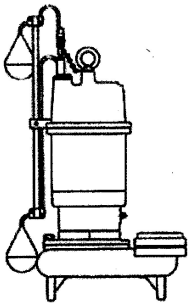
| No. | 87002722E |
|---|---|

Kawamoto

**Uniting water with an abundant lifestyle ••••• Kawamoto Pump**



# Submersible Pump for Swage

ZU3 / ZUJ Type (Removable type) Instruction Manual

Thank you for purchasing the Kawamoto ZU3(J) type submerged pump for sewage.
Always read this manual thoroughly and fully comprehend the contents before starting use. Please keep this instruction manual in a handy place for quick reference.

<Contents>



## ⚠ Special Notes

1. Don't use this pump in place where people are present (bathroom, pools, lakes, etc.) Failure to observe this could result in electric shock when a fault or electric leakage occur
2. Securely earth the equipment, and install a dedicated earth leakage breaker. Failure to observe this could result in electric shock, electric leakage, or fire.
3. Always shut OFF the power and ensure that no power is being supplied to the pump when attaching or disconnecting wiring.(3-phase) Failure to observe this could result in electric shock or injury.
4. Always disconnect the power plug from the socket.(single-phase) Furthermore, never plug/unplug with wet hands. Failure to observe this could result in electric shock or injury.
5. Carefully handle the pump while taking care not to hit against objects. Failure to observe this could result in electric shock or injury.
6. Do not suspend the pump with the power cable. Failure to observe this could lead to damage of the power cable, electric shocks or fires.

Precautions for using this product safely and for preventing personal injuries or physical damage are given in this manual.
The precautions are classified as "Dangers", "Warnings" and "Cautions" to alert of the degree of injury or damage that could occur if handling is mistaken. In either case, these are important matters related to safety, and must be observed.

⚠ Warning: Details which if ignored could lead to fatalities or serious injuries.
⚠ Caution: Details which if ignored could lead to personal injuries or physical damage.

## [1] Introduction

Please check the following items upon receipt of the product.

1.1. Check the nameplate to ensure that the correct pump has been delivered.
Check the type, bore, total head, frequency, No. of phases, required power, etc.

1.2. Check that no parts have been damaged during transportation, and that none of the bolts, nuts, etc., are loose.

1.3. Make sure that all of the ordered accessories are included.
<<If there is any problem, contact your dealer>>

## [2] Specifications

**⚠ Caution**

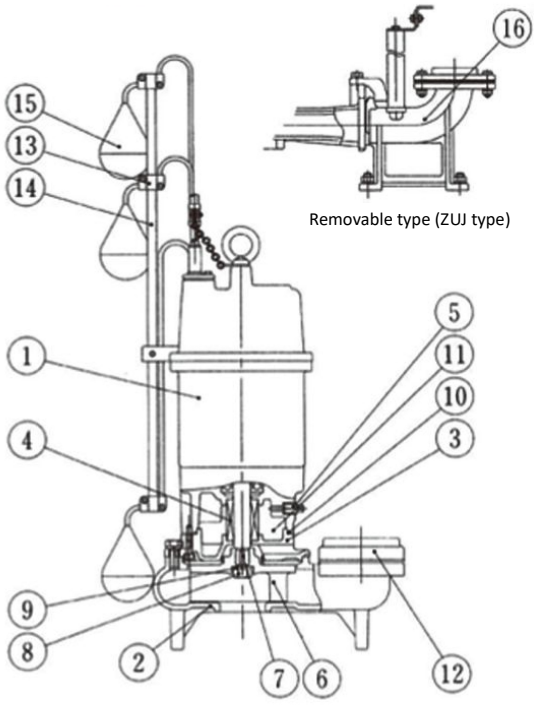
- Always use this pump within the specified product specifications. Failure to observe this could result in electric shocks, fires or water leakage, etc.
- When using this pump for living things (fishery, fish tank, aquarium, etc.), always prepare a spare unit. If the pump fails, an oxygen deficiency or degradation of water quality, etc., could occur and affect the creature's life.
- This pump may not be used for the transfer of food-related goods. There is a risk of bacteria forming or foreign matter entering the goods.

| | | |
|---|---|---|
| Pumped, fluid | Fluid quality | Polluted water (PH 5 to 9) |
| | Fluid temp. | 0 to 40°C (to the extent no freeze) |
| Diameter of content solids | 0.4/0.75kW | 35mm sphere or less |
| | 1.5kW | 35mm sphere or less |
| | 2.2 to 7.5kW | 40mm sphere or less |
| Installation | In water | |
| Power voltage fluctuation | Within ±10% of rated voltage | |
| Pump submerging depth | Within 8m | |

ZU3(J) type : Manual type
ZU3(J)-L type : Auto type
ZU3(J)-LN type : Alternative Auto type
(with –ZU3(J)-L type)

## [3] Product Configuration

3.1. Structure




The drawing below represents a typical example of a ZU3-LN type and may differ slightly depending on the model.

| No. | Name |
|---|---|
| 1 | Motor |
| 2 | Casing |
| 3 | Casing cover |
| 4 | Mechanical seal |
| 5 | Plug |
| 6 | Impeller |
| 7 | key |
| 8 | Nut |
| 9 | Toothed lock washer |
| 10 | O ring |
| 11 | Turbine oil |
| 12 | Rhombic flange |
| 13 | clamp |
| 14 | rod |
| 15 | Float |
| 16 | Removable unit |

**(Note)** The specifications and structure, etc. are subject to change without notice.

3.2. Standard Accessories

| Parts name | Remarks |
|---|---|
| Name plate | For attachment over ground : Attach at a place over ground that is easy to see. |
| Instruction manual | |

ZUJ type has suspension chain (4m) and support (1pc) as standard accessory.

## [4] Installation and Piping

### ⚠ Warning

- If unloading or carrying in the product, or if suspending it for installation, do so correctly by first checking the product weight and suspension method in the catalog, installation drawing, and installation manual. Furthermore, do not suspend products heavier than the rated load for the suspension equipment. Failure to suspend properly could result in injury if the product falls.
- Carry out installation properly in accordance with the instruction manual. Failure to carry out installation properly could result in electric chock, fire, or injury if the product falls.
- Carry out installation in accordance with applicable legal requirements (electrical equipment guideline, interior wiring regulations, building codes, etc.) Failure to observe this may not only violate legal requirements, but could also result in fire or injury.
- Don't use this pump in place where people are present (bathroom, pools, lakes, etc.) Failure to observe this could result in electric shock when a fault or electric leakage occur
- Open the wood packing with caution to the box nail. Failure to observe this could result in injury.

### ⚠ Caution

- Carefully handle the pump while taking care not to hit against objects. Failure to observe this could result in electric shocks or malfunction.
- Do not suspend the pump with the power cable. Failure to observe this could lead to damage of the power cable, electric shocks or fires.
- Do not install this pump in places such as machine shops or chemical plants where toxic gases such as acid, alkaline, organic solvents or paint are present, or gases containing corrosive elements are produced, or there are high levels of dust. Failure to observe this could result in electric leakage or fire.
- When piping, screw the copper piping, etc., so that it does not protrude from flange end. Failure to observe this could result in flange or casing damage.
- Do not change the float position. Failure to observe this could result in malfunction or reduce product lifetime from high frequency operation.
- Do not damage, treat, forcibly bend, pull, twist, tuck, apply load or bundle the power cable. Failure to observe this could lead to damage of the power cable, electric shocks or fires.
- Prepare a spare pump to be used in case the pump should stop There is a risk of water being cut off and equipment stopping if the pump fails.
- The cutting oil and foreign matter in the piping system could get into the pumped fluid. Depending on the equipment, properly flush the system and make sure that it is free of foreign matter before starting operation.
- Remove the mating flange from the pump and screw it into the pipe. There is a risk of damage or water leaks.
- Do not get onto the pump or motor, etc. There is a risk of product damage, or injury from falling.
- Check with the local municipality for information on disposal of unnecessary parts and packaging materials, etc.

4.1. Before installation

1. Measure the insulation resistance between the cable conductor (single-phase: power plug, 3-phase: U, V, W) and the ground (E), and confirm that it is 10MΩ or more.
2. Refer to the following and confirm the operation of the float switch on automatically operated models.

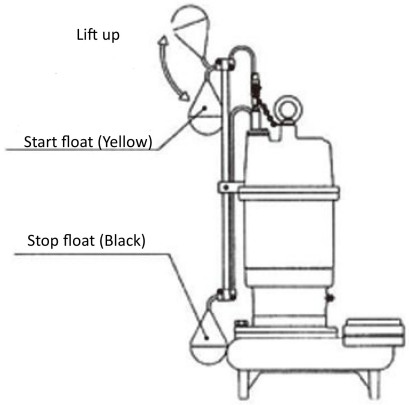
   For the ZU3(J)-L and LN types, automatic operation is possible with the float switch and control circuit (built-in) when the power cable is connected to the power supply.

   For the ZU3(J)-L type, independent automatic draining operation is possible.

   The ZU3(J)-LN type can be used in combination with the ZU3(J)-L type for automatic alternate discharge operation.

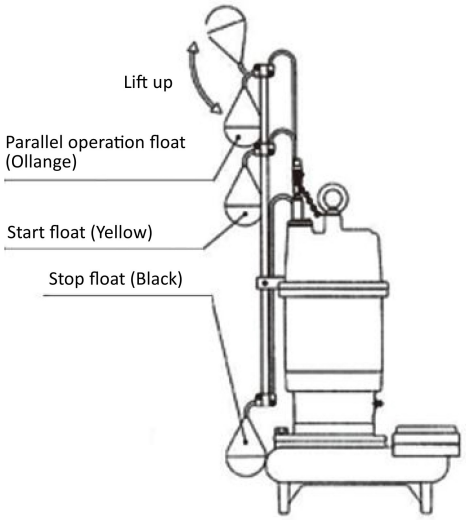
Carry out the following procedures after connecting the power supply. Maintain each operation for two seconds or more. Complete the confirmation of operation within one minute.

(1) ZU3(J)-L type: Refer to the drawing on the right.




1. Set all floats so that they face downward.
2. Lift up the floats in the order of the stop float (black) and start float (yellow). The pump will start.
3. Return the start float (yellow) to its original position, and confirm that the pump operation continues.
4. Next, return the stop float (black) to its original position, and confirm that the pump stops.
5. Repeat steps 2, 3 and 4 in order for two or more times to confirm the operation.

(2) ZU3(J)-LN type: Refer to the drawing on the right.

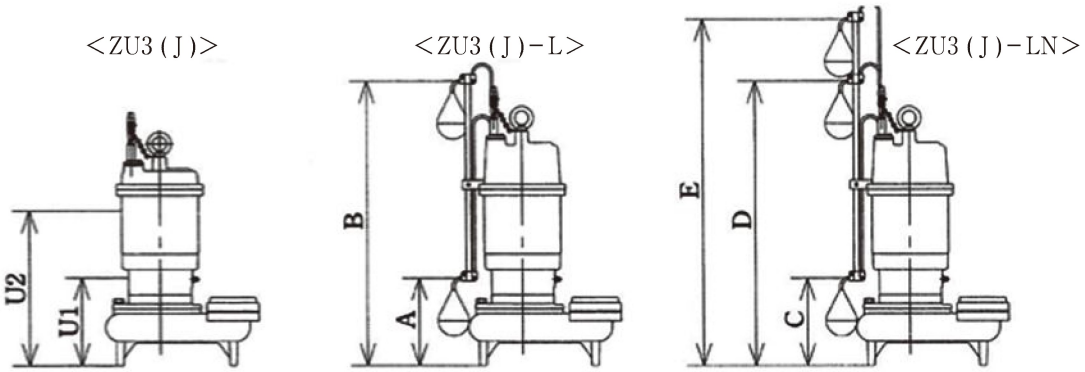



1. Set all floats so that they face downward.
2. Lift up the floats in the order of the stop float (black) and alternate start float (yellow).
3. Return the alternate start float (yellow) and stop float (black) to their original positions.
4. Repeat steps 2 and 3 in order for three or more times. Confirm that once out of every two times, the pump starts when the alternate start float (yellow) is lifted, and the pump stops when the stop float (black) is returned to its original position.
5. Set all floats so that they face downward again.
6. Lift up the floats in the order of the stop float (black) and parallel operation float (orange). The pump will start.
7. Next, return the alternate start float (orange) to its original position, and confirm that the pump operation continues.
8. Next, return the stop float (black) to its original position, and confirm that the pump stops.
9. Repeat steps 6 and 7 in order for two or more times to confirm the operation.

(Note) Do not change the float position. improper position could read to malfunction.

4.2. Installation

1. Install the pump in a flat and sturdy place.
2. When carrying out alternate parallel operation with two pumps (ZU3(J)-L+LN), install the two pumps on the same surface.
3. Do not install the pump where it may be affected by the water that flows into the tank. Arrange the ropes and power cables so that they do not obstruct the pump or float operation.
4. If the pump might be submerged in sediment, etc., install the pump higher than the floor level.
5. The operation water level is as shown below.




U1: Minimum water level for operation (Operation at a water level lower than this could result in pumping failure or vibration, etc.)

U2: Minimum water level for continuous operation (Do not run the pump at this water level for more than 20 minutes. The protection switch could activate and cause the pump to stop.)

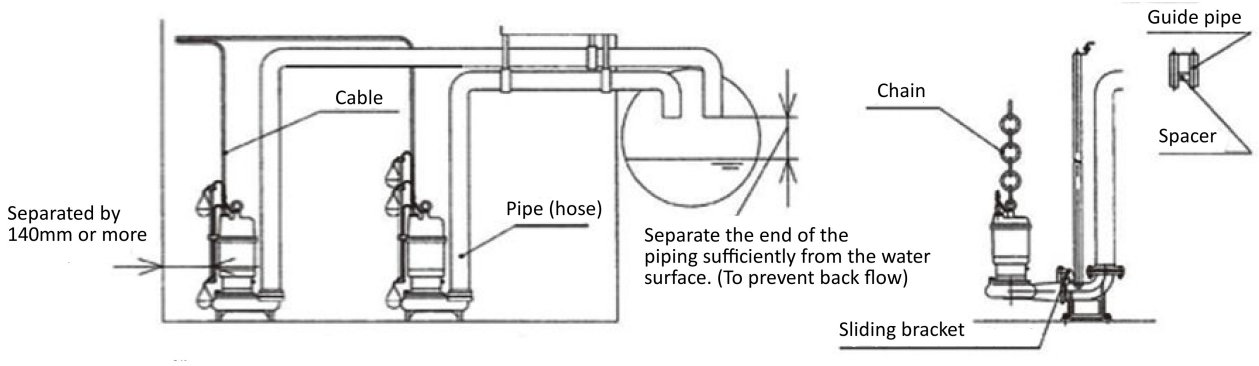
ZU3(J)-L Type : A: Stopping water level B: Starting water level
ZU3(J)-LN Type : C: Stopping water level D: Starting water level (alternate)
E: Parallel operation water level

| Model name | ZU3(J) | | ZU3(J)-L type | | ZU3(J)-LN type | | |
|---|---|---|---|---|---|---|---|
| | U1 | U2 | A | B | C | D | E |
| ZU3(J)-50-0.4S(T) | 140 (180) | 250 (290) | 140 (180) | 510 (550) | 200 (240) | 450 (490) | 570 (610) |
| ZU3(J)-50-0.75 | 140 (180) | 250 (290) | 140 (180) | 510 (550) | 200 (240) | 450 (490) | 570 (610) |
| ZU3(J)-50-1.5 | 170 (220) | 300 (350) | 170 (220) | 540 (590) | 230 (280) | 480 (530) | 600 (650) |
| ZU3(J)-65-1.5 | 170 (220) | 300 (350) | 170 (220) | 540 (590) | 230 (280) | 480 (530) | 600 (650) |
| ZU3(J)-65-2.2 | 200 (270) | 430 (500) | 200 (270) | 720 (790) | 270 (340) | 650 (720) | 790 (860) |
| ZU3(J)-65-3.7 | 200 (270) | 430 (500) | 200 (270) | 720 (790) | 270 (340) | 650 (720) | 790 (860) |
| ZU3(J)-80-2.2 | 200 (270) | 430 (500) | 200 (270) | 720 (790) | 270 (340) | 650 (720) | 790 (860) |
| ZU3(J)-80-3.7 | 200 (270) | 430 (500) | 200 (270) | 720 (790) | 270 (340) | 650 (720) | 790 (860) |
| ZU3(J)-80-5.5 | 240 (276) | 490 (496) | | | | | |
| ZU3(J)-80-7.5 | 240 (276) | 490 (496) | | | | | |

4.3. Piping

1. When setting removable unit onto pump

<Installation and piping example>




2. Suspend the pump with a crane (chain block), and engage the sliding bracket and guide pipe. Lower the pump carefully in this state. Do not shake or twist the chain at this time. After connecting, lift the pump slightly up and set it down again carefully to complete the connection. If the guide pipe is long, weld spacer on to reinforce it.

## [5] Electrical Work

**⚠ Warning**

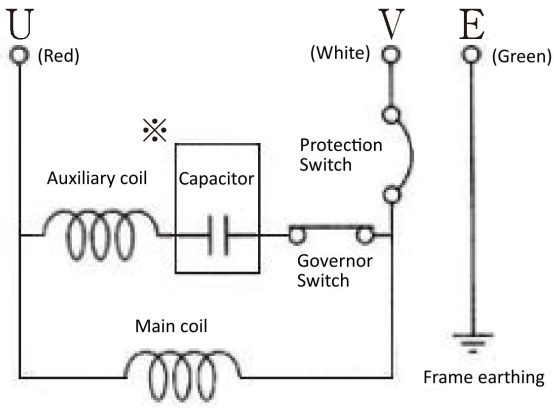
- Always turn OFF the power and ensure that no power is being supplied to the pump when attaching or disconnecting wiring. Failure to observe this could result in electric shock.
- All wiring work must be done by a qualified electrician according to the Electrical Installation Technical Standards and Wiring Regulations. Incorrect wiring could result in electric shocks or fires.
- Securely earth the equipment, and install a dedicated residual current circuit breaker. Failure to observe this could result in electric shock, electric leakage, or fire.
- Always earth the pump before turning the power on. Do not connect the earthing wire to gas pipes, water pipes, lightning rods or telephone earthing wires. Failure to earth the equipment correctly could result in electric shocks.
- Check that none of the wiring connections are loose. Any loose or disconnected wires could result in fire or electric shock.

**⚠ Caution**

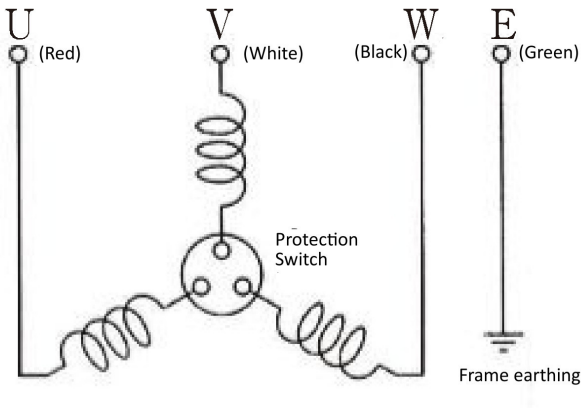
- Do not lay the power cable or control cables in the same conduit or duct. The product or other devices could malfunction.
- When a socket must be provided outdoors, use a waterproof socket. Failure to observe this could result in electrical leakage or fire.
- Do not damage, treat, forcibly bend, pull, twist, tuck, apply load or bundle the power cable. Failure to observe this could lead to damage of the power cable, electric shocks or fires.

5.1. When running the pump with a control panel, use the Kawamoto control panel (ECD2 type).
5.2. Refer to the control panel and float switch instruction manual for the connection methods when carrying out water level control operation using a control panel. Do not use an electrode type as it could malfunction due to the sewage, etc.
5.3. Do not extend the cables. If a long cable is required, contact your dealer.
5.4. ZU3(J) motor circuit diagram

Single phase 100V




Three Phase 200V




## [6] Operation

### ⚠ Warning

- Don't use this pump in place where people are present (bathroom, pools, lakes, etc.) Failure to observe this could result in electric shock when a fault or electric leakage occur
- If any abnormality is found, immediately turn OFF the power to prevent accidents, and contact your dealer for inspections and repairs. Continuing operation in an abnormal state could result in fires from electric shocks, electric leakage or short-circuiting.
- Always turn OFF the power and ensure that no power is being supplied to the pump when attaching or disconnecting wiring. Failure to observe this could result in electric shock.
- Periodically check for and remove dust on the outlet in which the power plug is inserted or in the power supply box. If dust is left for a long period of time, it could cause the power plug to heat up, resulting in fire.
- Unplug the power cord when not using the pump for a long time.
- Turn the power switch OFF if the power fails. Failure to do so could result in product or system device damage, or injury if the pump starts suddenly
- When carrying out maintenance or repair, always turn OFF the power. Furthermore, never service the pump with wet hands. Failure to observe this could result in electric shock or injury.

Do not place hands or feet near the suction port during operation. There is a risk of being suctioned in and injured.

**⚠ Caution**

- Do not use this product out of the rated voltage. Failure to observe this could result in fire or electric shock.
- Always turn the main power OFF when suspending use for a long time. Failure to observe this could result in electric shocks, electrical leakage or fires from deteriorated insulation.
- Do not perform idling (operating with no water in the pump) or zero-discharge operation (operating with no inflow/outflow of water inside the pump). Failure to observe this could lead to a rapid rise in the motor temperature, resulting in burns.
- Do not run the pump more than 5 second in the air. Failure to observe this could lead to a rapid rise in the motor temperature, resulting in burns.
- Do not run a 50Hz specification pump at 60Hz. The motor will burn. Do not run a 60Hz specification pump at 50Hz. The pump's performance will drop.
- Do not touch the pump, motor or heater during operation or immediately after stopping. There are extremely hot sections that could cause burns if touched.
- Confirm that there is sufficient turbine oil in the mechanical seal chamber. Running the pump with a low oil level could greatly shorten the life of the mechanical seal.

6.1. Before operation

1. Confirm that the electric leakage breaker capacity, power voltage and wiring are correct.
2. Submerge the pump in water higher than the minimum water level for continuous operation. (Refer to section [4]-2.) The protection unit could function if the water level is lower than this. Submerge the pump in water higher than the starting water level. (Refer to section [4]-2.) If the water level is lower, the pump will not start.

6.2. Trial operation

1. Turn the power ON and check the pump rotation direction. The pump is rotating in the forward direction if its is reacting to the direction of the arrow indicated on the top of the pump when the power is turned ON. If the pump is rotating in reverse, the discharge rate could drop and the current could increase. If the motor is rotating in reverse, turn the power OFF and interchange two of the three power cables.
2. Confirm that the water is discharged with force from the piping (or hose). Make sure that there is no abnormality in the voltage, current, operation noise or vibration.

6.3. Operation

1. Do not touch the pump or motor after operation lower than minimum water level for continuous operation. There are extremely hot sections that could cause burns if touched.
2. Limit the operation frequency to within ten times /hour. Highly frequent operation could burn the motor. Especially in a narrow pit that cause to high frequent operation, confirm the operation frequency.

## [7] Maintenance and Inspection

**⚠ Warning**

- If the pump stops running or if an abnormality is found, immediately turn OFF the power to prevent accidents, and contact your dealer for inspections and repairs. Continuing operation in an abnormal state could result in fires from electric shocks, electrical leakage or short-circuiting.
- The Pump should never be disassembled, repaired, or modified by anyone other than a qualified repair technician. Inadequate repair could result in electric shock, fire, or water leakage.
- The cables must be replaced only by a qualified technician. Improper handling could result in electric shocks.
- Always shut OFF the power and ensure that no power is being supplied to the pump when attaching or disconnecting wiring. (3-phase) Failure to observe this could result in electric shock or injury.
- Always disconnect the power plug from the socket.(single-phase) Furthermore, never plug/unplug with wet hands. Failure to observe this could result in electric shock or injury.
- Always consult with Kawamoto Pump or the sales outlet where the pump was purchased before moving and re-installing the pump. Incorrect installation could cause electrical shocks, fires, and water leakage.

**⚠ Caution**

- Confirm that there is sufficient turbine oil in the mechanical seal chamber. Running the pump with a low oil level could greatly shorten the life of the mechanical seal.
- Always confirm that the internal pressure is zero before starting inspections. The water could spray out.

### 7.1. Daily Inspection

| Check Item | Determination Reference | Inspection guide |
|---|---|---|
| Current | Nameplate rated current value or less. | Daily |
| Voltage | Within ±10% of rated voltage | |
| Ball-bearing | Operation noise & vibration should be unchanged from initial condition. | |
| Insulation resistance | 1MΩ or more | Monthly |

Daily inspections are essential for detecting problems quickly. The maintenance of a daily operation log is therefore recommended.

### 7.2. Consumable parts

The following parts are consumable parts. Refer to the replacement guidelines and replace the parts.

| Parts Name | Inspection frequency guideline | Replacement guideline |
|---|---|---|
| Mechanical seal | 2 year | Turbine oil (lubricant) must not be murky or black |
| O ring Packing | - | Every disassembling |
| Turbine oil | 1 year | When discolored into white or black |
| Ball-bearing | 3 year | When bearing heat, or abnormal operational noise or abnormal vibration occur. |

## [8] Troubleshooting

**⚠ Warnig**

- If the pump stops running or if an abnormality is found, immediately stop operation and turn OFF the power, and contact your dealer for inspections and repairs. Continuing operation in an abnormal state could result in fires from electric shocks, electrical lea ge or short-circuiting.
- Always shut OFF the power and ensure that no power is being supplied to the pump when attaching or disconnecting wiring. (3-phase) Failure to observe this could result in electric shock or injury.
- Always disconnect the power plug from the socket.(single-phase) Furthermore, never plug/unplug with wet hands. Failure to observe this could result in electric shock or injury.

### 8.1. Protection switch (motor burning prevention device)

The protection (motor burning prevention device)

This pump has a built-in protective switch, so the pump may stop in the following cases to prevent the motor from burning.

- When the voltage fluctuates greatly
- When the frequency fluctuates greatly
- When operation continues after the top of the pump is exposed to air.
- When open-phase operation or constrained operation is carried out

After a set time, the protective switch is automatically reset and the pump starts operating, so always turn the power OFF before carrying out inspections.

### 8.2. Troubleshooting

| Problem | Cause | Countermeasure | Manual page No. |
|---|---|---|---|
| Pump does not run | The power plug is disconnected. | Insert the power plug into the socket. | - |
| | The residual current circuit breaker has tripped. | Reset the residual current circuit breaker. | - |
| | The protection switch has activated. | Refer to the section 9.1 Protection switch. | 11 |
| | Operation of the float is obstructed. | Remove the obstruction, and check the float operation. | 6 |
| Pump rotates, but no water is discharged. Prescribed discharge amount/ pressure is not obtained. | The sluice valve is closed | Open the sluice valve. | - |
| | The strainer is clogged. | Remove any foreign matter. | - |
| | Air is trapped in the pump. | Stop the pump once and then restart. | - |
| | The pump rotation direction is reversed (3-phase). | Correct the connection. | 9 |
| Overload (over-current) occurs | The pump rotation direction is reversed (3-phase). | Correct the connection. | 9 |
| | Foreign matter is stuck in the pump. | Disassemble and inspect the pump, and remove any foreign matter | - |
| Pump vibrates | The piping is not securely fixed. | Securely fix the piping. | 7 |
| | Foreign matter is stuck in the pump. | Disassemble and inspect the pump, and remove any foreign matter | - |
| | The motor's ball-bearings are worn | Contact your dealer for inspection and repairs. | - |
| Pump does not automatically run | Operation of the float is obstructed. | Remove the obstruction, and check the float operation. | 6 |
| | The float switch is faulty. | Contact your dealer for inspection and repairs. | - |
| | The control section built into the pump or the control panel is faulty. | Contact your dealer for inspection and repairs. | - |

Unexpected trouble could occur. However, it is important to take appropriate measures immediately when an abnormal condition is found. If the cause of the trouble is not clear, contact your dealer or designated service center. Notice the pump type, serial No. and trouble (fault) state making an inquiry.

**Kawamoto Pump Mfg. Co., Ltd.**
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Okazaki plant: 1 Goryoden Hashime-cho Okazaki, 444-8530 Japan

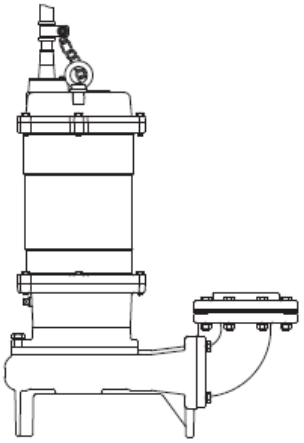
| No. | 87002722E |
|---|---|

大切な「水」をあなたへ Kawamoto

Bringing valuable “water” to you....

# Sewage/Waste water submersible pump

# ZU4 type operation manual



Thank you very much for purchasing the ZU4 type of sewage and waste water pumps.

Before using the product, read this manual carefully and use it correctly and safely.

Be sure to keep the watch where you can see it at any time after reading it.

Table of contents



## ⚠ Particular attention should be paid.

1. Construction should be carried out in accordance with applicable laws and regulations (Electrical Equipment Technical Standards, Extension Regulations, Building Standards Law, Water Supply Law, etc.).
   In addition to violating laws and regulations, it may cause electric shock, fire, fall, or injury due to falling.
2. Do not use the product in a place that may be touched by people (bathtubs, pools, ponds, etc.). Electric leakage and electric shock may result.
3. Be sure to perform grounding before energizing. Failure to securely install the ground wire may result in failure, electric leakage, electric shock, or fire. Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. Incomplete ground may cause electric shock.
4. Personnel other than repair technicians must not disassemble, repair, modify or replace cables. Failure to do so may result in failure, damage, electric shock, or fire.
5. Be sure to shut off the power before checking or replacing the product. Failure to observe this warning may result in electric leakage, electric shock, or injury.

Relevant parts of this manual also contain precautions to ensure that the product is used safely and correctly and to prevent harm or damage to you or others.

Precautions are classified into three categories: "Danger", "Warning" and "Warn" in order to clearly indicate the magnitude of the hazard or damage and the degree of urgency.

All of these are important matters related to safety. Be sure to observe them.

⚠ Hazards: Contents that are expected to cause imminent danger of death or serious injury.

⚠ Warning: Contents that may result in death or serious injury.

⚠ Caution: Content in which only the possibility of injury to a person and physical damage are expected to occur.

# 1 Introduction

When the pump reaches you, check the following.

1.1 Check the pump or nameplate as ordered.
Type, bore size, total head, frequency, number of phases, rated output, etc.

1.2 Check that the product is damaged during transportation and that the bolts, nuts, etc. are loose.

1.3 Please confirm that all accessories (see page3 3.2) are included in the order.

Note

1. Before using the product, be sure to read the instruction manual and use it correctly and safely. Precautions for preventing harm and damage are included in the instruction manual.
   ※ Kawamoto are not liable unless you observe the above.
2. Failure to comply with instructions, precautionary statements, improper repairs or alterations, natural disasters, installation environments (e.g., power supply abnormalities, foreign matter, sand, etc.), non-compliance with laws, ordinances, ministerial ordinances, or standards equivalent thereto, accidental or intentional failure or damage, replacement of consumable parts, resale, etc. may not be warranted.
3. When you contact us, please inform us about the model name and serial number.
4. Confirm with local governments about how to dispose of unnecessary parts and packaging materials.

< If you have any problems, please contact your supplier for any trouble.... >

# 2 Specifications

## ⚠ Warning

- Do not use the product outside the specified specifications, which may cause electric shock, fire, or water leakage.

## ⚠ Caution

- Caution should be exercised when rust, corrosion, or elution cannot be tolerated depending on the application and liquid quality. Select and examine all pumps and equipment. There is a risk of unexpected damage.
- Select products that suit your application. Use in inappropriate applications may cause an accident.
- The hazard, warning, and caution labels contain information that may cause personal injury or damage to property. Be sure to observe these instructions. Failure to observe this warning may result in equipment failure, electric shock, fire, or injury.
- Do not use liquids that are not listed as specified liquid quality. Failure of the pump may result in electric leakage, electric shock, or fire.
- Prepare a spare unit for use in facilities of living things (fish farms, fish pond, aquariums, etc.) or important facilities. Oxygen deficiency, water quality deterioration, etc. may occur due to pump failure, which may affect the life of living organisms.
- Be careful to check the materials used when transferring foods. Foreign matter may be mixed in.
- Avoid using copper alloy in living organisms. Life may be adversely affected.

| | | |
|---|---|---|
| Pumping fluid | Liquid quality | Miscellaneous wastewater, sewage and sewage (pH5 to 9) |
| | Liquid temperature | 0℃~40℃ |
| Installation site | | Underwater |
| Maximum water depth for pump installation | | 8m |
| Supply voltage fluctuations | | Rated voltage 10% or less |

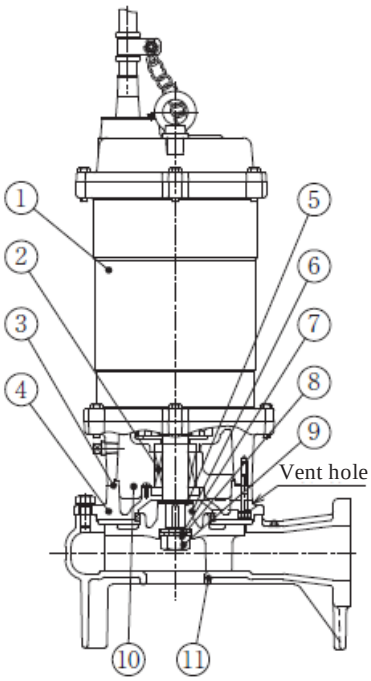
| Ability to pass foreign matter | |
|---|---|
| Diameter (mm) | Solid (sphere diameter (mm)) |
| 80 | 40 |

① It cannot be used in seawater or organic solvents.
② Autocut built-in.
③ The allowable value of voltage fluctuation is within ±10%, and the allowable value of frequency fluctuation is within ±1%.
The sum of the absolute values of the simultaneous voltage and frequency fluctuations is 10% or less. In either case, however, the motor characteristics and temperature rise do not conform to the rated value. Therefore, the overload protection device may operate depending on the set value of the control panel.

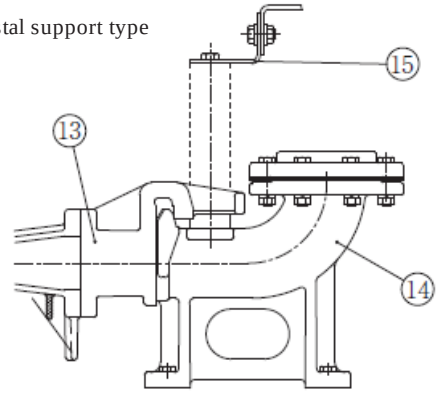
# 3 Product composition

## 3.1 Structural diagram

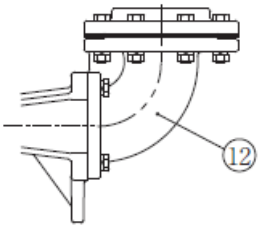
This drawing shows representatives of the ZU4 type, and may differ somewhat from this drawing depending on the model.




Pedestal support type




Flange-type




| No. | Name | Remark |
|---|---|---|
| 1 | Motor | |
| 2 | Mechanical seal | |
| 3 | O-ring | |
| 4 | Casing cover | |
| 5 | Shim | |
| 6 | Impeller | |
| 7 | Plain washer | |

| No. | Name | Remark |
|---|---|---|
| 8 | Spring washer | |
| 9 | Nut | |
| 10 | Turbine oil | |
| 11 | Casing | |
| 12 | Connecting bend | Select components |
| 13 | Connected straight pipe | Select components |
| 14 | Pedestal support | Select components |
| 15 | Support | Attachments to the detachable unit |

## 3.2 Accessory

### 1. Standard accessories

| Name | Quantity |
|---|---|
| Nameplate | 1 |
| Instruction Manual | 1 |

### 2. Selected parts (package separately)

When installing the pump, the following parts are required for each type.

| Type | Select components | Applicable model |
|---|---|---|
| Flange-type | Connecting bend | All models |
| Detachable type | Connected straight pipe | All models |
| | Pedestal support | All models |
| | Chain | All models |

### 3. Special accessory

| Name |
|---|
| Control panel |
| Check valve |
| Float switch |

# 4 Installation and piping

**⚠ Warning**

- When suspending the product by unloading, carrying in, or installing it, check the mass in the catalog or installation drawing, check the suspending method in the instruction manual, and do not suspend the product beyond the rated load of the suspending tool. Failure to suspend the product may result in injury due to fall.
- Follow the instructions in this manual to install the product without fail. Failure to install the product may result in electric leakage, electric shock, fire, injury due to falling or falling, or vibration.
- Construction should be carried out in accordance with applicable laws and regulations (Electrical Equipment Technical Standards, Extension Regulations, Building Standards Law, Water Supply Law, etc.). In addition to violating laws and regulations, it may cause electric shock, fire, fall, or injury due to falling.
- Do not use the product in a place that may be touched by people (bathtub, pool, pond, etc.), which may cause electric shock due to electric leakage.
- Unpack the product carefully with nails or staples. There is a risk of injury.
- Do not incinerate resin or rubber parts on site. Burning may generate harmful gases. Please check with local governments for the treatment method.
- Do not use the product in an explosive atmosphere. Fires might occur if used near such locations.

**⚠ Caution**

- Do not damage, break, process, bend, pull, twist, bundle, or pinch the power supply cable, which may damage the cable and cause a fire or electric shock.
- Turn the cable supplied with the pump to the appropriate length and insulate it. If the cables are bundled together, the cables may generate heat, causing disconnection, water breakage, or fire.
- Do not impact the equipment or cause it to fall, which may result in damage.
- Prepare a spare pump in case of stoppage of the pump. Water may be cut off due to pump failure, and the equipment may stop.
- Depending on the equipment, install an appropriate filter, etc. on the discharge side, perform sufficient flushing, and confirm that there is no foreign matter before use. Otherwise, cutting oil, rubber mold releasing agent, foreign matter, cutting oil contained in piping systems, foreign matter, etc. may be mixed into the handling fluid.
- Remove the phase flange from the pump and screw it into the piping. Otherwise damage or water leakage may result.
- Do not put anything on the equipment or put someone on it. Otherwise damage to the equipment or falls may result in injury.
- Use a sealant for the threaded part of the piping to ensure that water does not leak. If the product is not properly installed, water may leak.
- Before installing or check the product, arrange the surrounding areas. Sliding, stumbling, or injuring may result.
- Do not allow air to accumulate in the piping. If there is an air pool in the piping, the pump may not operate properly.
- Do not cover the plastic bags used to package this product. Otherwise, asphyxiation may occur.

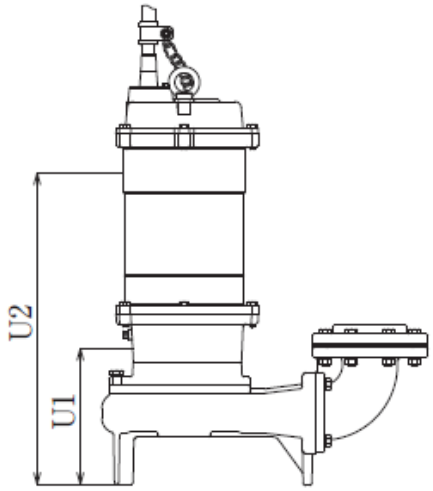
## 4.1 Prior to installation

Measure the insulation resistance between the conductor (three phases: U, V, W) of the cable and the ground (E) to check that it is 100 MΩ or more.

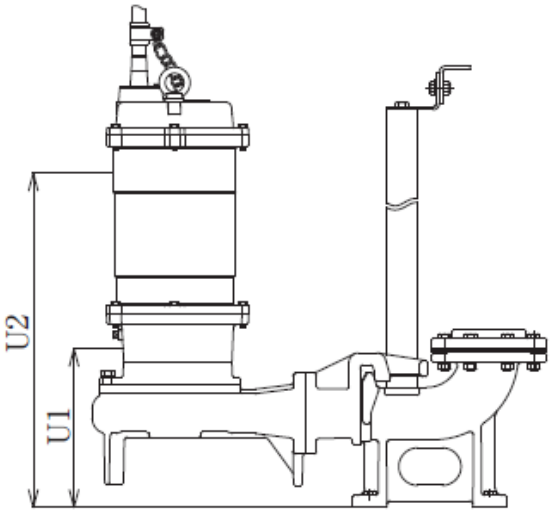
## 4.2 Installation

1. Install the pump in a flat and rugged place.
2. When two pumps are operated alternately in parallel, install the two pumps on the same plane.
3. The operating water level is as shown in the figure below.

〈Flange-type〉




〈Pedestal support type〉




| Type | Flange-type | |
|---|---|---|
| | U1 | U2 |
| ZU4-80-5.5 | 240 | 490 |
| ZU4-80-7.5 | 240 | 490 |

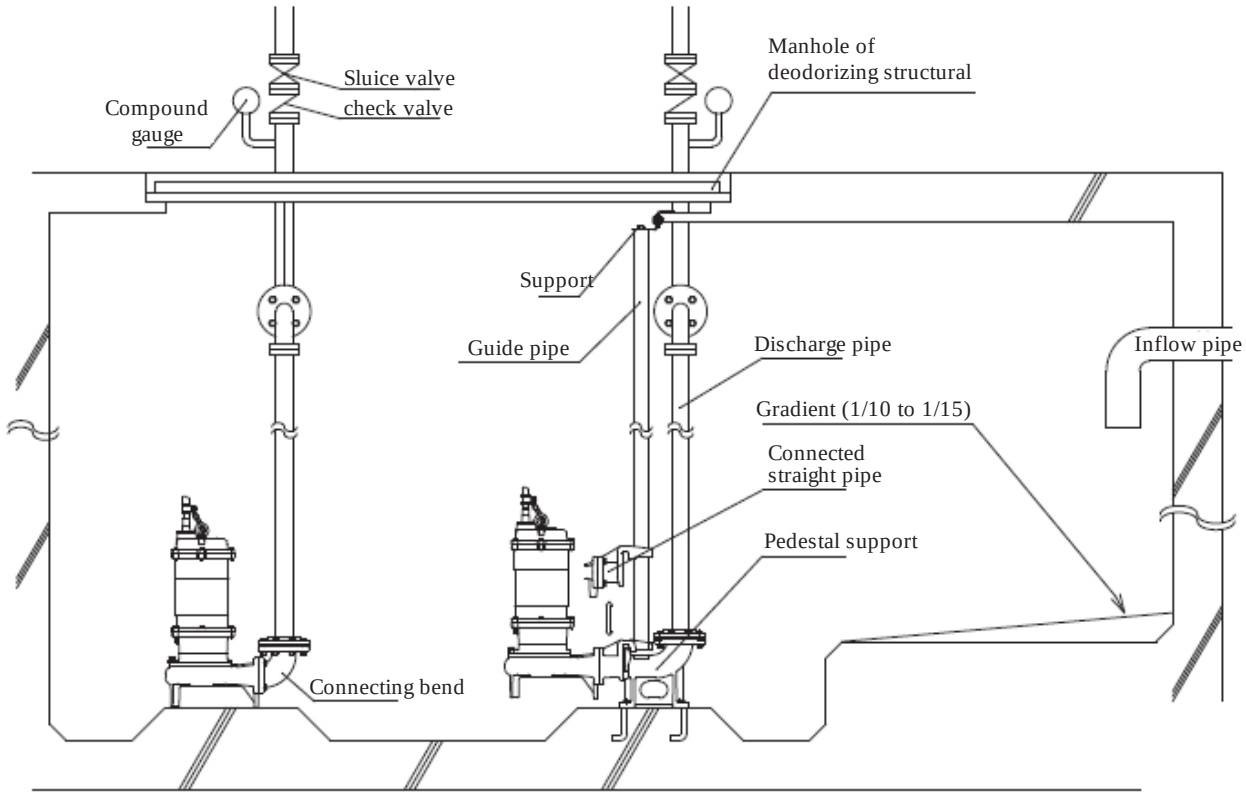
| Type | Pedestal support type | |
|---|---|---|
| | U1 | U2 |
| ZU4-80-5.5 | 275 | 525 |
| ZU4-80-7.5 | 275 | 525 |

U1: The lowest water level that can be operated (when operating below this water level, water cannot be pumped, vibration, etc. will occur).

U2: The lowest water level at which continuous operation is possible (Do not operate for 20 minutes or longer below this water level. Protective equipment may operate and the pump may stop).

## 4.3 Piping

1. When installing the check valve, use the check valve for sewage (Kawamoto products VCO type).
2. Install the pump from the wall of the tank to the center of the pump at a distance of 1.5 times or more the outside diameter of the pump. Install the pump at a distance of 3 times or more the outside diameter of the pump when two pumps are installed.
3. Install the manhole at a position where the level controller or pump in the tank can look through the manhole for inspection.
4. Install the inflow pipe and aeration unit at a position where air does not get caught in the suction port of the pump. Otherwise pumping failure or vibration may result. Install piping, power cables, ropes, etc. so that they do not interfere with the operation of the pump, float, etc.
5. Install the product so that the inflow does not come into direct contact with the level controller. Otherwise malfunction may result.
6. Install the foundation of the mounting and demounting device flat and horizontally.



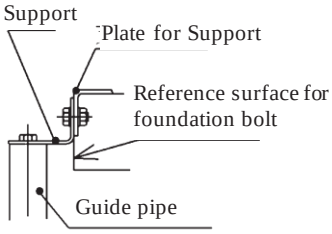

Flange-type Pedestal support type

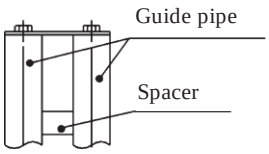
<<Reference drawing for installation and piping>>

7. To set the pump in the pedestal support unit.
   - Suspend the pump with the crane (chain block) and connect the connecting straight pipe with the guide pipe to gently lower the pump. Do not shake or twist the chain.
   - After connection, pull it up slightly and gently remove the pump to stabilize the connection.
   - If the guide pipe is long, weld and reinforce the spacer.

| Output (kW) | Recommended guide pipe material and diameter |
|---|---|
| 5.5, 7.5 | Stainless steel 40 A(Schedule 40) |

   - The guide pipe, support mounting plate, and spacer should be prepared by the customer.




# 5 Electrical work

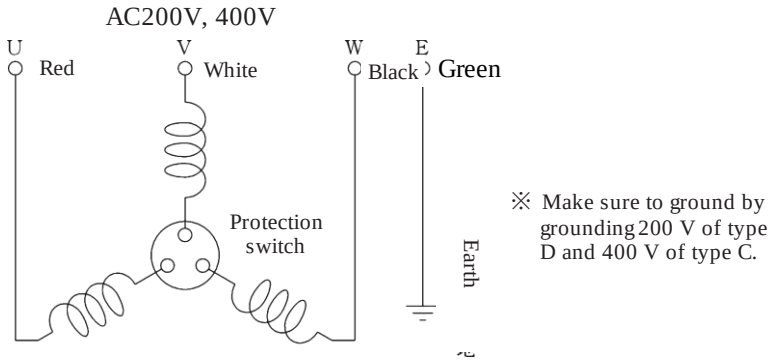
## ⚠ Warning

- Ensure that the electrical work is performed by a specialist in accordance with the Electrical Equipment Technical Standards and Extension Regulations. Insufficient wiring or connection may cause failure, electric leakage, electric shock, or fire.
- Be sure to perform grounding before energizing. Do not connect the Ground Wire to a gas pipe, a water pipe, a lightning rod, or a ground wire of a telephone. Otherwise, the Earth Wire may cause a failure, electric leakage, electric shock, or fire if it is not securely connected to the Earth Wire. Do not connect the Earth Wire to the Earth Wire of a gas pipe, a water pipe, a lightning rod, or a telephone. Incomplete ground may cause electric shock.
- Install a leakage circuit breaker exclusively for this product. Earth leakage, electric shock, or fire may result.
- Do not connect the power strip wiring (connecting multiple electric devices) and install the wiring with the dedicated wiring. Earth leakage, electric shock, or fire may result.
- Remove dust from the power plug, wiring connections, wiring connections, and terminals. If the product is left with dust, it may generate heat and cause a fire.
- Before turning on the power supply, check that the wiring connections and connections are not loosened or disconnected. Loosening or disengagement of even one location may cause fire or electric shock.

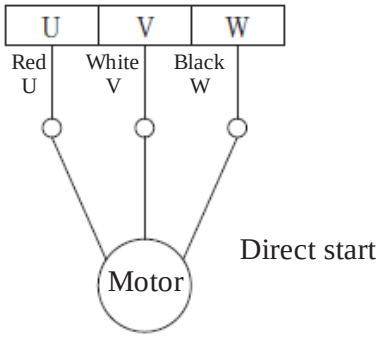
**⚠ Caution**

- Do not install power cables or control wires in the same pipe or duct. Otherwise the product or other equipment may malfunction.
- Do not damage, break, process, bend, pull, twist, bundle, or pinch the power supply cable, which may damage the cable and cause a fire or electric shock.
- Turn the cable supplied with the pump to the appropriate length and insulate it. If the cables are bundled together, the cables may break due to heat generation, which may cause water breakage or fire.

5.1 When operating the pump on the control panel, use an ECD type pump.
5.2 Refer to the operation manual of the control panel and float switch for the connection method when the water level control operation is performed on the control panel.
5.3 Do not connect cables.
5.4 Circuitry diagram of ZU4 motor




5.5 Wiring method Connect the wires according to the figure below.




# 6 Operation

**⚠ Warning**

- Be sure to shut off the power before attaching or removing the wiring. Electric shock may result.
- Do not touch the charging part, motor terminals, or cable tips of the control panel (electrical equipment box) after turning on the power supply or in an energized state, which may cause electric leakage, electric shock, or fire.
- Turn off the power switch in case of power failure. Otherwise damage to the product or equipment may result, or the pump may operate rapidly, resulting in injury.
- Keep hands and feet away from the suction port during operation. It may cause injuries due to inhalation.
- Do not touch the power supply or operation switch with wet hands after turning on the power supply. Doing so may result in electric shock or injury.
- Do not disassemble or inspect the protective switch (motor burn-out prevention device) during operation. The pump is energized and restarts without notice, which may result in electric shock or injury.
- Do not operate in continuous operation for a long period of time or under severe repeated starting conditions. Otherwise leakage from the mechanical seal or failure of the pump may result.

**⚠ Caution**

- Do not use the product at voltages other than the rated voltage, which may cause fire or electric

shock.

- Confirm that the rotation direction is the normal rotation direction. If the machine is operated in the wrong rotation direction, the impeller nut or bolt may loosen due to vibration, causing an accident.
- Do not touch the rotating parts or put fingers or foreign matter into the opening during operation, which may cause electric shock, damage, or injury.
- Do not touch the pump or motor during operation or immediately after stopping. The product may be hot and may cause burns.
- If the product is not used for a long period of time, shut off the power supply, which may cause electrical leakage, electric shock, or fire due to insulation degradation.
- Do not run idle, shut off for a certain period of time, or mix air in the handling liquid. Otherwise, the casing, bearings, shaft seals, etc. may be damaged or water pumping may be impossible. The pump may overheat and burn.
- Do not operate a 50 Hz pump at 60 Hz. Otherwise damage due to excessive pressure or burning of the motor due to overload may result. Do not operate a 60 Hz pump at 50 Hz. The performance of the pump deteriorates.
- Use the valves in the normal condition. Failure to operate properly may result in damage to the unit.
- When starting operation after long-term storage or stoppage, follow the order of "Install" and "Operation" to perform trial operation. Otherwise, the pump may be restrained due to sticking, the motor may burn, or the motor may run idle due to falling water.
- Operate the equipment within the specification range. Operation outside the specification range may cause equipment failure or accident.
- Carry out adequate venting of air from the pump and piping during trial operation. The pump may cause an air lock or increase in temperature, which may result in failure or accident.
- When driving with an inverter, do not operate at a frequency exceeding the rated frequency. Otherwise burning or fire may result. When driving with a 400V class inverter, install a suppression filter or a reactor on the inverter side. Fire or damage due to dielectric breakdown may result.
- Check the appropriate amount of turbine oil in the mechanical seal room. If the product is operated in shortage, the service life of the mechanical seal will be significantly reduced. (Ref. 7.3 Turbine oil volume)
- Do not operate in air for 5 seconds or longer. The temperature of the motor rises rapidly, which may cause burning.
- Do not operate the inverter of the motor with the built-in auto-cut. Malfunction of auto-cut may result.

6.1 Before starting

1. Check that the capacity, power supply voltage, and wiring of the leakage circuit breaker are correctly performed.
2. Keep the pump submerged at or above the lowest water level for continuous operation (see 4.2). Below that, the protective device may be activated.

6.2 Trial operation

1. Turn on the power supply and check the rotation direction of the pump.
   When the motor rotates in the reverse direction, the vibration is large, the discharge amount is small, and the current value is large. In case of reverse rotation, turn off the power and check the power cable connection.
2. Confirm that the water flows out of the discharge piping. Check that there are no abnormalities such as pressure, current, operating noise, or vibration.
   ※ Water is discharged from the exhaust hole when the pump is running, but it is not abnormal. The exhaust hole is for discharging air mixed in the casing. (as described in Section 3.1)

6.3 Operations

1. If operation is continued for a long time at a low water level, the protection unit may operate and the pump may stop. However, this is not a failure.
2. The motor should be started 6 times/1 hour or less. High-frequency operation may damage the motor.

# 7 Maintenance and Inspection

## ⚠ Warning

- Immediately stop operation and power supply if there is a failure or abnormality (e.g., broken cable or burnt smell). Shut off and ask your supplier or nearest sales office to inspect or repair the product. If the product continues to operate or is repaired incompletely, it may cause electric leakage, electric shock, fire, or water leakage.
- Personnel other than repair technicians must not disassemble, repair, modify, or replace cables. If there is any defect, it may result in failure, damage, electric shock, or fire.

- Be sure to shut off the power before checking or replacing the product. Failure to observe this warning may result in electric leakage, electric shock, or injury.
- If you move the equipment and reinstall it, consult your supplier or our nearest sales office. If the equipment is installed incompletely, it may cause a leakage of electricity, electric shock, fire, or water.
- When inspecting or replacing the control panel (electrical box) or other electrical components, check that the power supply is cut off and no voltage is applied to the tester before performing work. Failure to observe this warning may result in electric shock or injury.
- If the insulation resistance of the motor drops below 1MΩ, contact the supplier or nearest our sales office immediately, and the motor may burn or cause electric shock or fire.
- Use our genuine parts for repair. Use of parts other than genuine parts may cause failure or accident. In addition, the product may not function properly.
- Do not touch the power supply or operation switch with wet hands after turning on the power supply. Doing so may result in electric shock or injury.
- Do not disassemble or inspect the protective switch (motor burn-out prevention device) during operation. The pump is energized and restarts without notice, which may result in electric shock or injury.

## ⚠ Caution

- Check the appropriate amount of turbine oil in the mechanical seal room.
  If the product is operated in shortage, the service life of the mechanical seal will be significantly reduced.
- Check that the internal pressure is zero during disassembly and inspection. Water may spout and cause injury.
- When starting operation after long-term storage or stoppage, follow the order of "Install" and "Operation" to perform trial operation. Otherwise, the pump may be restrained due to sticking, the motor may burn, or the motor may run idle due to falling water.
- We recommend that you perform both periodic and daily inspections to ensure that you can use the watch for a long period of time with peace of mind. Failure to inspect the pump may result in pump failure or accident. Consult your supplier or nearest sales office for periodic inspections.
- Periodically check the operation of the protective relay. Failure to operate normally in the event of an accident may result in electric shock or failure.
- Periodically replace consumable parts. If the product is used without deterioration or wear, it may cause water leakage, seizure, or damage. Please contact your supplier or nearest sales office for periodic inspection, parts replacement, etc.
- Close the cock when using a pressure gauge or a combination gauge, etc., except when measuring the pressure gauge or combination gauge. Opening the pressure gauge at all times may cause failure of the pressure gauge, coupling gauge, etc.
- Be sure to perform the inspection according to the inspection items. Failure to prevent failure may result in an accident.

### 7.1 Daily check

| Check item | | Criteria |
|---|---|---|
| Motor | Insulation resistance | Insulation resistance 1 MΩ or more |
| | Ball bearing | Operating noise and vibration shall not change from the initial level. |
| Current | | Nameplate current value or less |
| Voltage | | Rated voltage 10% or less |

1. Measure the insulation resistance once every six months.
   If the insulation resistance of the motor drops below 1 MΩ, repair the motor or replace it with a new one.
2. It is important to know daily changes in order to detect abnormalities quickly. For this purpose, it is recommended to make a daily operation report.

### 7.2 Check should be performed every 3000 hours of operation or every six months.

| Confirmation item | Criteria |
|---|---|
| Mechanical seal | Turbine oil shall be free of white turbidity and darkness. |
| Turbine oil | |

### 7.3 Consumable part

The following parts are consumable parts. Replace the parts according to the standard for replacement.

| Check item | Guideline for replacement | Indication of the replacement |
|---|---|---|
| O-ring (packing) | Every disassemble and inspection | - |

| | | |
|---|---|---|
| Mechanical seal | 1-2 years or 5000 hours, whichever comes first | Turbine oil is cloudy. |
| Ball bearing | Three years | When the bearing overheats or abnormal noise/vibration occurs |
| Turbine oil | 6 months | White turbidity or darkening |

| Output (kW) | Turbine oil (L)* |
|---|---|
| 5.5、7.5 | 0.68 |

※ If lubrication exceeds the specified value, the seal life will be significantly reduced due to the rise in the internal pressure of the mechanical seal chamber.

# 8 Troubleshooting

**⚠ Warning**

- If the product is stuck or has an error (e.g., a broken cable or a burnt smell), shut down the product immediately, shut down the power supply, and ask the supplier or our nearest sales office to check or repair the product. If the product continues to operate or is repaired incorrectly, it may cause a leakage of electricity, electric shock, fire, or water leakage.
- Be sure to shut off the power before checking or replacing the product. Failure to observe this warning may result in electric leakage, electric shock, or injury.
- Personnel other than repair technicians must not disassemble, repair, modify, or replace cables. If there is any defect, it may result in failure, damage, electric shock, or fire.

8.1 Protective switch

1. The auto-cut (motor burn-out prevention device) is built in. In the following cases, the pump may stop.
   - When the voltage fluctuates excessively
   - When the frequency fluctuates higher
   - When operation is continued for a long time at the lowest possible water level.
   - In case of phase-out operation or restrained operation

   The auto-cut automatically returns after a certain period of time, and the pump starts operation without notice. Be sure to turn off the power supply during inspection.

8.2 A cause and measures of the trouble

| Phenomenon | Possible causes | Recommended action | Text page |
|---|---|---|---|
| Motor won't run | The motor has failed. | Repair at specialized plants | 8、9、10 |
| | There is some trouble in power supply. | Check and repair | 6、7、8 |
| | Have a single-phase connection | Correctly connect | 6、7、8 |
| | Foreign matter is caught in the sliding part. | Repair at specialized plants | |
| The motor rotates, but water does not flow out. | The impeller is clogged with foreign matter. | Repair at specialized plants | |
| | The piping is clogged. | Inspect the inside of the piping and remove foreign matter. | |
| The specified discharge amount and specified lift do not come out. | Actual head is too high. | Review the plan | |
| | Loss of piping is too large. | Review the plan | |
| | The impeller is worn. | Check, repair, and replace | |
| Result in overload (overcurrent) | Decrease in voltage and large imbalance of each phase | Examine the power supply | 6、7、8、10 |
| | The motor is defective. | Repair at specialized plants | 8、9、10 |
| | Large specific gravity and viscosity of liquid | Review the plan | |
| | The rotating part is in contact with one another. | Repair at specialized plants | |
| Cause the pump to vibrate | The impeller is clogged with foreign matter. | Repair at specialized plants | |
| | There is a bend in the axis. | Repair at specialized plants | |
| | Bearings are damaged. | Repair at specialized plants | |

Failure may occur unexpectedly. However, it is important to take immediate measures if any abnormality is detected. If the cause of the failure is unknown, contact your supplier or nearest sales office. When you contact us, please inform us of the pump type, serial number, and the status of the failure (error).

MEMO

Failures can be caused by something unexpected, but it is important to take action immediately if you find any abnormalities. If the cause of the failure is unknown, please contact your distributor or our nearest sales office. When contacting us, please tell us the pump model, serial number, and circumstances regarding the failure (abnormality).

**Kawamoto Pump Mfg. Co., Ltd**

http://www.kawamoto.co.jp

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