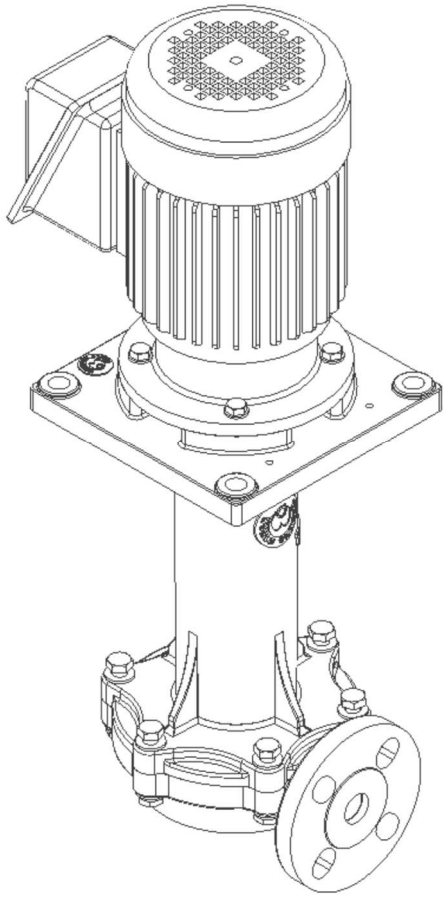
VERTICAL SEALLESS PUMP

DRYFREE

YD-2500VK-CP Series

INSTRUCTION MANUAL

Version: 20240706



World Chemical Co.,Ltd.

Preface

Thank you very much for purchasing World Chemical's sealless vertical pump "DRYFREE".

DRYFREE is constructed of corrosion resistant materials such as CFR PP (Carbon fiber reinforced polypropylene) and easy to handle. Appropriate operation and maintenance is necessary for the pump's long life and read this instruction manual thoroughly

Notice:

- Make sure that the manual is accessible to the user.
- Store the manual where it can be easily accessed after reading.

Table of Contents

Caution

The bolts for suction flange should be used the bolt size considered the depth of casing and gasket for the casing tap as follows.

Model	The depth of suction tap
YD-2500VK series	M16 x 16 mm

Safety Precautions (To be observed at all times)

The following procedures are intended to protect you from personal injury and/or property damage.

- The following symbols classify the degree of danger and explain the damages that could occur when its contents are ignored or the pump is used improperly.

	**Warning:** Non-compliance can lead to fatal or serious injury.
	**Caution:** Non-compliance can lead to some injury and/or property damage.

- Safety rules to be observed are classified and explained under the following symbols. (The following are examples of picture displays.)

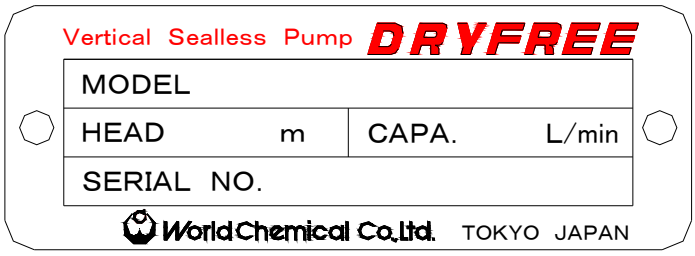
	This symbol **cautions people to be careful.**
	This symbol signifies that this **action must not be taken.**
	This symbol indicates that the **action must be taken.**

1. Do not use the pump for purposes other than those specified on the name plate.
2. The modification by customers is not covered by warranty.
3. Delivery, installing, wiring, operating, maintenance and check is performed by qualified people who have full knowledge of pumps.
4. Do not obstruct ventilation of the motor.
5. When checking the pump's rotating direction, open the suction and discharge valves, release air and confirm that the pump is filled with liquid. Then, inch and check the pump.
   The direction of arrow pasted on the motor is correct. If the direction is reverse, switch two wires of the three phases motor to reverse the direction.
6. When black out power, turn off the power switch.
7. Contact your supplier or us for repair.

8. When sending the pumps for repair or used pumps by courier, wash inside by fresh water and check no chemical liquid on. Then, pack the pumps wrapped with plastic bag and send them back.
9. Dispose pumps treated adherent chemical liquid as industrial waste.
10. Do not insert your fingers or objects into the open (Bracket, Frame, Fan cover and so on) of the pump or motor.
11. Do not carry the pump by hands as much as possible to prevent accidents. Lift the pump with the hoist belt if it is attached. If not, lift it while watching the weight balance by using a belt sling. Even the lightest pump weights more than 18 kg.
12. Do not check and disassemble pumps during the power on. Make sure to turn off the power and confirm the safety before.
13. Wiring the motor should be performed by qualified people in accordance with electric facilities technical standards and interior wiring regulations.
14. Do not touch the rotating parts (Shaft etc.) during operation.
15. When going wrong, stop the operation. (Consult with your supplier or us.)
16. Follow the instruction of the agent or the chemical manufacturer about handling the dangerous liquid such as acid or alkalis.
17. When removing the pump from the pipe, make sure to close the suction and discharge pipe and check not liquid leakage.
18. When opening wooden boxes, beware of injury by nails, silvers and woods.
19. Do not use the pump in surroundings of explosion.

Unpacking Check

Check the followings and ask your supplier if there is anything unclear.



1. Check that the model name, total head (HEAD), capacity (CAPA), motor specification and voltage indicated in the motor nameplate are the same as the order.
2. Check that there are all accessories.
3. Check that there are no damage parts during transportation.

Model Description

Example YD – 25 00 VK – CP – D E 5 1 - L

(1) (2) Model (3) (4) (5) (6) (7) (8)

(1) Bore: Discharge bore

Model	Suction bore	Discharge bore
2500VK	40A	25A

(2) Motor output: 0.4kW

(3) Main material: CFR PP

(4) Gas seal material: FPM

(5) O-ring material: E = EPDM, F = FPM

(6) Motor frequency: 5 = 50Hz, 6 = 60Hz

(7) Limit of Specific gravity: 1 = 1.1

(8) Special specification: Non = Standard, L = 400 under the pump base
V = Non-standard Other = Depends on our provision

Model description: 2500VK-CP: Vertical sealless pump Main material: CFR PP

Specification

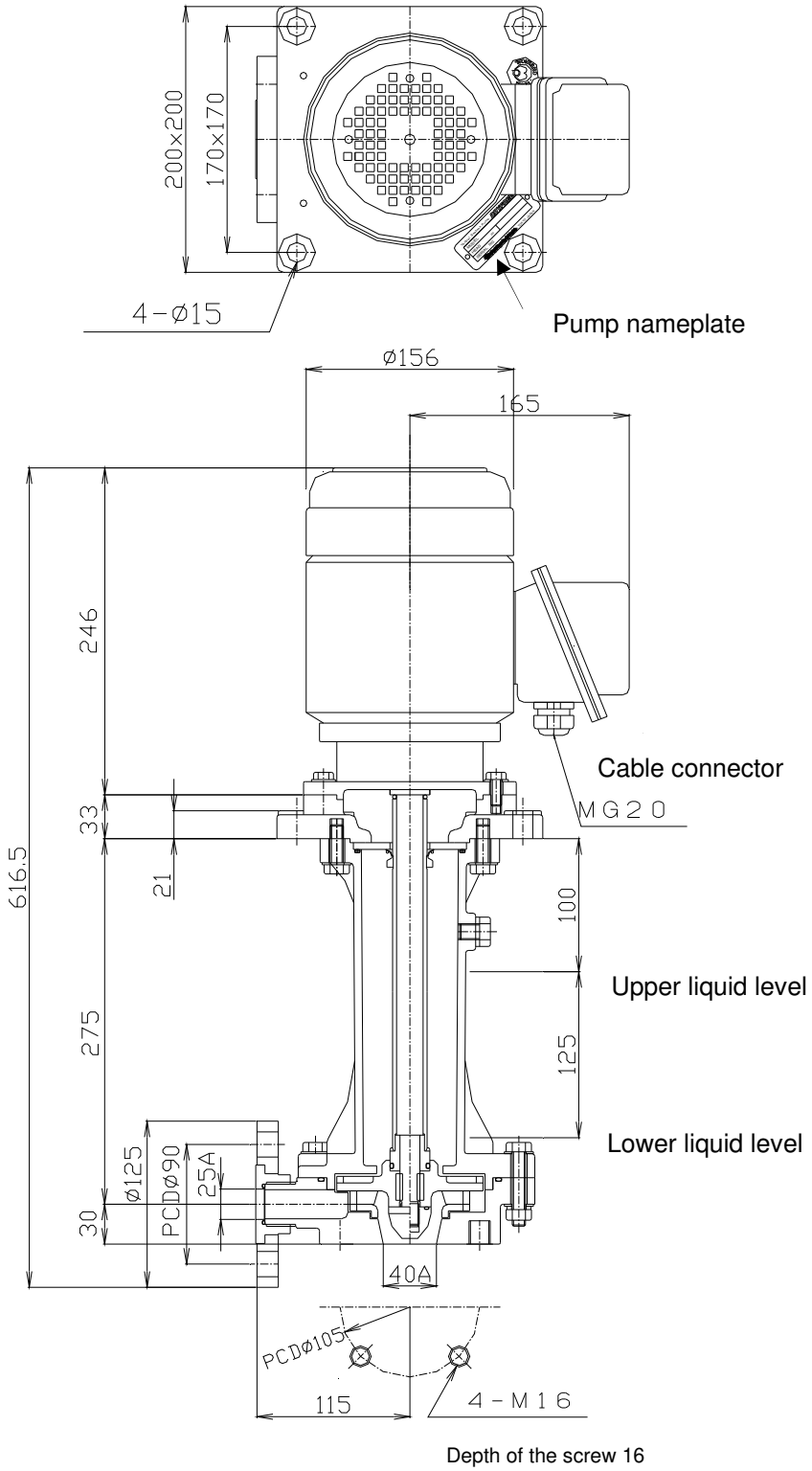
Model	Bore Suc. x Dis.	Motor output kW	Std. Spec. m_L/min	Frequency Hz	Approx. Weight kg	Liquid temperature in use℃
2500VK-CP-DE51	40A x 25A	0.4	8 - 80	50	17.5	0~70
2500VK-CP-DE61	40A x 25A	0.4	8 - 70	60	17.5	0~70
2500VK-CP-DD51	40A x 25A	0.4	8 - 80	50	17.5	0~70
2500VK-CP-DD61	40A x 25A	0.4	8 - 70	60	17.5	0~70
2500VK-CP-DE51-L	40A x 25A	0.4	8 - 80	50	18.5	0~70
2500VK-CP-DE61-L	40A x 25A	0.4	8 - 70	60	18.5	0~70
2500VK-CP-DD51-L	40A x 25A	0.4	8 - 80	50	18.5	0~70
2500VK-CP-DD61-L	40A x 25A	0.4	8 - 70	60	18.5	0~70

Note: The specification in the above list is by pure water (S.G.1.0) 20 degrees. When transferring high specific gravity liquid, high viscosity liquid or high temperature liquid, it is changed.

Note: The maximum liquid temperature to be used is 70 degrees when it is clear water.
Acid or Alkali high temperature liquid corrodes parts. If use them, consult with us.

Outline dimension

(Motor: Outdoor type without a water proof cover)

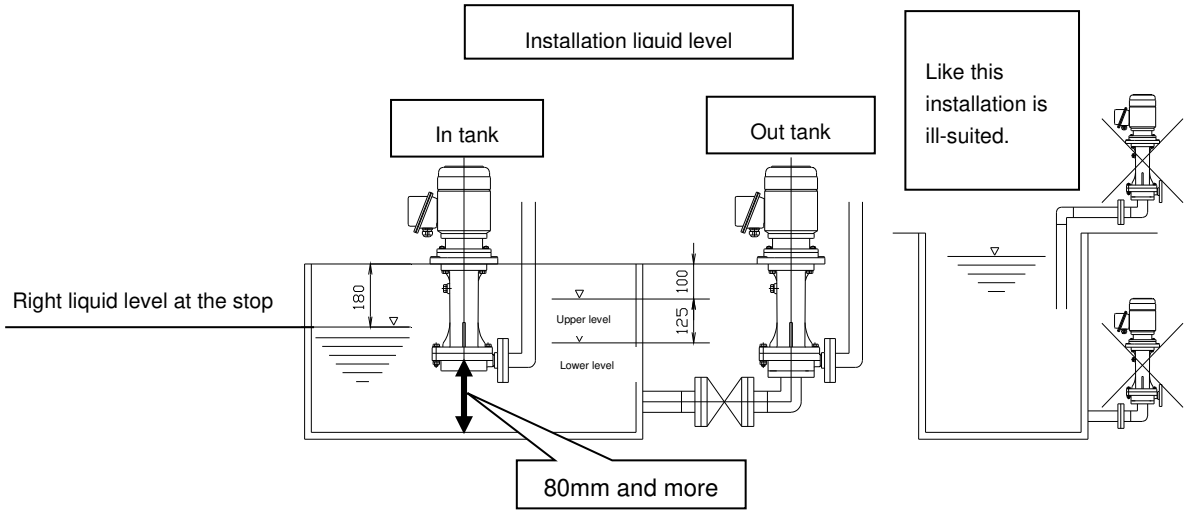


Installing / Piping precautions

1. Installing level and liquid level of the suction tank

   The pump has no sliding type seal such as mechanical seal or grand packing. Regarding the install height standard of the pump, refer to the below pictures. The liquid level of the suction tank against the pump is the standard range between the max. liquid level to lowest liquid level. When installing at the maximum liquid level at the stop / start of the pump, liquid may rise to the top of the pump and overflow depending on the condition of the pipe of the installed device or accessary.

   On the other hand, if there is any devises or pipes which have much space liquid stays near the discharge outlet under suspension, install the check valve between the discharge flange and the device or the piping to prevent overflow.



2. Caution of the operation without confirming of joints and seals

   When operating the pump for the first time after installing or disassembling, check that it is primed and air is released. Additionally, check the sealing state of the pump and suction/discharge joints before the operation. Start the operation with no liquid leakage and air suction.

3. Installation

   - Install the pump as close as possible to the tank and maintain the liquid level within the standard setting range (flooded suction method). It is possible to use the pump indoors or outdoors. (The pump with an indoor use motor is only for indoors.) However, it is recommended to take safety measures to prevent negative effects on the motor and wiring at the time of disaster such as flood. If the pump is installed outdoors and gets wet by rain water, it is recommended to attach the protective cover.

- Install the pump vertically on level surface where there is no influence of other machine's vibration. An installation stand should be secured.

4. Piping
   - Use M 16 bolts for suction / discharge flanges and tighten them evenly with an appropriate torque.
     Recommend --- Torque for the suction side bolts : 6.0 N・m
     Torque for the discharge side bolts & nuts : 9.8 N・m
   - The suction pipe should be the flooded suction method and the bend should reduce. Additionally, install pipe supports to prevent the piping load and heat stress from the pipe.
   - Do not allow areas such as projections where air may be trapped in the suction pipe, cause air lock.
   - When transferring high temperature liquid, saturated vapor pressure becomes high and the suction performance is reduced. It is recommended to use pipes with one size larger diameter or the shortest pipes possible with as a few bends as possible to prevent cavitation.
   - Install pipe supports on the discharge pipe to prevent applying the piping load on the pump.
   - If it is possible for the piping to be expanded by high temperature liquid, the pump may be damaged by expansion. Therefore, install the extendable or flexible joint to prevent the load to the pump at the expansion.
   - When installing a screen such as a strainer at the suction inlet, clean it periodically. If it is clogged, the performance and function may be greatly affected.
   - If the pipe is long, the piping resistance is increased and the specified performance may not be obtained. The piping resistance should be calculated and decided.
   - Install valves that induce less pressure loss on the suction / discharge pipes with consideration for maintenance and accessibility.

5. Wiring 

   Qualified people must handle electrical wiring and power source setup. If not following it, we are not responsible for personal injury and equipment damage. If necessary, confer with your supplier or us. Wiring should be done to standard of the electric code.
   - Use an electromagnetic switch that conforms to the specifications of the pump motor. (Voltage, capacity, etc.)
   - If the pump is used outdoors, the switch should be protected from rainwater.
   - The electromagnetic switch and push bottom should be installed a reasonable distance from the pump.

6. Operating precautions

1. Cautions

- Never operate the pump with the suction valve closed. It may cause the pump damage by a rapid vacuum state.
- In the event of cavitation, stop the pump immediately. Do not operate the pump with air trapped.
- Beware of the pump operation with the discharge valve closed for a long time. It may cause the pump damage because the inside liquid temperature is raised.
- In the event of a power failure, turn off the switch immediately.
- When transferring high temperature liquid, the surface of the pump is very hot. Install a protection device to prevent burn injury.
  The max. liquid temperature for use --- water 70 degrees or less
- Pump noise is as follows. (It is the reference and changed depending on the conditions of use.)

Model	Noise
YD-2500VK-CP	65dB

2. Before starting operation

When operating the pump for the first time after installation or after long-time suspension, prepare for the operation as described below.

- Put liquid into the tank and piping after thoroughly cleaning them.
- Check and re-tighten the flange bolts and pump base bolts.
- Add priming liquid into the pump and release air in the pump and pipe completely.
  Loose the air release bolt on the connecting pipe and release air. At this time, do not close your face to the air release bolts, because it is dangerous to the liquid spilled out. Re-tighten the bolts after air release.
- When priming liquid (or checking that the pump is filled with liquid), check the direction of motor's rotation. It is clockwise as viewed from the motor fan and also indicated by the arrow on the motor casing. If the motor rotates in the wrong direction, stop the pump immediately and reverse two wires o the three-phase power wires after the power source is shut off.

3. Operation

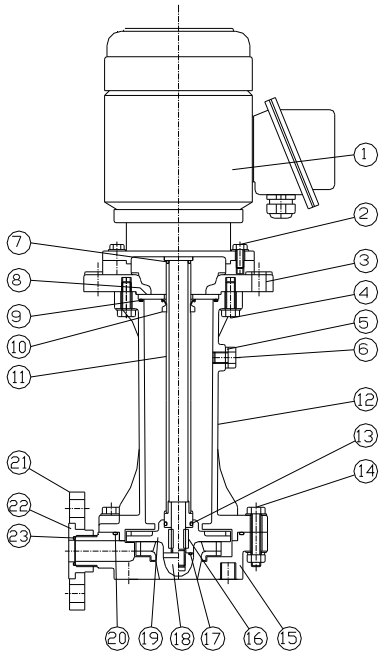
Check the valves first, and then check that the flow rate and pressure are appropriate specified points during the continuous operation.

4. When stopping operation

Turn off the power supply, and observe if the pump stops smoothly. If not, check the inside of the pump. In case of long-term suspension, remove inside liquid from the pump, wash it and close the suction / discharge valves.

Parts description

/ material / structure



No	Name	Qty	Material	Remarks
1	Motor	1	FC	
2	Bolt	4	SUS304	M8x25 with Washer
3	Pump base	1	GFR PP	
4	Bolt	4	SUS304	M10x30 with Washer
5	Gasket	1	NBR	
6	Air release bolt	1	PVC	M12
7	O-ring	1	EPDM	P-20
8	Counter face ring	1	Alumina ceramics	
9	O-ring	1	EPDM	G-75
10	Dry seal	1	FPM	φ25
11	Shaft sleeve	1	PP	
12	Connecting pipe	1	CFR PP	
13	O-ring	1	EPDM / FPM	G-25
14	Bolt	6	SUS304	M10x55 with Nut, Washer
15	Casing	1	CFR PP	
16	Key	2	SUS304	5x5x20
17	O-ring	1	EPDM / FPM	P-22
18	Impeller nut	1	CFR PP	
19	Impeller	1	CFR PP	
20	O-ring	1	EPDM / FPM	ISO-251
21	Discharge flange	1	GFR PP	
22	Lap joint	1	GFR PP	
23	O-ring	1	EPDM / FPM	ISO-120

7. Assembly / disassembly

Caution / Warning

Make sure to turn off the power before removing the pump and check the power off.

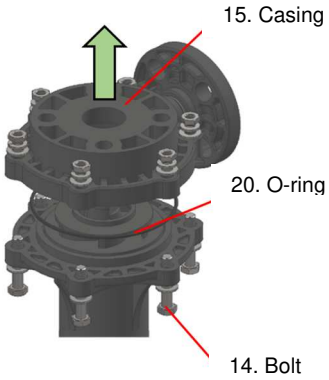
Or put the sign “Working” near the power switch and announce it.

Tape the tip of the cable which is removed from the terminal block with the insulation tape. Pay sufficient attention to the work.

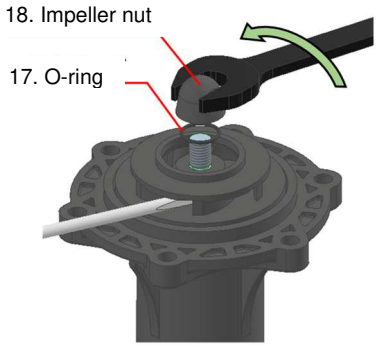
■ Pump disassembly

Firstly:

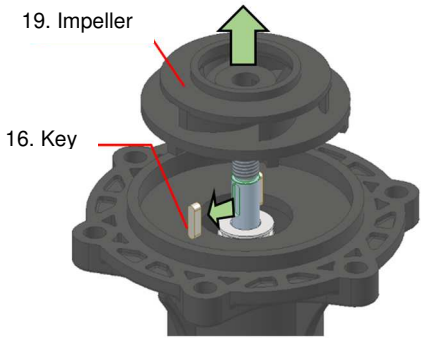
Wash the inside of the pump which is removed from the mounting before disassembly. Dry the inside of the pump and lay the pump upside down on the flat surface to work for easy assembly & disassembly.



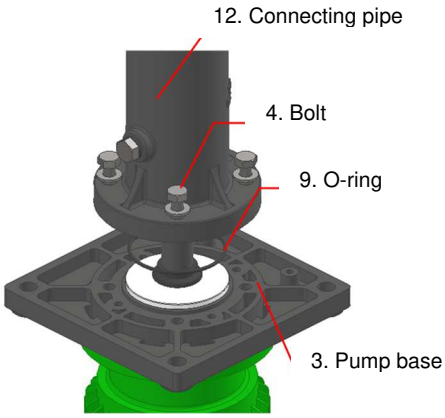
1) Remove the bolt (14) and the casing (19). At that time, the O-ring (20) is removed all together



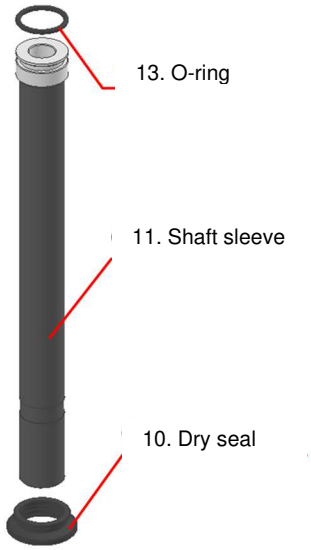
2) Remove the impeller nut (18). At that time, put a screwdriver and fix the impeller not to rotate. Then, remove the impeller nut by turning anti-clockwise with a wrench. Remove the O-ring (17) all tegher.



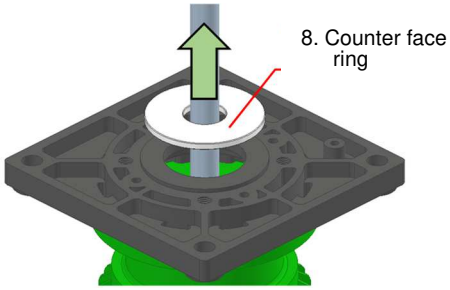
3) Pull the impeller (19) up and remove it. After that, remove the key (16) from the shaft (2 positions).



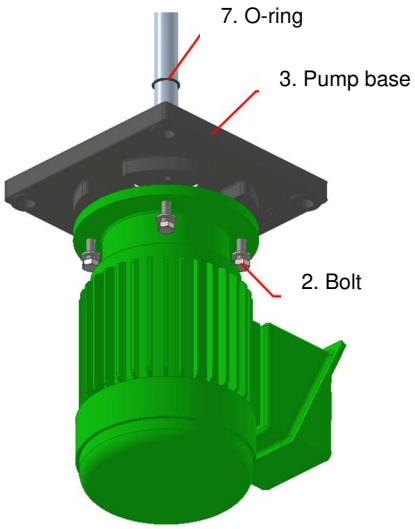
4) Fix the connecting pipe (12) and pump base (3). Remove the bolt (4), and pull up and remove the connecting pipe.
At that time, the O-ring (9) is removed.



5) Pull the shaft sleeve (11) up from the shaft and remove it.
At that time, remove the dry seal (10) and O-ring (13).



6) Remove the counter face ring (8).



7) Remove the hex. bolt (2) and pump base (3). Additionally, remove the O-ring (7) which is fixed

■ Pump assembly

Rub all parts disassembled off with a clean cloth and assemble them the reverse of the assembly procedure after washing them with water.

The clearance of the impeller is top and bottom 2mm ± 0.2.

The tightening torque of the parts is as follows.

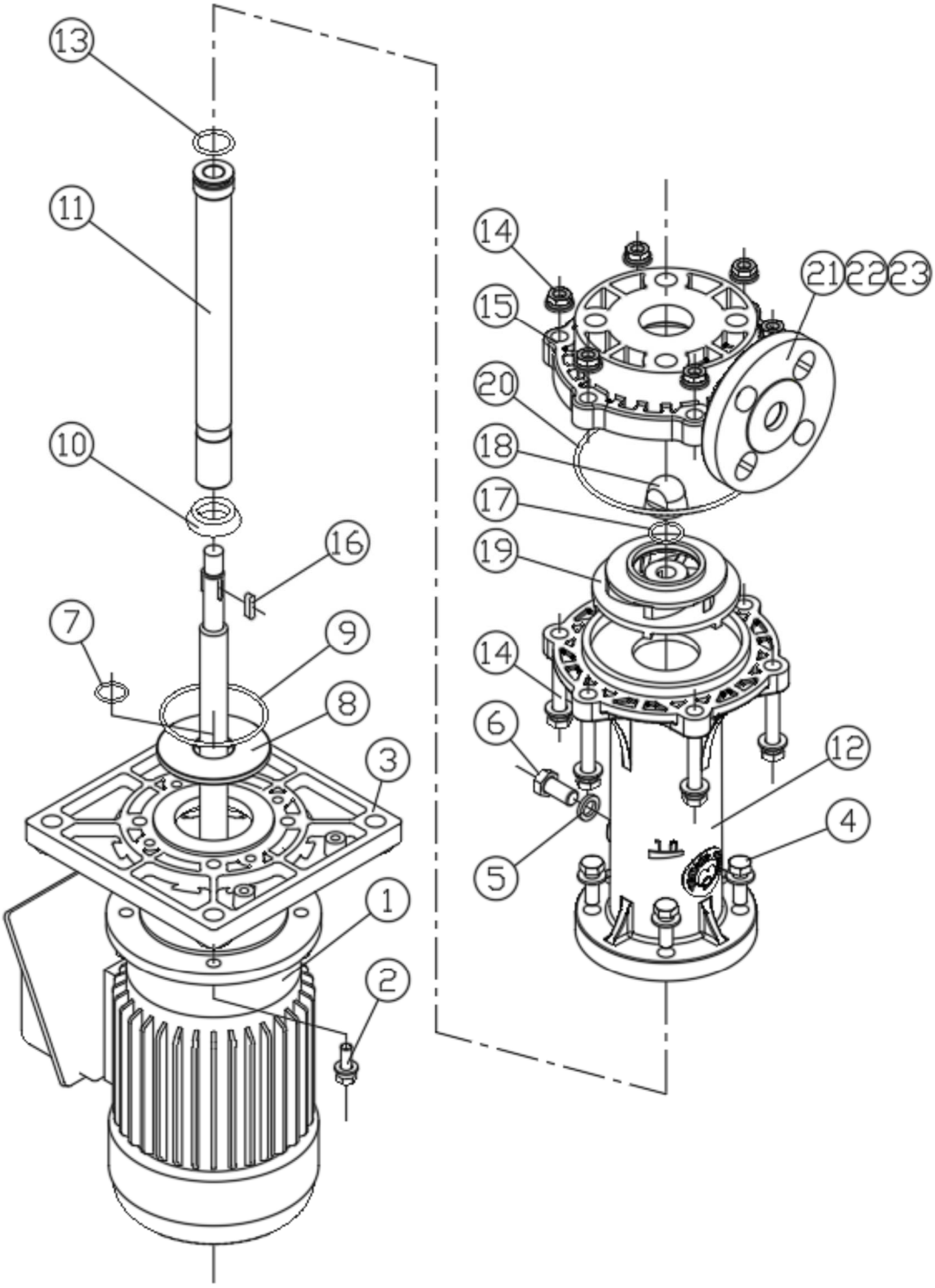
- Impeller nut : 7.8N・m
- Casing + Connecting pipe : 9.8N・m (when it is a stainless bolt.)
- Connecting pipe + Motor base : 6.0N・m (when it is a stainless bolt.)

(Note) The rotating direction of the motor is as a clockwise as viewed from the motor.

■ The sample of installation of the discharge pipe for the in-tank type.

Refer to the page 16, the working drawing of the discharge pipe for the in-tank type.

- Exploded view



Working drawing of the discharge pipe for the in-tank type.

(Sample)

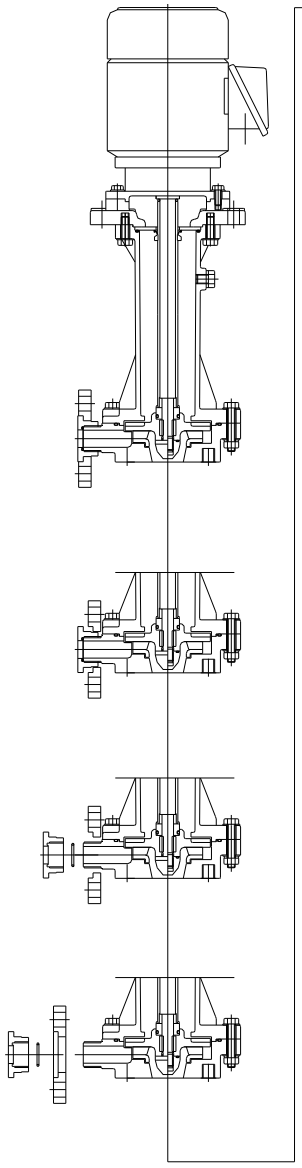
Standard

Standard
Remove
the discharge flange.

Move the discharge
flange to the back.

Loosen and remove
the lap joint.

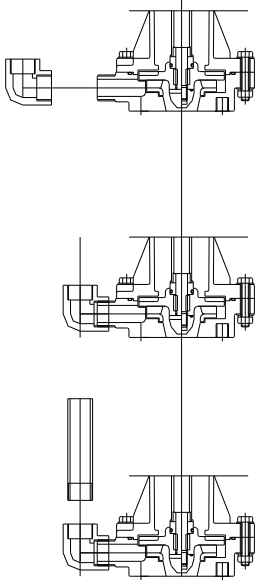
Remove them from
the casing with the O-
ring.



Prepare the
commercial PP
elbow (25A: thread
type, 1PF)

Install the PP
elbow.

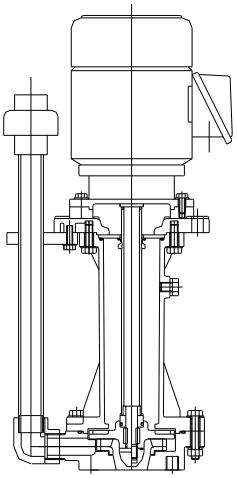
Attach the thread
processed pipe to
the PP elbow.



In-tank : Sample

Install the support
to the discharge
pipe to prevent load
from the casing

If the union on the
discharge pipe, it is
smooth to
disassemble the
pump.



※ The sealing tape is needed for the sealing parts.

※ The in-tank type is our standard.

8. Maintenance

1. Troubleshooting

If a cause of pump failure is unknown, stop the pump and contact us or your distributor immediately.

PROBLEM	SYMPTON ON PUMP		CAUSE	INSPECTION & CORRECTION
	DISCHARGE VALVE CLOSE	DISCHARGE VALVE OPEN		
Pumping failure		The Pressure / vacuum gauge indicates zero.	● Insufficient priming water.	* Stop the pump and fill with enough liquid, then restart.
	Priming water does not go into the pump.		● Stainer is clogged. ● Improper suction piping. ● Liquid level in suction tank is decreased.	* Clean the strainer. * Check the pipe closed. * Adjust the liquid level.
	When the discharge valve is opened at the start, the pressure is decreased.	The pressure / vacuum gauge reading vibrates and drops to zero.	● Air enters through the suction pipe or gasket	* Check the sealing of the suction flange. * Check the liquid level is lower. * Check the voltage.
	Pumping failure at the re-start after the suspension.	Pumping failure at the re-start after the suspension.	● Air lock or air accumulation in the suction pipe.	* Release air in the pipe. * Clear the air pockets. * Improve the pipe's incline for air release to the suction tank and clean the strainer clogged.
	The pressure gauge reading stays low.		● Pump rpm is not enough. ● Inverse rotation of the pump.	* wiring, motor check, measures. * Switch the wiring.
Low capacity		The vacuum gauge reading is high.	● The strainer and suction pipe are clogged.	* Clean the striner and remove foreign objects.
	The pressure and vacuum gauge readings are normal.	Vibration	● Inlet of the mpeller is clogged.	* Remove foreign objects.
		The gauges readings are fluctuated.	● Air enters throgh the suction pipe or gasket.	* Check the joints of the suciton pipe and re-tighten it.
			● Foreign objects at the discharge side.	* Remove foreign objects in the pump and pipes.
		The pressure gauge reading is high, but the vacuum' one is normal.	● There is resistance in the discharge pipe or high head loss.	* Check and adjsut the actual head or pressure loss.
	The pressure and vaccum gauge readings are low.	The pressure and vacuum gauges readings are low.	● Reverse rotation.	* Switch wiring.
Motor heats up			● Low voltage. ● Overload ● High ambient temperature	* Check the voltage and Hz. * Check the flow rate, S.G. and viscosity. * Well ventilate.
Sudden loss of capacity		High vacuum gauge reading.	● The strainer is clogged.	* Remove foreign objects.
Pump vibration			● Base defect ● Bolts are loosened. ● Closed suc. pipe, cavitation. ● The impeller comes into contact with the casing. ● The motor bearing is worn.	* Re-install. * Tighten bolts * Resolve causes. * Remove causes or replace. * Replace the bearing or motor.

2. Inspection

- Daily inspection

- Check for no liquid leakage before operation. If any, stop the pump and take proper action(s)
- Check that the pump works smoothly without generating abnormal sounds or vibration.
- Check the liquid level in the tank and the suction pressure.
- Compare the flow rate, discharge pressure and current value during operation to those values indicated on the nameplate, and check that the pump load is normal.

  Note: The indication of the pressure gauge varies in proportion to the specific gravity of the liquid.
- If a spare pump is available, keep it ready for use by operating it from time to time.
- Check for fluctuations of discharge pressure, discharge flow rate and motor current/voltage. If they fluctuate greatly, see *Troubleshooting* and take proper actions.

- Periodic check

  Conduct the following periodic check to use the pump smoothly.

Checkout time	Parts	Check points	Measures
Once a year * Keep the records.	Motor	● Bearing noise (Abnormal noise during operaiton) ● Vibration ● Bolts for base loosened.	* Replace the bearing. * Contact your supplier. * Retighten.
	Connecting pipe	● Scratches and cracks. ● Corrosion. ● Deformation. ● Liquid leakage from sealing parts.	* Replace if damaged. * Replace if damaged. * Remove the load when the pipes have load. * Replace the O-ring.
	Casing	● Scratches and cracks. ● Scales adhered on the inside of the wet parts kit. ● Expansion or corrosion of the O-ring.	* Replace if damaged. * Remove scales. * Replace if damaged (When checking after disassembly, replace new O-ring.)
	Impeller	● Sliding scratch. ● Corrosion. ● Impeller nut loosened.	* Replace if damaged. * Replace if damaged. * Remove the nut & impeller and check the corrosion of the shaft. Re-tighten after checking. If the shaft is corroded, contact your supplier.
	Dry seal	● Abrasion or corrosion	* Replace if damaged.

Warranty / Repair

1. Warranty period and coverage
   (1) The warranty period is 12 months from dispatched from our factory.
   (2) During warranty period, if the pump breaks down or is damaged at the use under the condition instructed in this manual due to manufacturing defect(s), the failure parts are repaired free of charge.
   (3) Even if the failure occurs within the warranty period, the followings are repaired or replaced for compensation in principle.
   - Breakdown or damage due to different use or safekeeping from the instructions in this manual.
   - Breakdown or damage due to incorrect use or unjust repair or modification.
   - Breakdown or damage as result of pollution, salt damage, gas damage, abnormal voltage or undesigned power (voltage, frequency) as well as fire, earthquake, flood disaster, lightning strike or other natural disaster.
   - Abrasion or degradation of consumable parts like a gasket or O-ring.
   - Breakdown or damage during transportation, for relocation or fall after your purchase

   (4) We cannot be responsible for the break down or damage of the customer-specified pump.
   (5) Irregularities or breakdowns due to chemical or hydrodynamic corrosion by liquid are not covered under the warranty. The material chosen at the time of the contract is only a recommendation. We do not guarantee the chemical resistance of the material.
   (6) If the determination of the cause for the breakdown or damage is questionable, it attributes to the negotiation between the customer and us.
   (7) Expenses or other damage incurred as a result of breakdowns at the use under the different condition from the instruction in this manual are not covered under the warranty.
2. Repair

Notice:

For repair, consult the supplier. When returning a pump, thoroughly clean and pack the wet parts kit.

If irregularities are detected during operation, stop the operation immediately for check. (Refer to the section on “troubleshooting”).

(1) Consult your supplier or us for repair.
(2) Read this manual again and re-check before requesting repair.
(3) When visiting to a distance location for repair, the travel expenses are charged.
(4) Inform the followings when requesting repair.
- Model name and serial number
- Use duration and condition
- Damages parts and condition
- Liquid (Name, Specific gravity, Temperature, Slurry)

If liquid leaks during transportation, it is very dangerous, so make sure to clean inside thoroughly. When ordering replaced parts, specify the name in the parts name list (P9). Although, inform the parts’ number and material, too.

Installation record

Model:	
Purchase date:	Serial number:
Start date:	Supplier:

Ver.20240819

World Chemical Co.,Ltd.

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