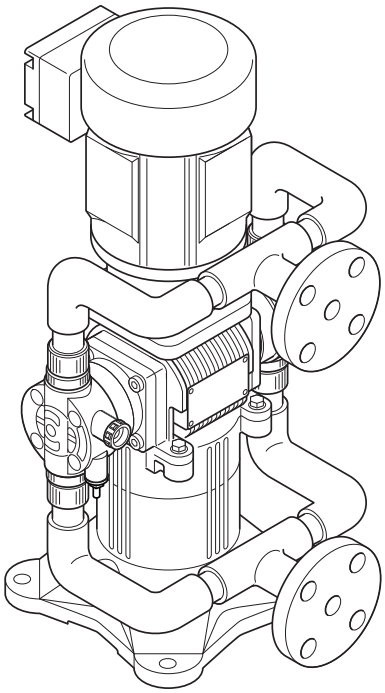
TACMINA

SmoothFlow Pump

BPL Series

User's Manual

Before beginning operation, read this manual carefully!
Ignoring the descriptions in this User's Manual and mishandling the unit may result in death or injury, or cause physical damage.



Applicable Models

BPL-005	BPL-1
BPL-01	BPL-2
BPL-02	BPL-3
BPL-03	BPL-5
BPL-06	BPL-10
	BPL-20
	BPL-30

- TACMINA accepts no liability whatsoever for any damage caused by malfunction of this unit and other damage caused by use of this unit.
- In this manual, the explanations of motors are based on TACMINA-standard motors. If you have selected a motor that is not a standard product or if you have purchased the pump and motor separately, refer to the operation manual of the motor being used.
- For details on handling the inverter and other components, refer to the respective User's Manual.
- If the pump you bought conforms to special specifications not described in this User's Manual, handle the pump according to details of separate meetings, drawings and approval documents.
- Additional information on this product and manuals in other languages may be found on our website.

www.tacmina.com

For the Safe Use of This Product

This manual is intended to help the operator to handle the product safely and correctly. In support of this aim, important safety-related instructions are classified as explained below.
Be sure to follow them at all times.

⚠ WARNING

• If the product is operated incorrectly in contravention of this instruction, it is possible that an accident resulting in death of serious injury will occur.

⚠ CAUTION

• This indicates that improper operation can result in an injury or physical damage to the product.

IMPORTANT

•This indicates information that should always be followed to maximize the product's performance and service life.

NOTE

•This indicates supplementary explanations.

Conditions of Use

⚠ WARNING

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

⚠ CAUTION

• This pump can be used for transfer of liquids only. Do not use this pump for other applications. Doing so might cause accidents or malfunction.
• Do not use the pump outside the following usage ranges. Doing so may cause malfunctions.

Ambient temperature/humidity	0 to 40°C*1 / 35 to 85% RH
Transferred liquid temperature	PVC type: 0 to 40°C (No freezing allowed) SUS type: 0 to 60°C (No freezing allowed)
Max. discharge pressure*2	005/01/02/03/06/1 : 1.0MPa (10bar) 2/3/5/10/20/30 : 0.5MPa (5bar)

*1 Transport and store the pump at temperatures within the -10°C to +50°C range.
*2 In the case of models BPL-3/5, the maximum discharge pressure is 0.3MPa when a setting of 1:10(6to60Hz) is used for the discharge volum control range.

Transportation, Installation & Piping

⚠ WARNING

• Do not use in explosion-proof areas or in explosive or combustible atmospheres.
• Install the pump in a location that cannot be accessed by anyone but control personnel.
• Do not stand or move under a hoisted pump. The pump might fall, causing an accident.

⚠ CAUTION

• Take preventative measures such as a chemical drainage ditch that is capable of handling the flow of the transfer liquid. Implement the m easures so that the fluid level does not rise up to the surface where the pump is installed.
• Do not subject the pump to strong impacts.
• Keep the product level while transporting it. If the product is tilted by 10° or more, it may fall over.
• If this pump has been dropped or damaged, consult your vendor or a TACMINA representative. Using a dropped or damaged pump may result in accidents and/or malfunctions.
• The installation work must be carried out by individuals who have received the required training.
• Do not install the pump in humid or dusty locations. Otherwise there is a risk of electric shock or malfunction.
• When a tightening valve is located on the discharge-side piping, and when there is a risk of blockage, be sure to install a relief valve on the piping immediately on the discharge side of this pump.
• If there is a chance of the fluid solidifying or freezing due to reasons such as using water-diluted solutions in areas where the temperature is low, install a heating apparatus or heat insulation. The fluid solidifying or freezing may lead to damage to the pump or surrounding equipment.

- The water used for the shipment tests may remain in the liquid-end section of the pump. If the pump will transfer chemicals that harden or give off gas when they react with water, be absolutely sure to drain the water and dry off the liquid-end section prior to use.
- The discharge volume cannot be adjusted by operating valves on the discharge piping.
- The pump head and the attachment are not designed to support the piping. Ensure that the pump and pipe joints will not be subjected to any excessive force that might be exerted by, for instance, the weight of the piping or the shifting of the pipe joints out of position. In particular, pulsation will occur at the suction side, so provide sufficient support to ensure that the attachment does not shake.

Electrical Wiring

⚠ WARNING

- Do not use in explosion-proof areas or in explosive or combustible atmospheres.
- The wiring must be done by a qualified electrician or somebody with electrical knowledge.
- Do not operate the pump with wet hands. Doing so may result in electric shocks.
- 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.
- Securely ground the protective earth terminal, and be absolutely sure to install an earth leakage breaker. Otherwise, you may receive electric shocks.
- Use cables with a thickness that conforms to the rated current of the motor for the electrical wiring and the earth wire.
- To prevent water from entering the terminal box, implement waterproofing by way of cable glands or other similar methods.

⚠ CAUTION

- 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.
- Check the motor's voltage, phases, and power supply before wiring, and then correctly wire it. If the wiring is incorrectly wired, there is a risk of malfunction.
- The rotation direction for the motor has been predetermined for this pump. Wire the motor so that it rotates in the predetermined rotation direction.

Operation & Maintenance

⚠ WARNING

- Install the pump in a location that cannot be accessed by anyone but control personnel.
- Do not operate the pump with wet hands. Doing so may result in electric shocks.
- 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.
- When there is a problem (such as when smoke appears or there is a burning smell), shut down the pump immediately, and contact your vendor or a TACMINA representative. Otherwise, there is a risk of fire, electric shock, malfunction, or accident.
- Check if the valves are open before operating the pump. If you have forgotten to open a valve or foreign objects are blocking the piping on the discharge side of the pump, an excessive pressure rise that will exceed the pump's specification ranges may occur, liquid may spray out, or piping may be damaged, which is dangerous.
- During air release, chemicals spray forcefully from the tip of the piping. Return the tip of the air release piping to the tank. During this operation, secure the air release hose in position.
- When working on the liquid-end section 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 maintaining or repairing the pump, be sure to release the discharge-side pressure, drain the chemicals from the liquid-end section, and wash the pump with deionized water.

⚠ CAUTION

- The sound pressure level may exceed 80 dB. When performing work near the pump while it is operating, wear protective gear to protect your ears.
- Set the relief valve pressure to a value that is 120% or less of the pump's normal operation pressure.
- Gear oil may spray out when you open the oil filling hole. Wait for the drive box to cool off sufficiently before you perform this work.
- Replace the gear oil every 4,000 hours (operation time) or 1 year (usage period), whichever is reached first.
- Be absolutely sure to use the specified oil for the BPL-005/01/02/03/06/1/2/3/5. No guarantees are given in the event that a type of oil not specified by Tacmina has been used with trouble occurring as a result.

Other Precautions

⚠ CAUTION

- **Do not modify or alter the pump.**
- **The materials of the parts used in this pump are written in the provided diagrams and similar documents. When it comes time to dispose of the pump, do so after first giving careful consideration to the appropriate disposal method for each material according to the laws and regulations in the area where the pump will be disposed of. Alternatively, contract the disposal of the pump to a dedicated waste disposal company.**

Checking the Product

After unpacking the pump, check the following.

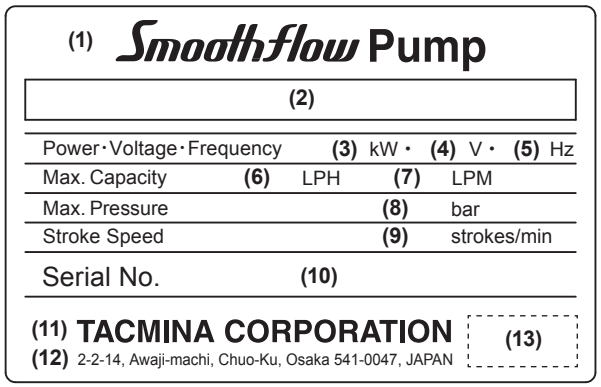
- Is the pump the one that was ordered?
- Do the details on the pump's nameplate match what was ordered?
- Is all the accessories supplied?

  ✻ 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.

■Name plate

Products with CE marking
(65mm × 35mm)



(1) Brand Name
(2) Model Code
(3) Motor Power (kW)
(4) Motor Voltage (V)
(5) Motor Frequency (Hz)
(6) Max Capacity (LPH)
(7) Max Capacity (LPM)
(8) Max. Pressure (bar)
(9) Stroke Speed (strokes/min)
(10) Serial Number
(11) Manufacturer
(12) Address
(13) Marking and type of Protection
Refer to the EC Declaration of Conformity for directives that apply to this product.
Only pump parts are applied to this standard.
Please note a motor for the pump is not included.

Accessory List

For all models: User's Manual 1 copy

✻ For the BPL-005/01/02/03/06-VTCE/VTCF/VT6E/VT6F : Air-release hose (4 mm dia. x 6 mm dia., 1 m)

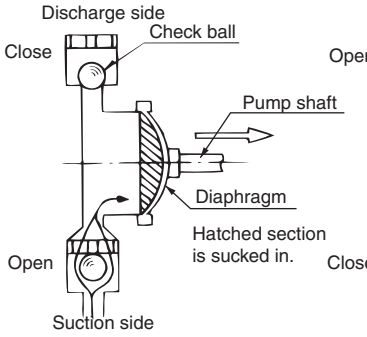
Contents

Explanation of product

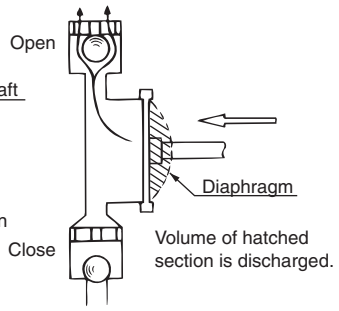
The BPL series are direct-drive diaphragm pumps that minimize the pulsation that is characteristic of diaphragm metering pumps. Since there is virtually no pulsation on the discharge side, the aperture of the piping can be made smaller and a pulsation attenuator is no longer required. This makes it easier to use the pumps to transfer liquids or in manufacturing processes. This series consists of compact pumps, with two pump heads on the left and right, and the motor located vertically.

Principle of operation

(1) Motor rotation is decelerated by a reduction gear.
(2) Rotary action is converted to reciprocating motion by an eccentric cam mechanism.
(3) When the diaphragm at the end of the pump shaft moves in a reciprocal manner, the volume inside the pump head changes.
(4) When the diaphragm moves backward, minus pressure is generated inside the pump head. At this time, the check ball on the discharge side closes the flow path as shown in Figure 1 to prevent reverse flow from inside the discharge-side piping. Meanwhile, on the suction side, liquid flows into the pump head as the check ball opens the flow path.
(5) Next, when the diaphragm is pushed out forwards, positive pressure is generated inside the pump head. For this reason, the check ball on the suction side closes the flow path to open the discharge side, and discharge liquid to the discharge side. (Figure 2)



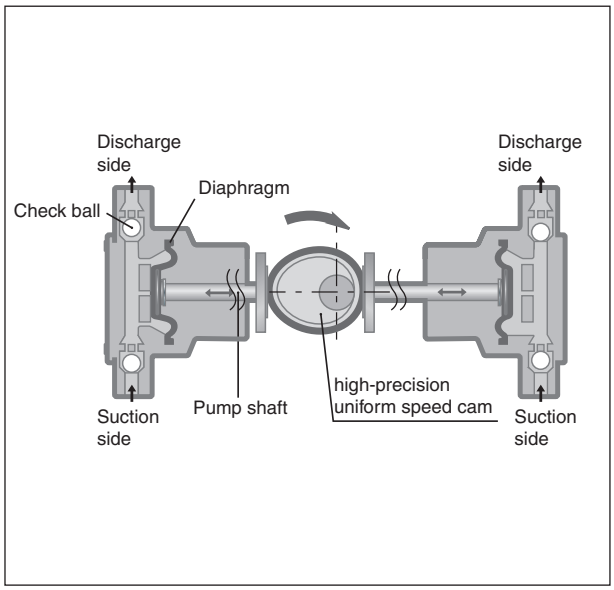
(Figure 1)



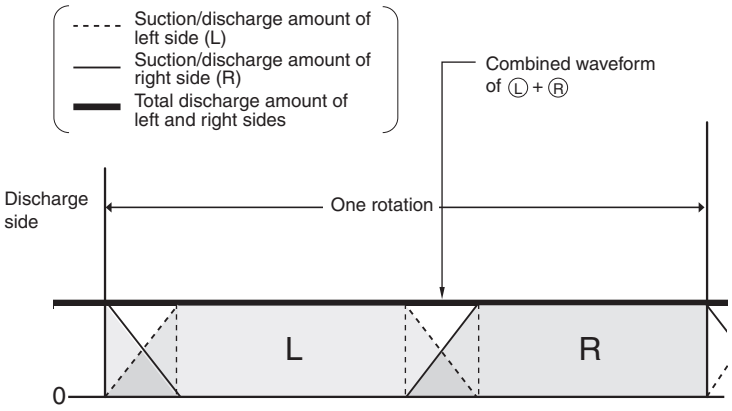
(Figure 2)

■Duplex Pulseless Mechanism

This pump employs a high-precision uniform speed cam mechanism as the eccentric cam mechanism. It results in a trapezoid shaped waveform L as shown in Figure 1, and the successive discharge waveforms from each pump head partially overlapping by a 180° phase in such a way as R that the combined waveform is a horizontal straight line.
Pulsation occurs on the suction side.



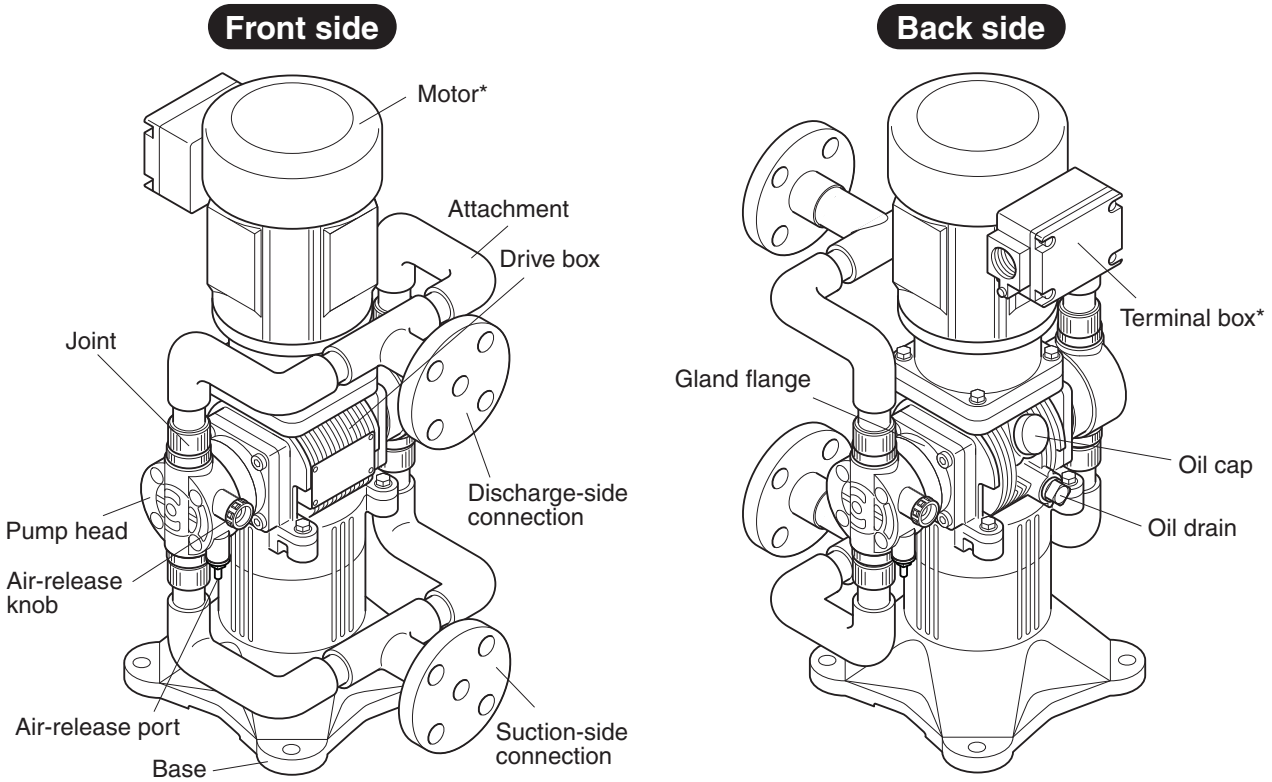
■Discharge waveform



Names of parts

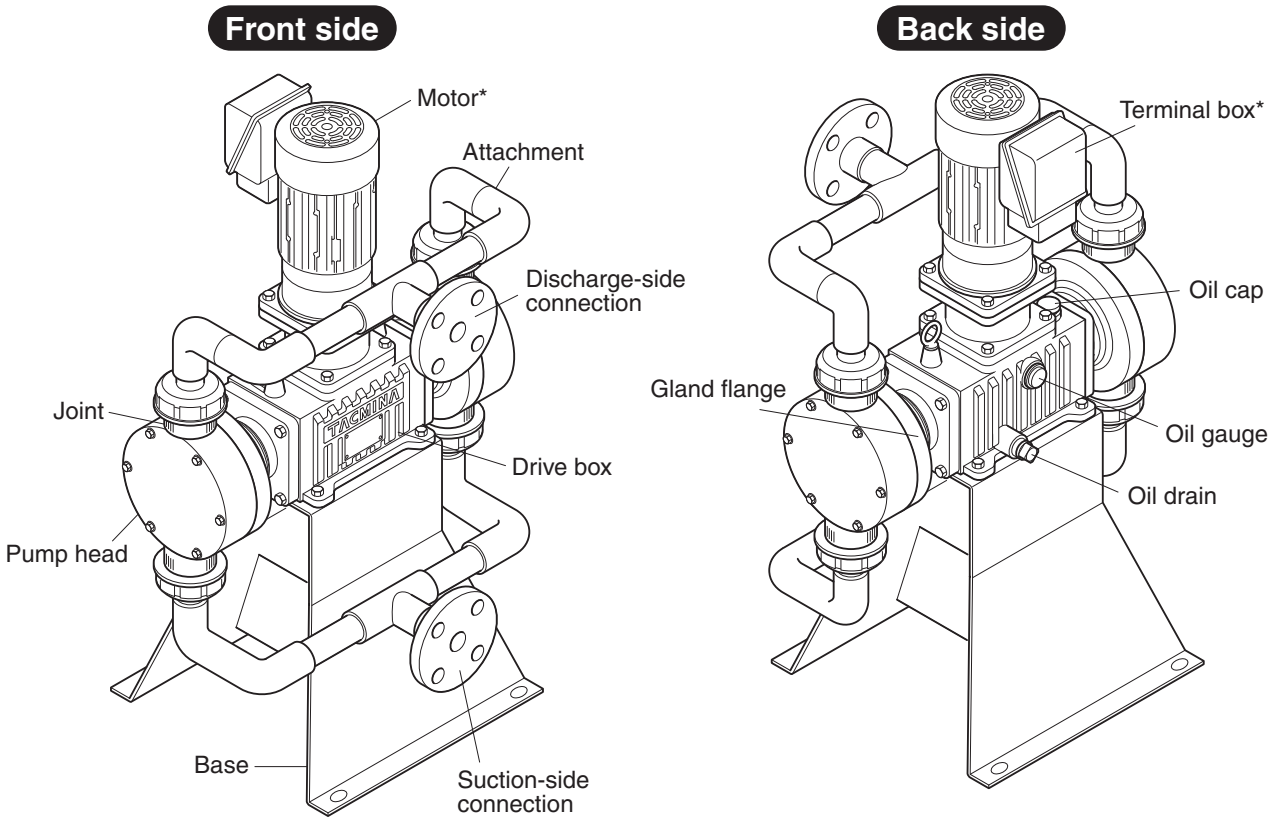
■BPL-005-VTCE/VTCF

✻ BPL-005/01/02/03/06/1/2/3/5 share the same body. However, the shapes of pump heads and attachment differ slightly depending on the liquid-end material and connection type.



■BPL-10-VTCE/VTCF

✻ BPL-10/20/30 share the same body. However, the shapes of pump heads and attachment differ slightly depending on the liquid-end material and connection type.



✻ The Illustration is Non-CE marking model.

Installation

WARNING

- **Do not use in explosion-proof areas or in explosive or combustible atmospheres.**
- **Do not stand or move under hoisted pumps. The pump might fall, causing an accident.**
- **Install the pump in a location that cannot be accessed by anyone but control personnel.**

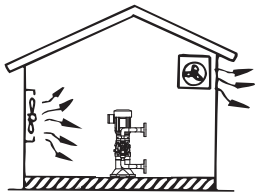
Installation location

- **Whenever possible, avoid installing the pump in a location that will shorten its service life**

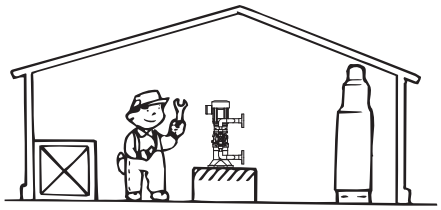
Avoid the following location:

- **Location subject to the direct sunlight or location where corrosive gases are generated**
- **Location exposed to the wind and rain, or poorly ventilated location**
- **Location subject to lots of moisture or dust**

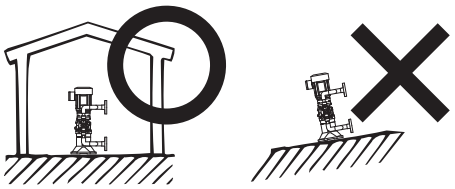
- **Install the pump in a location where the ventilation is good and where the chemical will not freeze.**



- **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.**



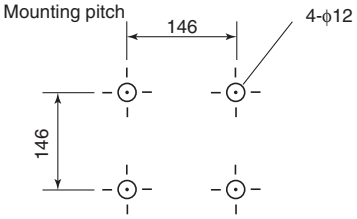
Securing the pump

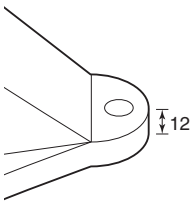
Use items such as bolts and nuts or anchor bolts to firmly secure the pump in place.

✻ When placing the pump in a location temporarily, either secure the pump in place temporarily or insert a support under the pump head to ensure that the pump does not fall over.

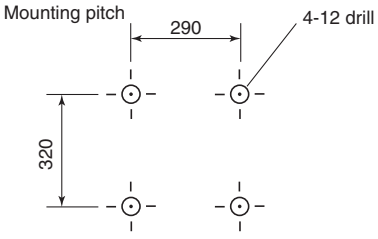
● When using a base (BPL-005/01/02/03/06/1/2/3/5)

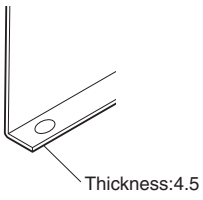
Prepare four M10 bolts for fixing the base.





● When using a base (BPL-10/20/30)





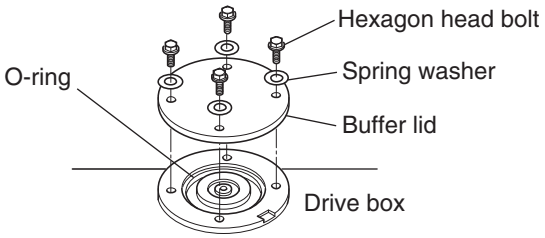
Installation

Attaching the motor

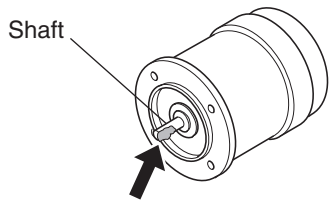
If you are attaching the motor, do so according to the procedure shown below.

✻ For details on the motors that can be attached, see the outline drawing.

(1) Loosen the hexagon head bolts, and then remove the buffer lid.



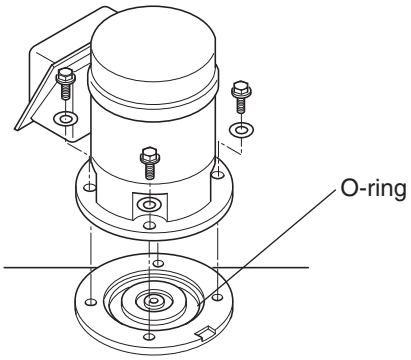
(2) Coat the motor-side shaft with the grease that fills the motor insertion hole.



(Coat this part with the grease.)

(3) Attach the motor to the drive box, and then secure it in place with the hexagon bolts and spring washers removed in step (1).

✻ Check that the O-ring is properly inserted into the groove.

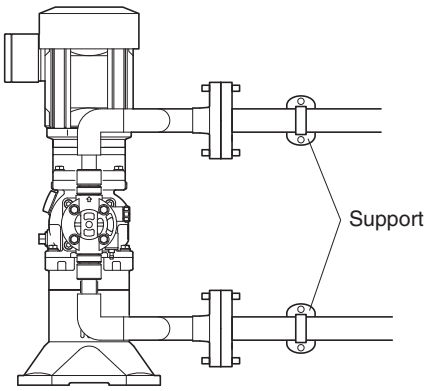


Piping

Requests during Piping

● Pump head joining section with pipes

- The pump head is not designed to support piping.
- Support the piping so that the attachment does not bear the weight of the piping. In particular, pulsation will occur at the suction side so provide sufficient support to ensure that the attachment does not shake.
- Make sure that the pump and pipe joints will not be subjected to any excessive force which might be exerted by, for instance, the weight of the piping or the shifting of the pipe joints out of position. Use of flexible joints is recommended in order to protect the pump and the pipe joints.



Piping

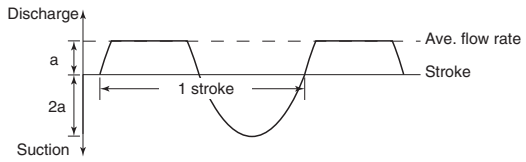
● Pipe length

- An excessively long pipe/hose 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.
- When extending the piping, pressure loss might exceed the pump's maximum discharge pressure. So, larger piping must be provided. Notify your supplying agent of (1) viscosity of the liquid, (2) length (positional relationship) of the piping, (3) specific gravity of the liquid, and other information.
  Your supplying agent will select the ideal piping sizes for you.

● Pulsation on the suction-side piping

- Though pulsation is minimized on the discharge side, pulsation*1 occurs on the suction piping.
- In principle, the piping aperture must be larger than the pump's aperture.

*1 Pulsation
This pump generates pulsation unique to reciprocating pumps. This pulsation has sine wave characteristics, and the momentary flow rate is about twice that of the average flow rate. For example, this means that a momentary flow rate of 6 L/min is shown on a reciprocating pump having an average flow rate 3 L/min.
For this reason, when selecting piping, the piping differs from that used on a continuous flow pump such as a centrifugal pump in that a value twice the operating discharge volume (L/min) must be used.



Flow rate wave form of this pump (one side)

● Other

- When transferring liquid that coagulates due to temperature changes, the transferred liquid will coagulate in the pump head or piping, which sometimes might break the pump or its periphery. Be sure to install a heater or heat retainer.

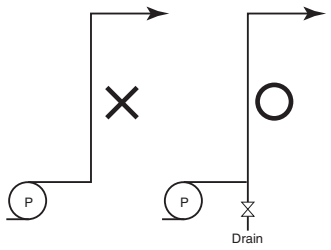
● Liquid containing slurry

When transferring liquid containing slurry on this pump, satisfy the following conditions and observe the piping cautions.

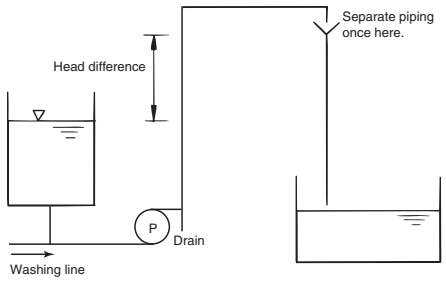
- For details of the size and concentration of slurry that can be transferred by this pump, contact TACMINA.

Piping cautions

- Install a drain on the ascending piping immediately after the joint on the pump's discharge side.



- When transferring liquid is containing slurry, use narrower piping to increase the flow velocity inside the piping within the permissible pressure loss range.
- Install a washing water (pressurized water such as city water) line on the suction-side piping. Before stopping operation, flush the pump and piping with washing water to remove any slurry inside.
- Do not use of a back pressure valve. Slurry sticking to valve seals will prevent the valves from functioning.
- When siphoning or overfeed might occur, provide a countermeasure as much as possible on the ascending piping (by a head difference).

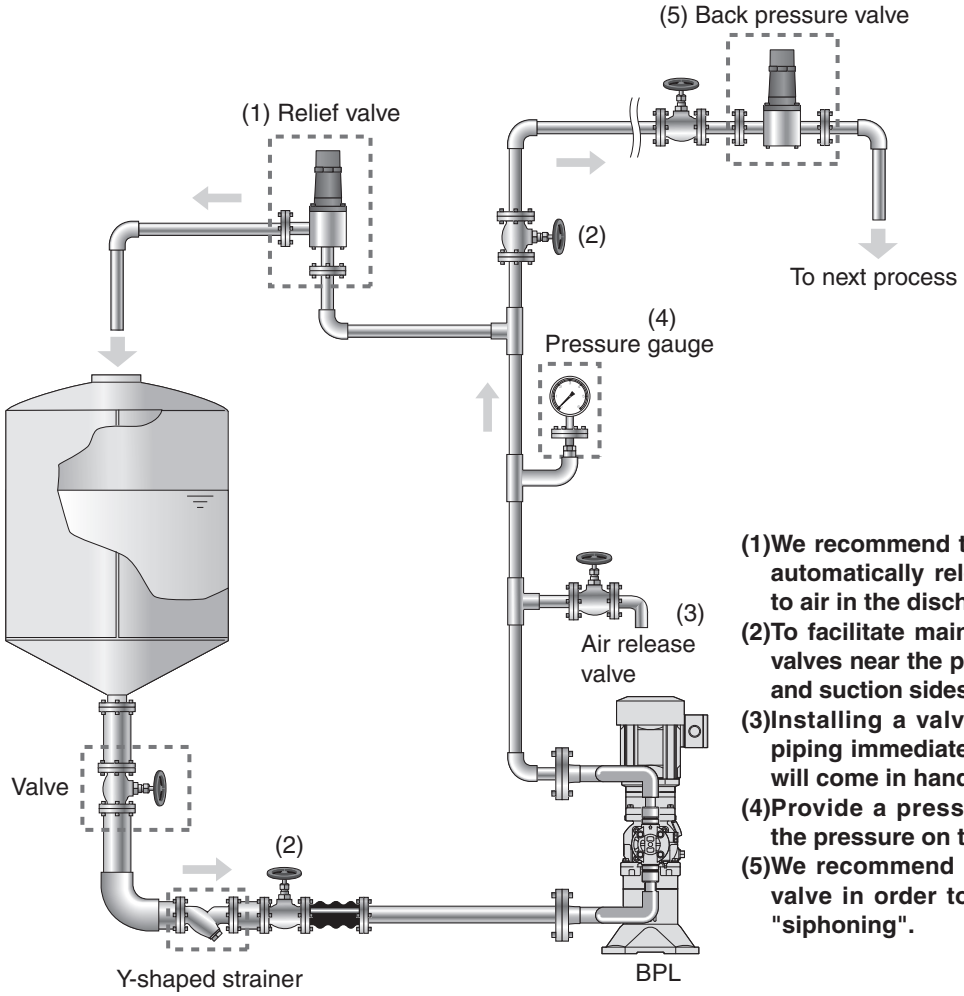


- When a relief valve is installed and is acting, slurry will bite into the seals. So, the piping must be flushed with washing water.

Piping

Example of recommended piping arrangements

Install the pump so that it is lower than the level of liquid in the tank using pressure booster piping. The length that the piping can be extended to differs according to the viscosity and specific gravity of the liquid, and the piping diameter. Lay piping taking the piping resistance and other factors into full consideration.
Keep the suction-side piping as short as possible and keep the number of bends and joints that cause resistance to a minimum.

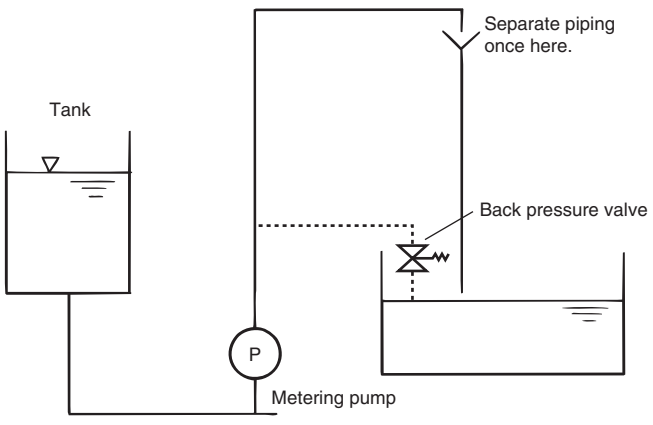


(1)We recommend to install a relief valve*1 for automatically releasing abnormal pressure to air in the discharge-side piping.
(2)To facilitate maintenance, install tightening valves near the pump on both the discharge and suction sides.
(3)Installing a valve for releasing air on the piping immediately after the discharge side will come in handy.
(4)Provide a pressure gauge for measuring the pressure on the pump's discharge side.
(5)We recommend to install a back pressure valve in order to avoid "overfeeding" and "siphoning".

*1 Relief valve
When the discharge-side piping on this pump becomes blocked, the discharge-side pressure increases abnormally, and may cause oil leakage or the pump heads, joints and driven parts to break.
For this reason, a relief valve must be installed on the pump's discharge side. Adjust the relief valve setting pressure to about 120% of the operating pressure.
Furthermore, do not use a small aperture relief pipe or point the secondary side of the relief valve upward but point it straight down toward the tank.

● When injecting to below the level of liquid in a tank

When injecting to a position lower than the level of the liquid in the tank, siphoning will cause liquid to flow down naturally. To prevent this, either install a back pressure valve, or install a ventilation duct at a position above the level of liquid in the tank and near the injection point.

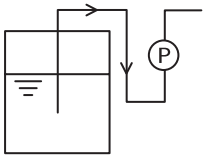


Piping

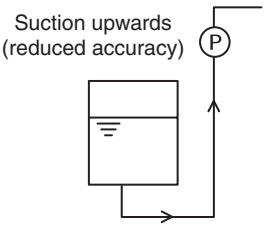
Bad examples of piping

We do not recommend the piping conditions as below since these will cause unstable discharge or liquid may not be able to be discharged.

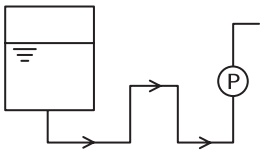
Suction upwards
(reduced accuracy)



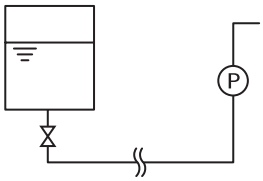
Suction upwards
(reduced accuracy)



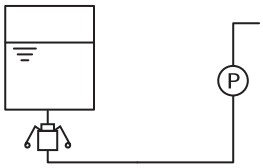
Rise-and-fall midway piping
(reduced accuracy)



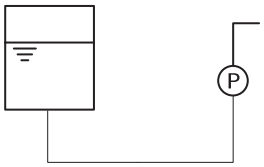
Suction-side piping too long
(cavitation, entry of air, pulsation)



Coupler
(entry of air)



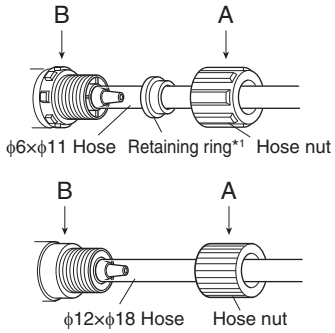
Suction-side piping too narrow
(cavitation)



Connection

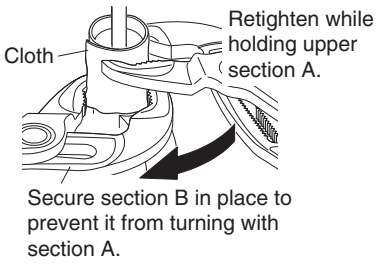
- Hose connections (PVC)

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



*1 Supplied for BPL-005 - 02 only.

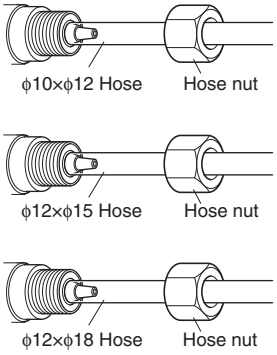
(2) Fully tighten the hose nut by hand.
(3) Wrap the nut with a cloth to prevent damage.
(4) Use two water pump pliers to retighten one more rotation as shown in the figure below.



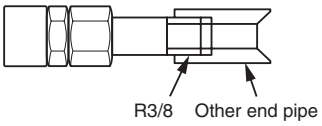
✻ After starting operation, retighten the nut as needed.

In order to prevent the hoses from disengaging, insert the hose nuts all the way to the shoulder of the threads, and tighten them up.

- Hose connections (PTFE)



- Union type



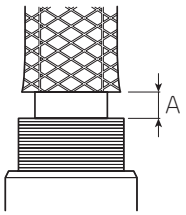
There is an R3/8 male screw at the end of the union pipe joint. Wrap this screw with tape two or three times around it before connecting the pipe.

Piping

NOTE

Depending on the hose diameter, it may not be possible to insert the hose all the way to the base of the joint. 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	ϕ6×ϕ11	1 mm or less
	ϕ12×ϕ18	2 mm or less
	ϕ19×ϕ26	6 mm or less
PTFE hose	ϕ10×ϕ12	0 mm
	ϕ12×ϕ15	5 mm or less

Electrical wiring

⚠ WARNING

- **Do not use in explosion-proof areas or in explosive or combustible atmospheres.**
- **The wiring must be done by a qualified electrician or somebody with electrical knowledge.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **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.**
- **Securely ground the protective earth terminal, and be absolutely sure to install an earth leakage breaker. Otherwise, you may receive electric shocks.**
- **Use cables with a thickness that conforms to the rated current of the motor for the electrical wiring and the earth wire.**
- **To prevent water from entering the terminal box, implement waterproofing by way of cable glands or other similar methods.**

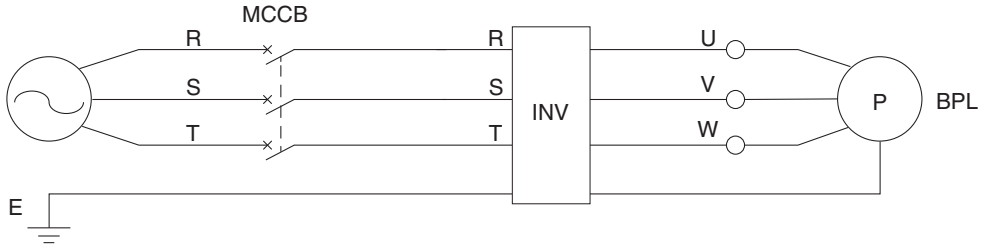
The pump's discharge volume is adjusted by changing the inverter frequency and controlling the motor speed.
A terminal box is used for the electrical wiring of the motor, and the connection size of the wiring conduit is as below.
Use the conduit to protect the electrical wires.

● Connection size of wiring conduit

Models	Connection size
BPL-005/01/02/03/06/1/2/3/5/10	PF1/2
BPL-20/30	G3/4

✻ In case of CE marking-compatible model, connection size of wiring conduit is M24 x 1.5 and M16 x 1.5.

Wiring example



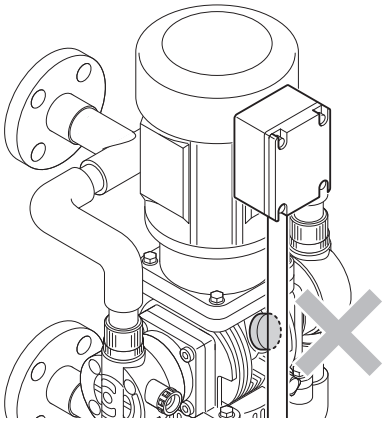
MCCB : Molded case circuit breaker
INV: Inverter

✻ For pump maintenance, install separate MCCBs for this pump.

NOTE

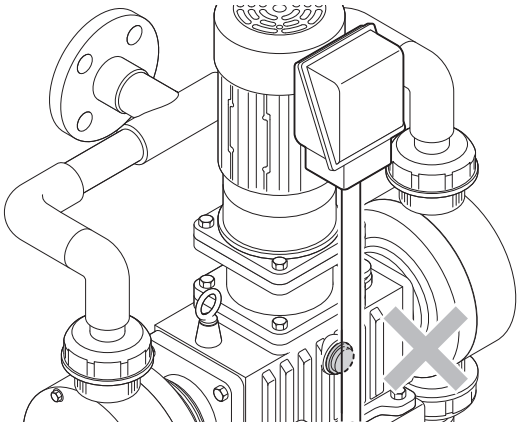
● In case of BPL-005/01/02/03/06/1/2/3/5

- When rotating the terminal box, provide sufficient space to ensure that the electrical wire conduit does not pass around the oil cap.



● In case of BPL-10/20/30

- When rotation the terminal box, ensure that the oil gauge will not be hidden behind the wiring.



Operation

⚠ WARNING

- **Install the pump in a location that cannot be accessed by anyone but control personnel.**
- **Do not operate the pump with wet hands. Doing so may result in electric shocks.**
- **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.**
- **When there is a problem (such as when smoke appears or there is a burning smell), shut down the pump immediately, and contact your vendor or a TACMINA representative. Otherwise, there is a risk of fire, electric shock, malfunction, or accident.**
- **Check if the valves are open before operating the pump. If you have forgotten to open a valve or foreign objects are blocking the piping on the discharge side of the pump, an excessive pressure rise that will exceed the pump's specification ranges may occur, liquid may spray out, or piping may be damaged, which is dangerous.**
- **During air release, transfer liquid may spray forcefully from the tip of the piping. Return the tip of the air release piping to the tank. During this operation, secure the air release hose in position.**
- **Before starting operation, be sure to check the amount of gear oil and add more if the amount is low.**

Before the first operation

- Make sure that the Conditions of use are appropriate. (See “Conditions of Use” on page 1.)
- Flush the piping with water or other safe liquid, and make sure that the piping is free of leaks and blockages. Also, flush the piping to prevent chips and other foreign objects from remaining in the pipes during piping.

Before operation

Check the following points every day.

Check Point	Details to Check	Remarks
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.
Chemical tank	Make sure that there are sufficient chemicals in the chemical tank. Replenish the chemical tank if necessary.	Pay particular attention when handling chemicals or performing processes that are adversely affected by contact with air.
Piping/hose connections	Check for disconnected or damaged pipes and hoses as well as twisted hoses. Reconnect or repair any disconnected/damaged pipes and hoses.	The disconnected/damaged pipes and hoses can result in damage or cracks.
Valves (suction side and discharge side)	Make sure that valves on the suction side and discharge side are open. Open any closed valves.	Closed valves may cause pressure to build up, chemicals to spurt out or damage piping.
Power supply	Make sure that the pump is connected correctly to the specified power supply.	Connection to a wrong power supply may cause motor seizure.
Electrical wiring	Make sure that electrical connections to inverters and other devices are correct.	Wrong connections may cause short circuits or electrical leakage.
Driven parts	Make sure that the amount of gear oil in the drive box is appropriate. Check the drive box for oil leakage.	Refer to "Checking the amount of gear oil" on page 18 and re-tighten if you find an oil leak.

During operation

Check Point	Details to Check	Remarks
Pump head	Check for liquid leakage from the holes on the gland flange.	Liquid leaks may indicate the damage of diaphragm. So, inspect the diaphragm also.
Joints	Check for liquid leakage.	If there are liquid leaks, inspect for insufficient tightening and loosening of bolts, and re-tighten as necessary. If this does not correct the liquid leak, inspect each of the O-rings
Discharge-side pressure	Check the pressure gauge on the pump discharge side.	If an abnormal numerical value is indicated, the piping may be clogged or valves may be blocked. Inspect the piping also.
Motor unit Pump unit	Check for generation of heat or abnormal noise.	Refer to "Troubleshooting" on page 38.

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

→ **Air releasing (page 16)**
✻ Not required for the BPL-10/20/30

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

→ **Discharge-volume setting (page 18)**

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

→ **Procedure for prolonged shutdown of operation (page 18)**

Trial operation

IMPORTANT

- **Make sure that the motor is rotating to the clockwise when the motor is viewed from the cooling fan side. (Do not operate the pump in the opposite direction. If the motor is rotating in the opposite direction, considerable pulse occurs on the discharge side.)**

(1) Adjust the inverter, bosed on the inverter's instructions, and proceed with tuning.
- **Be absolutely certain to use an electronic thermal relay in the inverter that corresponds to the pump rating. (Refer to pages 41 to 43.)**

(2) Operate the pump by inching, and check that the motor is rotating clockwise as seen from the cooling fan.
(3) Conduct a trial run.

When liquid is not sucked up by trial operation
A probable cause is that foreign objects are biting into the seals on the discharge or suction side (sections sealed by check balls). Remove any dirt by the following procedure:
(1) Turn off the pump's power.
(2) Remove the attachment or valve seats, and wash the check balls and valve seats with water.
(3) Re-assemble the check balls and valve seats into the pump heads while still wet making sure not to mistake the discharge and suction sides.
(Be sure to allow the inside of the pump to dry when using liquid that is adversely affected by water.)

Air releasing

⚠ WARNING

- **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.**

⚠ CAUTION

- **In the case that a liquid is affected by water is to be transferred please dry the pump and piping sufficiently.**

IMPORTANT

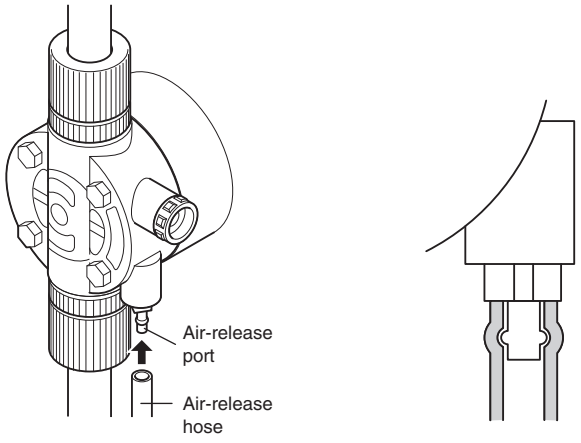
- **When using the pump for the first time or when the chemical container has been replaced, proceed with the task of air releasing prior to operating the pump.**

BPL-005/01/02/03/06-VTCE/VTCF

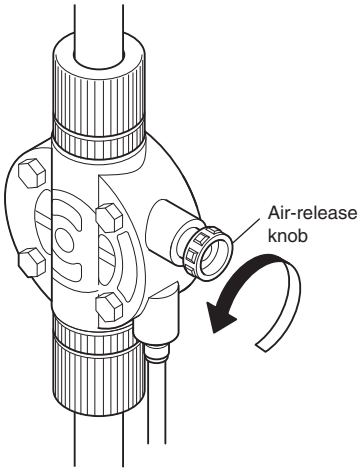
BPL-01/02/03/06-VT6E/VT6F

(1) Turn off the pump's power.
(2) Release the pressure inside the discharge-side pipe.
(3) Insert the air-release hose provided into the air-release port.
- Connect the air-release hose as shown in the illustration.

(4) Return the other end of the air-release hose to the tank or other container, and secure it firmly.
(5) Start operating the pump.



(6) While operating the pump, turn the air-release knob counterclockwise for 1 to 1-1/2 turns.
(7) After a few moments air will exit from the air-release port together with the liquid.
(8) After all the air has been released, turn the air-release knob clockwise, and tighten it securely.
(9) Shut down the pump.



NOTE

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

Air releasing

BPL-005/01/02/03/06-STST

• When not using the hose pump

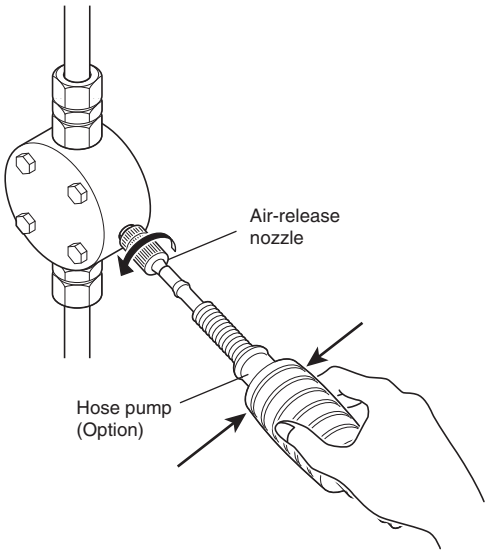
(1)Turn off the pump's power.
(2)Release the pressure in the discharge side pipe.
(3) Turn the air-release nozzle counterclockwise.
(4) Start operating the pump.
(5) Liquid comes out from the end of the air-release nozzle so use a measuring cup or other container to catch it.
(6) Once the liquid has entered the pump head, shut down the pump.

• When using the hose pump

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

IMPORTANT

• If the air-release nozzle is loosened too much, it will be disconnected and damage the packing. Take care not to loosen the nozzle too much.



BPL-1/2/3/5

(1) Turn off the pump's power.
(2) Release the pressure inside the discharge-side pipe.
(3) Start operating the pump.
(4) Shut down the pump after its pump head is filled with the liquid.
(5) Set the discharge-side piping again.

Discharge-volume setting

This pump does not have a flow rate adjusting dial as a general metering pump does.
Flow rate is controlled by changing frequency and adjusting the motor speed with inverter.

⚠ CAUTION

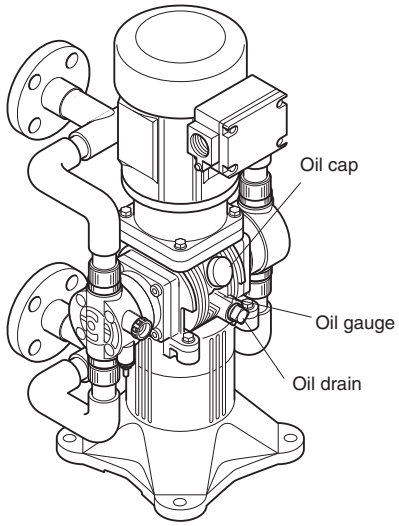
- **Ensure that the inverter frequency is changed within the following ranges. Operation outside the ranges given will result in motor damage (when the pump is operated at the maximum discharge pressure).**

BPL-005/01/02/03/06/1/2	**: 6 to 60 Hz**
BPL-3	**: 15 to 60 Hz (or 6 to 60 Hz at a discharge pressure below 0.3 MPa)**
BPL-5	**: 30 to 60 Hz (or 6 to 60 Hz at a discharge pressure below 0.3 MPa)**
BPL-10/20/30	**: 6 to 60 Hz**

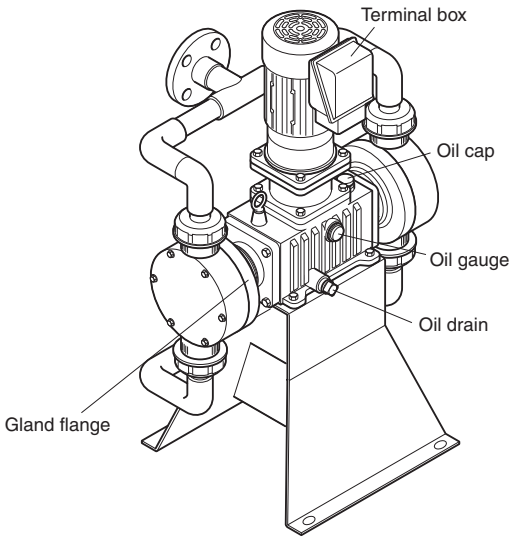
Checking the amount of gear oil

With the pump stopped, check that the oil gauge is filled with gear oil up to the top.
If there is not enough gear oil, add more.
✻ During pump operation, the accurate oil amount is not displayed. Be sure to perform this check with the pump stopped.

BPL-005/01/02/03/06/1/2/3/5



BPL-10/20/30



Procedure for prolonged shutdown of operation

Perform the following operation when stopping operation for a long time (e.g. due to an off season) and restarting pump operation after a prolonged downtime.

To shutdown the pump

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

To resume operation

(1) Check the inside of the tank for sediment, clouding of liquid and other abnormalities. If the liquid inside the tank has deteriorated, drain the liquid, wash the inside of the tank with water, and completely replace with fresh liquid.
(2) Check the check ball and valve seats inside the pump heads for adhesion of dirt.

Maintenance

⚠ WARNING

- **Ensure that nobody other than the operators and control personnel will operate the pump.**
- **When handling liquid-end sections, be sure to wear protective coverings (rubber gloves, mask, protective goggles, chemical-resistant overalls, etc.) appropriate for the chemicals be using used.**
- **Do not turn ON the pump's power during maintenance. Attach a "Work In Progress" label to the power switch.**
- **Before disassembling liquid-end sections, be sure to release the discharge-side pressure, drain the chemicals from liquid-end sections, and clean the liquid-end parts.**

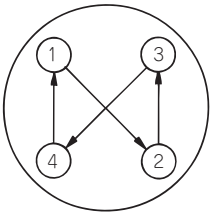
Replacing the liquid - end section

Replacing the gear oil

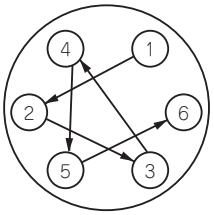
IMPORTANT

- **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 chemical leakage from the pump head.**

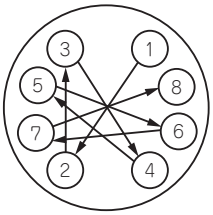
BPL-005/01/02/03/06
1/2/3/5



BPL-10



BPL-20/30



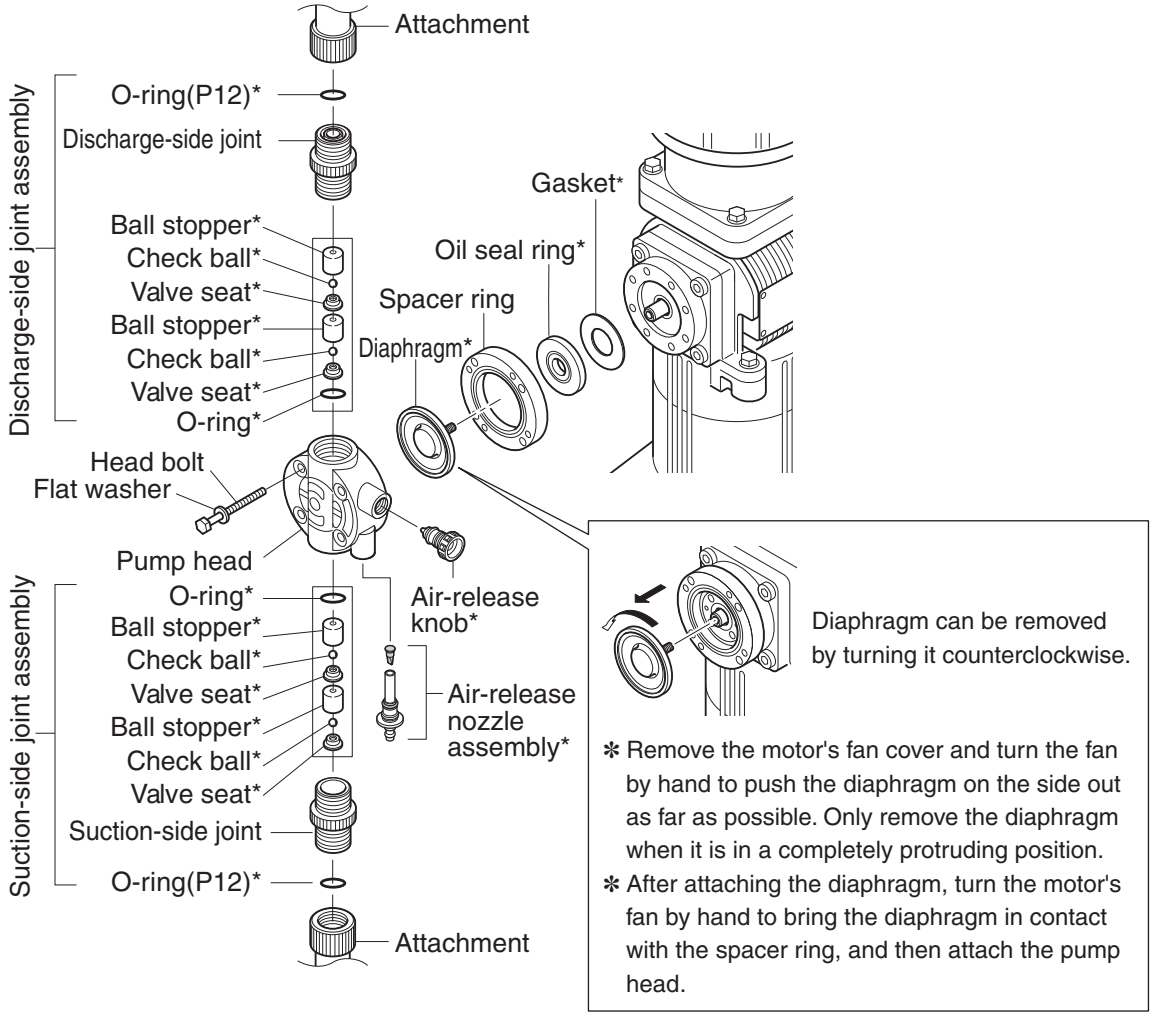
NOTE

- **Before installing the new diaphragm, apply an anti-seizing agent to the thread sections where the diaphragm is secured.**
- **When installing the attachment, check the connection aperture, and attach the attachment while ensuring that it is not attached upside down.**

Replacing the liquid - end section

VTCE/VTCF – 005/01/02/03/06

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 49.
✻ “Pump head set” which contains all the above parts is also available.

⚠ CAUTION

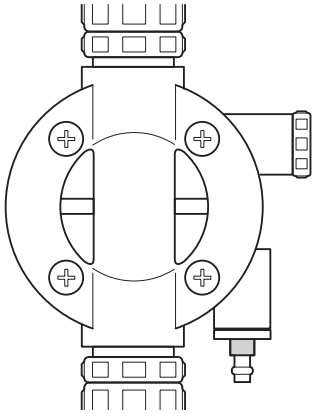
- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

Replacing the Air-bleeding Nozzle

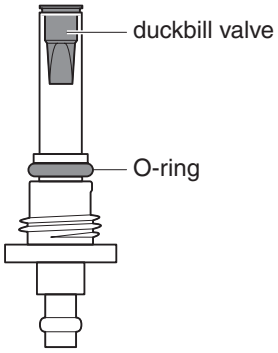
(1)If a relief hose or air-bleeding hose is connected, remove the hose.

(2)Remove the air-bleeding 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.

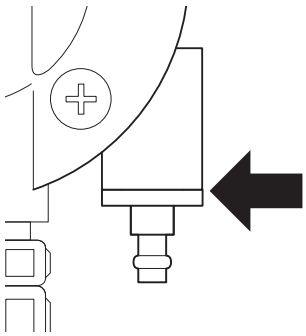


(3)Attach a new air-bleeding nozzle.

- Before attaching a new air-bleeding nozzle, check that the duckbill valve is inserted into the end of the air-bleeding 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-bleeding nozzle. Be careful not to lose the duckbill valve when handling it.**

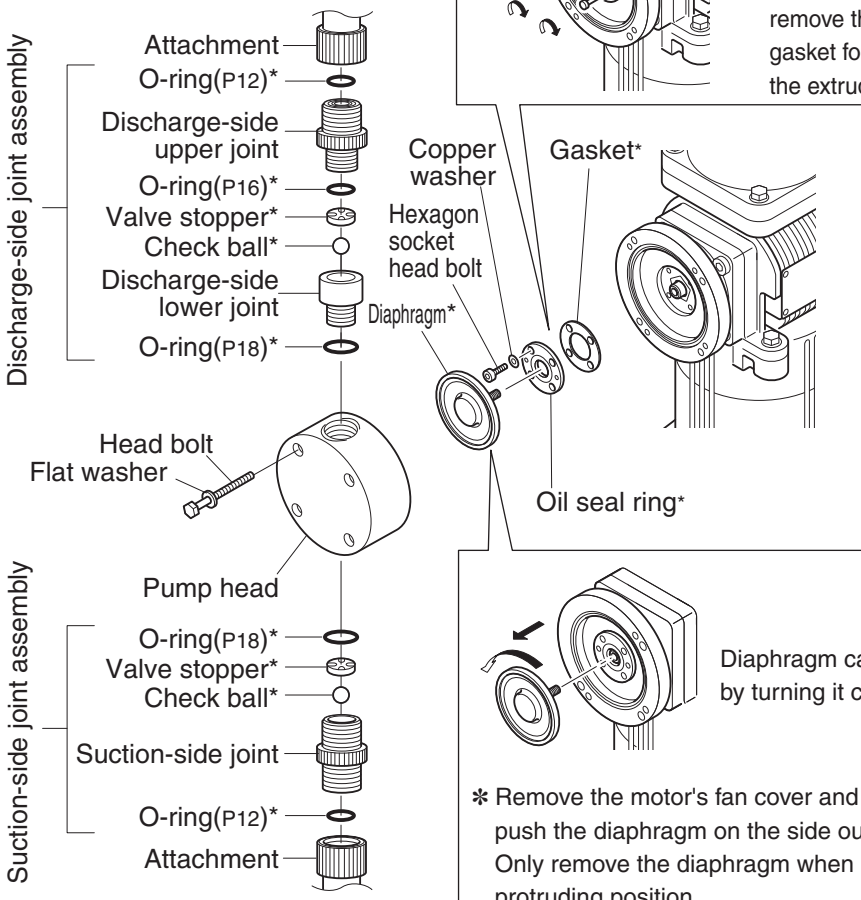
(4)Attach the pump head.

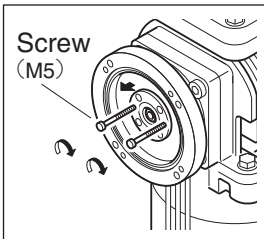
(5)Attach the relief hose if using a pump with simple relief valve.

Replacing the liquid - end section

VTCE/VTCF — 1/2

■Replacing the liquid - end materials





(1) Remove the four hexagon socket head bolts (M4) used to secure the oil seal ring.
(2) Have M5 screws ready, and remove the oil seal ring and gasket following the procedure for the extruded bolts.

Diaphragm can be removed by turning it counterclockwise.

✻ Remove the motor's fan cover and turn the fan by hand to push the diaphragm on the side out as far as possible. Only remove the diaphragm when it is in a completely protruding position.
✻ After attaching the diaphragm, turn the motor's fan by hand to bring the diaphragm in contact with the gland flange, and then attach the pump head.

* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 49.
✻ “Pump head set” which contains all the above parts is also available.

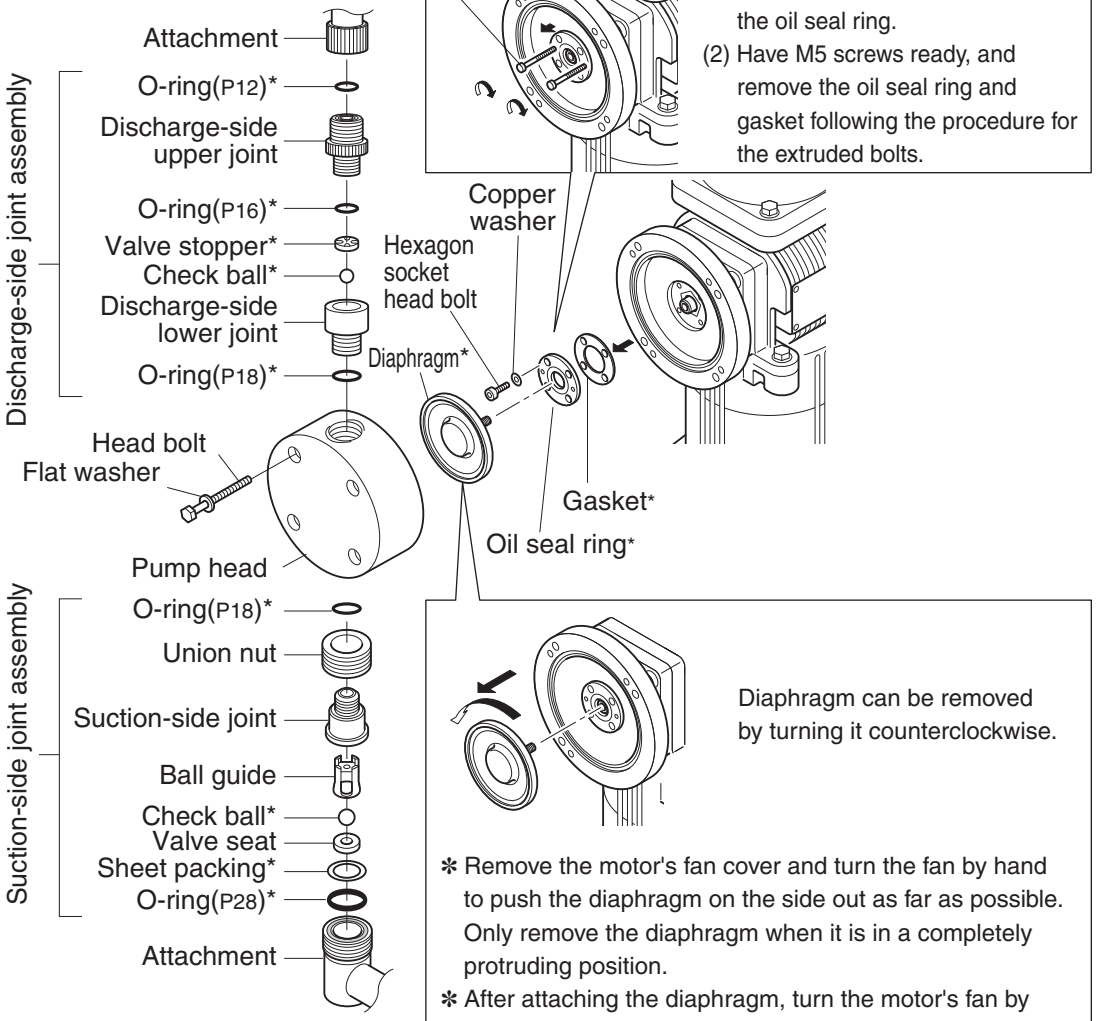
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VTCE/VTCF — 3/5

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 49.

✻ “Pump head set” which contains all the above parts is also available.

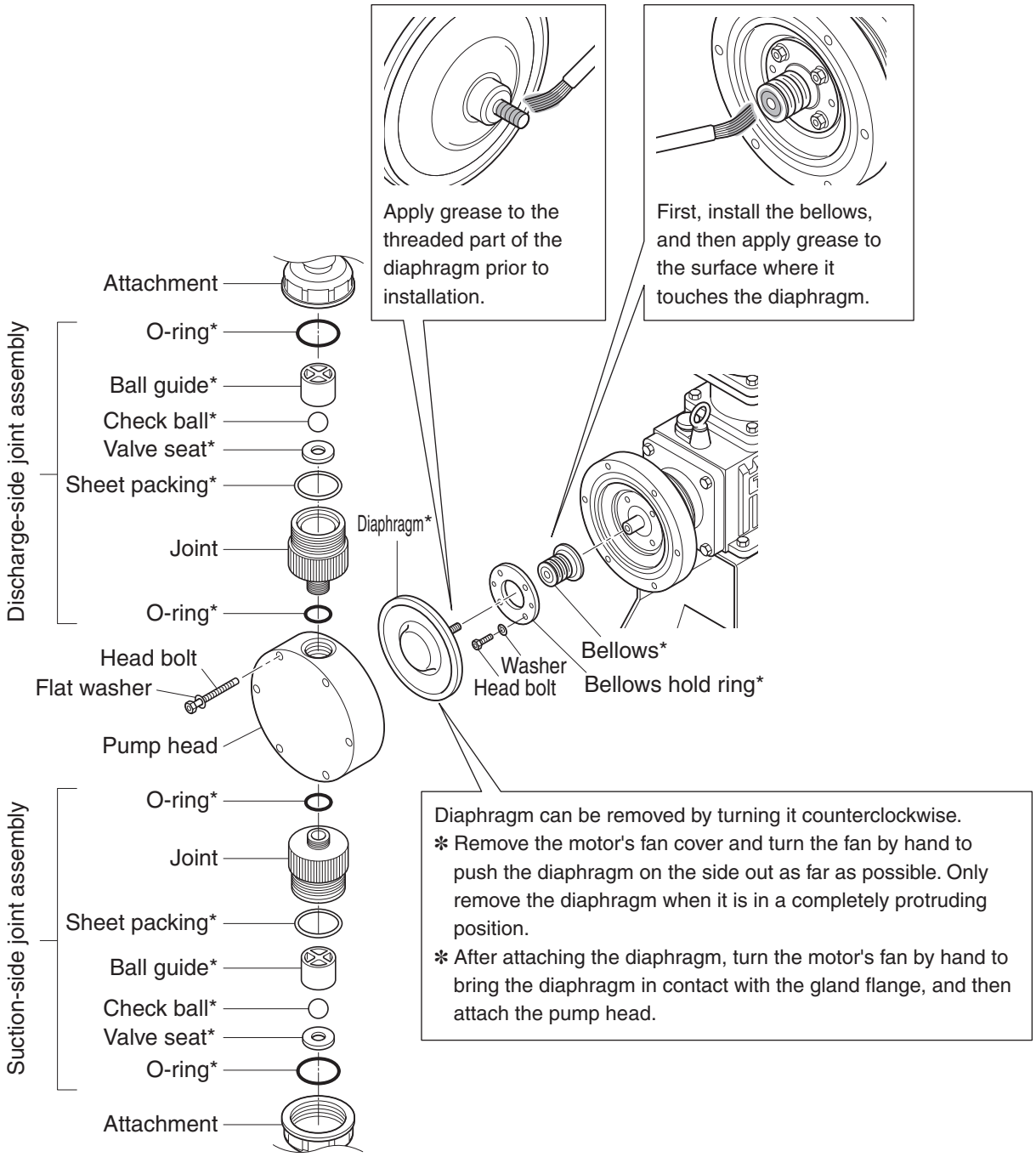
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VTCE/VTCF — 10/20

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 49.

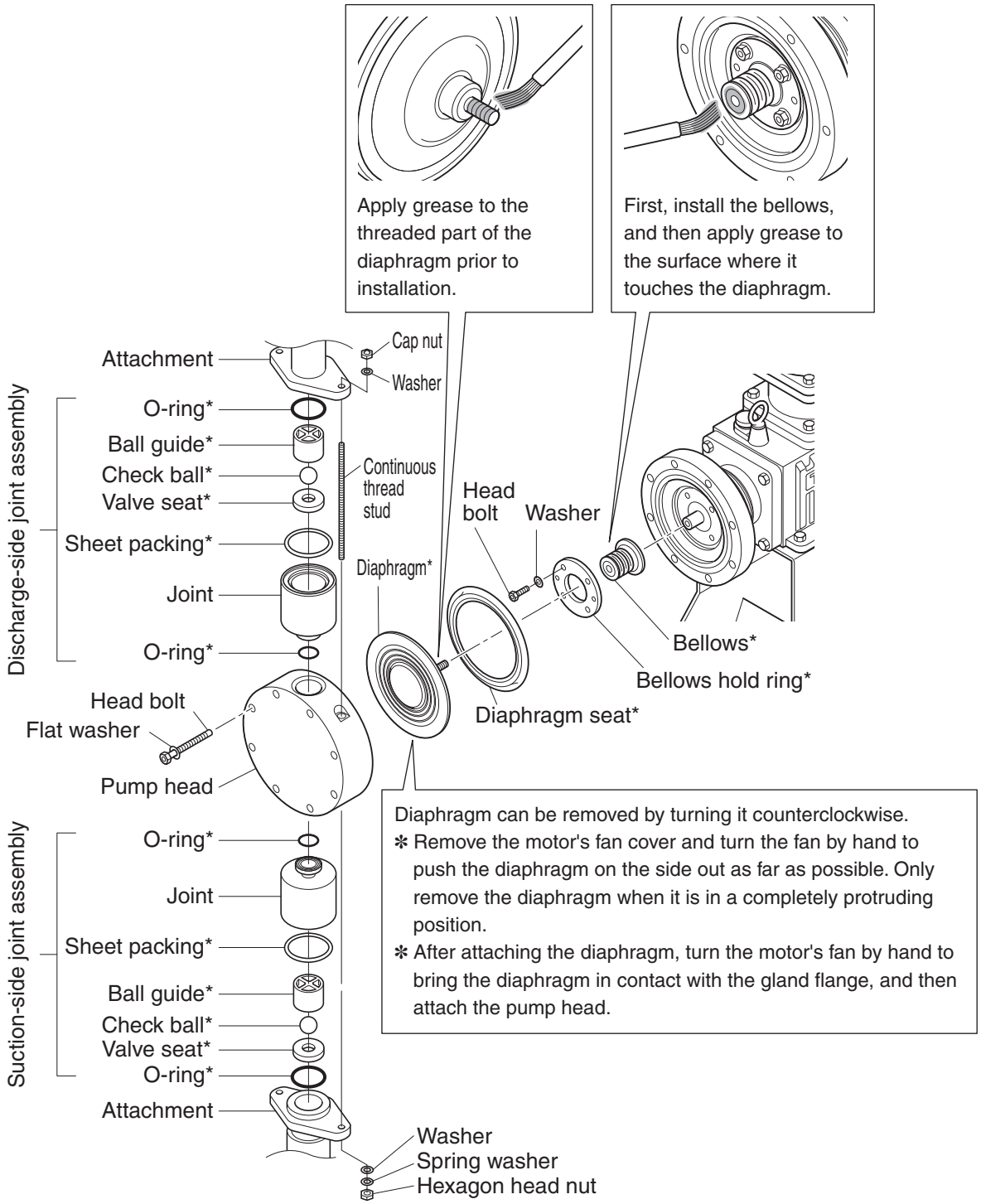
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VTCE/VTCF − 30

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 49.

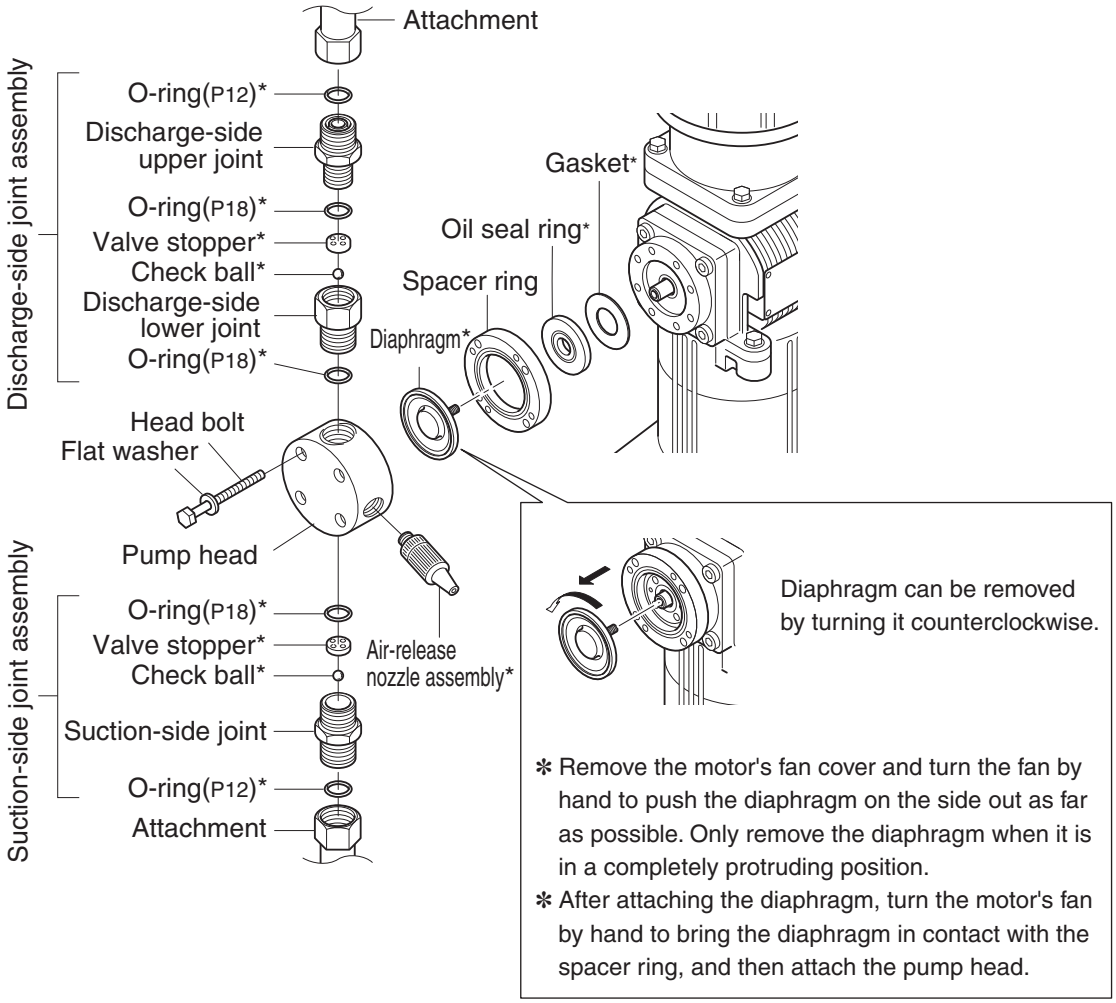
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

STST — 005/01/02/03/06

■Replacing the liquid - end materials



Diaphragm can be removed by turning it counterclockwise.

✻ Remove the motor's fan cover and turn the fan by hand to push the diaphragm on the side out as far as possible. Only remove the diaphragm when it is in a completely protruding position.

✻ After attaching the diaphragm, turn the motor's fan by hand to bring the diaphragm in contact with the spacer ring, and then attach the pump head.

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

✻ “Pump head set” which contains all the above parts is also available.

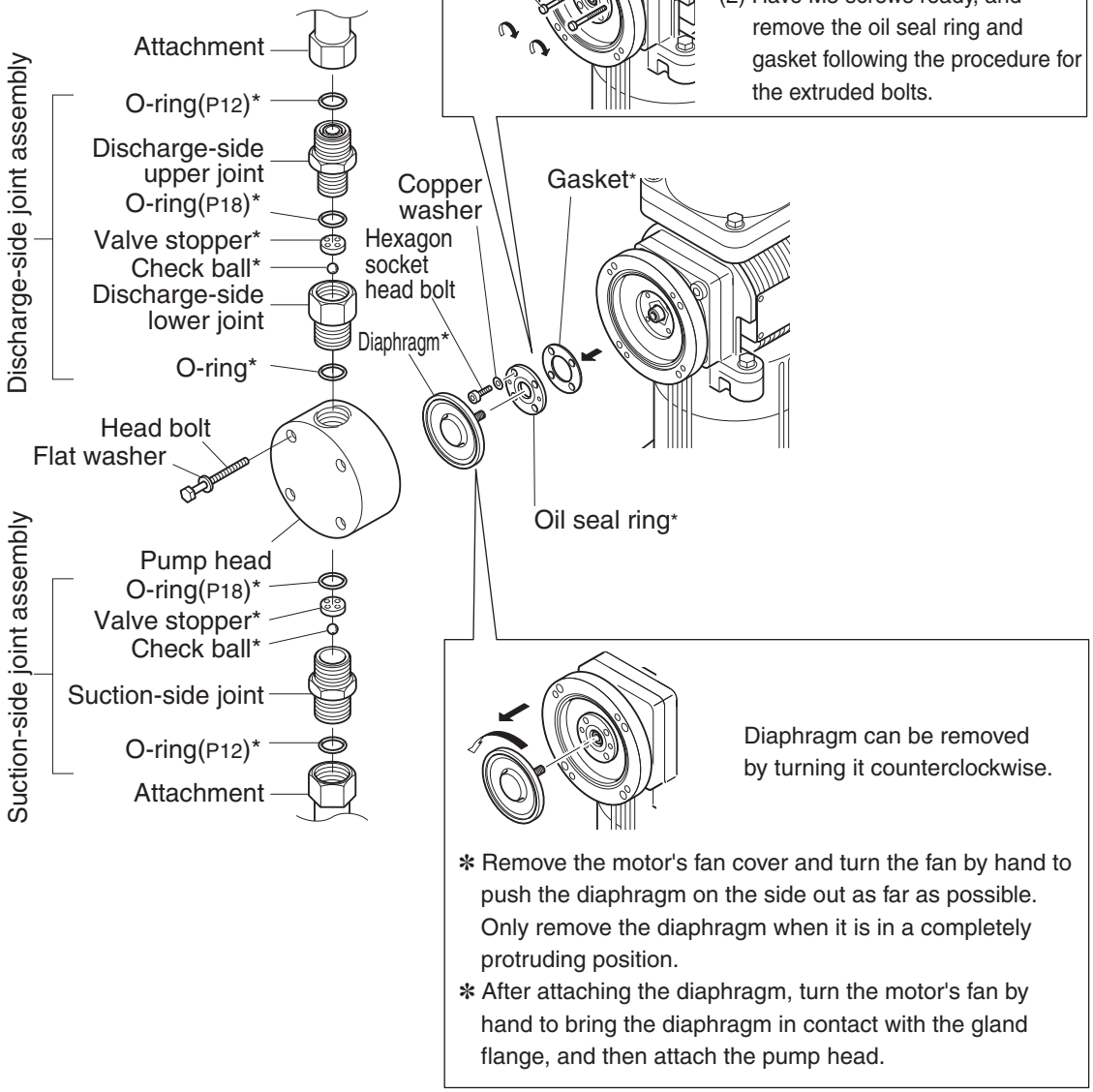
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

STST — 1/2

■Replacing the liquid - end materials



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

✻ “Pump head set” which contains all the above parts is also available.

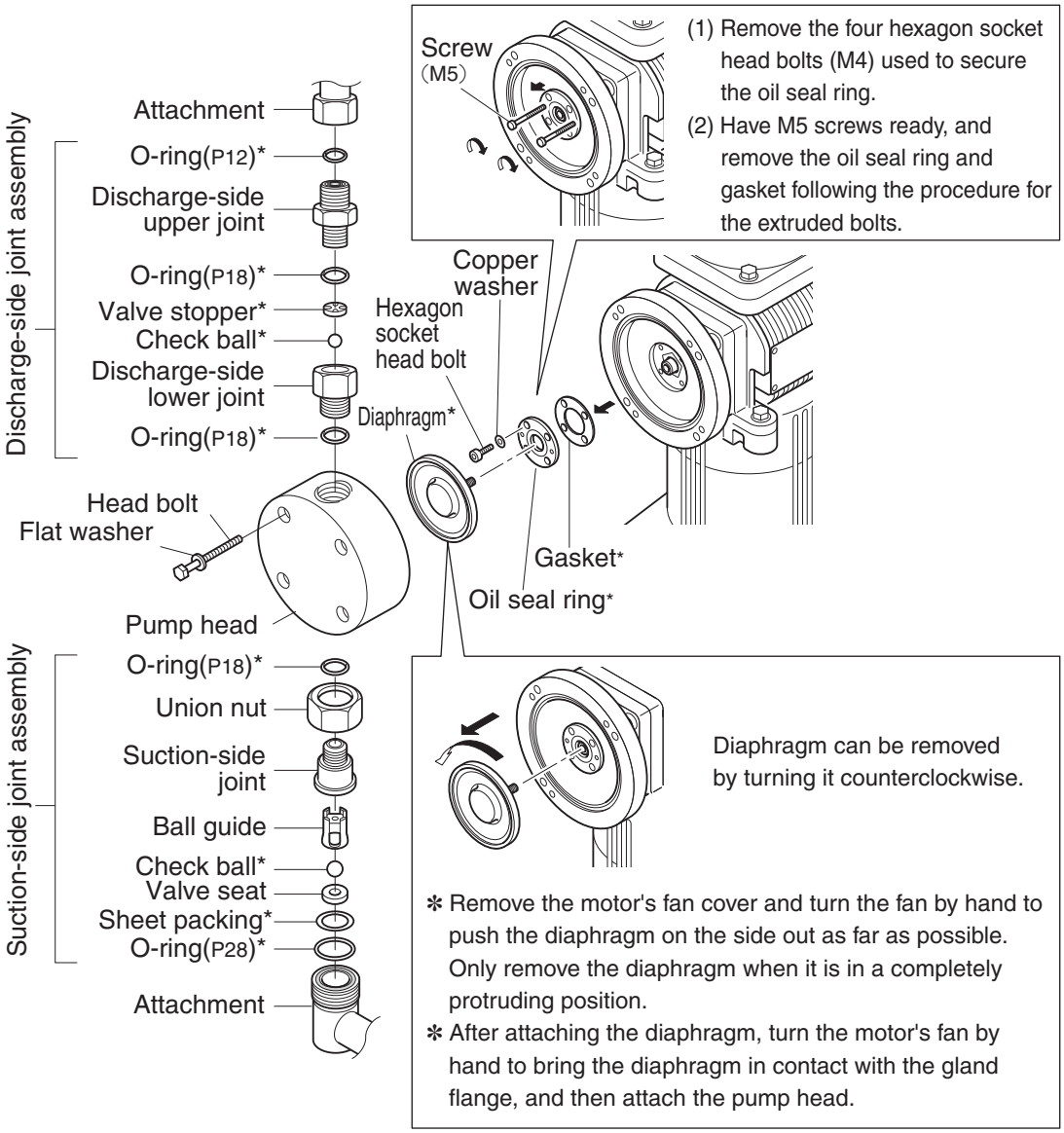
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

STST — 3/5

■Replacing the liquid - end materials



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

✻ “Pump head set” which contains all the above parts is also available.

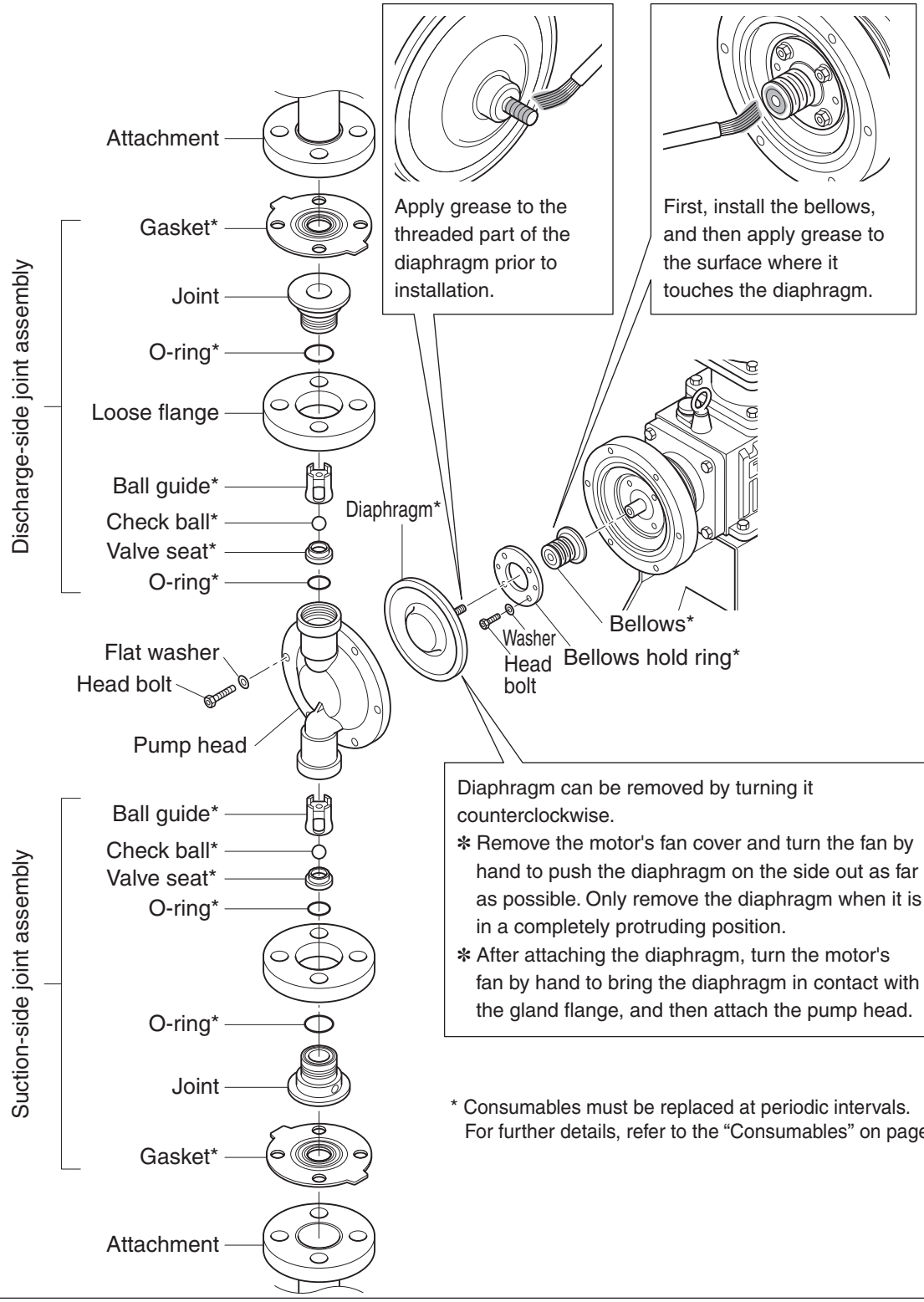
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

STST — 10/20

■Replacing the liquid - end materials



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

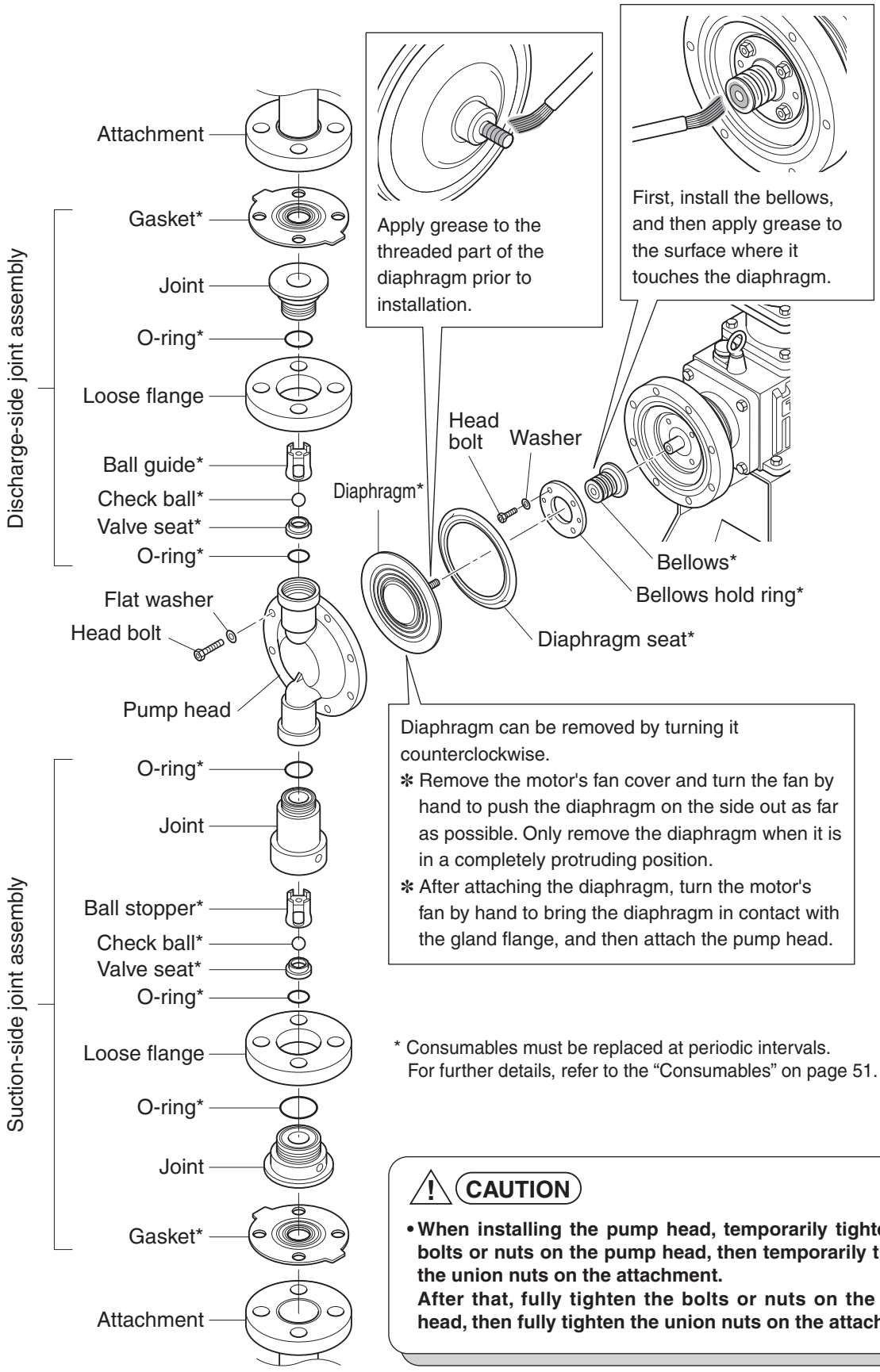
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

STST — 30

■Replacing the liquid - end materials



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

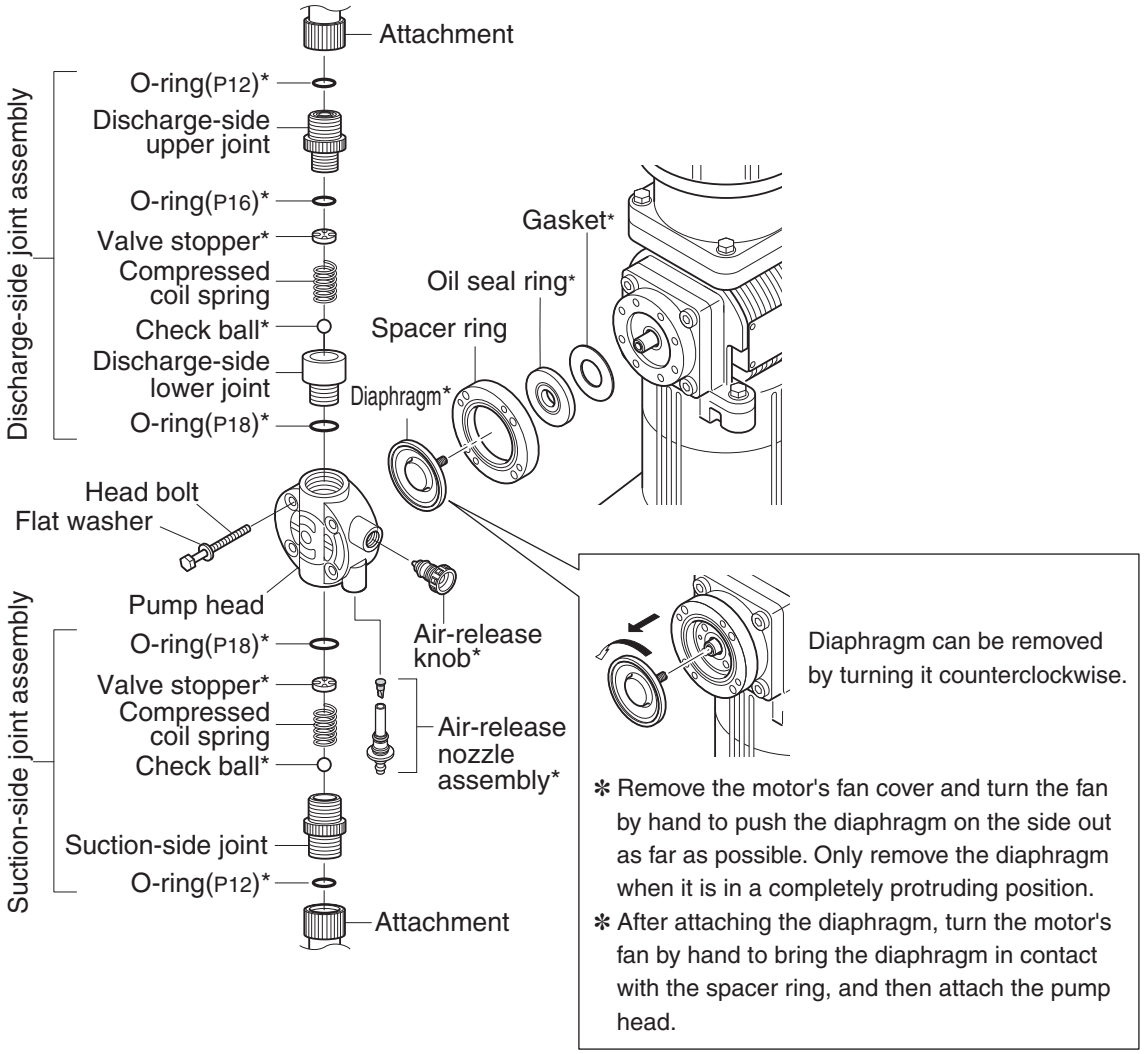
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VT6E/VT6F — 01/02/03/06

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 50.

✻ “Pump head set” which contains all the above parts is also available.

⚠ CAUTION

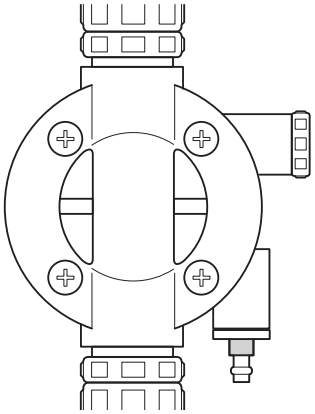
- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

Replacing the Air-bleeding Nozzle

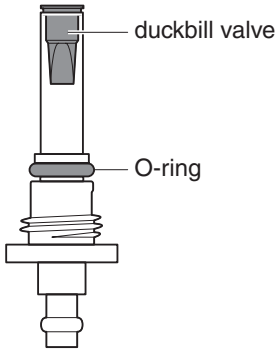
(1)If a relief hose or air-bleeding hose is connected, remove the hose.

(2)Remove the air-bleeding 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.

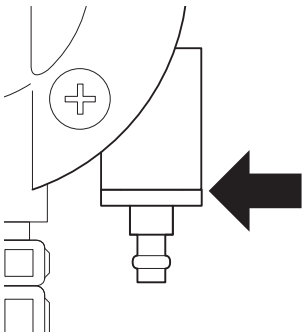


(3)Attach a new air-bleeding nozzle.

- Before attaching a new air-bleeding nozzle, check that the duckbill valve is inserted into the end of the air-bleeding 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-bleeding nozzle. Be careful not to lose the duckbill valve when handling it.**

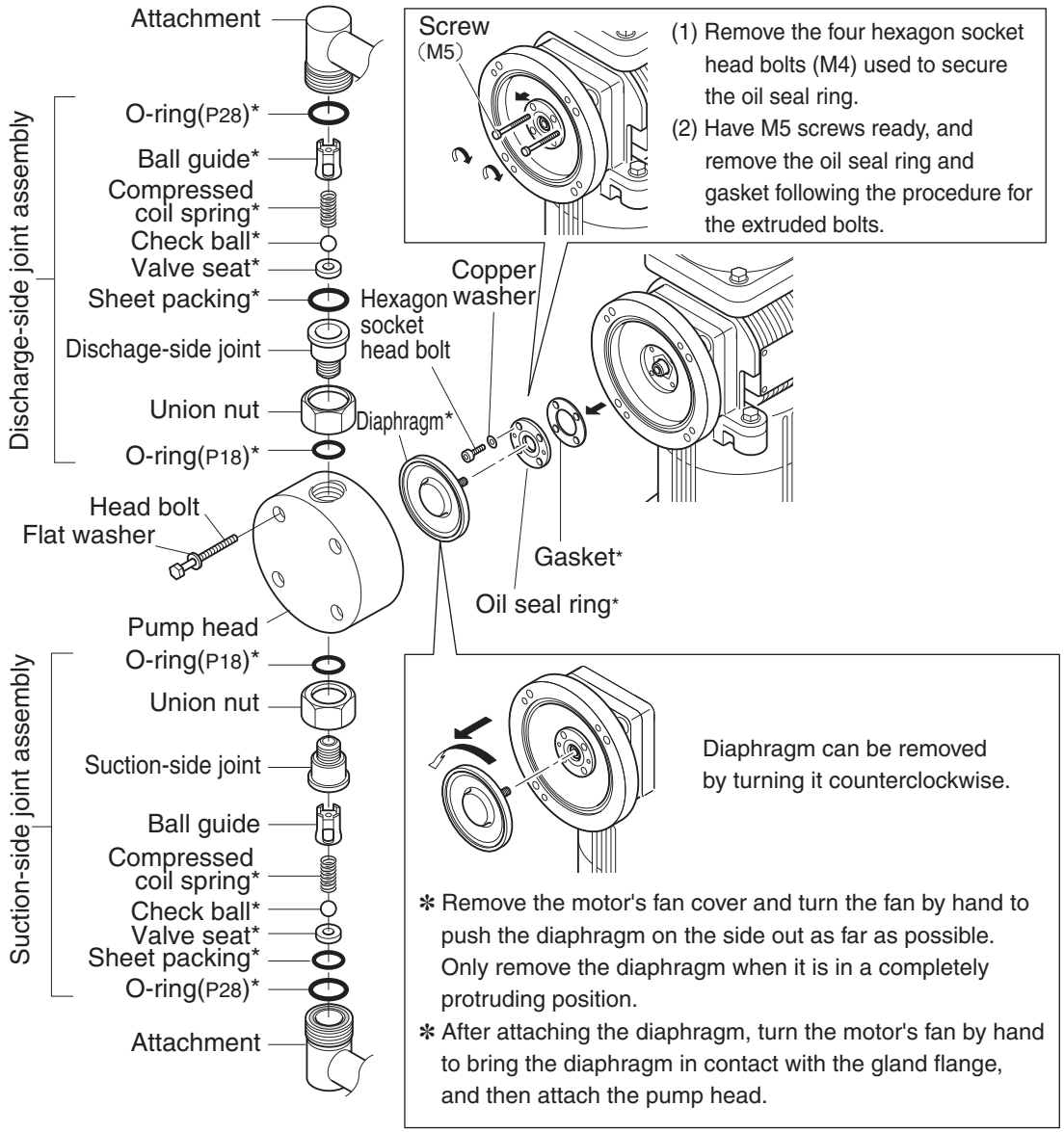
(4)Attach the pump head.

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

Replacing the liquid - end section

VT6E/VT6F — 1/2/3/5

■Replacing the liquid - end materials



* Consumables that must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 50.
✻ “Pump head set” which contains all the above parts is also available.

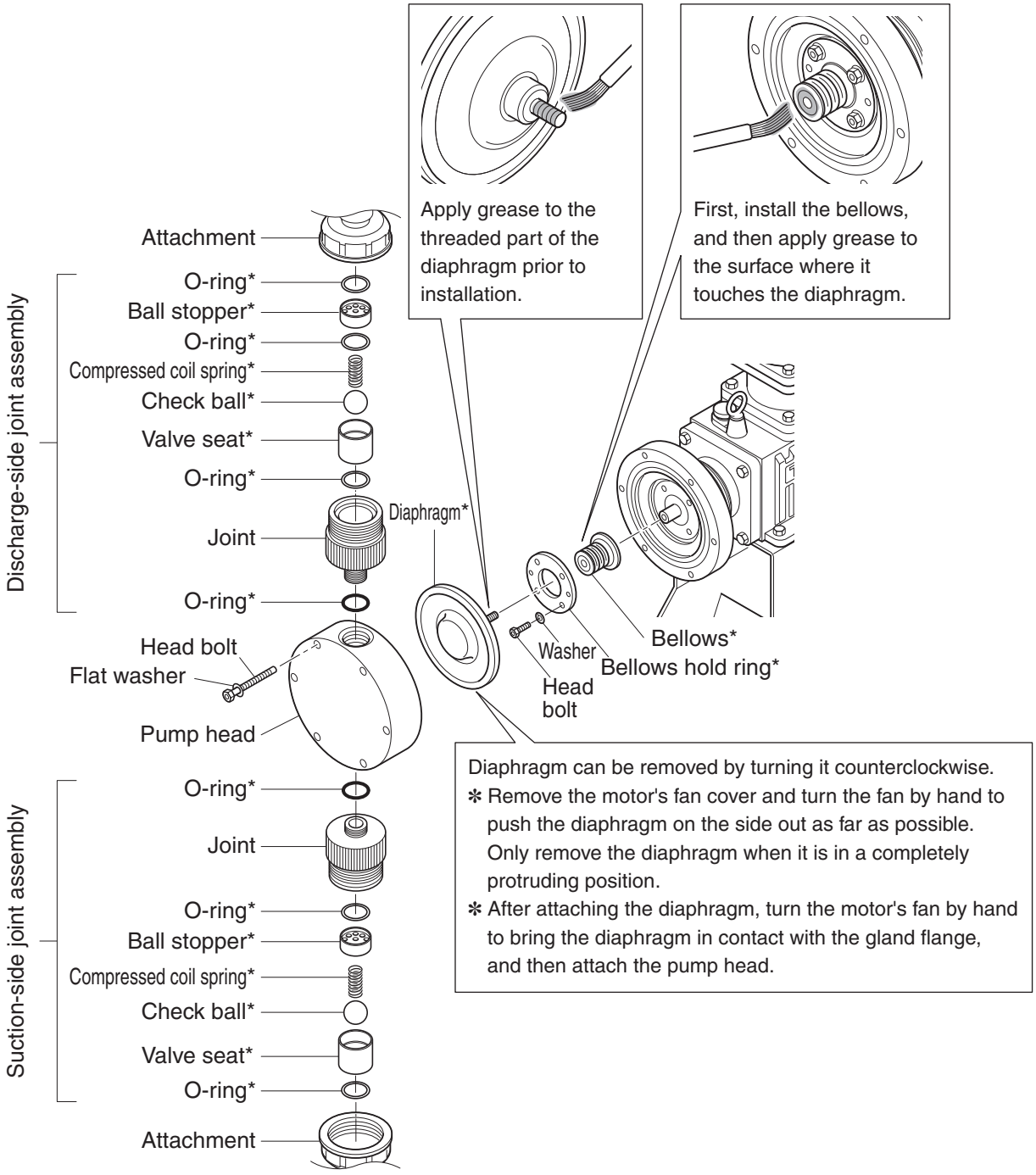
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VT6E/VT6F — 10/20

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 50.

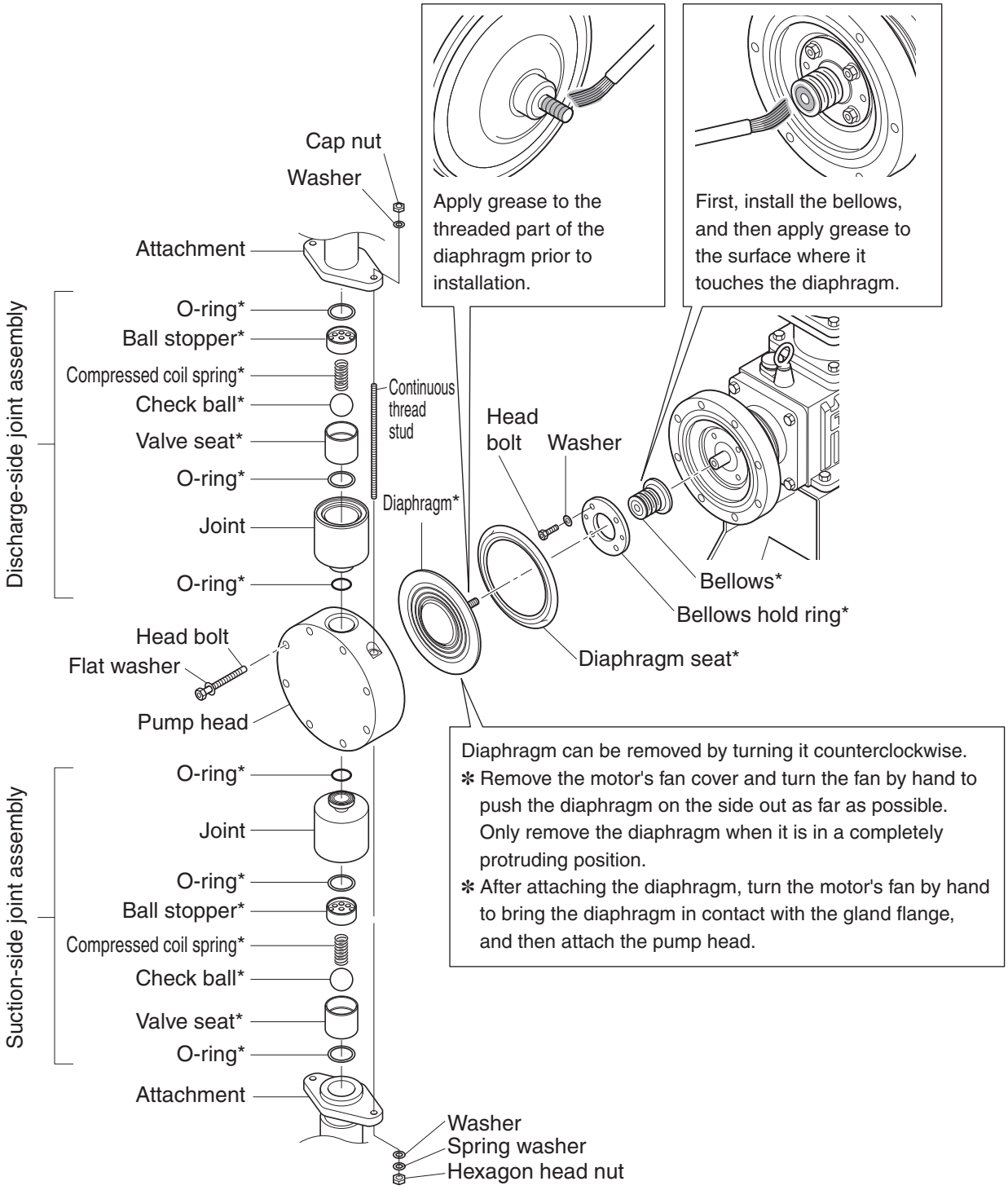
⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the liquid - end section

VT6E/VT6F — 30

■Replacing the liquid - end materials



* Consumables must be replaced at periodic intervals. For further details, refer to the “Consumables” on page 50.

⚠ CAUTION

- **When installing the pump head, temporarily tighten the bolts or nuts on the pump head, then temporarily tighten the union nuts on the attachment.**
  After that, fully tighten the bolts or nuts on the pump head, then fully tighten the union nuts on the attachment.

Replacing the gear oil

Type and amount of gear oil

⚠ CAUTION

- **Be absolutely sure to use the specified oil for the BPL-005/01/02/03/06/1/2/3/5. No guarantees are given in the event that a type of oil not specified by Tacmina has been used with trouble occurring as a result.**
- **Make sure to replace the parts in question at the recommended replacememt interval when either the accumulated operating time (4,000 hours) or the period of use (1 year) has been reached.**

■Gear oil

● BPL-005/01/02/03/06/1/2/3/5

• DO NOT use other brands.

Manufacturer	Brand of Oil
SUMICO LUBRICANT CO., LTD	MOLY OIL F320

As of June 2023

● BPL-10/20/30

When shipped, the pump is filled with Daphne Super Gear Oil 320, manufactured by Idemitsu Kosan Co., Ltd. Other recommended products can be checked by accessing the following URL.
www.tacmina.co.jp/gearoil

■Amount of gear oil

Refer to the table shown below and fill the pump with the necessary amount of gear oil.
After injecting the gear oil, stop the pump and check that the oil gauge is filled with gear oil up to the top.
If there is not enough gear oil, add more. If the oil level is low, there is a risk of breakdown.

✻ During pump operation, the accurate oil amount is not displayed.
Be sure to perform this check with the pump stopped.

Guidelines for the amount of gear oil to inject

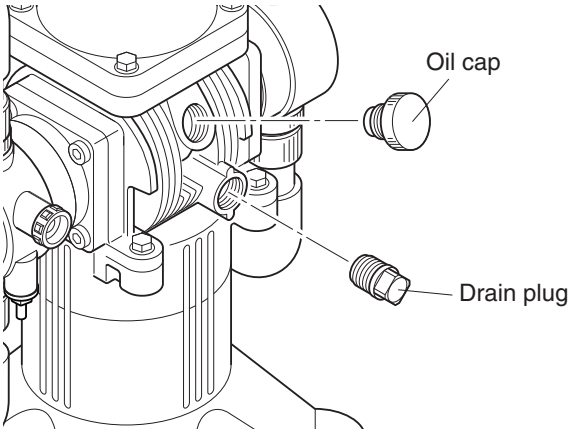
Models	Amount to inject
BPL-005 ～ 5	120mL
BPL-10 ～ 30	1.6L

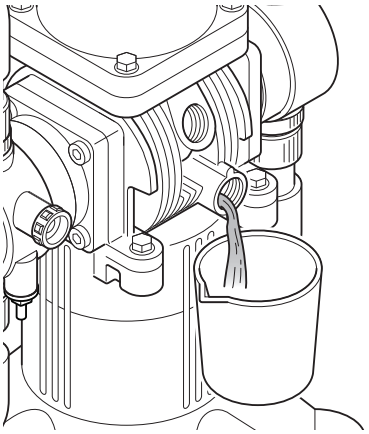
Replacing the gear oil

● BPL-005/01/02/03/06/1/2/3/5

(1) Remove the oil cap.

(2) Remove the drain plug. (Use the container prepared to catch the oil.)

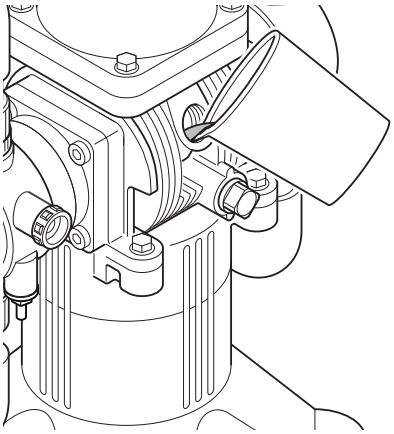




(3) Replace the sealing tape around the drain plug, and re-insert the plug.

✻ The proper torque when tightening the drain plug is as follows.
BPL-005 to 5 : 16 N·m
BPL-10 to 30 : 19.5 N·m
Do not use excessive force, as this may damage the drive box.

(4) Pour the oil (120 ml).



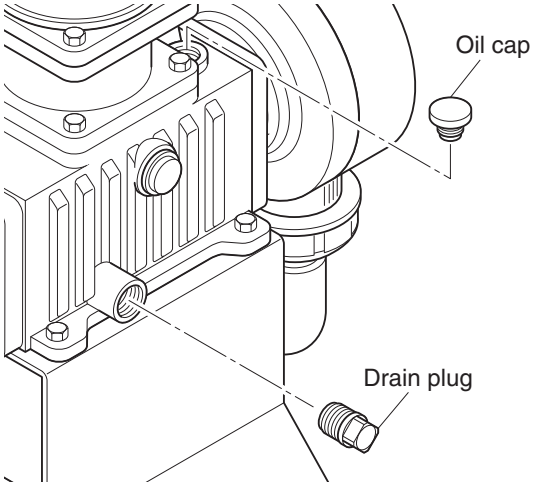
Replacing the gear oil

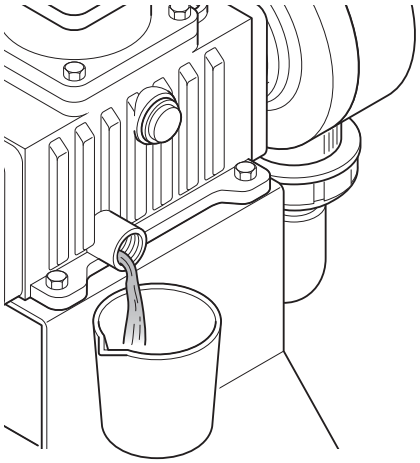
Replacing the gear oil

● **BPL-10/20/30**

(1) Remove the oil cap.

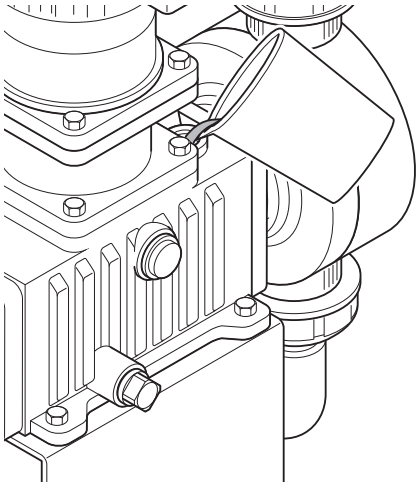
(2) Remove the drain plug. (Use the container prepared to catch the oil.)





(3) Replace the sealing tape around the drain plug, and re-insert the plug.

(4) Pour the oil.



Troubleshooting

■Liquid is not discharged.

Details of trouble		Cause	Remedy
Pump does not operate.	Motor does not run.	(1) Defective power supply and voltage	(1) Check the power supply and voltage, and connect to the correct power supply.
		(2) Defective motor wiring	(2) Inspect the wiring and correct as required.
		(3) Disconnection of leads	(3) Repair or replace.
		(4) Switch is OFF	(4) Turn ON the switch correctly.
		(5) Breaker tripped or fuse blown	(5) Check the causes, and restore or replace the fuse.
		(6) Fuse is blown	(6) Seek cause and replace the fuse.
		(7) Motor immersed in water	(7) Replace the motor.
		(8) Motor malfunction	(8) Replace the motor.
		(9) Defective magnet switch	(9) Replace the magnet switch.
		(10) Inverter malfunction	(10) Inspect and repair the inverter.
		(11) Inverter setting frequency too low	(11) Set the appropriate frequency.
	Motor runs.	(1) Damaged speed reduction mechanism	(1) Repair or replace.
		(2) Damaged eccentric cam mechanism	(2) Replace.
Pump operates though liquid is not transferred.	Air enters the pump.	(1) Gas is being generated due to the nature of the liquid.	(1) Remove causes of gas generation.
		(2) Liquid leaks from joints, seals, etc.	(2) Check O-rings, etc. and re-tighten.
		(3) Empty chemical tank	(3) Replenish transferred liquid and release air.
	Liquid is not sucked in.	(1) Clogged strainer	(1) Wash the strainer and tank.
		(2) Dirt biting into valve seats	(2) Disassemble and wash.
		(3) Scratched valve seats	(3) Replace.
	Liquid leakage	(1) Damaged diaphragm	(1) Replace the diaphragm.

■Low discharge volume

Details of trouble	Cause	Remedy
Low discharge volume though pump operates normally.	(1) Damaged diaphragm	(1) Replace the diaphragm.
	(2) Foreign matter biting into valve seats and check balls.	(2) Inspect and clean.
	(3) Air sucked in from suction-side piping	(3) Inspect and re-tighten the piping.
	(4) Defective valve seats and seals	(4) Replace the valve seat, check balls and O-rings.
	(5) Cavitation occurring in suction-side piping and pump head.	(5) Provide larger or shorter suction-side piping.

■Excessive discharge

Details of trouble	Cause	Remedy
Excessive discharge volume though pump operates normally.	(1) Overfeed is occurring.	(1) Review the piping and install a back pressure valve.
	(2) Connected to the suction side (minus pressed side) of the main pump	(2) Install a back pressure valve.
Liquid discharge does not stop.	(1) Siphoning is occurring.	(1) Review piping, and provide a ventilation duct or install a back pressure valve.
	(2) Air remains in piping, or damper effect is occurring.	(2) Release air inside the piping.

Troubleshooting

■Unstable discharge volume

Details of trouble	Cause	Remedy
Unstable discharge volume	(1) Cavitation occurring in suction-side piping and pump head.	(1) Provide larger or shorter suction-side piping.

■Large pulsation

Details of trouble	Cause	Remedy
Large pulsation	(1) Motor is rotating in the opposite direction. (2) The discharge volume of each pump head is not uniform as the check valve in the pump head is worn or foreign matter is biting into the check valve. (3) Pulsation is being carried in by the suction-side piping.	(1) Change the wiring or switch pump operation by the inverter. (2) Replace parts or disassemble and wash. (3) Connect the pump to the piping or firmly support the piping using flexible joints.

■Liquid leakage

Details of trouble	Cause	Remedy
Liquid leakage	(1) Pressure rise caused by blockage inside discharge-side piping (2) Damaged diaphragm (3) Insufficiently tightened screws (4) Insufficiently tightened attachment (5) Deteriorated O-rings (6) Defective valve seat mounting (7) Unevenly tightened bolts	(1) Disassemble and clean. (2) Replace the diaphragm. (3) Re-tighten. The bolts on the pump head are insufficiently tightened. (4) Re-tighten. (5) Replace. (6) Mount correctly. (7) Tighten the bolts evenly.

■Abnormal heat generation or sounds

Details of trouble	Cause	Remedy
Abnormal noise or heat is being generated at the drive section.	(1) Overload (2) Insufficient lubrication (3) External temperature or temperature of transferred liquid too high (4) Speed reduction mechanism worn or damaged (5) Damaged springs (6) Abnormal pressure applied on discharge side (7) Inverter setting frequency too high or too low	(1) Inspect discharge pressure and clogging of parts. (2) Inspect the gear oil. (3) Improve the installation environment. (4) Repair or replace. (5) Replace. (6) Inspect the piping. (7) Set the inverter to the appropriate frequency.

Model code

BPL	-	01	-	VTCE	-	F	W	X	-	CE
(1)		(2)		(3)		(4)	(5)	(6)		(7)

(1) Series name

(2) Model (discharge-volume standard)*1
005/01/02/03/06/1/2/3/5/10/20/30

(3) Liquid-end material*2

Type	Pump head	Dia-phragm	Check ball	O-ring
VTCE	PVC	PTFE	Ceramic	EPDM
VTCF				Fluoro rubber
VT6E			SUS316	EPDM
VT6F				Fluoro rubber
STST	SUS304*3		SUS304	PTFE*4

(4) Connection type*5

H	Hose*6
F	JIS Flange
A	ANSI flange*7
D	DIN flange*7
U	UNION
M	Screw(Rp female screw)*6

(5) Joint specification*8

W	Standard
V	High-viscosity type

(6) General specification*9

S	Standard
X	Special

(7) Applicable standard

CE	CE marking-compatible*9
Blank	None

*1 “10 to 30”cannot be selected as the model in (2) for CE marking-compatible.
*2 “005”cannot be selected as the model in (2) for VT6E/VT6F.
“V”is selected in (5).
*3 If “10 to 30” is selected as the model in (2), “SCS14” (equivalent to SUS316) should be selected.
*4 If “10 to 30” is selected as the model in (2), “PFA/Silicone” should be selected.
*5 “3 to 30” cannot be selected as the model in (2) for the hose type.
“3 to 30” cannot be selected as the model in (2) for the union type; “STST” is selected in (3).
“3 to 30” cannot be selected as the model in (2) for the screw type; “VTCE/VTCF” is selected in (3).
*6 For those who would like to use a hose other than the standard size listed in the specifications, select M rather than H and designate the desired hose size.
*7 Only 380V, 400V and 440V motor can be selected for ANSI/DIN connection type.
*8 “VT6E/VT6F” should be selected in (3) for the high-viscosity type.
*9 Select “X” in (6), if “CE” is selected in (7).
Only 380V and 400V motor (50Hz) can be selected for CE marking-compatible model.

✻ An X at the end of a model code indicates a made-to-order product. For the detailed specifications, see the diagrams, approval documents, or similar materials.

Specifications

Specifications \ Model				BPL-005	BPL-01	BPL-02	BPL-03	BPL-06
Max. discharge volume*1			L/min	0.05	0.14	0.2	0.3	0.6
			L/h	3	8.4	12	18	36
			US G/h	0.79	2.21	3.16	4.75	9.5
Max. discharge pressure			MPa	1.0				
			bar	10				
			psi	145				
Discharge volume control range			1 : n	1 : 10				
			Hz	6 to 60				
Stroke speed			strokes/min	105			119	105
Stroke length			mm	2	3			6
Connection	Standard type	Hose*2	Discharge side	6 × 11 PVC braided(standard) ／ 6 × 8PE ／ 1/4 × 3/8PE			12 × 18 PVC braided(standard)	
			Suction side	12 × 18 PVC braided(standard)				
		Flange	Discharge side	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15				
			Suction side	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15				
		Union*3		R3/8				
		Screw*4		Rp1/2				
	High-viscosity type	Hose	Discharge side	–	12 × 18 PVC braided			
			Suction side	–	12 × 18 PVC braided			
		Flange*5	Discharge side	–	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15			
			Suction side	–	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15			
Transferable viscosity			Standard	50mPa·s or less				
			High viscosity type	–	50 to 2000mPa·s			
Allowable temperature			Ambient temperature	0 to 40˚C				
			Transfering liquid	PVC type : 0 to 40˚C ／ SUS type : 0 to 60˚C (no freezing allowed)				
Motor		Type		Totally enclosed fan-cooling outdoor type				
		Power supply (V) / frequency (Hz) / no. of poles (P)*5		3-phase ／ 200V (50Hz), 200V (60Hz), 220V (60Hz), 380V (50Hz), 400V (50Hz/60Hz), 440V (60Hz) ／ 4P				
		Output (kW)		0.2				
		Reduction ratio		1/17			1/15	1/17
		Rated current/ Max. Start current (A)	200V/50Hz	1.24 ／ 4.6				
			200V/60Hz	1.09 ／ 4.2				
			220V/60Hz	1.09 ／ 4.8				
			380V/50Hz*5	0.61 ／ 2.2				
			400V/50Hz*5	0.62 ／ 2.3				
			400V/60Hz*5	0.55 ／ 2.1				
			440V/60Hz*5	0.55 ／ 2.4				
		Insulation class		E [F]				
		Cable conduit connection diameter		PF1/2 [M24 × 1.5, M16 × 1.5]				
Pump paint color				Body : Munsell (approximate) 10YR7.5/14 Motor : Munsell (approximate) N5.5				
Weight		VTCE/VTCF flange type (kg)		11 [12]				
		STST flange type (kg)		15 [16]				
Sound pressure level				78dB				

✻ The specifications listed here correspond to the case in which the motor and inverter that are used are TACMINA-standard devices.
✻ The specifications and capacity listed are for VTCE/VTCF type.
✻ Letters in parentheses [ ] are for CE marking-compatible model.
*1 The discharge volume applies to the Max. discharge pressure.
*2 STST type discharge side:BPL-005 to 02, 10mm dia.×12mm dia.
BPL-03 and 06, 12mm dia.×15mm dia.
STST type suction side:BPL-005 to 06, 12mm dia.×15mm dia.
*3 STST type only.
*4 VTCE/VTCF type only.
*5 Only 380V, 400V, and 440V motor can be selected for ANSI/DIN connection type.
Only 380V and 400V motor (50Hz) can be selected for CE marking-compatible model.

Specifications

Specifications \ Model				BPL-1	BPL-2	BPL-3	BPL-5
Max. discharge volume*1			L/min	1	2	3	5
			L/h	60	120	180	300
			US G/h	15.84	31.68	47.52	79.2
Max. discharge pressure*2			MPa	1.0	0.5		
			bar	10	5		
			psi	145	72.5		
Discharge volume control range*2			1 : n	1 : 10		1 : 4	1 : 2
			Hz	6 to 60		15 to 60	30 to 60
Stroke speed			strokes/min	105	119		
Stroke length			mm	6		4	6
Connection	Standard type	Hose*3	Discharge side	12 × 18 PVC braided(standard)		–	
			Suction side	12 × 18 PVC braided(standard)		–	
		Flange	Discharge side	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15			
			Suction side	JIS10K15A ／ ANSI150Lb1/2B ／ DIN250 1PN10 DN15		JIS10K25A ／ ANSI150Lb1B ／ DIN250 1PN10 DN25	
		Union*4		R3/8		–	
		Screw*5		Rp1/2		–	
	High-viscosity type	Hose	Discharge side	19 × 26 PVC braided		–	
			Suction side	19 × 26 PVC braided		–	
		Flange*6	Discharge side	JIS10K25A ／ ANSI150Lb1B ／ DIN250 1PN10 DN25			
			Suction side	JIS10K25A ／ ANSI150Lb1B ／ DIN250 1PN10 DN25			
Transferable viscosity			Standard	50mPa·s or less			
			High viscosity type	50 to 1000mPa·s			
Allowable temperature			Ambient temperature	0 to 40˚C			
			Transfering liquid	PVC type : 0 to 40˚C ／ SUS type : 0 to 60˚C (no freezing allowed)			
Motor	Type			Totally enclosed fan-cooling outdoor type			
	Power supply (V) / frequency (Hz) / no. of poles (P)*6			3-phase ／ 200V (50Hz), 200V (60Hz), 220V (60Hz), 380V (50Hz), 400V (50Hz/60Hz), 440V (60Hz) ／ 4P			
	Output (kW)			0.2			
	Reduction ratio			1/17	1/15		
	Rated current/ Max. Start current (A)		200V/50Hz	1.24 ／ 4.6			
			200V/60Hz	1.09 ／ 4.2			
			220V/60Hz	1.09 ／ 4.8			
			380V/50Hz*6	0.61 ／ 2.2			
			400V/50Hz*6	0.62 ／ 2.3			
			400V/60Hz*6	0.55 ／ 2.1			
			440V/60Hz*6	0.55 ／ 2.4			
	Insulation class			E [F]			
	Cable conduit connection diameter			PF1/2 [M24 × 1.5, M16 × 1.5]			
Pump paint color				Body : Munsell (approximate) 10YR7.5/14 Motor : Munsell (approximate) N5.5			
Weight	VTCE/VTCF flange type (kg)			12 [13]	13 [14]	15 [16]	
	STST flange type (kg)			16 [17]	18 [19]	25 [26]	
Sound pressure level				78dB			

* The specifications listed here correspond to the case in which the motor and inverter that are used are TACMINA-standard devices.
* The specifications and capacity listed are for VTCE/VTCF type.
* Letters in parentheses [ ] are for CE marking-compatible model.

*1 The discharge volume applies to the Max. discharge pressure.

*2 In the case of models BPL-3/5, the maximum discharge pressure is 0.3MPa when a setting of 1 : 10 (6 to 60Hz) is used for the discharge volume control range.

*3 STST type discharge side:BPL-1 and 2, 12mm dia.×15mm dia.
STST type suction side:BPL-1 and 2, 12mm dia.×15mm dia.

*4 STST type only.

*5 VTCE/VTCF type only.

*6 Only 380V, 400V, and 440V motor can be selected for ANSI/DIN connection type.
Only 380V and 400V motor (50Hz) can be selected for CE marking-compatible model.

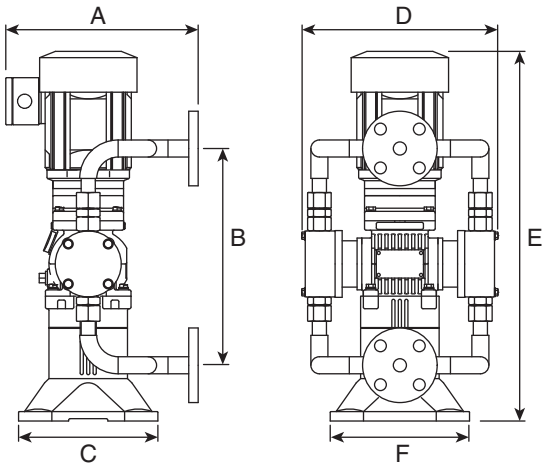
Specifications

Specifications \ Model			BPL-10	BPL-20	BPL-30
Max. discharge volume*1		L/min	10	20	30
		L/h	600	1200	1800
		US G/h	158.4	316.8	475.2
Max. discharge pressure		MPa	0.5		
		bar	5		
		psi	72.5		
Discharge volume control range		1 : n	1:10		
		Hz	6 to 60		
Stroke speed		strokes/min	84	104	
Stroke length		mm	10	13	20
Connection	Hose		–		
	Flange	Discharge side	JIS10K25A DIN2501 PN10DN25 ANSI150LB 1B	JIS10K40A DIN2501 PN10DN40 ANSI150LB 1-1/2B	
		Suction side	JIS10K25A*2 DIN2501 PN10DN25 ANSI150LB 1B	JIS10K40A DIN2501 PN10DN40 ANSI150LB 2B	
	Union		–		
	Screw		–		
Transferable viscosity	Standard		50mPa·s or less		
	High-viscosity type		2000mPa·s or less		
Allowable temperature	Ambient temperature		0 to 40℃		
	Liquid temperature		PVC type:0 to 40℃ ／ SUS type:0 to 60℃ (no freezing allowed)		
Motor	Type		Totally enclosed fan-cooling outdoor type		
	Power supply(V)/ frequency(Hz)/no. of poles(P)*3		3-phase ／ 200V(50Hz/60Hz),220V(60Hz) ／ 4P		
	Output(kW)		0.4	0.75	1.5
	Reduction ratio		1/21	1/17	
	Rated current/ Max.startup current(A)	200V/50Hz	2.35 ／ 9.1	4.29 ／ 26.3	7.48 ／ 45.0
		200V/60Hz	2.05 ／ 8.3	3.73 ／ 23.9	6.80 ／ 41.1
		220V/60Hz	2.02 ／ 9.4	3.78 ／ 26.7	6.57 ／ 45.7
	Insulation class		E	F	
	Cable conduit connection diameter		PF1/2	G3/4	
Pump paint color			Body : Munsell (approximate) 10YR7.5/14 Motor : Munsell (approximate) N5.5		
Weight	VTCE/VTCF flange type(kg)		46	69	77
	STST flange type(kg)		64	91	101
Sound pressure level			78dB		

✻ The specifications listed here correspond to the case in which the motor and inverter that are used are TACMINA-standard devices.
✻ The specifications and capacity listed are for VTCE/VTCF type.
*1 The discharge volume applies to the Max. discharge pressure.
*2 For VT6E/VT6F types, JIS10K40A is used for the suction side of BPL-10.
*3 Other motors are also available. For details, contact your TACMINA representative.

External Dimensions

* The example given here is of the standard model. For information on the separate models, see the diagrams.

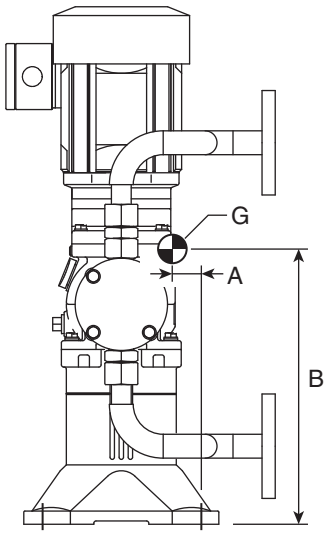


Unit: mm

	A	B	C	D	E	F
BPL-005-STST-FWS	245	267.5	177	235	471	177
BPL-01-STST-FWS	245	267.5	177	242	471	177
BPL-02-STST-FWS	245	267.5	177	242	471	177
BPL-03-STST-FWS	245	267.5	177	246	471	177
BPL-06-STST-FWS	245	267.5	177	246	471	177
BPL-1-STST-FWS	245	276	177	250	471	177
BPL-2-STST-FWS	245	292	177	274	471	177
BPL-3-STST-FWS	275	293	177	291	471	177
BPL-5-STST-FWS	275	293	177	291	471	177
BPL-10-STST-FWS	-	380	350	561	796	350
BPL-20-STST-FWS	410	523	350	601	910	350
BPL-30-STST-FWS	425	545	350	677	937	350

Center of Gravity

* The information given here indicates the center of gravity when no motor is attached.
* If the center of gravity differs, such as with made-to-order products, the value written in the diagram shall be taken as correct.



Unit: mm

	A	B
BPL-005/01/02/03/06/1/2/3/5	28	255
BPL-10	90	551
BPL-20/30	90	555

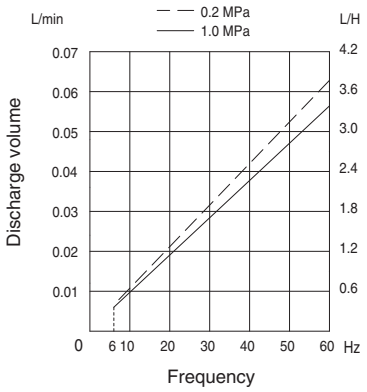
Performance curves

The following performance curves were obtained by measuring on test equipment at TACMINA under the following conditions. These performance curves may differ slightly depending on various on-site conditions and product differences. Measure the discharge volume under actual operating conditions, and set the frequency according to the performance curve that is obtained.

■BPL-VTCE/VTCF-HW/FW/MW

Conditions: clean water, room temperature

005



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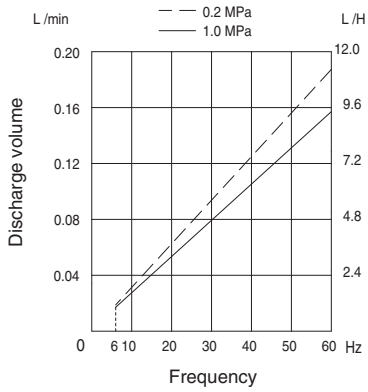

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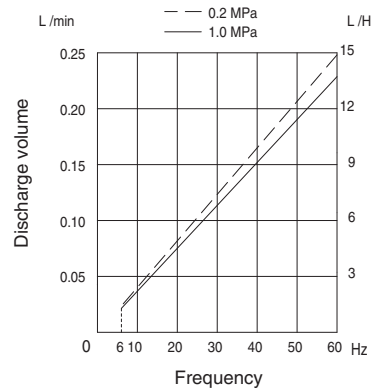

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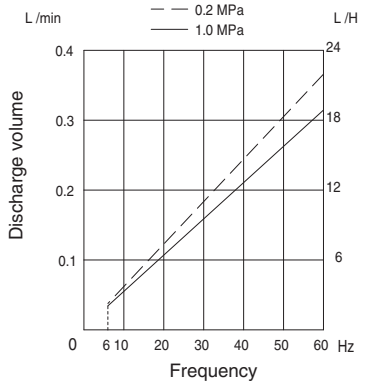

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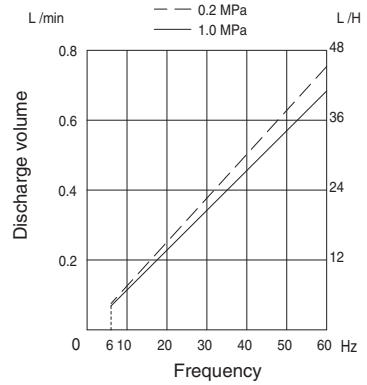

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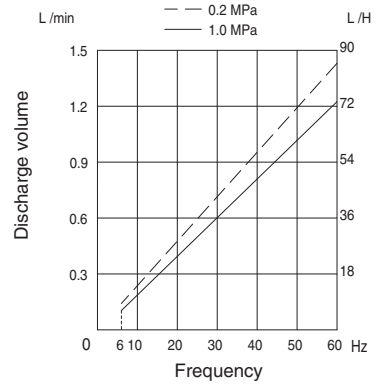

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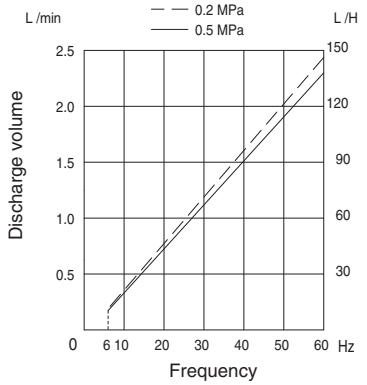

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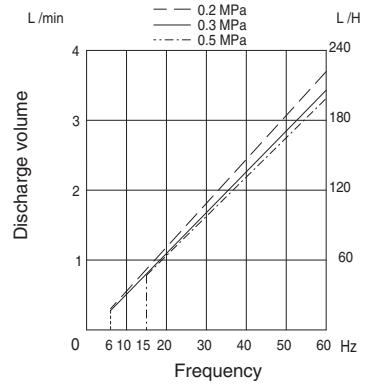

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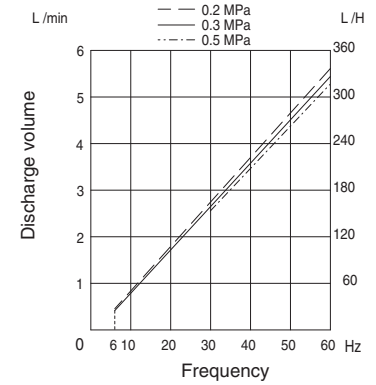

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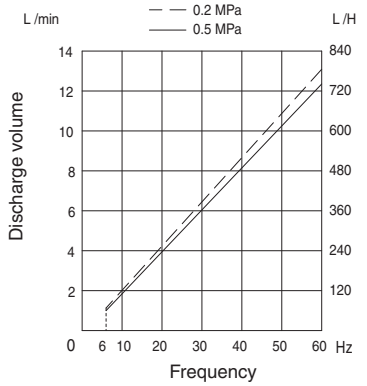

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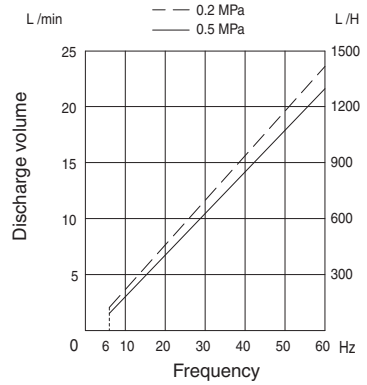

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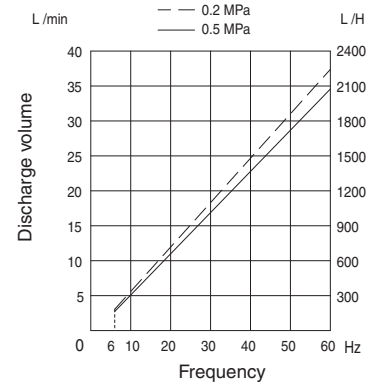
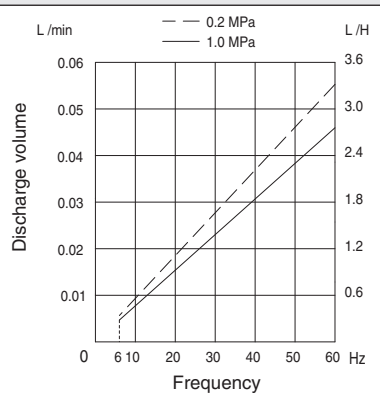


Performance curves

■BPL-STST-FW/UW

Conditions: clean water, room temperature

005



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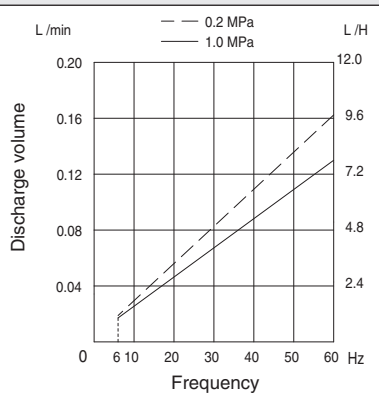

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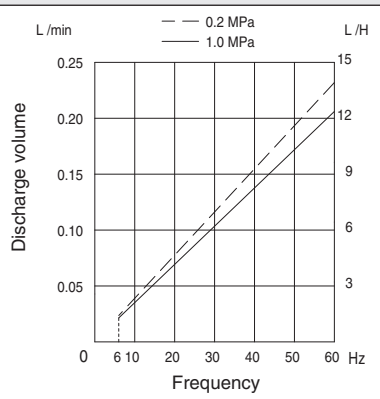

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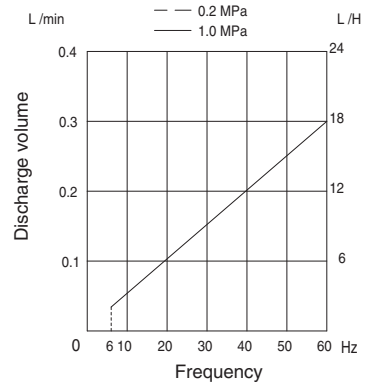

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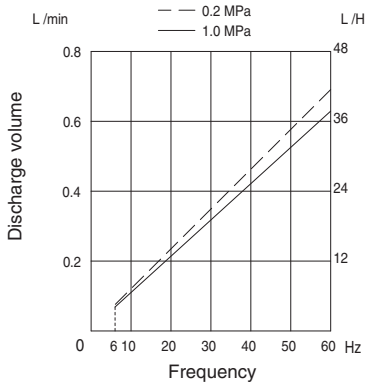

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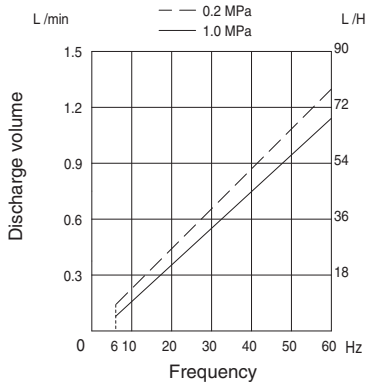

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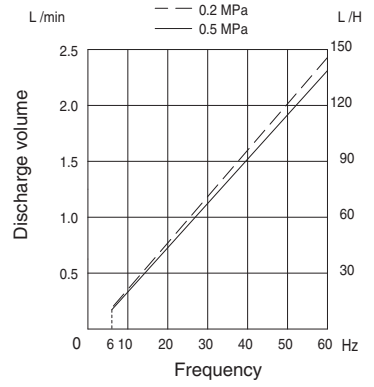

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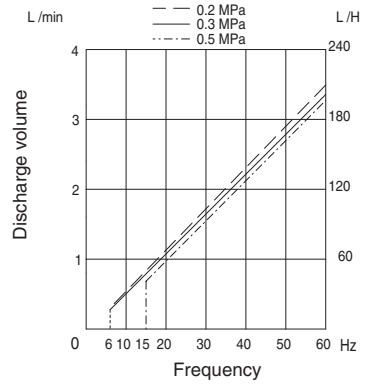

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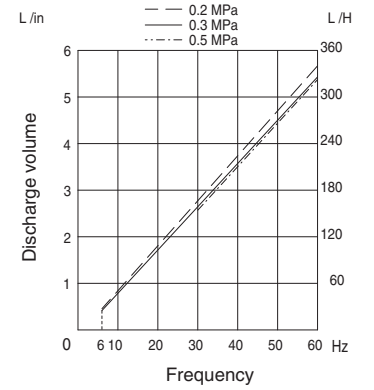

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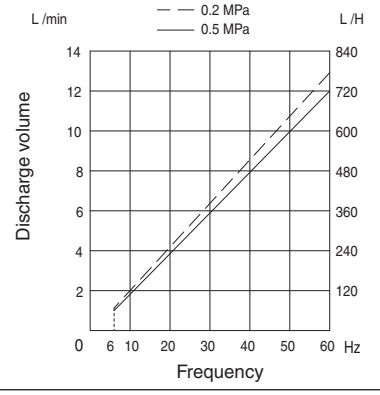

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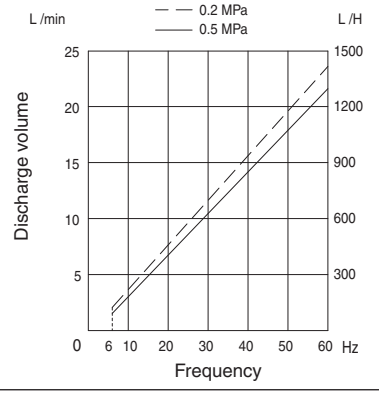

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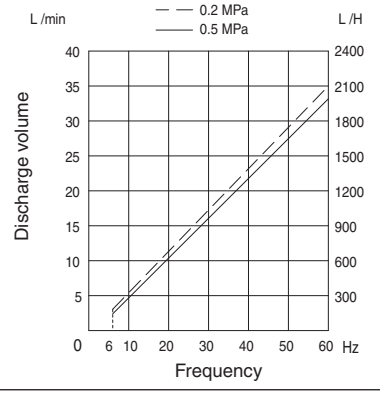

Performance curves

■BPL-STST-HW

Conditions: clean water, room temperature

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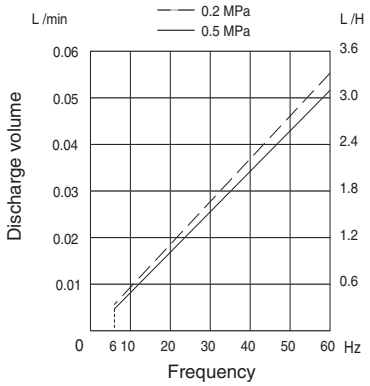	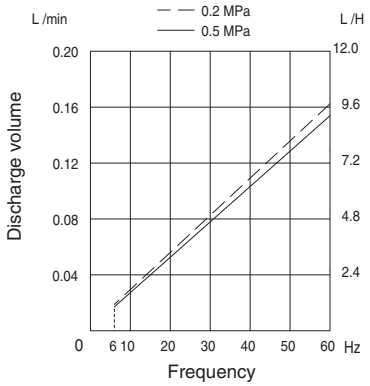	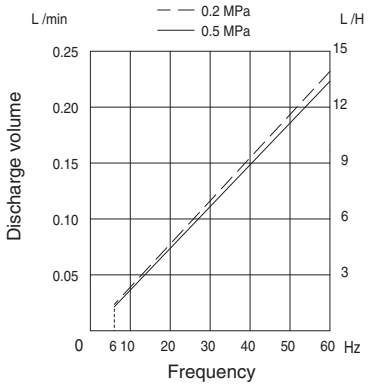
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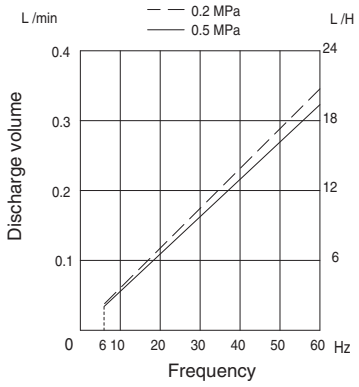	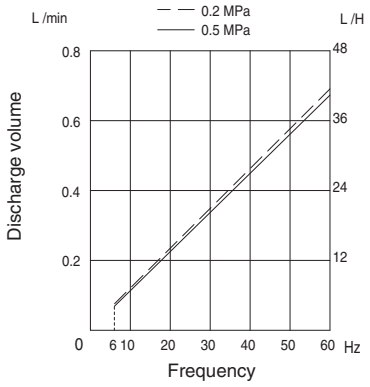	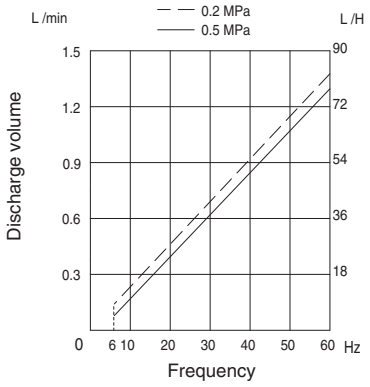
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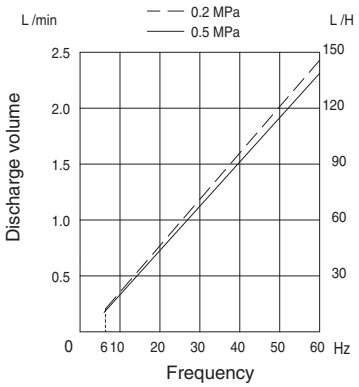		

Performance curves

■BPL-VT6E/VT6F-HV/FV

Conditions: clean water, room temperature

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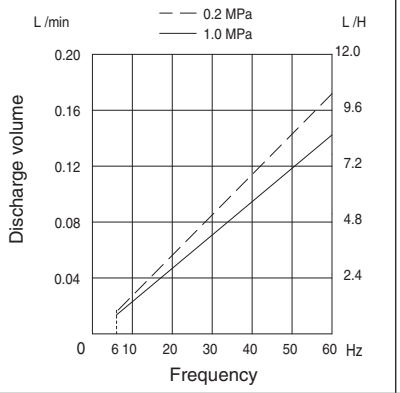

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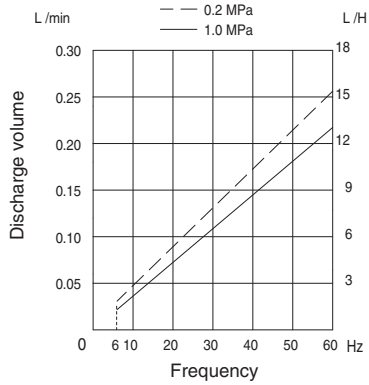

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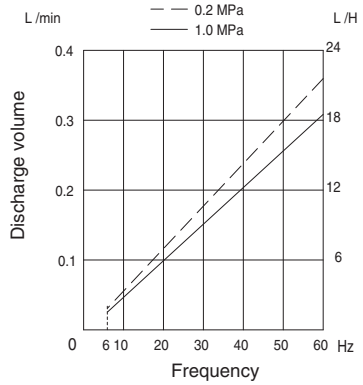

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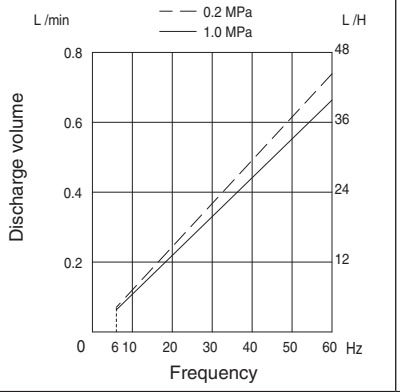

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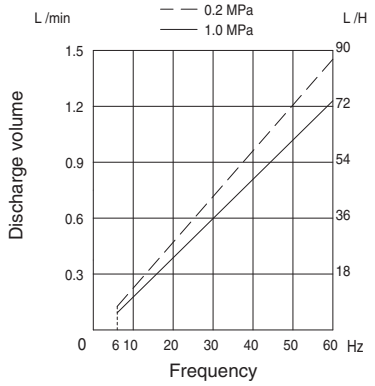

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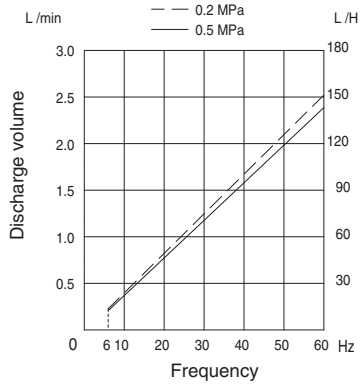

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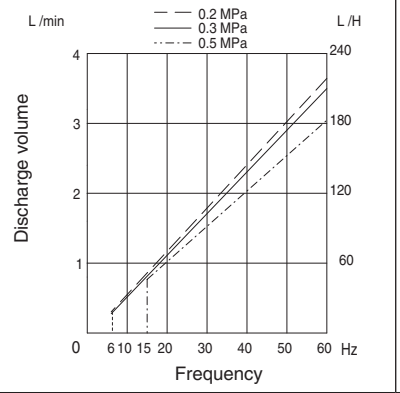

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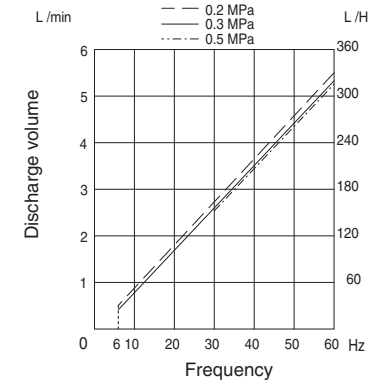

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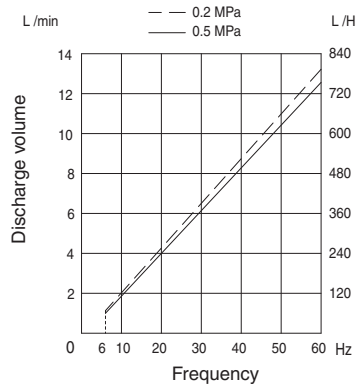

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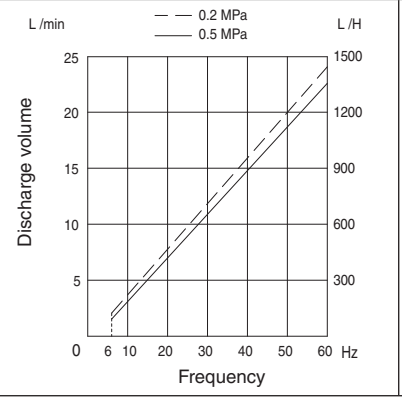

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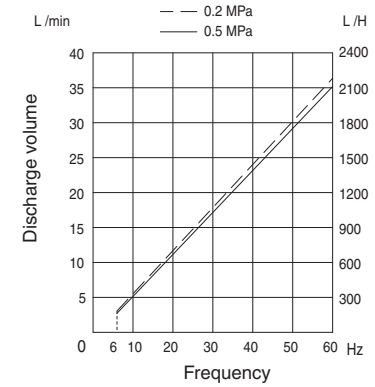

Specifications

List of consumables

The recommended replacement interval is shown in the table below.
The recommended replacement cycles are for cases where the pump is operated under constant conditions (room temperature and clean water). These cycles change according to individual site conditions. Use these cycles as rough guidelines for replacing consumables. Neglecting to replace consumables may cause defective discharge (injection) or malfunction.

■BPL-005/01/02/03/06-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat assembly	4	
O-ring(P12)	4	
Gear oil	120mL	
Oilseal ring assembly	2	
Air-release nozzle assembly	2	
Air-release knob	2	

* Whichever is reached the earliest

■BPL-1/2-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Valve stopper	4	
O-ring (P12)	4	
O-ring (P16)	2	
O-ring (P18)	4	
Gear oil	120mL	
Oilseal ring assembly	2	

* Whichever is reached the earliest

■BPL-3/5-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball (ϕ11.11)	2	
Check ball (ϕ15.875)	2	
Valve stopper	2	
Ball guide	2	
O-ring (P12)	2	
O-ring (P16)	2	
O-ring (P18)	4	
O-ring (P28)	2	
Gear oil	120mL	
Oilseal ring assembly	2	
Sheet packing	4	
Valve seat	4	

* Whichever is reached the earliest

■BPL-10-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Ball guide	4	
Valve seat	4	
Sheet packing	4	
O-ring(P21)	4	
O-ring(P38)	4	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-20-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Ball guide	4	
Valve seat	4	
Sheet packing	4	
O-ring(P29)	4	
O-ring(G55)	4	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-30-VTCE/VTCF

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat(Discharge side)	2	
Check ball(Discharge side)	2	
Ball guide(Discharge side)	2	
Sheet packing(Discharge side)	2	
Valve seat(Suction side)	2	
Check ball(Suction side)	2	
Ball guide(Suction side)	2	
Sheet packing(Suction side)	2	
O-ring(P29)	2	
O-ring(P38)	2	
O-ring(G55)	2	
O-ring(G70)	2	
Diaphragm seat	2	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

List of consumables

■BPL-01/02/03/06-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve stopper	4	
O-ring (P12)	4	
O-ring (P16)	2	
O-ring (P18)	4	
Gear oil	120mL	
Oilseal ring assembly	2	
Check ball	4	
Air-release nozzle assembly	2	
Air-release knob	2	
Compressed coil spring	4	

* Whichever is reached the earliest

■BPL-1/2-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Ball guide	4	
O-ring (P18)	4	
O-ring (P28)	4	
Gear oil	120mL	
Oilseal ring assembly	2	
Sheet packing	4	
Valve seat	4	
Check ball	4	
Compressed coil spring	4	

* Whichever is reached the earliest

■BPL-3/5-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Ball guide	4	
O-ring (P18)	4	
O-ring (P28)	4	
Gear oil	120mL	
Oilseal ring assembly	2	
Sheet packing	4	
Valve seat	4	
Check ball	4	
Compressed coil spring	4	

* Whichever is reached the earliest

■BPL-10-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat(Discharge side)	2	
Check ball(Discharge side)	2	
Ball stopper(Discharge side)	2	
Compressed coil spring(Discharge side)	2	
Valve seat(Suction side)	2	
Check ball(Suction side)	2	
Ball stopper(Suction side)	2	
Compressed coil spring(Suction side)	2	
O-ring(P21)	4	
O-ring(P29)	4	
O-ring(P38)	2	
O-ring(P40)	2	
O-ring(G55)	2	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-20-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat(Discharge side)	2	
Check ball(Discharge side)	2	
Ball stopper(Discharge side)	2	
Compressed coil spring(Discharge side)	2	
Valve seat(Suction side)	2	
Check ball(Suction side)	2	
Ball stopper(Suction side)	2	
Compressed coil spring(Suction side)	2	
O-ring(P29)	4	
O-ring(P40)	4	
O-ring(G55)	6	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-30-VT6E/VT6F

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat(Discharge side)	2	
Check ball(Discharge side)	2	
Ball stopper(Discharge side)	2	
Compressed coil spring(Discharge side)	2	
Valve seat(Suction side)	2	
Check ball(Suction side)	2	
Ball stopper(Suction side)	2	
Compressed coil spring(Suction side)	2	
O-ring(P29)	2	
O-ring(P38)	2	
O-ring(G55)	4	
O-ring(G70)	4	
Diaphragm seat	2	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

List of consumables

■BPL-005/01/02/03/06-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Valve stopper	4	
O-ring (P12)	4	
O-ring (P18)	6	
Gear oil	120mL	
Oilseal ring assembly	2	
Ari-release valve	2	

* Whichever is reached the earliest

■BPL-1/2-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Valve stopper	4	
O-ring (P12)	4	
O-ring (P18)	6	
Gear oil	120mL	
Oilseal ring assembly	2	

* Whichever is reached the earliest

■BPL-3/5-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball (ϕ11.11)	2	
Check ball (ϕ15.875)	2	
Valve stopper	2	
Ball guide	2	
O-ring (P12)	2	
O-ring (P18)	6	
O-ring (P28)	2	
Gear oil	120mL	
Oilseal ring assembly	2	
Sheet packing	4	
Valve seat	4	

* Whichever is reached the earliest

■BPL-10-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Ball guide	4	
Valve seat	4	
O-ring(P22)	4	
O-ring(P31)	4	
Gasket	4	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-20-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Check ball	4	
Ball guide	4	
Valve seat	4	
Gasket	4	
O-ring(P31)	4	
O-ring(P45)	4	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

■BPL-30-STST

Part	Quantity per pump	Recommended replacement cycles
Diaphragm	2	4000 hours of operation or 1 year *
Valve seat(Discharge side)	2	
Check ball(Discharge side)	2	
Ball guide(Discharge side)	2	
Gasket(Discharge side)	2	
Valve seat(Suction side)	2	
Check ball(Suction side)	2	
Ball stopper(Suction side)	2	
Gasket(Suction side)	2	
O-ring(P31)	2	
O-ring(P45)	4	
O-ring(G40)	2	
O-ring(G60)	2	
Diaphragm seat	2	
Gear oil	1.6L	
Bellows	2	

* Whichever is reached the earliest

Options and related equipment

- **Back pressure valve**

This option is used to prevent "overfeeding" and "siphoning" that occur depending on the piping conditions. These phenomena are the flow of liquid at an excessive discharge volume.

- **Relief valve**

This valve automatically releases pressure to the air when excessive pressure occurs in the pump's discharge-side piping due to clogging by foreign objects or a closed valve.

- **Anti-siphon check valve**
- **Hose pump**

005/01/02/03/06-STST types only.

Glossary

- **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**

This is the phenomenon where transferred liquid continues to flow even if the pump is stopped as the tip of the pump's discharge side piping is lower than the level of liquid in the suction-side tank.

- **Cavitation**

Back pressure in the pump head causes air bubbles to occur, which reduces the discharge volume and cases abnormal noise or vibration to occur.

List of tools

■Discharge side

Model	Tool Used
STST-005 to 5	Spanner, 29mm across flats
STST-10,20,30	Spanner, 24mm across flats

■Suction side

Model	Tool Used
STST-005 to 2	Spanner, 29mm across flats
STST-3,5	Spanner, 50mm across flats
STST-10,20,30	Spanner, 24mm across flats

■Pump head

Model	Tool Used
005 to 06	Spanner, 8mm across flats
1 to 10	Spanner, 10mm across flats
20,30	Spanner, 13mm across flats

■Oilseal ring

Model	Tool Used
005 to 06	Hand or water pump pliers, etc
1 to 5	Allen wrench, 3mm across flats,M5(used with extruded bolts)
10,20,30	Allen wrench, 8mm across flats,M5(used with extruded bolts)

■Motor (Fan-cover)

Model	Tool Used
005 to 5	Allen wrench, 7mm across flats
10,20,30	Allen wrench, 8mm across flats

■Motor (Terminal box)

Model	Tool Used
005 to 5	Allen wrench, 3mm across flats
10,20,30	Allen wrench, 8mm across flats

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.

Maintenance data

If the pump requires repair, wash the interior thoroughly with water, make a copy of this sheet and fill out all relevant details. Then enclose a copy when you dispatch the pump for repair.

	No.
Customer name:	Telephone No.:
Address:	
Department:	Person in charge:
Name of sales agent:	
Model:	Serial No.:
Power source: ☐ 50 Hz ☐ 60 Hz ☐ 3-phase ☐ 200 V ☐ Other (V)	
Control method: ☐ Inverter ☐ Other ( )	
Delivery date: ___ (D) ___ (M) _____ (Y)	First operation date: ___ (D) ___ (M) _____ (Y)
Operating hours: _____ hours/day	
Inverter frequency setting ( ) Hz	
Installation conditions: ☐ Indoor ☐ Outdoor	Ambient temperature ( ) ˚C
Name/composition of chemicals transferred:	Concentration ( )%
Specific gravity: ( ) / Temperature: ( ) ˚C	Viscosity: ( )mPa·s
Slurry: ☐ No ☐ Yes Content ratio: ( )wt%	Particle size: ( )
Layout (Flow sheet)	Piping diameter:_____A Piping length Suction side: _____m Discharge side: _____m Discharge pressure: _____MPa Accessories used:
Failure explanation (summary)	

EU DECLARATION OF CONFORMITY
(Directive 2006/42/EC, 2014/35/EU, 2014/30/EU)

Manufacturer : TACMINA CORPORATION
Address : 2-2-14, Awajimachi Chuo-ku, Osaka 541-0047, Japan

Herewith declares that
Product : Pulseless Motor-Driven Diaphragm Metering Pump
Model (Type) : BPL Series

- is in conformity with the provisions of Machinery Directive 2006/42/EC,
- is in conformity with the provisions of Low Voltage Directive 2014/35/EU,
- and, is in conformity with the provisions of EMC Directive 2014/30/EU

And furthermore declares that
- the following (parts / clauses of) harmonized standards have been applied :

Machinery Directive
EN ISO 12100 :2010
EN809 :1998+A1:2009/AC:2010

Low Voltage Directive
EN60204-1 :2018

EMC Directive
EN61000-6-2 :2005/AC:2005
EN61000-6-4 :2019

TD File No. : 10-01
Ref. No. : DoC10-2021-000
Name : Hidenori Arai
Position : Head of Development Center, TACMINA CORPORATION
Date of issue : 31 August. 2021

Signature :

H. Arai

EU DECLARATION OF CONFORMITY
(Directive 2006/42/EC)

Manufacturer : TACMINA CORPORATION
Address : 2-2-14, Awajimachi Chuo-ku, Osaka 541-0047, Japan

Herewith declares that
Product : Pulseless Motor-Driven Diaphragm Metering Pump
Model (Type) : BPL Series (without motor type)
- is in conformity with the provisions of Machinery Directive 2006/42/EC

And furthermore declares that
- the following (parts / clauses of) harmonized standards have been applied :

Machinery Directive
EN ISO 12100 :2010
EN809 :1998+A1:2009/AC:2010

TD File No. : 10-01
Ref. No. : DoC10-2021-100
Name : Hidenori Arai
Position : Head of Development Center,
TACMINA CORPORATION
Date of issue : 31 August. 2021

Signature : H. Arai

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

TACMINA CORPORATION

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