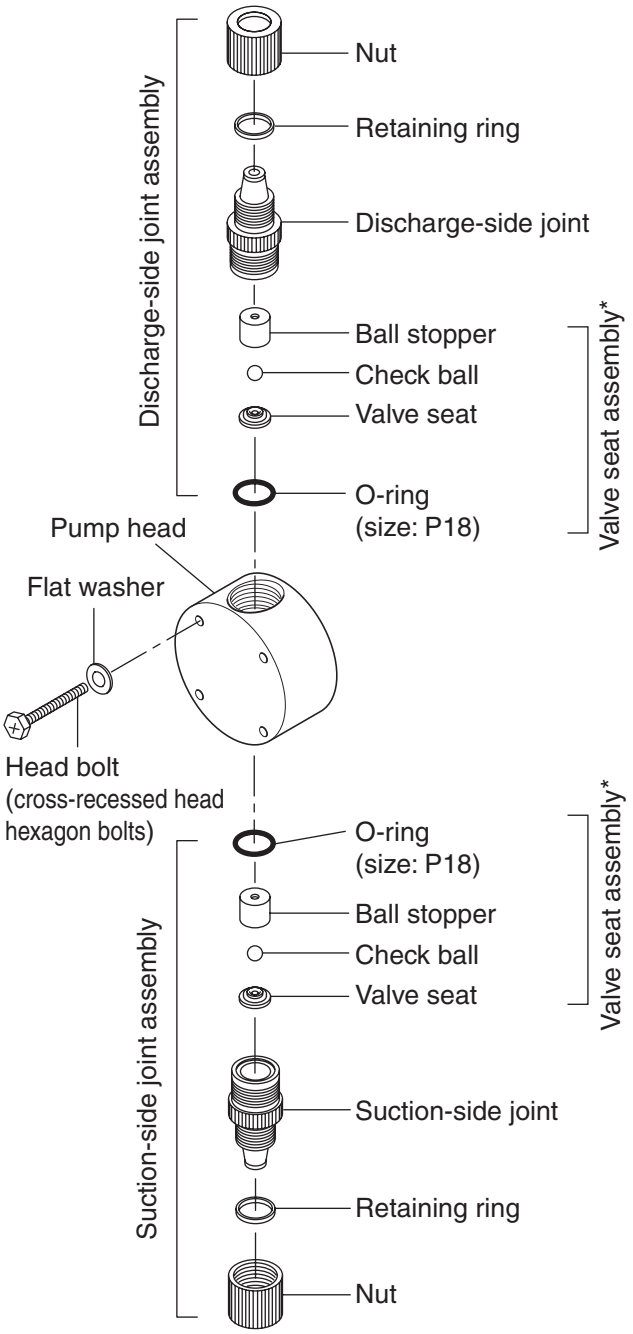
Maintenance

* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

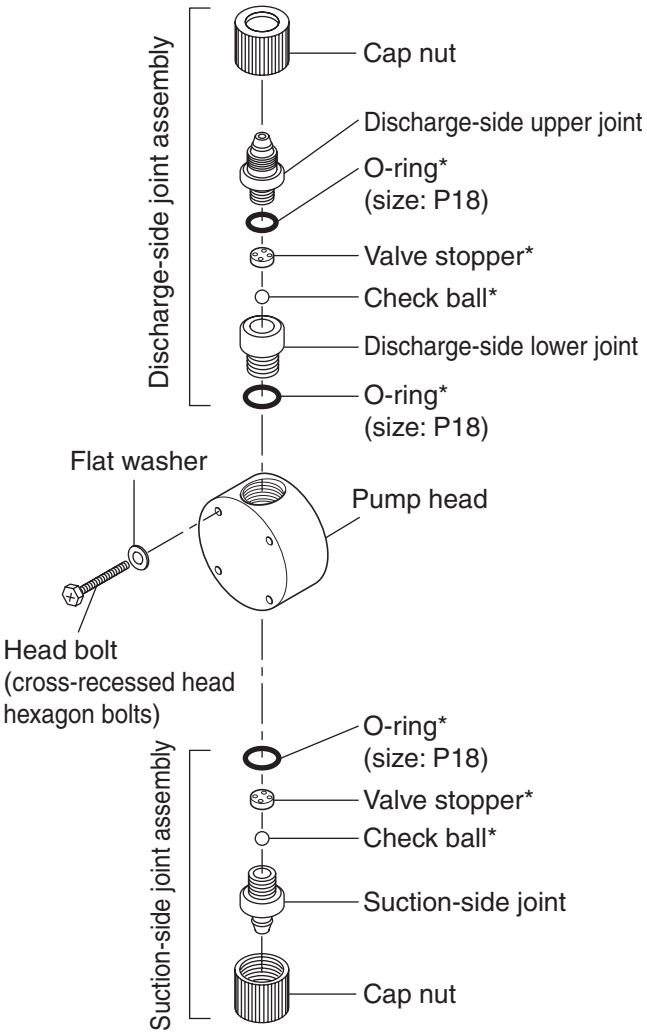
Replacing the valve seats and check balls

Model for injection of general chemicals (large type)

Series: PZD
Model : Large type (300/500)
Liquid-end material: VTCE/VTCF



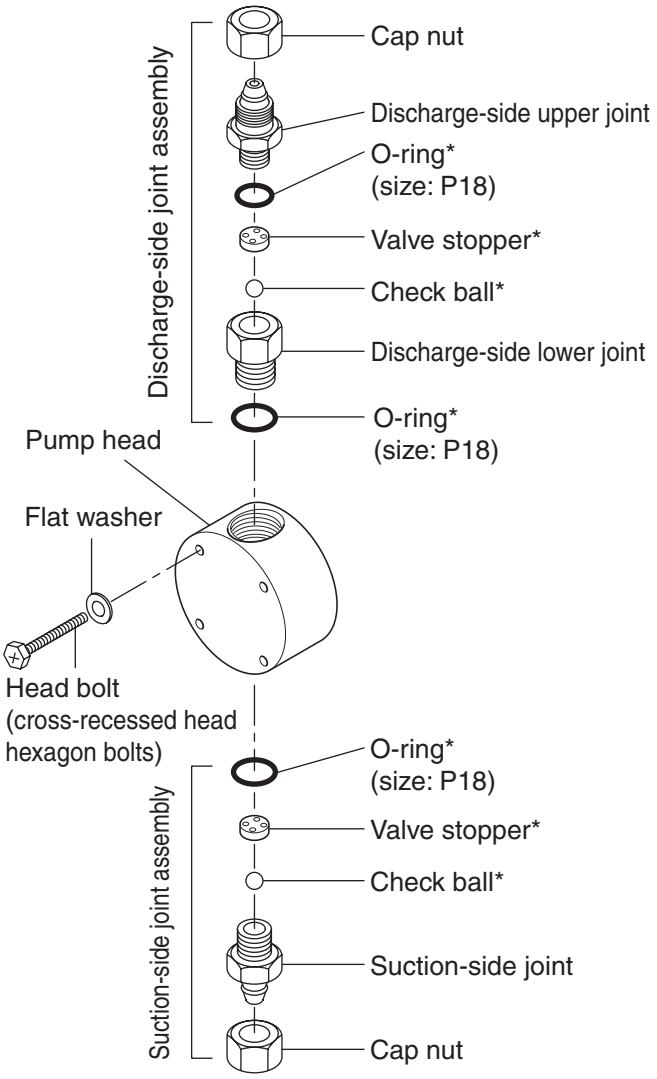
Series: PZD
Model : Large type (300/500)
Liquid-end material: FTCT



* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

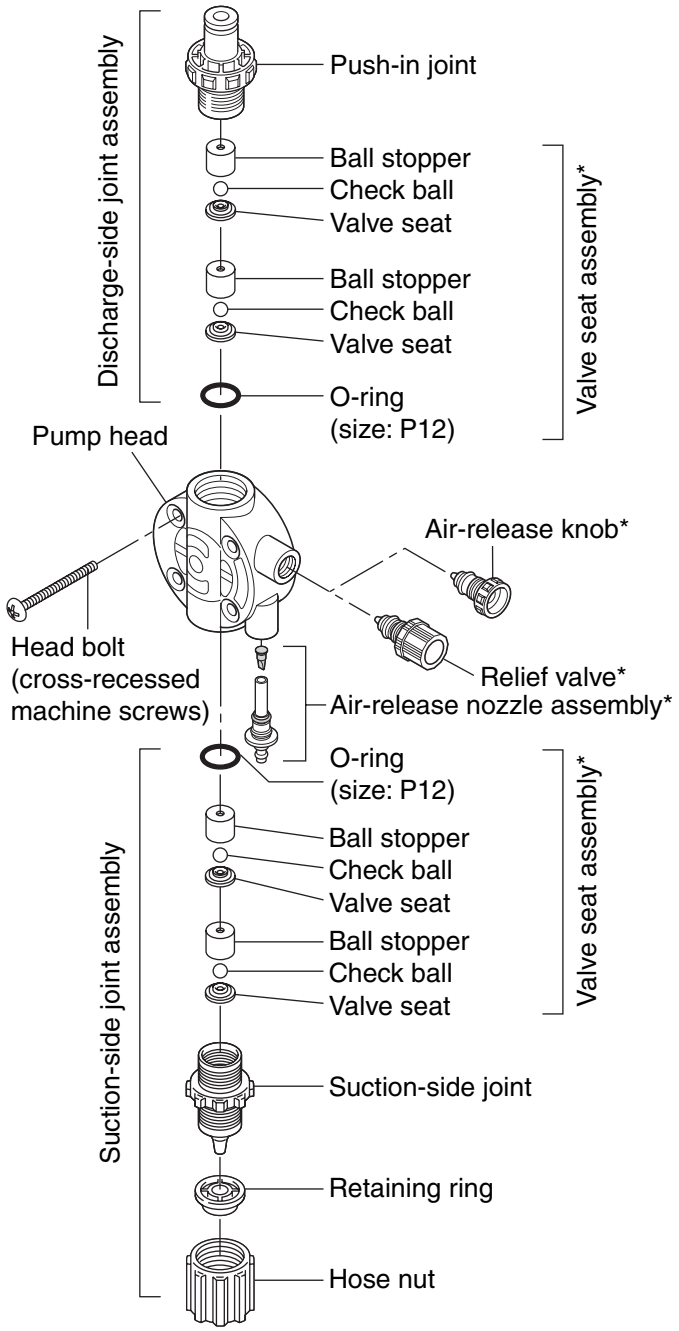
Replacing the valve seats and check balls

Series: PZD
Model : Large type (300/500)
Liquid-end material: STCT



Model for injection of boiler chemicals

Series: PZD
Model : Small type (30R/30)
Liquid-end material: VTCE

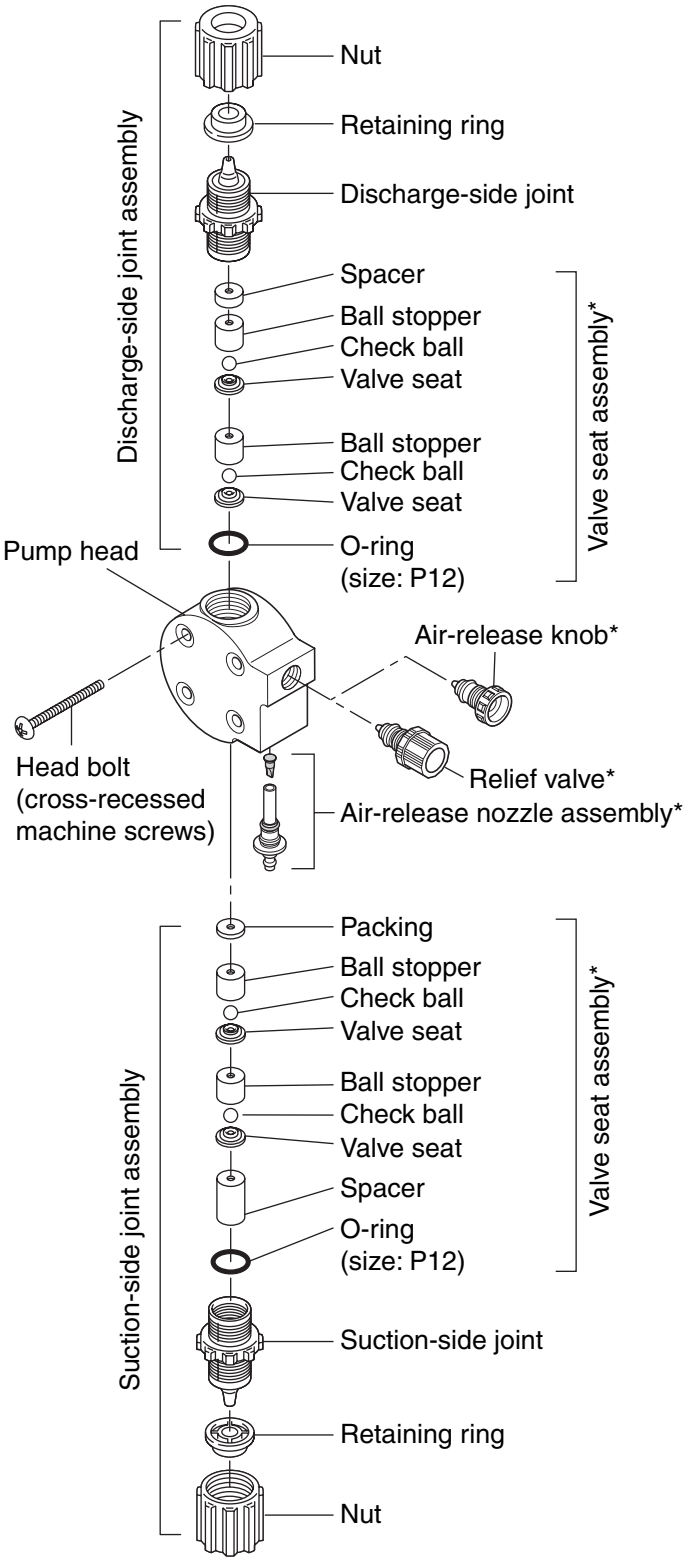


* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

Model for injection of sodium hypochlorite

Series: CLPZD
Model : Small type (30R/60R/100R/30/60/100)
Liquid-end material: ATCF

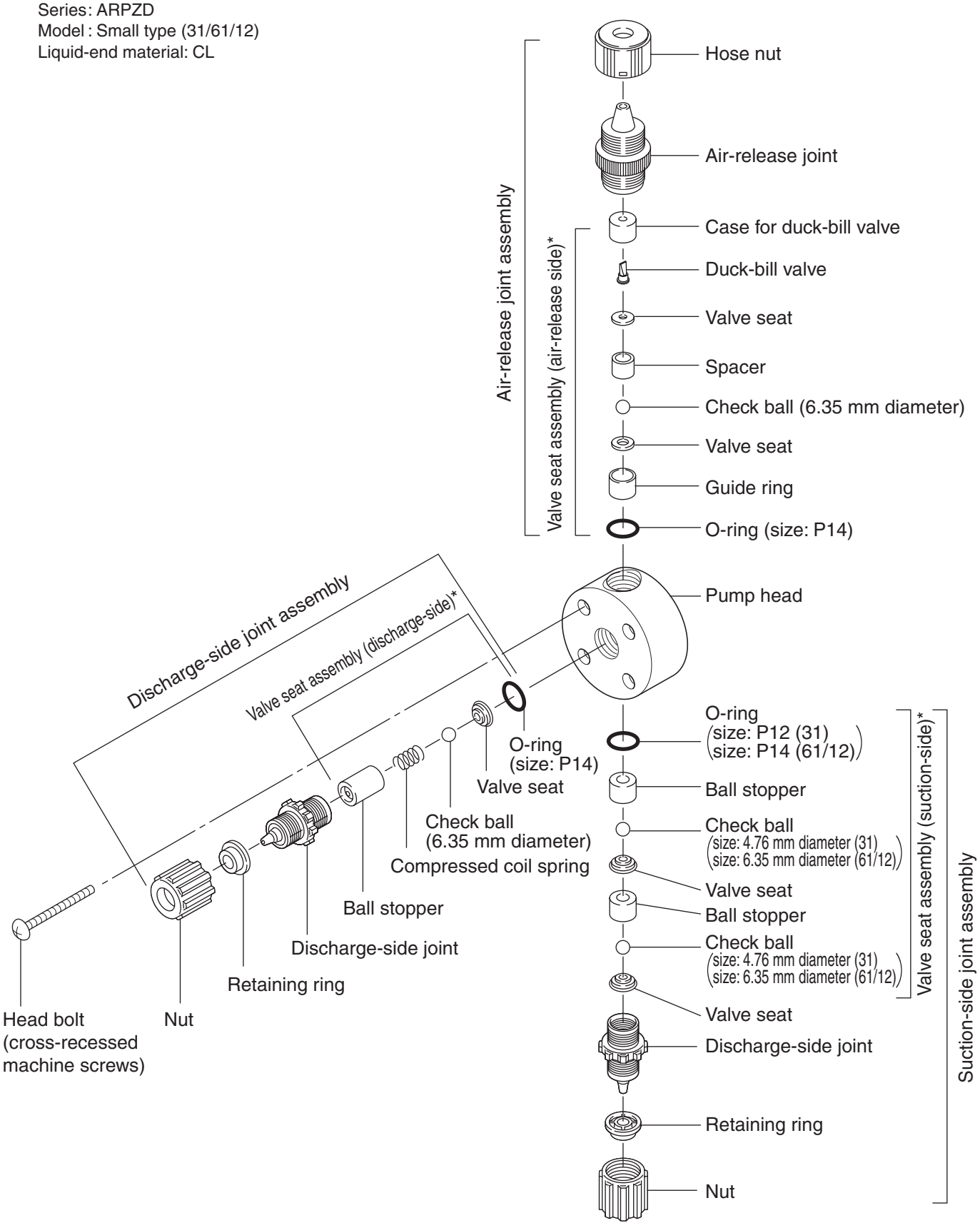


* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the valve seats and check balls

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

Series: ARPZD
Model : Small type (31/61/12)
Liquid-end material: CL



* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on pages 79 to 80.
✻ Also available is “Pump head assembly” containing all of the above parts.

Replacing the relief valve

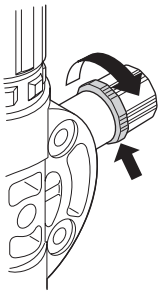
IMPORTANT

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

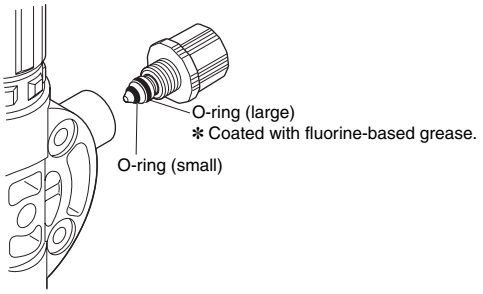
- **Shut down the pump immediately, remove the cause of the trouble, and take steps to prevent its recurrence.**
- **The relief valve is a consumable. Replace it once it has been activated.**

Replacing the relief valve

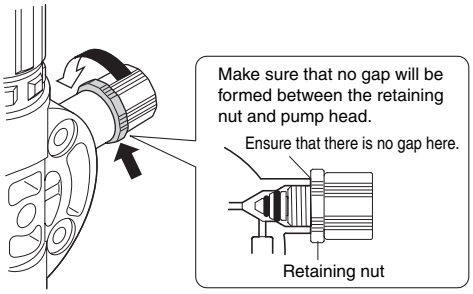
(1) Hold the retaining nut (the part shown by the arrow), and turn it counterclockwise.



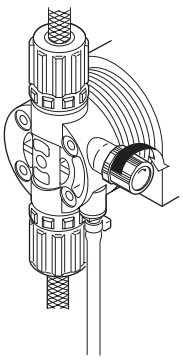
(2) Check the O-ring of the new relief valve for dirt or foreign matter.
✻ The large O-ring comes coated with fluorine-based grease. Use it as is.



(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 81.

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. (2) Problem in the wiring connections to the pump. (3) Broken power cable. (4) Main power supply disconnection. (5) The breaker has tripped. (6) Circuit malfunction.	(1) Check the power supply and the voltage, and then connect the pump to the correct power supply. (2) Inspect the wiring connections, and connect the wires properly. (3) Check the power cable. (4) Position the switch on the correct side. (5) Investigate why the breaker has tripped, and then reset it. (6) Replace the circuit.
The power turns on, but the pump does not operate.		(1) The STOP lamp lights. (2) The displayed value blinks.	(1) Press the [STOP/START] key. (2) Remove the stop input signal.
The pump operates.	No chemical liquid is discharged. (The chemical liquid is not pumped up.)	(1) The chemical liquid is too viscous. (2) The hose or valve is clogged. (3) The hose aperture is too small or the pipe is too long. (4) The stroke length is too short. (5) The valve seats are clogged with dirt or deformed. (6) The amount of chemical liquid remaining in the tank is low. (7) The foot valve or the strainer is clogged. (8) The pump is gas locked. (9) The valve seat area has been assembled in the wrong direction.	(1) Lower the viscosity of the chemical liquid. (2) Clean the hose and valve. (3) Make the hose aperture larger or the pipe shorter. (4) Increase the stroke length. (5) 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. (6) Replenish the chemical liquid. (7) Clean the foot valve, strainer, and tank. (8) Release the air. (9) 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. (2) There is a leak in the joints, seal areas, or other parts. (3) The chemical liquid tank is empty.	(1) Dilute the chemical liquid. (2) Tighten the joints, seal areas, or other parts that are leaking. (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. (2) A thermal relay has been used as a protection device.	(1) Connect the pump to the correct power supply. (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. (2) An abnormal pressure has been generated.	(1) Replace the relief valve. (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. (2) The discharge-side pipe is clogged with dirt or other foreign material, which has caused the pressure to increase. (3) The hose connections have deteriorated.	(1) Tighten the hose and nuts. (2) Clean inside the pipe. (3) Replace the hose.
	Chemical liquid is leaking from the pump head.	(1) The head bolts are not tight enough. (2) The discharge-side pipe is clogged with dirt or other foreign material, which has caused the pressure to increase. (3) The diaphragm has suffered damage due to fatigue.	(1) Tighten the head bolts. (2) Clean inside the pipe. (3) Replace the diaphragm.
The discharge capacity is too small.		(1) Air has entered into the pump head. (2) The diaphragm has deteriorated or has been damaged. (3) The valve seat area has deteriorated or is clogged. (4) The pipe is clogged. (5) The suction height is outside of the specified range. (6) The chemical liquid is too viscous. (7) The discharge pressure is too high. (8) The stroke length is too short. (9) The suction-side hose or valve is clogged. (10) The foot valve or the strainer is clogged.	(1) Release the air. (2) Replace the diaphragm. (3) Clean the valve seats or replace them. (4) Clean inside the pipe. (5) Set the suction height to a value within the specified range. (6) Reduce the viscosity of the chemical liquid or change the joints to high-viscosity type joints. (7) Check the pressure and the specifications. (8) Increase the stroke length. (9) Clean the suction-side hose and valve or replace them. (10) Clean the foot valve, strainer, and chemical liquid tank.
The discharge capacity is too large.		(1) An overfeed has occurred. (2) A negative pressure has occurred on the discharge side. (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. (3) Set the discharge-side pressure to a value that is higher than the push pressure.
The keys cannot be operated.		(1) The keys have been locked.	(1) Release the key lock.
The actual discharge capacity differs significantly from the value that was set in manual mode (discharge capacity setting mode).		(1) The wrong maximum discharge capacity has been set. (2) The stroke length is different from the one when the maximum value was set.	(1) Perform calibration, and then set the maximum value correctly. (2) Set the stroke length to the necessary value, and then set the maximum value correctly.
Pulse input cannot be received.		(1) Signal cable disconnection. (2) The signal input specifications are different.	(1) Check the signal cable. (2) Check the specifications.

Error code

When the error occurs, the following code appears on the display.

Error code	Model	Error	Description	Pump status during error	Remedial action
E-01	All models	Memory-data read error	Trouble relating to pump body circuit or program	Stopped	Try turning the power off and then back on. (The error is released when normal operation is restored.) If this does not solve the problem, contact the manufacturer.

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

PZD - 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
300	300 mL/min
500	500 mL/min

(2) Liquid-end material

Type	Applicable models
VTCE	All models
VTCF	All models
FTCE	Small type (30R/60R/100R/30/60/100)
FTCF	Small type (30R/60R/100R/30/60/100)
FTCT	All models
6TCT	Small type (30/60/100)
STCT	Large type (300/500)

(3) Hose standard

Size	Material
4×9	PVC
6×11	PVC
12×18	PVC
6×8	PE/FEP/PTFE
9×12	PE
1/4×3/8	PE/FEP
3/8×1/2	PE
12×15	PTFE

(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
NON	No Cable

Model for injection of boiler chemicals

PZD - 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
NON	No Cable

Model code

Model for injection of sodium hypochlorite

CLPZD - [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
NON	No Cable

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

ARPZD - [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
NON	No Cable

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	STCT	VTCET	ATCF	CL
Pump head	PVC		PVDF			SUS316	SUS304	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	SUS304	PVC		
Ball stopper	PVC		PVDF	PTFE (valve stopper)				PVC		
Compressed coil spring	–									Hastelloy C

* PTFE for the large type (300/500)

Specification

Model w/ relief-valve function for injection of general chemicals: PZD (small type)

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				
Max. discharge pressure*1	MPa	0.7*2										0.7				
	Bar	7*2										7				
Stroke speed		1 to 300 strokes/min (digital setting)														
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 (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														
Operation mode	Manual	Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]														
Power supply	Rated voltage	AC 100 to 240 V (±10%)														
	No. of phases/ Frequency	1-phase/50 or 60 Hz														
	Maximum current	2.0 A					2.5 A									
	Power consumption	Max.: 200 VA/Ave.: 15 W					Max.: 250 VA/Ave.: 18 W									
Weight		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.

Specification

Model w/o relief-valve function for injection of general chemicals: PZD (small type)

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					1.6	3.6					3.3	6.0					5.7
Max. discharge pressure*	MPa	1.0					0.5	1.0					0.5	0.7					0.5
	Bar	10					5	10					5	7					5
Stroke speed		1 to 300 strokes/min (digital setting)																	
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																	
Operation mode	Manual	Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]																	
Power supply	Rated voltage	AC 100 to 240 V (±10%)																	
	No. of phases/ Frequency	1-phase/50 or 60 Hz																	
	Maximum current	2.0 A						2.5 A											
	Power consumption	Max.: 200 VA/Ave.: 15 W						Max.: 250 VA/Ave.: 18 W											
Weight		1.7 kg					1.8 kg	1.8 kg					1.9 kg	1.8 kg					1.9 kg

* Conditions: Clean water, room temperature

Specification

Model for injection of general chemicals: PZD (large type)

Specification \ Model		300				500			
		VTCE	VTCF	FTCT	6TCT	VTCE	VTCF	FTCT	6TCT
Max. discharge volume*	mL/min	360		330		540		510	
	L/h	21.6		19.8		32.4		30.6	
	US G/h	5.7		5.22		8.55		8.07	
Max. discharge pressure*	MPa	0.3				0.2			
	Bar	3				2			
	psi	43.5				29			
Stroke speed		1 to 300 strokes/min (digital setting)							
Stroke length		0.3 to 1.5 mm (manual dial)							
Connection (hose/tube: I.D×O.D)	Discharge side	12×18 (PVC braided hose), 9×12 (PE) or 3/8×1/2 (PE)		12×15 (PTFE)		12×18 (PVC braided hose), 9×12 (PE) or 3/8×1/2 (PE)		12×15 (PTFE)	
	Suction side								
	Relief valve/ air release	–							
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							
Operation mode	Manual	Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]							
Power supply	Rated voltage	AC 100 to 240 V (±10%)							
	No. of phases/ Frequency	1-phase/50 or 60 Hz							
	Maximum current	3.0 A							
	Power consumption	Max.: 500 VA/Ave.: 30 W							
Weight		4.0 kg		4.2 kg	6.0 kg	4.0 kg		4.2 kg	6.0 kg

* Conditions: Clean water, room temperature

Specification

Model for injection of boiler chemicals: PZD

Specification \ Model			30R	30
			VTCET	VTCET
Max. discharge volume*		mL/min	28	
		L/h	1.68	
Max. discharge pressure*		MPa	1.5	
		Bar	15	
Stroke speed			1 to 300 strokes/min (digital setting)	
Stroke length			Fixed at 1.0 mm	
Connection (hose/tube: I.D×O.D)	Discharge side		4×6 (nylon tube)	
	Suction side		4×9 (PVC braided hose)	
	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	
Operation mode	Manual		Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]	
Power supply	Rated voltage		AC 100 to 240 V (±10%)	
	No. of phases/ Frequency		1-phase/50 or 60 Hz	
	Maximum current		2.5 A	
	Power consumption		Max.: 250 VA/Ave.: 18 W	
Weight			1.8 kg	

* Conditions: Clean water, room temperature

Specification

Model for injection of sodium hypochlorite: CLPZD

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
Max. discharge pressure*1	MPa	0.7*2		0.7	1.0		0.7
	Bar	7*2		7	10		7
Stroke speed		1 to 300 strokes/min (digital setting)					
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					
Operation mode	Manual	Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]					
Power supply	Rated voltage	AC 100 to 240 V (±10%)					
	No. of phases/ Frequency	1-phase/50 or 60 Hz					
	Maximum current	2.0 A	2.5 A		2.0 A	2.5 A	
	Power consumption	Max.: 200 VA/ Ave.: 15 W	Max.: 250 VA/Ave.: 18 W		Max.: 200 VA/ Ave.: 15 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.

Specification

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

Specification \ Model			31	61	12
Max. discharge volume*		mL/min	30	57	93
		L/h	1.8	3.42	5.58
Max. discharge pressure*		MPa	1.0	1.0	0.7
		Bar	10	10	7
Stroke speed			1 to 300 strokes/min (digital setting)		
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)	
	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		
Operation mode	Manual		Digital settings: 3 patterns [stroke speed (1 to 300 strokes/min, in 1 stroke/min increments), percentage (1 to 100%, in 1% increments), discharge volume (in 0.1 mL/min increments)]		
Power supply	Rated voltage		AC 100 to 240 V (±10%)		
	No. of phases/ Frequency		1-phase/50 or 60 Hz		
	Maximum current		2.0 A	2.5 A	
	Power consumption		Max.: 200 VA/Ave.: 15 W	Max.: 250 VA/Ave.: 18 W	
Weight			1.7 kg	1.8 kg	

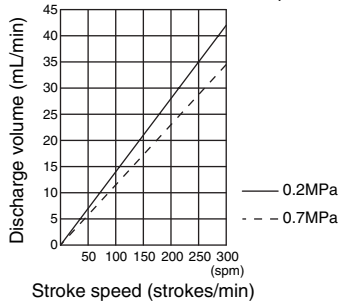
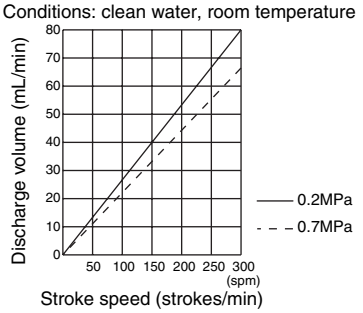
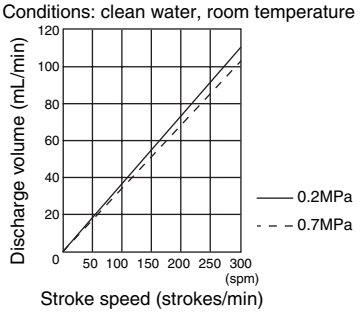
* Conditions: Clean water, room temperature

Performance curve

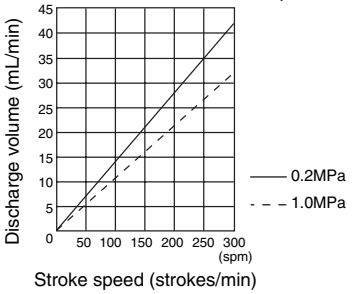
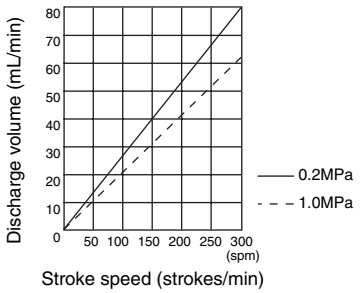
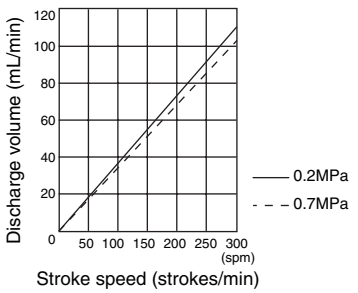
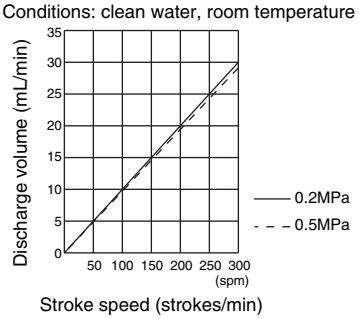
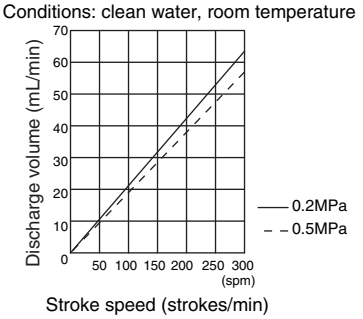
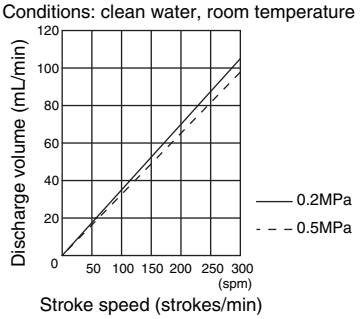
- The performance curves below represent the measurements taken under the conditions prevailing at TACMINA's test facilities, and are provided here as examples.
- The individual conditions prevailing on-site and differences between models may produce minor variations from these curves.
- Measure the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

■Model w/ relief-valve function

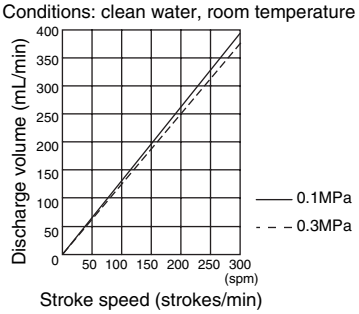
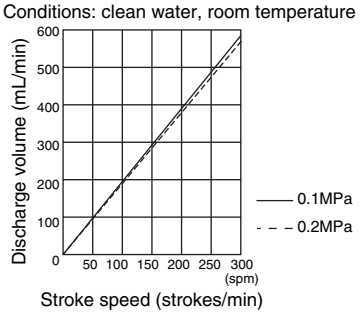
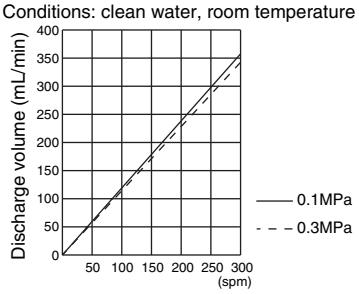
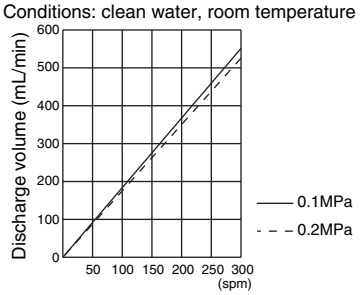
PZD–30R– VTCE/VTCF/FTCE/FTCF/FTCT	PZD–60R– VTCE/VTCF/FTCE/FTCF/FTCT	PZD–100R– VTCE/VTCF/FTCE/FTCF/FTCT
Conditions: clean water, room temperature  	Conditions: clean water, room temperature  	Conditions: clean water, room temperature 

■Model w/o relief-valve function

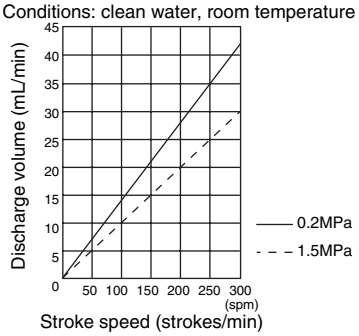
PZD–30– VTCE/VTCF/FTCE/FTCF/FTCT	PZD–60– VTCE/VTCF/FTCE/FTCF/FTCT	PZD–100– VTCE/VTCF/FTCE/FTCF/FTCT
Conditions: clean water, room temperature  	Conditions: clean water, room temperature  	Conditions: clean water, room temperature 
PZD–30– 6TCT	PZD–60– 6TCT	PZD–100– 6TCT
Conditions: clean water, room temperature  	Conditions: clean water, room temperature  	Conditions: clean water, room temperature 

Performance curve

Model for injection of general chemicals: PZD (large type)

PZD–300– VTCE/VTCF	PZD–500– VTCE/VTCF
Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)
PZD–300– FTCT/STCT	**PZD–500– FTCT/STCT**
Conditions: clean water, room temperature  Stroke speed (strokes/min)	Conditions: clean water, room temperature  Stroke speed (strokes/min)

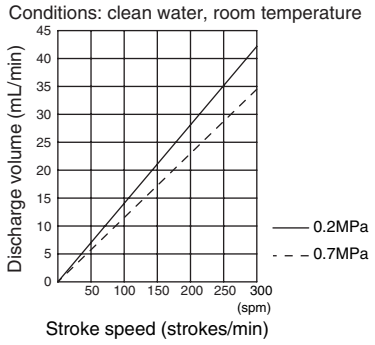
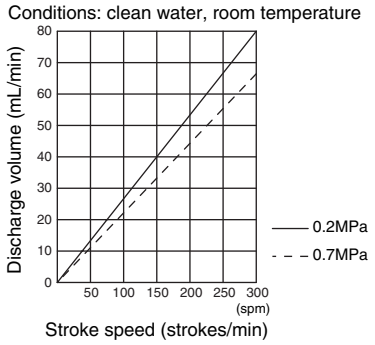
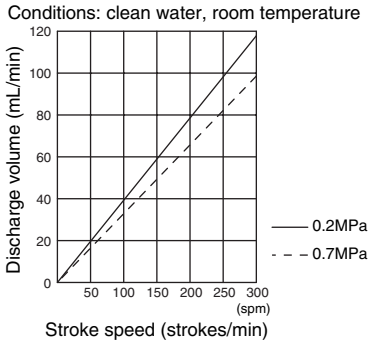
Model for injection of boiler chemicals: PZD

PZD–30R/30– VTCET
Conditions: clean water, room temperature    Stroke speed (strokes/min)

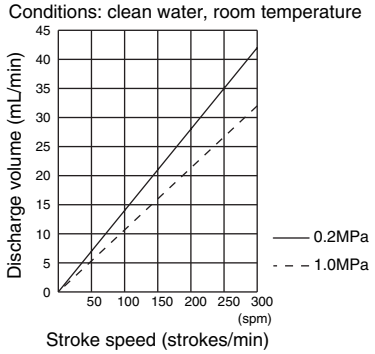
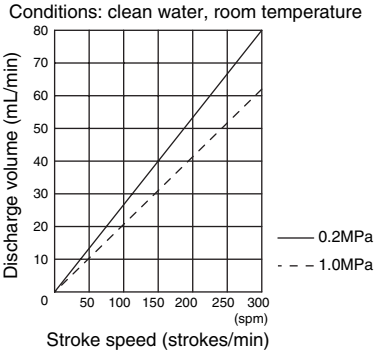
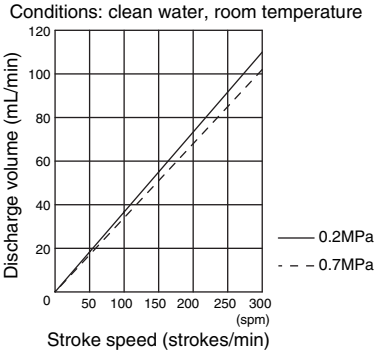
Performance curve

Model for injection of sodium hypochlorite: CLPZD

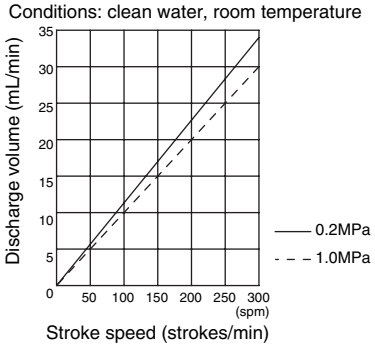
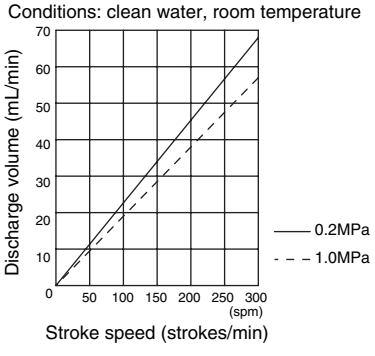
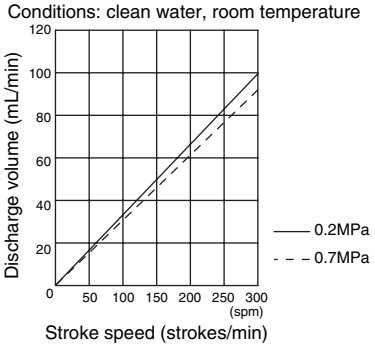
■Model w/ relief-valve function

CLPZD–30R–ATCF	CLPZD–60R–ATCF	CLPZD–100R–ATCF
		

■Model w/o relief-valve function

CLPZD–30–ATCF	CLPZD–60–ATCF	CLPZD–100–ATCF
		

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

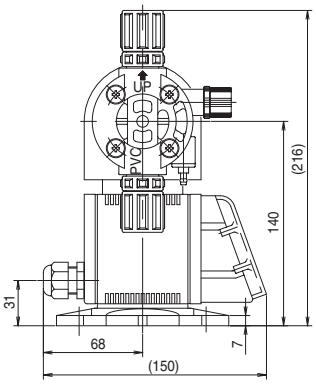
ARPZD–31–CL	ARPZD–61–CL	ARPZD–12–CL
		

External dimension

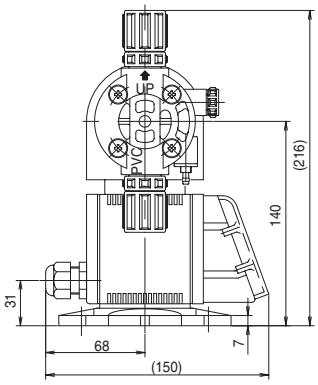
Model for injection of general chemicals: PZD (small type)

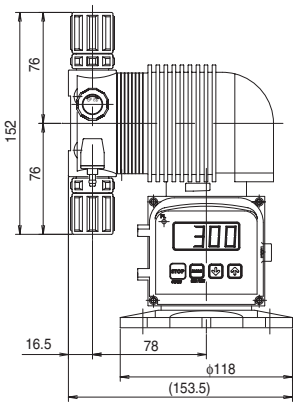
PZD–30R/60R/100R/30/60/100–VTCE/VTCF

Model w/ relief-valve function



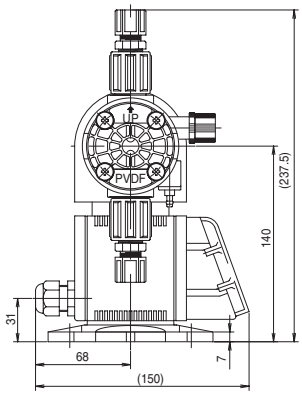
Model w/o relief-valve function



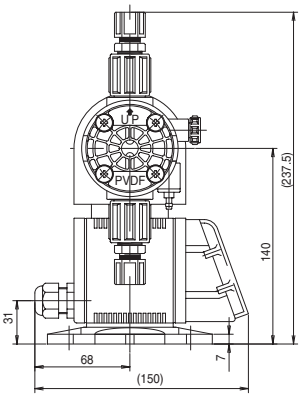


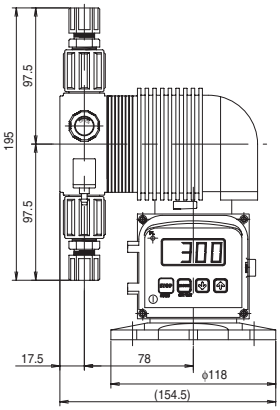
PZD–30R/60R/100R/30/60/100–FTCE/FTCF/FTCT

Model w/ relief-valve function

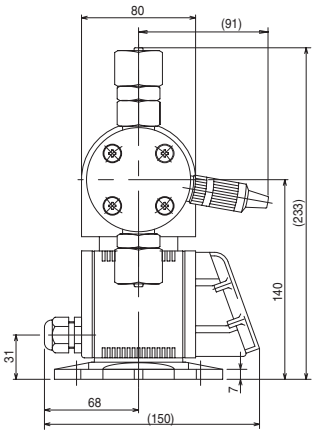


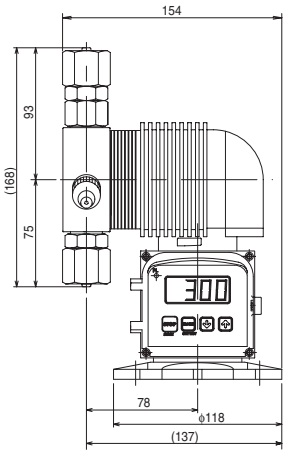
Model w/o relief-valve function





PZD–30/60/100–6TCT



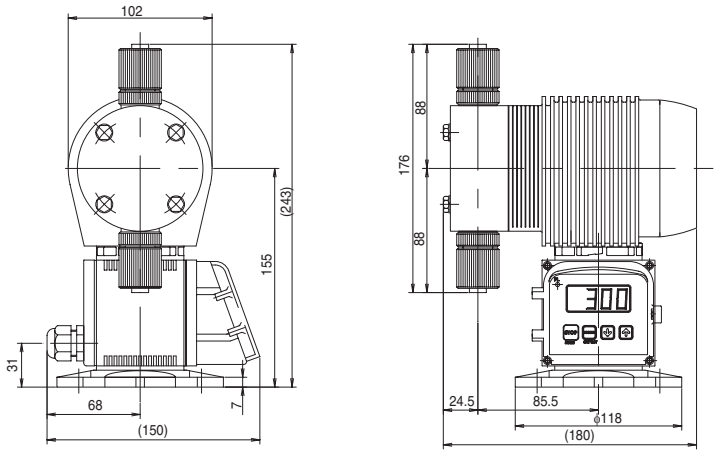


Specifications

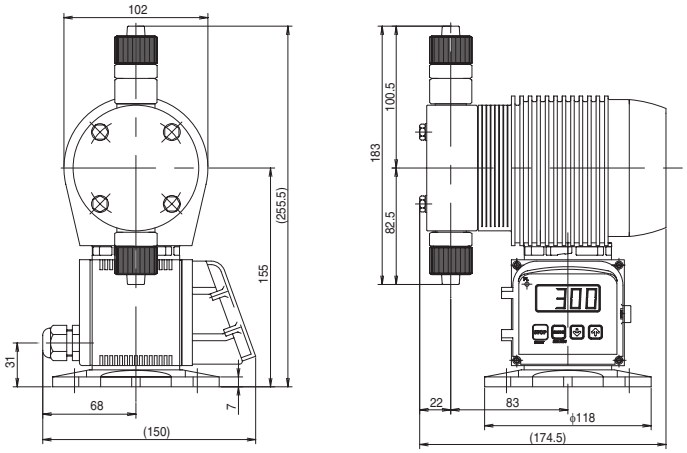
External dimension

Model for injection of general chemicals: PZD (large type)

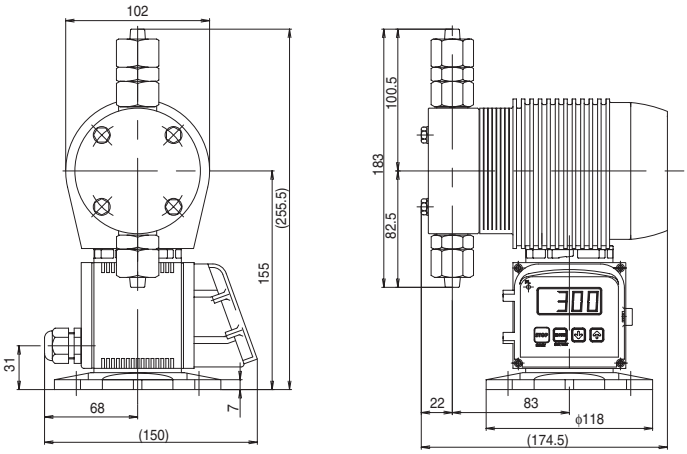
PZD–300/500–VTCE/VTCF



PZD–300/500–FTCT



PZD–300/500–STCT



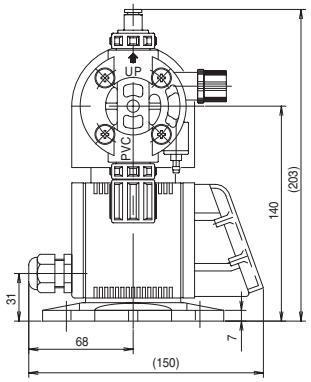
Specifications

External dimension

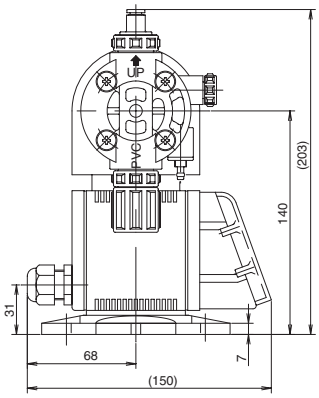
Model for injection of boiler chemicals: PZD

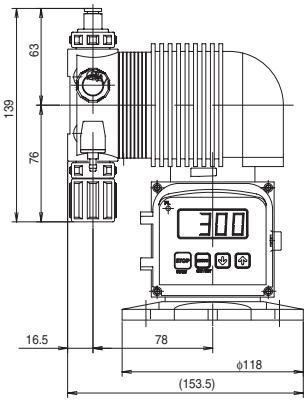
PZD–30R/30/VTCET

Model w/ relief-valve function



Model w/o relief-valve function

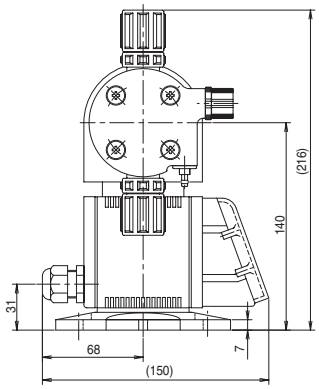




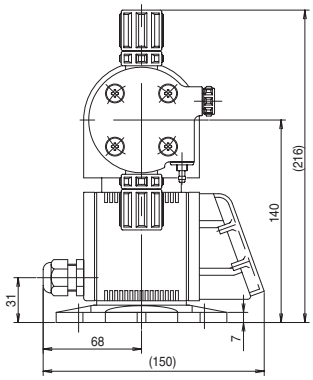
Model for injection of sodium hypochlorite: CLPZD

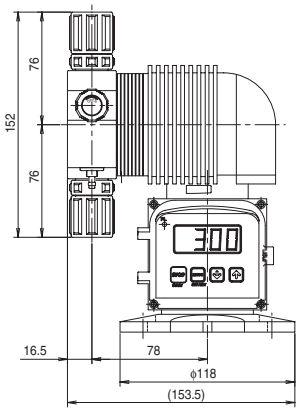
CLPZD–30R/60R/100R/30/60/100–ATCF

Model w/ relief-valve function



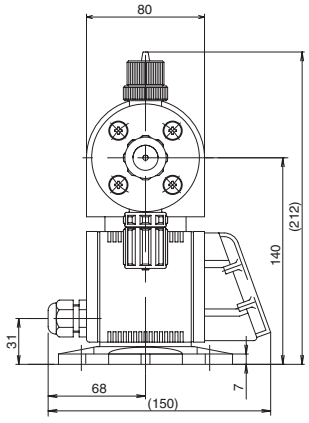
Model w/o relief-valve function

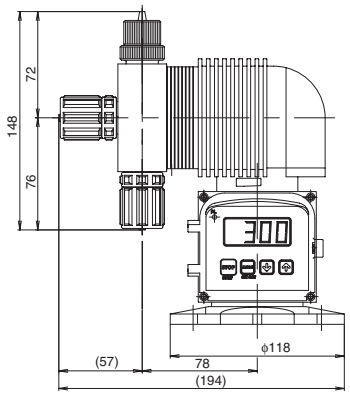




Model w/ automatic air-release function for injection of sodium hypochlorite: ARPZD

ARPZD–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 pages 53 to 61).

Model for injection of general chemicals: PZD (small type)

PZD–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		Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm, spacer)	1		Every 10,000 hours
Relief valve	1	–	Every 10,000 hours*
Air-release knob	–	1	Every 10,000 hours
Air-release nozzle assembly	1		Every 10,000 hours

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

PZD–30R/60R/100R/30/60/100–FTCE/FTCF

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

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

PZD–30R/60R/100R/30/60/100–FTCT

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

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

Consumables

PZD–30/60/100–6TCT

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

Model for injection of general chemicals (large type)

PZD–300/500–VTCE/VTCF

Part	Quantity per pump	Recommended replacement timeframe
Valve seat assembly	2	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm)	1	Every 10,000 hours

PZD–300/500–FTCT/STCT

Part	Quantity per pump	Recommended replacement timeframe
O-ring	3	Every 10,000 hours
Check ball	2	Every 10,000 hours
Valve stopper	2	Every 10,000 hours
Diaphragm assembly (diaphragm, protective diaphragm)	1	Every 10,000 hours

Model for injection of boiler chemicals

PZD

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

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

Model for injection of sodium hypochlorite

CLPZD

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

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

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

ARPZD

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

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

Spare parts & options

■Spare parts

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

■Options

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

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

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

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

• Level Switch
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 mounted on top.

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

Explanation of terms

• Overfeeding
A phenomenon that liquid continues to discharge from the piping for a few seconds due to the momentum of discharge (inertia) after stop operating a pump. In case of pulsation flow, the actual discharge volume might be larger than rated one because of this phenomenon.

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

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

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

After-sales services

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

Warranty

(1) The warranty period 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

Head Office:
2-2-14 Awajimachi, Chuo-ku, Osaka 541-0047 Japan
Tel.+81(0)6-6208-3974 Fax.+81(0)6-6208-3978
URL www.tacmina.com
E-mail trade@tacmina.com

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