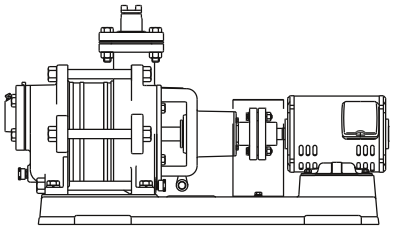
Bringing valuable "water" to you 川本ポンプ

# Self-priming turbine pump
# KS type
## Instruction manual



Thank you for purchasing the Kawamoto KS type Self-priming turbine pump.
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 . 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.
2 . All wiring work must be done according to the Electrical Installation Technical Standards and Wiring Regulations. Incorrect wiring could result in electric shocks or fires.
3 . 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). The pump will be very hot, possibly resulting in burns.
4 . Do not install the pump in a location that has not been treated for drainage, or that has not been waterproofed. Water leakages could result in significant damage.

Precautions for using this product safely and for preventing personal injuries or physical damage are given in this manual.
The precautions are classified as "Warning" and "Caution" 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.

The conventional units and values based on these given in { } are provided for reference.

# 1 Introduction

Please check the following items upon receipt of the product.
Check the nameplate to ensure that the correct pump has been delivered.
Check the type, bore, total head, frequency, No. of phases, Rated shaft power, etc.
Check that no parts have been damaged during transportation, and that none of the bolts, nuts, etc., are loose.
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.
- This pump may not be used for the transfer of food, processed food and so on. There is a risk of bacteria forming or foreign matter entering the goods.
- Avoid using this product with living things that are susceptible to copper alloys. The life of the creature could be affected.

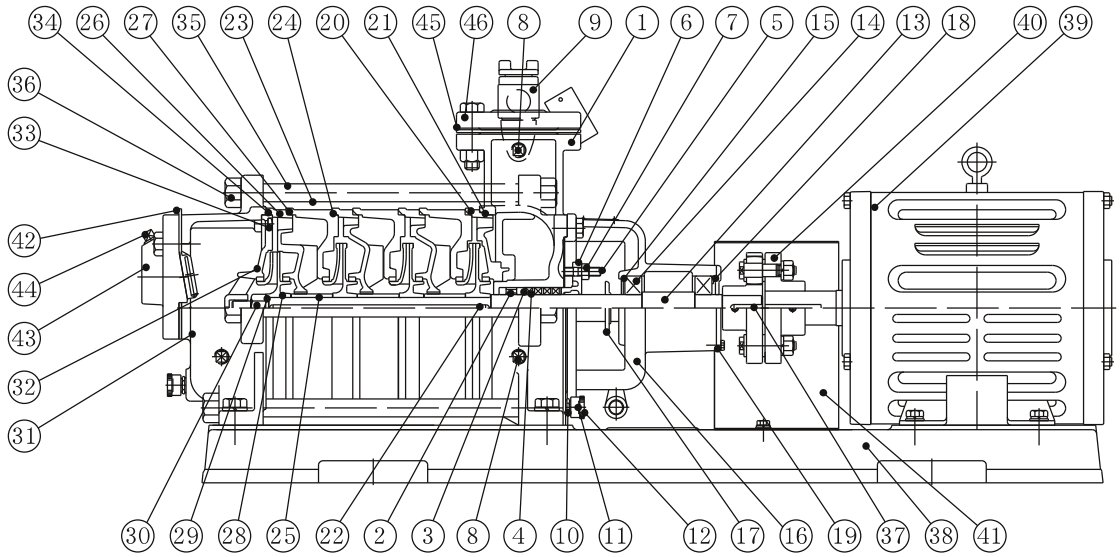
## 2. 1 Specification

| | | |
|---|---|---|
| Liquid | Liquid quality | Clean water (pH5.8~8.6) |
| | Temperature | 0~40 °C (no freezing) |
| | Chloride ion concentration | 200mg/L or less |
| | Solid object content amount | 50mg/L or less |
| | Solid object diameter | 0.3mm or less |
| Installation | | Indoor |
| Ambient temperature/humidity | | 0~40°C /90% RH or less |
| Maximum suction total head | | -6.0m (20°C) |
| Permissible back pressure | | 0.39MPa{4kgf/cm2} (provided, should be Shut off pressure + Back pressure < 1.37MPa{14kgf/mc2}) |
| Motor | Tyep | TEFC |
| | Frequency | 50/60 Hz |
| | Phase | Three phase |
| | Voltage | 380V |

# 3 Product Configuration

## 3. 1 Structure

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




| No. | Name |
|---|---|
| 1 | Discharge casing |
| 2 | Lantern ring |
| 3 | Ring packing |
| 4 | Gland packing |
| 5 | Double end stub |
| 6 | Gland |
| 7 | Nut |
| 8 | Plug |
| 9 | Exhaust valve |
| 10 | Nipple |
| 11 | Packing |
| 12 | Cap |
| 13 | Shaft |
| 14 | Ball-bearing |
| 15 | Bearing cover |
| 16 | Bearing box |

| No. | Name |
|---|---|
| 17 | Deflector |
| 18 | Wave washer |
| 19 | Bearing cover |
| 20 | Guide vane |
| 21 | O ring |
| 22 | key |
| 23 | Stage casing |
| 24 | O ring |
| 25 | Sleeve |
| 26 | Guide vane |
| 27 | O ring |
| 28 | Impeller |
| 29 | Impeller Washer |
| 30 | Small nut |
| 31 | Suction casing |
| 32 | Separator |

| No. | Name |
|---|---|
| 33 | Pan head screw |
| 34 | O ring |
| 35 | Double end stub |
| 36 | Nut |
| 37 | key |
| 38 | Base |
| 39 | Motor |
| 40 | Shaft coupling |
| 41 | Coupling guard |
| 42 | Packing with valve seat |
| 43 | Rhombic flange with valve seat |
| 44 | Plug |
| 45 | Flange packing |
| 46 | Flange |

## 3. 2 Standard accessory

| Name | Q'ty |
|---|---|
| Instruction manual | 1 |
| Strainer | 1 |

# 4 Installation

## ⚠ 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.
- Open the wood packing with caution to the box nail. Failure to observe this could result in injury.

## ⚠ Caution

- Do not install the pump in a location that has not been treated for drainage, or that has not been waterproofed. Water leakages could result in significant damage.
- Do not install the pump at a location with a lot of moisture such as a bathroom. Failure to observe this could result in electric shock when a fault or electric leakage occur
- Do not install this product in a machine or chemical factory etc. where toxic gas or corrosive gas of acid, alkali, organic solvents, paints, etc. is generated, or in a dusty place. Failure to observe this could result in electric leakage or fire.
- 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 Installation precautions

( 1 ) Use a nylon sling attached to the suction side's flange and the motor as shown in <Fig.1> when moving and positioning the pump unit on site.

( 2 ) Install the pump unit in a horizontal posture, and secure it firmly with the foundation bolts. An uneven foundation (not horizontal) can cause base twisting damage.

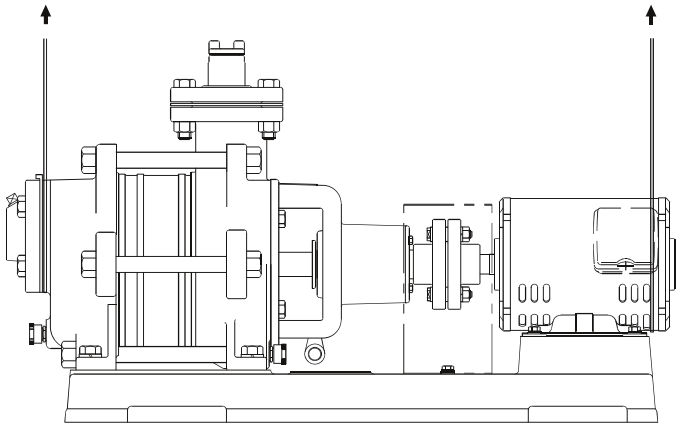
4. 2 Installation precautions

( 1 ) Install in a cool, well ventilated location which permits easy disassembly and assembly, and which is not exposed to rain or direct sunlight.

( 2 ) The installation site's ambient temperature must not exceed 40 °C.

( 3 ) Install a location which allows easy maintenance and inspection.

( 4 ) Install the pump as close to the water source as possible, where the suction height (height from suction fluid surface to center of pump) is low, and the horizontal distance of the suction pipe is as short as possible.



< Fig. 1 >

# 5 Piping

**⚠ Caution**

- Foreign matter and sand, etc., must not be allowed to flow into the pump. It may case impeller lock.

5. 1 Inflow pipe

Refer to <Fig.2>

( 1 ) The pipe should be as short as possible, with no bends.

( 2 ) Attach a strainer to the end of suction pipe so that foreign object doesn't come in the pipe.

( 3 ) The end of the suction piping must be two or more times deeper than the pipe diameter (D), and separated by 30 cm or more from the bottom and walls

( 4 ) Lay the suction piping with a gradient (1/100 or more) leading upward toward the pump so that air accumulation do not form.

( 5 ) Do not install a sluice valve on the suction piping.

5. 2 Discharge pipe

( 1 ) Install a sluice valve near the discharge port for maintenance purpose.

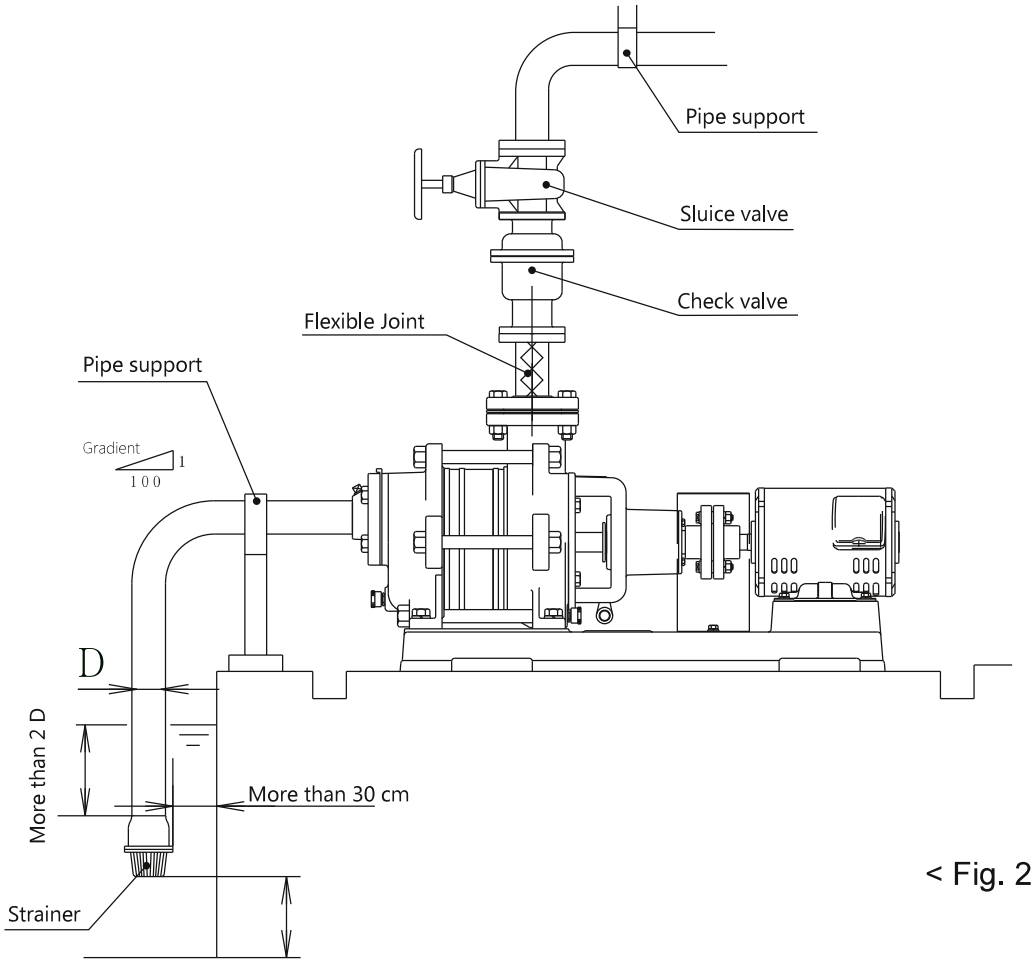
( 2 ) Be sure to install a check valve in cases where the pipe is long, where the actual head is high, where automatic operation occurs, where water is being fed to a pressure tank, and where 2 or more pumps are running in a parallel format. The check valve should be installed between the pump body and the sluice valve. The check valve should be installed between the pump body and the sluice valve.

( 3 ) A shock-less valve, etc., should be installed in cases where there is a risk of water hammer conditions.

( 4 ) An exhaust valve should be installed is cases where air accumulation in the piping cannot be avoided.

( 5 ) Install a vibration proof joint and piping support to prevent the piping weight from being applied directly to the pump.

( 6 ) While pump stops in winter season, remaining water in the pump may cause the pump and pipe to be broken by freezing.




< Fig. 2 >

# 6 Electrical work

## ⚠ Warning

- All wiring work must be done according to applicable legal requirements. 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.
- Reattach the terminal covers removed for the wiring work as back again. Failure to observe this could result in electric shock.
- Check that none of the wiring connections are loose. Any loose or disconnected wires could result in fire or electric shock.

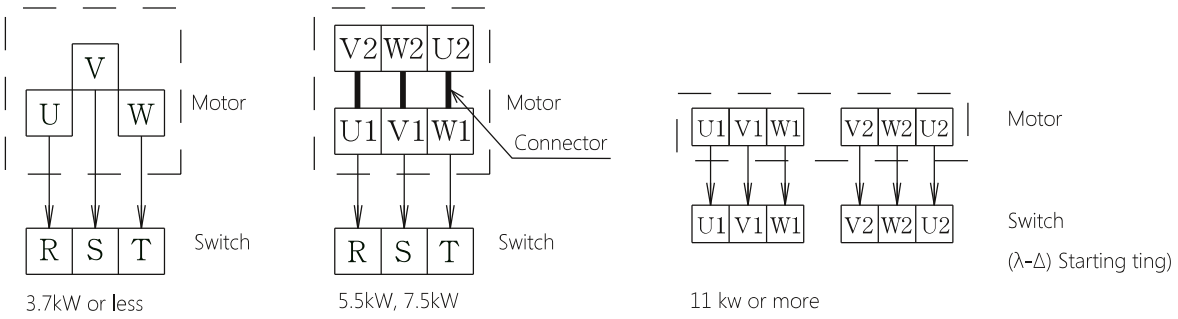
## ⚠ Caution

- Do not feed the power cable and control cable in one pipe or duct. The product or other devices could malfunction.

6. 1 Power supply

( 1 ) Install the electrical leakage breaker.

( 2 ) Connect the power cable to the motor as shown in <Fig.3>.

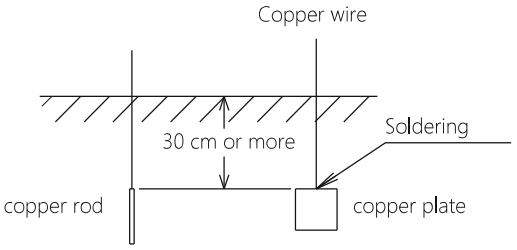



( In case where there is little margin in the power supply capacity, disconnect the connector, and use a star-delta starting)

< Fig. 3 >

6. 2 Attach a electromagnetic switch to protect a motor.

6. 3 As shown in <Fig.4>, grounding should be performed using either a copper plate 30 cm square or larger, or a 1 cm thick copper rod of 40 cm or longer, buried to a depth of 30 cm or more in a moist location.




< Fig. 4 >

# 7 Operation

## ⚠ Warning

- Do not run the pump with the shaft coupling guard removed. The operator could become entangled in the rotating area, possibly resulting in injury.
- 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.
- Do not pour water on the motor. Failure to observe this could result in electric shock, electric leakage, fault, or fire.
- 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
- Do not place hands or feet near the suction port during operation. There is a risk of being suctioned in and injured.

## ⚠ Caution

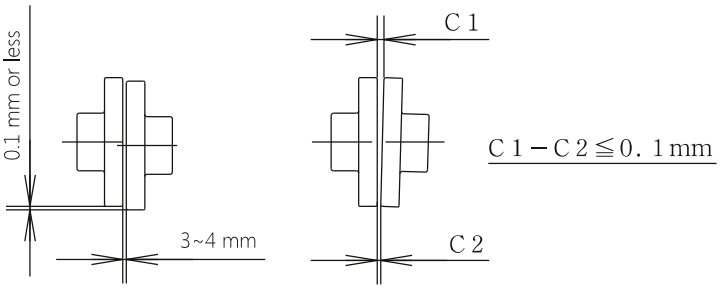
- Do not use this product out of the rated voltage. Failure to observe this could result in fire or electric shock.
- Verify that the motor is rotating in the prescribed direction. Rotation in the wrong direction can cause water leakage, etc.
- Do not perform idling (operating with no water in the pump) or zero-discharge operation (operating with no inflow/outflow of water inside the pump). The pump will be very hot, possibly resulting in burns.
- Do not touch the motor during operation. There are extremely hot sections that could cause burns if touched.
- Do not touch the rotating areas during operation, and do not insert fingers or rods, etc., into the motor openings. Failure to observe this could result in 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 run a 50 Hz specification pump at 60 Hz. The motor will burn. Do not run a 60 Hz specification pump at 50 Hz. The pump's performance will drop.
- Do not cover the pump with a blanket or cloth, or place objects on top. Failure to observe this could result in electric shock, electric leakage, or fire.

7. 1 Before operation

( 1 ) Always turn OFF power before checking.

( 2 ) Confirm that the electric leakage breaker capacity, power voltage and wiring are correct.

( 3 ) Remove the shaft coupling guard and verify that the coupling can be turned easily by hand. Stiff or uneven rotation can be caused by internal rust, etc., and the pump should be inspected in such cases. Also check for shaft center deviations. If deviated more than the amount shown in <Fig.5>, an alignment procedure should be performed.




< Fig. 5 >

( 4 ) Reattach the shaft coupling guard.

7. 2 Trial operation

( 1 ) Removing the priming cap, and fill the casing with water, and then, tighten the priming cap.

( 2 ) Turn the motor switch ON and OFF several times, and make sure it rotates without problem.

*Confirm that the direction of rotation matches the direction of the arrow on the casing in this time. If the motor is rotating in reverse, interchange two of the three power cables.

( 3 ) Turn on the power switch and fully open the sluice valve on the discharge side. Self-priming operation will be start, and pump exhaust the air in the suction pipe, and automatically pump up water. Pumping will start automatically in several minutes, but if the suction pipe's horizontal length is long, the self-priming can be finished quicker by removing the priming cap and adding water several times during this initial operation.

( 4 ) If self-priming does not end within seven to eight minutes, check whether air is abnormally entering from the pipes, etc.

( 5 ) Once pumping starts, read the pressure gage on the discharge side, adjust the discharge valve to the required pressure, and continue operation. Verify that the voltage, current, vibration, and noise conditions, etc., are normal.

7. 3 Stopping operation

( 1 ) If there is no check valve at the discharge side, operation should be stopped while gradually closing the discharge side sluice valve.

7. 4 Standard operation

( 1 ) The pressure gage and compound gage cocks should be closed except when performing measurements.

7. 5 Gland packing adjustment

**⚠ Caution**

- Pump should operate with appropriate amount of water leaking from gland packing. If the gland packing is too tight, the lubrication will drop, and the main shaft could wear, etc.

( 1 ) Adjusting the leakage amount

If the large amount of water leaks initially when staring operation, tighten the nut shown as No.7 in structural drawing and adjust to an appropriate leakage amount.

The state should stabilize approx. 30 minutes after operation is started, but if a large amount still leaks, tighten again and adjust to the appropriate amount.

( 2 ) Guide to appropriate leakage amount (mL/min)

| At initial operation | At stable operation |
|---|---|
| 60 or less | 10~30 |

# 8 Maintenance and Inspection

## ⚠ Warning

- When carrying out maintenance or repair, always turn OFF the power, and ensure that power is not being supplied. Failure to observe this could result in electric shock or injury.
- 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.
- 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.
- 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 leakage or short-circuiting.

## ⚠ Caution

- When the pump is hot, do not remove the plug (priming cup). Hot water may spurt out, possibly resulting in burns.
- When not using the pump for the winter season, do not fail to drain the water from the pump. Leaving water in the pump may cause the pump to be broken by freezing water.
- Always confirm that the internal pressure is zero before starting inspections. The water could spray out.

### 8. 1 Daily inspection

| Check item | | Determination reference |
|---|---|---|
| Gland packing | | There must be no dripping (leakage) from the seal |
| Motor | Insulation resistance | 1 M or higher |
| | Ball-bearing | Operation noise & vibration should be unchanged from initial condition |
| Pressure | | No significant increase or decrease from the normal pressure. |
| Current | | Nameplate rated current value or less |
| Voltage | | Within ±10% of rated voltage |

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

8. 2 Consumable parts

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

| Parts name | Replacement guideline | |
|---|---|---|
| O-ring (packing) | - | At each disassembly and inspection |
| Packing with valve seat | - | In case of serious wear or deterioration at time of replacement or inspection |
| Gland packing | Every 1 year | When large amount of water leaks even after tightening |
| Ball-bearing | Every 3 years | When the bearings heat up and abnormal noise, vibration observed |

# 9 Maintenance and Inspection

## ⚠ Warning

- 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 leakage or short-circuiting.

### 9. 1 Probable cause and countermeasure

| Problem | Cause | Contermeasure | Manual page No. |
|---|---|---|---|
| Pump does not run | Power supply problem | Inspect and repair | - |
| | Single phase connection is being used | Correct the wiring | 7 |
| | Foreign matter embedded in slide surface. | Remove the foreign matter | - |
| | Rust at rotating area | Disassemble and repair | - |
| Pump rotates, but no water is discharged. Prescribed discharge amount/pressure is not obtained. | The sluice valve is closed | Sluice valve is closed | - |
| | Impeller is clogged with foreign matter | Remove any foreign matter. | - |
| | Strainer is clogged with foreign matter. | Remove any foreign matter. | - |
| | Clogged pipe | Check the inside of the pipe and remove any foreign matter | 5, 6 |
| | The pump is insufficiently primed | Prime and fill the pump with water | 8 |
| | Air is trapped in the suction pipe. | Re plumb when suction pipe shapes right angled expansion pipe. | 5, 6 |
| | The suction pipe does not reach the water | Extend the suction pipe so it is submerged in the water | 5, 6 |
| | Actual head is too high | Re design the pumping plan | - |
| | Pipe friction loss it too large | Re design the pumping plan | - |
| | The pump rotation direction is reversed (3-phase). | Correct the connection. | 7, 8, 9 |
| | Worn parts | Replacing consumables | 11 |
| Overload occurs | Voltage drop, or imbalanced phase conditions exist. | Check the power supply. | - |
| | Obstruction at rotating area, Shaft is bent | Request repair from a facility specializing in this procedure | - |
| Pump vibrates, abnormal noise | Improper installation | Check the installation condition | 4, 5 |
| | Clogged impeller | Remove any foreign matter. | - |
| | The pump rotation direction is reversed (3-phase). | Correct the connection. | 7, 8, 9 |
| | Obstruction at rotating area, Shaft is bent | Request repair from a facility specializing in this procedure | - |
| | The motor's ball-bearings are worn | Request repair from a facility specializing in this procedure | 11 |
| Water leakage occurs | Bolt or nut is loose | Inspect and tighten | - |
| | Damaged O-ring | Replace the O-ring | 11 |

Grease may bleeds from bearing cover in the initial stage of operation, but this is not a failure. 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.