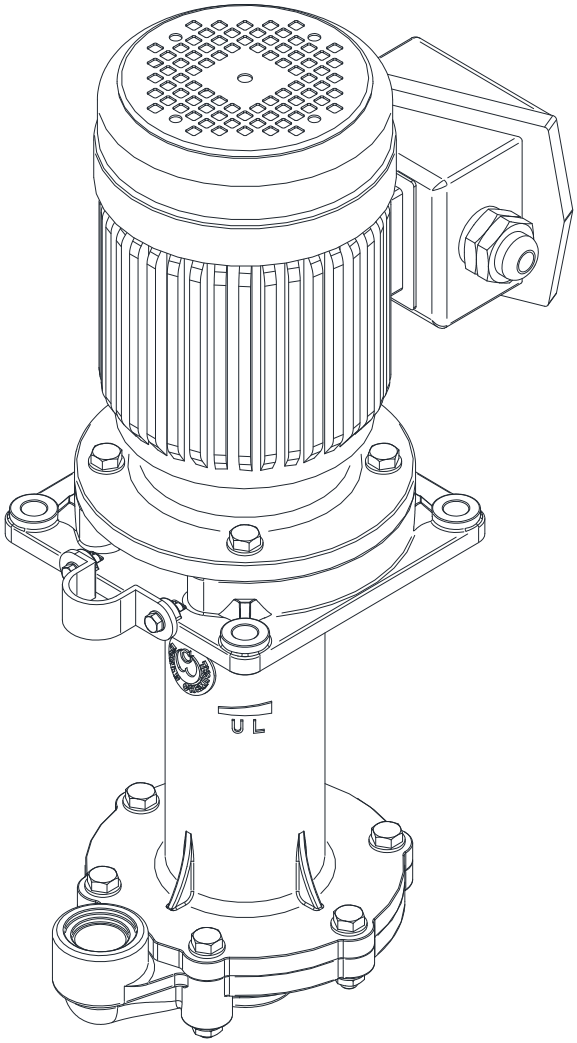
Vertical Sealless Pump

DRYFREE

Y D – 2 0 Y 0 V K – C P

Instruction Manual

Version: 20230704



World Chemical CO.,LTD.

PREFACE

Thank you for purchasing World Chemical's vertical sealless pump "Dryfree."
"Dryfree" is a hassle-free, easy-to-handle pump with major components made of high corrosion resistance resin such as CFR PP (Carbon Fiber Reinforced Polypropylene).
Using this "Dryfree" effective for a long time requires proper operation and maintenance. Please read this operation manual before use.

Notice:

- **Make sure that this operation manual is delivered to the person using this product.**
- **After reading this operation manual, store it where it can be easily accessed.**

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For safety use of Vertical Sealless Pump YD-20Y0VK-CP

(Notice)

The suction opening and discharge opening of this pump consist of tapered female pipe thread.
Before connecting a suction/discharge pipe or strainer, apply a ***resin valve socket*** on the pipe connection part (For details, refer to "4. Piping").

Pump suction opening screw standard: Rc1 (screw depth 25mm)
Pump discharge opening screw standard: Rc3/4 (screw depth 25mm)

Safety Precautions (must be observed)

To prevent danger to the user and others as well as property damage, the information that must be observed is described as follows.

■ The degree of danger or damage incurred because of a wrong use in violation of the indication is classified into the following.

 **Warning**	Indicates that there is a possibility of "death or a serious injury."
 **Caution**	Indicates that there is a possibility of "an injury or property damage only."

■ The type of information to be observed is classified into the following symbols.
(Examples of such symbols are shown below.)

	Indicates a "caution."
	Indicates a "prohibition."
	Indicates a "mandatory action."

Warning

(1) Using pumps with dangerous liquid or atmosphere.
When using pumps to transfer dangerous liquid, observe the equipment standards set forth by law and make sure to perform daily inspection to prevent liquid leakage. Operating the pump with any abnormality such as liquid leakage may cause a physical injury or major accident such as an explosion or fire. Regarding handling chemical liquid, follow the instructions of the supplier or manufacturer.

(2) Damaged or modified pumps are prohibited.
Using damaged pumps or modified pumps may cause a physical accident, electric shock, or failure. Using for them is not covered by our warranty.

(3) Cautions on transportation and lifting.
When lifting a pump, use a belt sling with care of the weight balance. It should be performed by qualified people and slings with sufficient strength should be used.
The weight of the pump is about 15kg. Do not carry it by hands unless absolutely necessary, because it may cause an accident.

(4) Work with the power on is prohibited.
Do not check or disassemble pumps or motors while the power is on. It may cause to get caught in rotating parts or a physical accident such as an electric shock. In addition to the main power and operation switch, use a hand switch of the pump for multiple safety measures.

(5) Connect of an earth wire.
Using the motor without an earth wire may cause an electric shock. Qualified people should connect it according to the guide book of electrical equipment and indoor wiring regulations.

(6) Protect a power cord.
If pulling, tucking, or damaging the power cord or motor lead wire, it may cause fire or an electric shock for the cable damaged. Additionally, place the terminal box cover at the specified place after motor wiring.

(7) Install an earth leakage circuit breaker.
If using the pump without an earth leakage circuit breaker, an electric shock may occur. Install the earth leakage circuit breaker or overcurrent protective device to prevent an electric accident or motor damage.

(8) Cautions on removing the pump.
When removing the pump from the installed piping, make sure to close valves on a suction and discharge piping to check no liquid leakage. Additionally, if touching chemicals directly, it may be hazardous. Wear protective equipment before starting work.

Caution

(1) Out of the specification is prohibited.
Do not use the pump with any specification other than listed on the pump specification or nameplate. Especially, check the motor power supply specifications (phase, voltage and frequency) before connecting. Wrong use may cause a physical injury or damage of the pump or peripheral devices.

(2) Restrict users.
Transportation, installation, wiring, operation, maintenance, and inspection must be performed by an expert with much knowledge about handling pumps.

(3) Caution on unpacking.
Before unpacking, check upside down of the pump.

(4) Caution on ventilation.
Do not place any obstacle blocking ventilation around the pump to overheat the motor.
When handling poisonous or odorous liquid, place the pump in a place with sufficient ventilation because there is a risk of intoxication.

(5) Repair and return.
For a repair of a failed pump, contact your supplier or us.
When returning the pump by transportation service or parcel delivery service, wash the interior and exterior of the pump with pure water, check that no chemical exists on it, wrap it with a plastic bag, and pack it.

(6) Caution on pump operation.
Do not touch the rotating parts (e.g. shaft) when the pump is running.

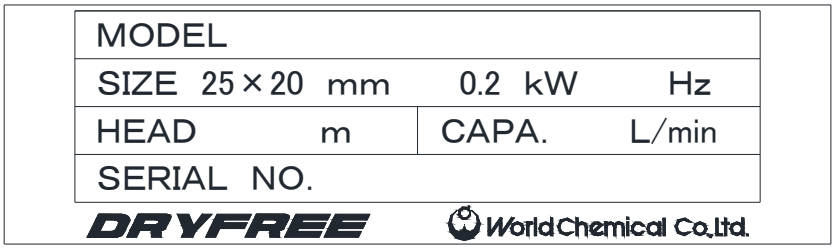
(7) Start a pump.
When starting a pump for the first time, make sure to check the rotating direction. Open suction and discharge valves to check no liquid leakage at the pipe connection. Turn on the switch instantaneously and check the rotating direction after the air in the pipe is removed and the pump is filled with liquid. If the direction is reversed for a three-phase power supply, switch two of the three lines and wire them again. Before wiring, make sure to turn off all the power and check the safety.

(8) Dispose a pump.
When disposing of used pumps, remove accumulated chemicals and dispose it as industrial waste according to the related laws and regulations.

(9) Spill protection measure.
Provide appropriate protection measures in case of liquid spill due to damaged pumps or pipes.

Unpacking Check

Check the followings. If you have any questions, please ask your supplier.



(1) Check that the model (MODEL), total head (HEAD), discharge capacity (CAPA.) on the pump nameplate, the motor specifications, and the voltage specification on the motor nameplate are as described in the order.
(2) Check that all the accessories are present.
(3) Check that there are no parts damaged during transportation or no loose bolts.

Model Description

(Example) YD - 20 Y0 VK CP D D 5 1 - V

① ② Model ③ ④ ⑤ ⑥ ⑦ ⑧

① Bore: Indicates Discharge Bore.

Model	Suction Bore	Discharge Bore
20Y0VK	25A	20A

② Motor Output
0.2kW

③ Main Material
CFR PP

④ Gas seal material
Dry seal specification: FPM

⑤ O-ring material
E: EPDM D: FPM (DAI-EL)

⑥ Frequency
5: 50Hz 6: 60Hz

⑦ Specific gravity limit
1: 1.1

⑧ Special Category
None: Standard, **V**: Non-standard voltage, **X**: Special specification,
Other: According to World Chemical's specifications

Specifications

Model	Bore Suc.×Disc. Mm (in.)	Motor Output kW (HP)	Standard Performance m-L/min (Ft-GPM)	Frequency Hz	Approximate Weight kg
20Y0VK-CP-DE51	25A×20A (‘1.0 x ‘1.0)	0.2 (1/4)	4-60 (13 – 16)	50	15
20Y0VK-CP-DE61	25A×20A (‘1.0 x ‘1.0)	0.2 (1/4)	4-60 (13 – 16)	60	15
20Y0VK-CP-DD51	25A×20A (‘1.0 x ‘1.0)	0.2 (1/4)	4-60 (13 – 16)	50	15
20Y0VK-CP-DD61	25A×20A (‘1.0 x ‘1.0)	0.2 (1/4)	4-60 (13 – 16)	60	15

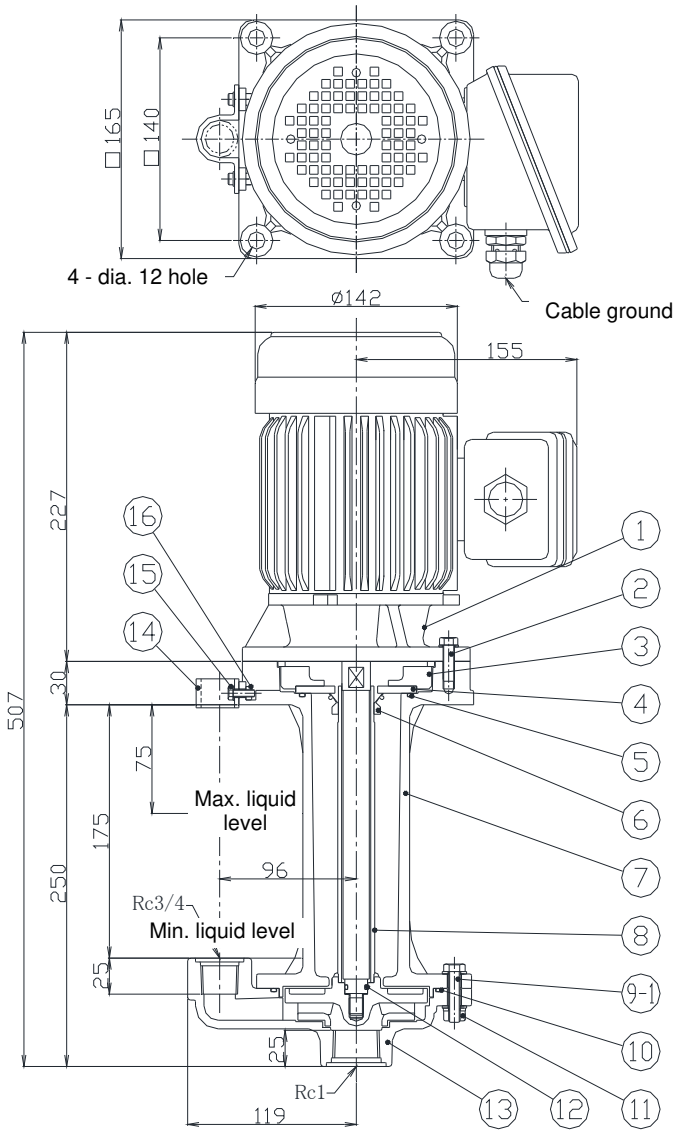
Note: The standard performance in the table is performance in pure water (specific gravity 1.0) at 20 degrees. When the liquid is high specific gravity, high viscosity, or high temperature, the specification is changed.

Note: The upper limit of the temperature of use liquid is 70 degrees in pure water, and the lower limit is 0 degrees.
Acidic and alkaline high temperature liquids will be highly corrosive to the pump components. Please contact us.

Note: Minimum required flow rate during pump operation: 10L/min (2.6GPM).

Dimensions and Part Configuration

(Motor dimensions are for outdoor models without drip-proof cover)

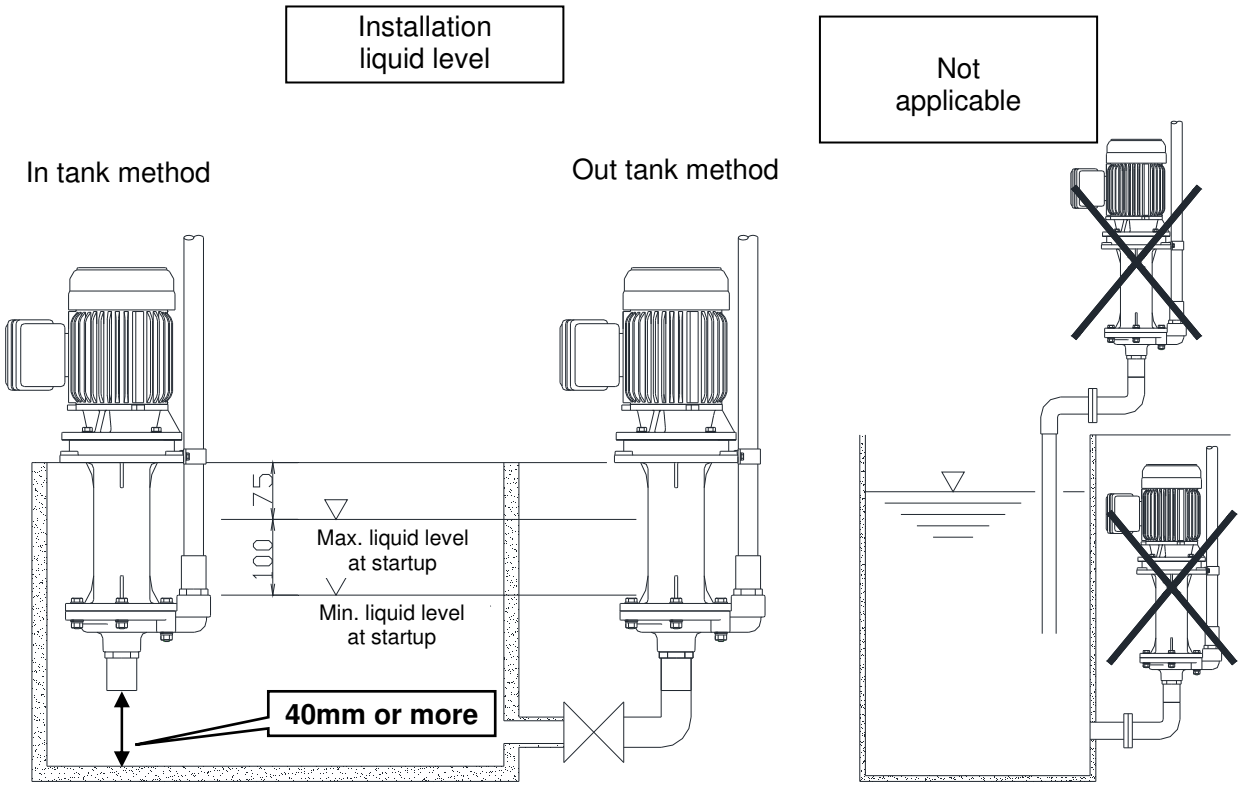


No.	Part name	Quantity	Material	Remarks
1	Motor	1	FC, etc.	
2	Hexagon head bolt (M8×25)	4	SUS304	With washer
3	Seal case	1	PP	
4	Counter face ring	1	Alumina ceramics	
5	O-ring (for counter face ring)	1	EPDM/FPM	G75
6	Dry seal	1	FPM	Dry seal 25
7	Connecting pipe	1	CFR PP	
8	Impeller	1	CFR PP	
9-1	Hexagon head bolt (M8×35)	5	SUS304	With washer
9-2	Hexagon head bolt (M8×50)	1	SUS304	With washer
10	O-ring (for casing)	1	EPDM/FPM	G115
11	Hexagon head nut (M8)	6	SUS304	With washer/spring washer
12	O-ring (for impeller)	1	EPDM/FPM	P12
13	Casing	1	CFR PP	
14	Saddle	1	PVC	
15	Hexagon head bolt (M5×15)	2	SUS304	With washer
16	Hexagon head nut (M5)	2	SUS304	

Installing and Piping Precautions

1. Pump installation level and suction tank liquid level

The pump has no fixed sliding type liquid sealing such as a mechanical seal or a gland packing. Regarding the standard installation height, refer the following installation example and fix the mount of the pump. The liquid level of the suction tank against the pump is the standard rage between the upper limit level and lower limit level. When setting the upper limit level, liquid may rise at the stop or start and be leaked depending on the piping of the device with the pump or the conditions of the ancillary equipment. If the discharge side ancillary facilities include equipment or piping causing trapped liquid such as a filter, ***install a check valve*** between the pump discharge opening and the equipment or piping to prevent back water intrusion at a stop of the pump.



2. Operation without checking joints and seal parts

After installation, check that priming water enters in, when using the pump for the first time or after disassembly. Then, check that air is completely removed and start the operation. Additionally, check that the sealing state of the pump and the suction / discharge joint parts before the operation and start the operation without liquid leakage or air suction.

3. Installing location

- Install the pump as close to the suction tank as possible and set the liquid level within the reference setting range (flooded suction type).
- Install the pump vertically on a flat surface securely where there is no vibration from other machine. Also, allow sufficient space around it for easy maintenance and motor fan cooling. Fix the pump mount securely to prevent vibrations.
- If the motor is installed outdoors where it directly gets wet by rain, it is recommended to put a water proof cover.

4. Piping

- Connecting pipes
  When connecting pipes to the suction inlet / discharge outlet of the pump, use a resin valve sockets.
  When setting valve sockets, put a sealing tape at the threads 5 to 6 times.
  Additionally, insert O-rings between the suction inlet / discharge outlet of the pump and the valve sockets for connecting the pipes.

  Suction inlet: Valve socket nominal diameter 25 (O-ring P-34)
  Discharge outlet: Valve socket nominal diameter 20 (O-ring P-26)

- The suction pipe should be of the flooded suction type, with short length and less bending. Also, use pipe supports to prevent piping load and piping thermal stress from affecting the pump.
- Avoid any protrusion in the suction pipe that may cause trapped air. It may cause air lock (idle running).
- When pumping high temperature liquid, the saturated steam pressure of the liquid is high, it causes suction performance lower. That is why it is recommended to use pipes which bore is one size bigger, or make the pipes as short as possible with least bending in order to prevent cavitations.
- Install pipe supports to eliminate the piping load of the discharge pipe 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 placing any screen such as a strainer at the suction inlet, clean it periodically. Clogging may affect the pump performance and function significantly.
- If the pipe is long, pipe resistance increases and expected performance may not be obtained. Determine the pipe diameter by calculating pipe resistance.
- For maintenance, place valves, which pressure loss is a little, on the suction / discharge pipe in front and back of the pump.

5. Wiring ⚠

Only qualified people (authorized workers) should perform electric work and handle the power supply.
We are not responsible for any physical accident or property damage if this is not observed.
If necessary, contact our distributor or us.
Perform wiring according to the electric work rules.

- Use a magnetic switch based on the motor specifications of the pump (voltage, capacity, etc.).

- When the pump is used outdoors, wire with no rain water into the switch part.

- Install the magnetic switch and a pushbutton switch securely in a place away from the pump.

6. Operating precautions ⚠

1. Caution

- If operating the pump during closing the valve on the suction inlet, a vacuum state is suddenly created in the pump and it may damage the pump, so make sure to prevent such the operation.

- When cavitation occurs, stop the pump immediately.
  Do not operate the pump with air captured from the suction inlet.

- If the pump is operated for a long time with the discharge valve closed, the liquid temperature in the pump raises, which may damage the pump.

- If power failure occurs during operation, turn off the power switch immediately.

- When high temperature liquid is pumped, the pump surface becomes very hot. Provide contact protection to prevent burns.
  * Upper limit operating liquid temperature ... Pure water at 70 degrees or lower

2. Preparation for operation

When starting operation for the first time after installation or when starting operation after a long time stop of operation, prepare as follows.

- Clean inside of the piping and the tank thoroughly before entering water.

- Check that there are any bolts loosen on pipes and pump parts, and re-tighten them as needed.

- Priming water and completely remove air from the pump and pipes.

- After priming water (or checking that it is filled), run the motor instantaneously to check if the motor rotating direction is correct. The correct rotating direction is clockwise as viewed from the motor fan. Follow the arrow on the pump. If the direction is reversed, stop the pump immediately, turn off the power, and switch the two phases of the three-phase power supply.

3. Operation

When the pump is ready for operation, check the valve opening.
When the pump starts as the continuous operation, check that the flow rate and pressure are at appropriate specification points.

4. Stopping operation

Turn off the power, and check that the pump stops slowly. If it's not smooth, check the pump inside. When the pump is not used for a long time, remove the liquid inside, clean the interior and close the suction and discharge valves.

7. Maintenance and check

1. Troubleshooting

If the cause of failure is unknown, stop the pump immediately and contact your supplier.

Failure	Phenomenon in the pump		Cause	Inspection and measures
	Discharge valve closed	Discharge valve open		
Liquid not pumped		Pressure gauge / vacuum gauge indicators indicate zero.	●Insufficient amount of priming water	○Stop pump and start again with sufficient priming water
	Priming water does not enter the pump		●Clogging of suction opening strainer ●Defective suction pipe ●Low suction tank liquid level	○Clean strainer ○Check closing of piping ○Proper liquid level
	After operation starts, pressure drops when discharge valve is opened.	Pressure meter/vacuum gauge indicators fluctuate and drop to zero.	●Air enters from connection of suction pipe and valve socket	○Check sealing of suction pipe ○Check for abnormal drop of suction water level ○Check if voltage is normal
	Inadequate pumping after a break	Inadequate pumping after a break	●Air lock, trapped air in suction side	○Remove air in piping ○Check piping and improve parts with trapped air ○Improve piping slope and clean strainer clogging so air in back water at pump stop can be emitted to suction tank
	Pressure gauge indicator remains low.		●Insufficient pump rotation ●Pump reverse rotation	○Check wiring and motor and take measures ○Switch connection
Low capacity		Vacuum gauge indicator is high.	●Clogging of strainer Suction pipe water path closed	○Clean strainer, remove foreign object
	Pressure gauge / vacuum gauge indicators are normal.	Vibrations occur	●Foreign object at impeller inlet	○Remove foreign object
		Pressure gauge / vacuum gauge indicators fluctuate.	●Air from suction pipe	○Check joint of suction pipe and tighten it
			●Foreign object at pump discharge side	○Remove foreign object in pump ○Remove foreign object and scale of piping
		Pressure gauge indicator is high, but vacuum gauge is normal.	●Resistance in discharge pipe High actual head and head loss	○Check actual head and piping loss of discharge pipe and take measures
	Pressure gauge indicator is low, and vacuum gauge is low.	Pressure gauge indicator is low, and vacuum gauge is low.	●Reverse rotation	○Switch connection
Motor overheats			●Voltage drop ●Overload ●High ambient temperature	○Check voltage and frequency ○Check flow rate, liquid specific gravity, and viscosity ○Improve ventilation
Capacity drops suddenly		Vacuum gauge indicator is high.	●Foreign object at strainer	○Remove foreign object
			●Incomplete foundation	○Install again

Pump vibrates			●Loose fixing bolt ●Closed suction pipe, cavitation occurred ●Impeller and casing in contact ●Worn motor bearing	○Tighten it ○Clean and remove cause of cavitation ○Remove cause or replace ○Replace bearing or motor

2. Maintenance

■ Daily check

- Check that there is no liquid leakage before operating the pump. If any liquid leakage is found, stop the pump and take appropriate measures.
- Check that the pump is running smoothly without vibration or abnormal sound.
- Check the water level and suction pressure of the suction tank.
- Compare the flow rate, discharge pressure, and current value during the operation to them on the motor nameplate and check that the pump load is normal.
  * The indication of the pressure gauge depends on the specific gravity of used liquid.
- If an auxiliary pump exists, operate it occasionally to make it ready for use.
- Check that there is no change of the discharge pressure, discharge flow rate, or motor current/voltage during the operation.
  If a significant change occurs, take measures by referring to "Troubleshooting."

■ Periodic check

To use the pump smoothly, check periodically as follows.
When overhaul, beware of the seal face damaged.

Check period	Parts name	Description	Measures
Once per 12 months * Keep the check records.	Motor	● Bearing sound (Check for abnormality during operation) ● Vibration ● Pump base bolt loosen	○ Replace the bearing ○ Contact your supplier in case of abnormality ○ Re-tighten the bolt
	Connecting pipe	● Scratch, rupture, crack ● Corrosion ● Deformation ● Liquid leakage from seal part	○ Replace it in case of abnormality ○ Replace it in case of abnormality ○ Remove load if any piping load exists ○ Replace O-rings in case of abnormality such as liquid leakage
	Casing	● Scratch, rupture, crack ● Scale inside wet part kit ● Swelling or corrosion of O-ring	○ Replace it in case of abnormality ○ Remove scale ○ Replace it in case of abnormality (Replace O-ring when disassembling to check it)
	Impeller	● Sliding dent on impeller ● Corrosion ● Impeller loosen	○ Replace it in case of abnormality ○ Replace it in case of abnormality ○ Remove impeller to check for corrosion on shaft, and re-tighten it in case of abnormality. Contact supplier in case of shaft corrosion.
	Dry seal	● Wear or corrosion of dry seal	○ Replace it if worn or corroded

8. Disassembling and Assembling

⚠ Cautions and Warnings

Make sure to turn off the power before removing the pump. Additionally, place "At Work" sign around the power switch to keep everyone informed.
The tip of the cable removed from the terminal block is wrapped with insulating tape for insulation. The working should be treated with enough care.

■ **Disassembling** (Refer to the disassembling drawing.)

1) If the discharge piping is fixed with the pipe saddle supplied with the pump, remove the hexagon head bolt (15), and remove the saddle (14) and hexagon head nut (16).

2) Clean the inside of the pump removed from the device mount thoroughly with water before disassembling.
After removing water inside the pump completely, and place the pump on a flat surface with the motor facing down for easy disassembly.

3) Firstly, loosen the hexagon head nuts (11) and remove the hexagon head bolts (9-1),(9-2). Then, remove the casing (13).
The O-ring (10) comes off at the same time.

4) As described in Note 1, lock the motor shaft and turn the impeller (8) counterclockwise to remove it from the motor shaft. The impeller has a dry seal (6).

5) Next, remove the hexagon head bolt (2), and remove the connecting pipe (7) from the motor (1).

6) Finally, remove the O-ring (5), counter face ring (4), and seal case (3). This is disassembling completed.

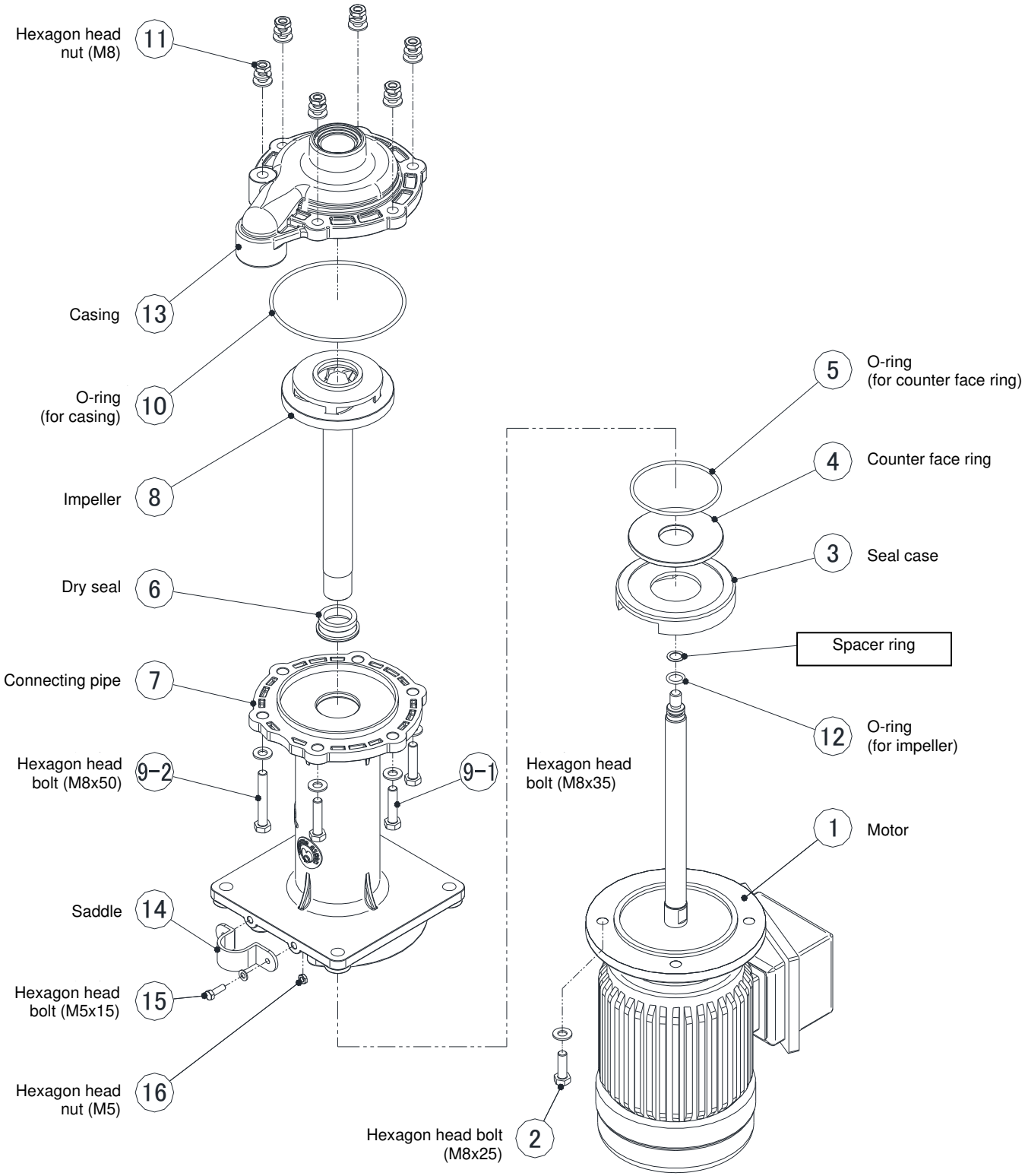
* Spacer rings act as a shim to adjust the impeller clearance. When disassembling, do not lose and store them in a safe place.

■ **Assembling**

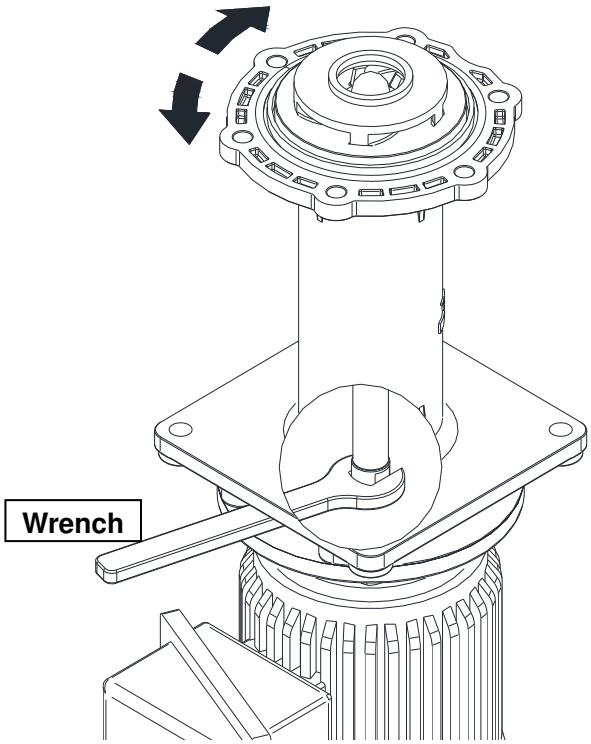
- After washing the disassembling parts with water, wipe them with a clean cloth. Assembling is in the reversed order of disassembling.
- The clearance of the impeller is $1.0mm^{\pm 0.3}$ in the front fan side, and $1.5mm^{\pm 0.3}$ in the back fan side.
- The tightening torque for the hexagon head bolt (2) is 30kgf-cm (2.9N-m).
- The tightening torque for the hexagon head bolts (9-1) (9-2) and hexagon head nuts (11) is 60kgf-cm (5.9N-m).
- Replace O-rings when re-assembling.
- Refer to Note 2 regarding cautions on assembling of the seal case and pump base.
- Refer to Note 3 to adjust the dry seal height when installing the impeller.
- When fixing the discharge piping with the pipe saddle supplied with the pump after installing the pump, refer to Note 4.

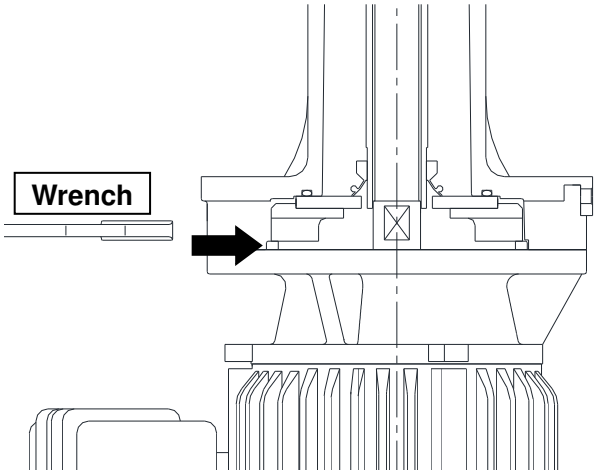
* All rotating direction the motor is clockwise as viewed from the motor.

Exploded view



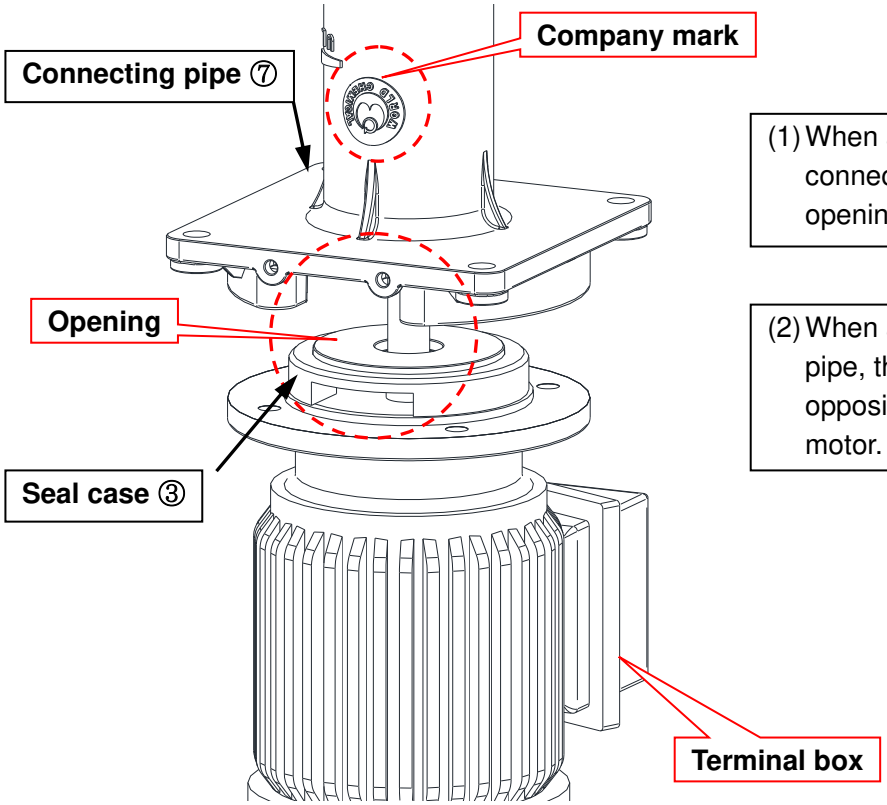
■ **Note 1:** Cautions on loosening/tightening the impeller.





As shown in the left figure, insert the 17mm wrench from the gas vent hole of the pump base to lock the motor shaft.
After that, turn the impeller counterclockwise to loosen it.
(When tightening it, turn it clockwise.)

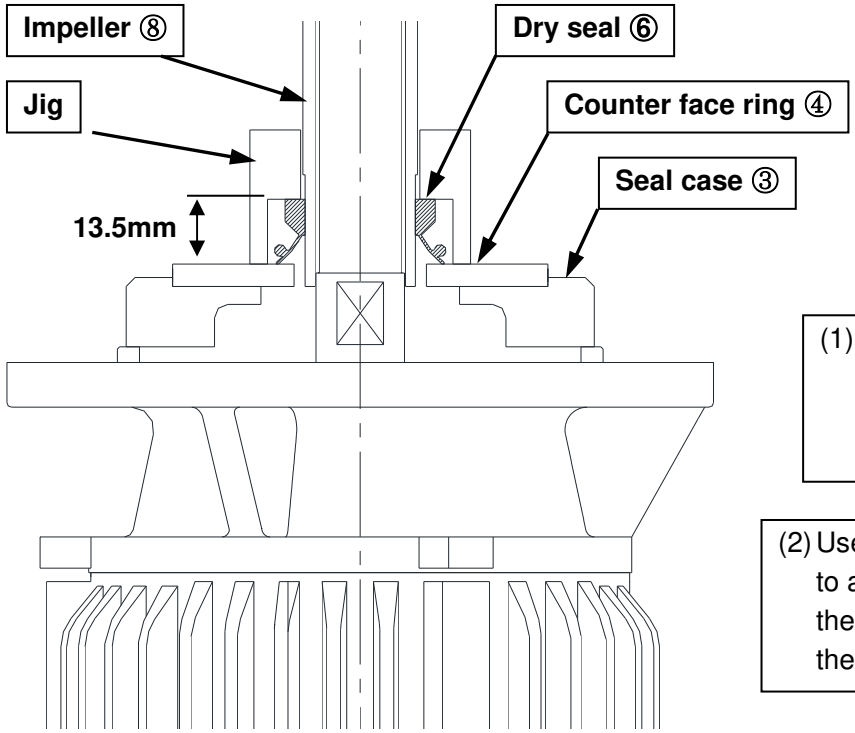
■ **Note 2:** Seal case/pump base installation.



(1) When assembling the seal case and connecting pipe, align the gas venting opening as shown in the left figure.

(2) When assembling the connecting pipe, the company mark faces the opposite of the terminal box of the motor.

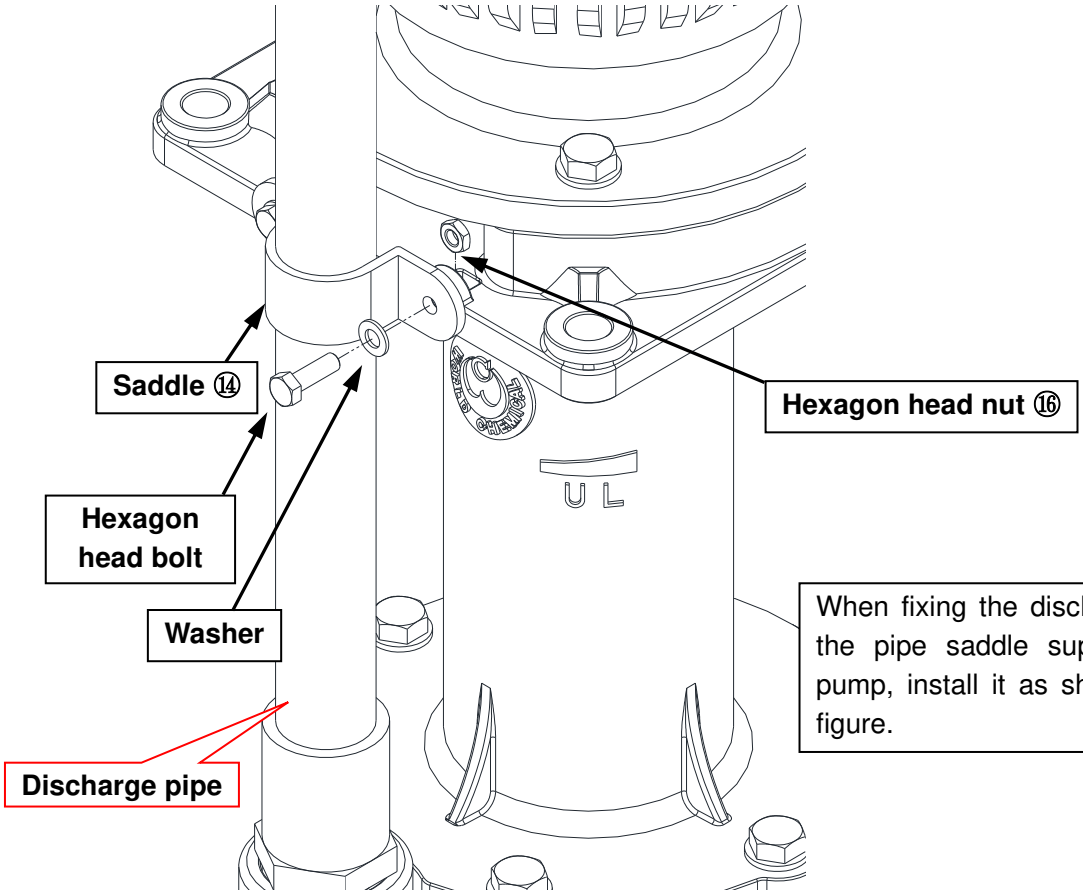
■ **Note 3:** Adjusting the height of the dry seal.



(1) Before assembling the connecting pipe, the impeller and dry seal do trial fitting and adjust the height of the dry seal.

(2) Use the jig as shown in the lift figure to adjust that the dimension from the counter face ring to the top of the dry seal is 13.5mm.

■ **Note 4:** Installing the saddle for fixing the discharge pipe.



When fixing the discharge pipe with the pipe saddle supplied with the pump, install it as shown in the left figure.

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 (P7). Although, inform the parts’ number and material, too.

Installation record

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

World Chemical Co.,Ltd.

WORLD CHEMICAL CO., LTD. / Japan

Head Office / Overseas department

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TEL 81-3-5818-5130 FAX 81-3-5818-5131 (Head office)

TEL 81-3-5818-5131 FAX 81-3-5818-5131(Overseas epartment)

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3F, 1-19-25, Edobori, Nishi-ku, Osaka-shi, Osaka, 550-0002 Japan

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