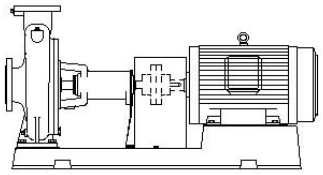
Stainless Steel Centrifugal Pump

GES Type Instruction Manual



Thank you for purchasing the Kawamoto GES type stainless Centrifugal 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.

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⚠ Special Notes

1. 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.
2. Do not install the pump in a location that has not been treated for drainage, or that has not been water proofed. Water leakages could result in significant damage.
3. All wiring work must be done according to applicable legal requirements (electrical equipment guideline, interior wiring regulations, building codes, etc.) Incorrect wiring could result in electric shocks or fires.
4. 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.
5. 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.

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 unit and values based on these given in parentheses are provided as reference.

1. Introduction

Please check the following items upon receipt of the product.

1. 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.
2. Check that no parts have been damaged during transportation, and that none of the bolts, nuts, etc., are loose.
   <<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.

2.1 Specifications

Liquid	Water quality	Fresh water, pH5.8~8.6, Chlorine ion concentration less than 200mg/L, Content solid concentration less than 50mg/L, Content solid concentration less than 0.3mm） *1
	Water temperature	0~90°C (however, there should be no freezing)
Installation		Indoor
Ambient temperature/humidity		0~40°C/90% RH or less
Maximum working pressure		1MPa {10.2kgf/cm^2}
Permissible back pressure		(1-shoutoff pressure)MPa {(10.2-shout off pressure) kgf/cm^2}
Maximum suction total head		Within -6m (20°C)
Motor	Type	Totally enclosed fan cooled indoor type
	Power supply	3-Phase 200V (Standard)
	Synchronous rotation speed	2 pole 50Hz: 3000min^{-1} 60Hz: 3600min^{-1}
		4 pole 50Hz: 1500min^{-1} 60Hz: 1800min^{-1}

*1 Fresh water is defined as the tap water for domestic and industrial, and well water, whose pH and chlorine ion concentration is within the value shown in above table.

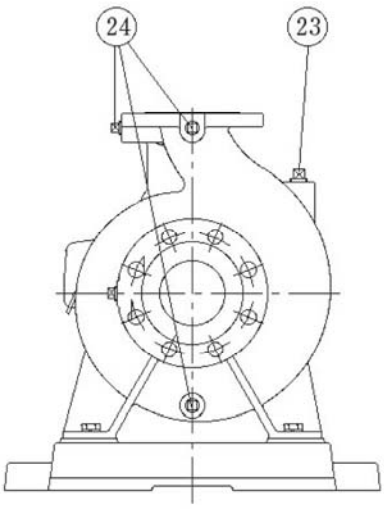
2.2 Special specification

Content		Applicable condition
Type	Motor	Totally enclosed fan cooled outdoor type
Liquid	quality/temperature	Antifreeze liquid（Ny brine Z-1, GD brine950、Show brine PP super） Concentration 35~50%/ -5~40°C, -15~40°C

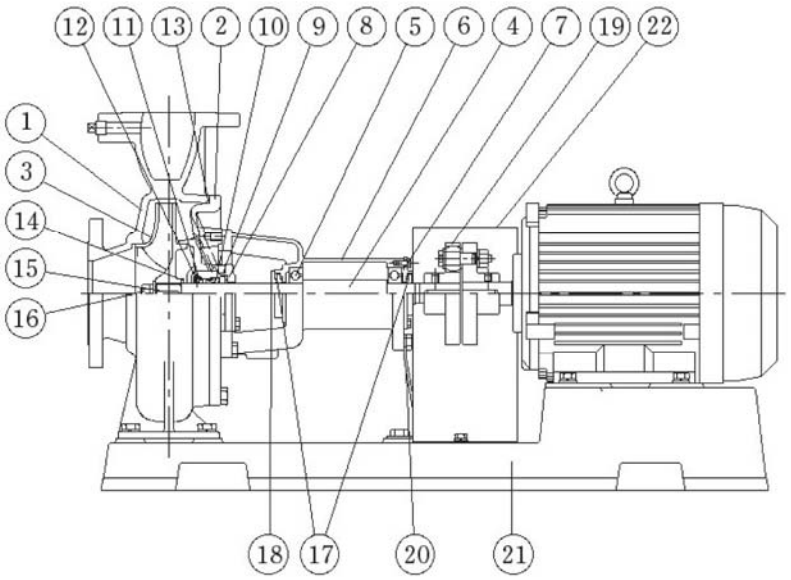
3. Product Configuration

3.1. Structure

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



Suction Bore size 40~100mm



No.	Name	Remark	No	Name	Remark
1	Casing		13	O ring	
2	Casing cover		14	Adjust ring	
3	Impeller		15	key	
4	Shaft		16	Nut	
5	Ball-bearing		17	Deflector	
6	Bearing box		18	Deflector	
7	Bearing cover		19	Shaft coupling	
8	Mechanical seal cover		20	Support	
9	O ring		21	Base	
10	Mechanical seal		22	Coupling guard	
11	Stopper ring		23	Plug	
12	Cup Point Set Screw		24	Plug	

3.2. Standard accessories

Name	Q'ty.
Instruction manual	1

3.3. Special accessories

Name	Remarks
Flange set	

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 in a highly humid place such as a bathroom. Failure to observe this could result in electric shock when a fault or electric leakage occur
- 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.
- If using this pump for drinking water, perform a water quality inspection as prescribed by the Health Department when installing and periodically thereafter. Drinking water with a poor quality could cause physical ailments.
- 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.
- 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 inflow side's flange and the motor as shown in <Fig.1> when moving and positioning the pump unit onsite.

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

4.2 Selecting the installation place

(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.

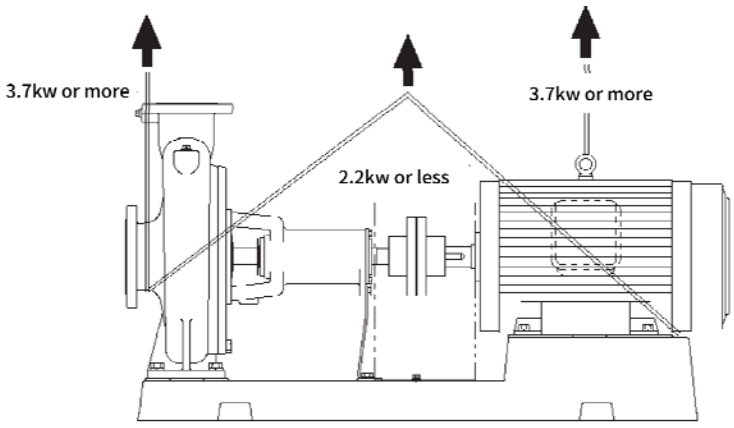
(3) Install a location which allows easy maintenance and inspection.

(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.

(5) Keep the suction total height within the maximum suction total height (-6m). Note that when pumping hot water (40°C or more), the total head must be compensated as shown on the right table.

(Example) Pump type GES-405M-4MN0.4, fluid temperature 90°C

Suction total head = -6+7.5=1.5 ... should be use with positive suction 1.5m



<Fig.1>

＜Compensation value of fresh water exceeding 40°C＞

Temp.（°C）	Compensation value（m）
50	+1.5
60	+2
80	+5
90	+7.5

5. Piping

⚠ Caution

■ Foreign matter and sand, etc., must not be allowed to flow into the pump. Such matter can cause impeller lock conditions and mechanical seal damage.

5.1 Inflow pipe

＜Common＞

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

(2) A strainer and sand filter should be installed in cases where foreign matter and sand, etc., are likely to be present in the water.

＜Suction＞：Refer to <Fig.2>

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

(2) Attach a foot valve to the end of the suction piping.

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

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

(5) Install the coupling reducer so that air accumulation do not form.

＜Inflow/positive pressure＞ Refer to <Fig.3>

(1) Install a sluice valve near the suction inlet for maintenance.

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 shockless valve, etc., should be installed in cases where there is a risk of water hammer conditions.

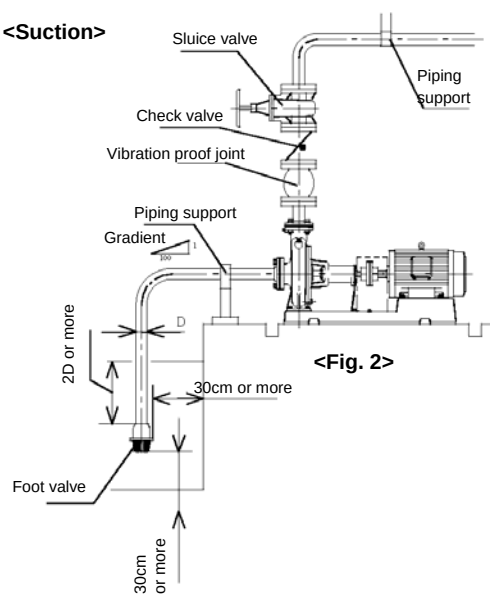
(4) An exhaust valve should be installed is cases where air accumulation in the piping cannot be avoided.

5.3 Common

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

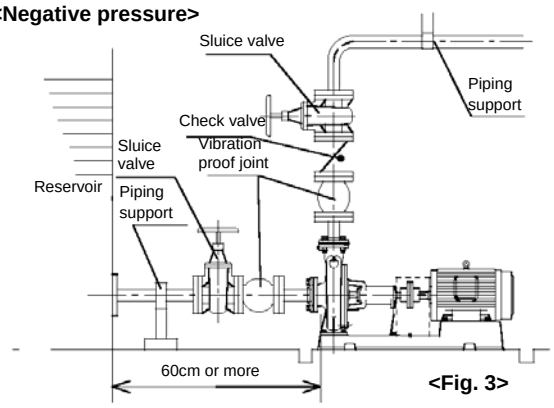
(2) Wrap the piping with insulating material to prevent freezing. The use of a pump heater is recommended.

<Suction>



<Fig. 2>

<Negative pressure>



<Fig. 3>

6. Electrical Work

⚠ Warning

- All electrical work must be done according to applicable guide line (electrical equipment guideline, interior wiring regulations, etc.) 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.

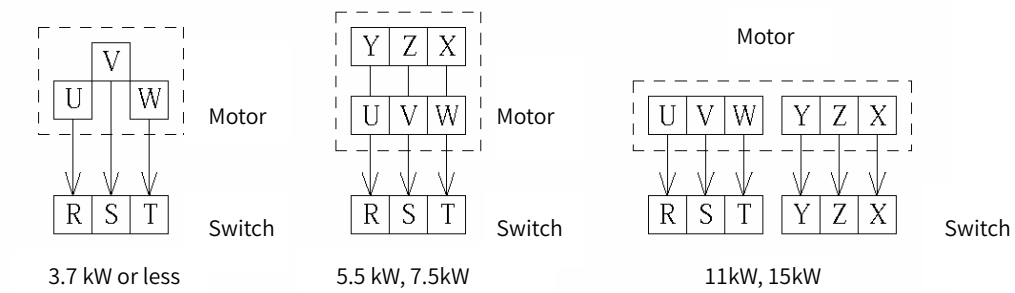
⚠ Caution

- Do not lay the power cable or control cables in the same conduit or duct. The product or other devices could malfunction.
- 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.

6.1. Power supply

(1) Install the electrical leakage breaker.

(2) Connect the power cable to the motor as shown in Fig.4.

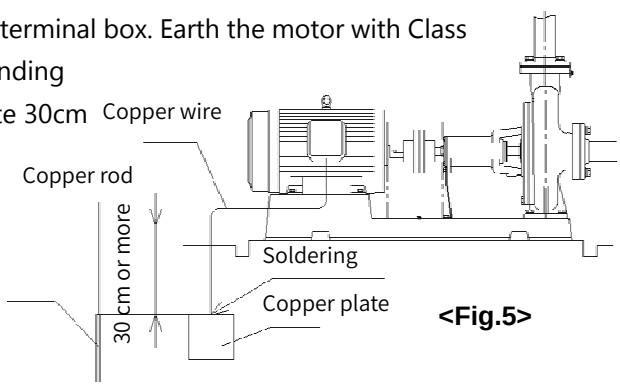


(In case where there is little margin in the power supply capacity, disconnect the connector, and use a star-delta start.)

<Fig.4>

6.2. Ground

(1) An earthing terminal is provided in the motor's terminal box. Earth the motor with Class D (Class 3) earthing. As shown in <Fig.5>, grounding should be performed using either a copper plate 30cm square or larger, or a 1cm thick copper rod of 40cm or longer, buried to a depth of 30cm or more in a moist location. Always turn the source power supply OFF when handling the ground wire.



<Fig.5>

7. Operation

⚠ Warnings

- 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 occurs. 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

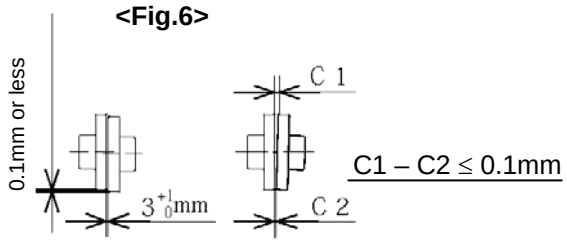
- Do not use this product out of the rated voltage. Failure to observe this could result in fire or electric shock.
- Verify that the motor is rotating in the prescribed direction. Rotation in the wrong direction can cause water leakage, etc.
- Do not touch the rotating areas during operation, and do not insert fingers or rods, etc., into the motor openings. Failure to observe this could result in electric shock.
- Do not touch the pump, motor or pump during operation or immediately after stopping. There are extremely hot sections that could cause burns if touched.
- 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). The pump will be very hot, possibly resulting in burns.
- Do not cover the pump or control panel with a blanket or cloth, or place objects on top. Failure to observe this could result in electric shock, electric leakage, or fire.
- 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 metal portion after passing hot water. The pump can become very hot and cause burn.

7.1. Before operation

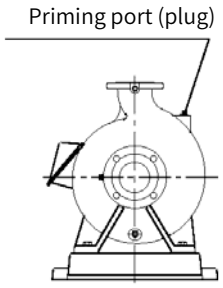
(1) Confirm that the electric leakage breaker capacity, power voltage and wiring are correct.

(2) Remove the shaft coupling guard and verify that the pump 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.6>, an alignment procedure should be performed.

<Fig.6>



(3) The pump must be primed. Do not perform dry operation, as this can cause a pump failure. When priming, rotate the shaft coupling by hand to completely discharge the air from the impeller.



＜Inflow or positive pressure＞：Open the sluice valves at the inflow and discharge side, then prime the pump.

＜Suction＞ ：Prime with the port.

(4) Reattach the shaft coupling guard.

7.2. Trial operation

(1) After priming the pump, close the sluice valve at the discharge side, and fully open the sluice valve at the inflow side.

(2) Turn the power ON and check the pump rotation direction. If the motor is rotating in reverse, turn the power OFF and interchange two of the three power cables.

(3) If the system appears normal, gradually open the sluice valve at the discharge side to establish a continuous operation mode. Verify that the voltage, current, vibration, and noise conditions, etc., are normal, and verify that there is no leakage from the mechanical seal.

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 gauge and compound gauge cocks should be closed except when performing measurements. Leaving these cocks open will increase the risk of damage.

8. Maintenance and Inspection

⚠ Warnings

- 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.
- 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.
- 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.
- 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.

⚠ Warnings

- 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.
- If the pump is hot, do not remove the plug (priming cap). Hot water may spurt out, possibly resulting in burns.

8.1. Daily Inspection

Inspection items		Determination reference
Mechanical seal		There must be no dripping (leakage) from the seal
Motor	Surface temperature	Ambient temperature +75℃
	Ball-bearing	Operation noise & vibration should be unchanged from initial condition
	Insulation resistance	1 MΩ or higher
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 consumable parts. Refer to the replacement guidelines and replace the parts.

Pats Name	Replacement guideline	Replacement guideline
O ring	—	At each disassembly and inspection
Mechanical seal	Every 1 year	When visible leakage observed
Ball-bearing	Every 3 years	When the bearings heat up and abnormal noise, vibration observed

9. Troubleshooting

⚠ Warnings

- 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.
- 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.

Problem	Cause	Countermeasure	Manual page No.
Pump does not run	Power supply problem	Inspect and repair	—
	Single-phase connection is being used (for 3-phase)	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	9
	The pump is insufficiently primed	Prime, and fill the pump with water	9
	The suction pipe does not reach the water	Extend the suction pipe so it is submerged in the water	6
	Impeller is clogged with foreign matter	Remove any foreign matter.	—
	The pump rotation direction is reversed (3-phase).	Correct the connection.	7
	Worn parts	Inspect and repair	—
Overload (over-current) occurs	Voltage drop or unbalaced phase conditions exist.	Check the power supply.	—
	Obstruction at rotating area/ Shaft is bent	Request repair from a facility specializing in this procedure	—
	Shaft center deviation	Perform an alignment procedure	9
Pump vibrates abnormal noise	Improper installation	Check the installation condition	4, 5, 6
	Clogged impeller	Remove any foreign matter.	—
	The pump rotation direction is reversed (3-phase).	Correct the connection.	7
	Obstruction at rotating area Shaft is bent	Request repair from a facility specializing in this procedure	—
	Shaft center deviation	Perform an alignment procedure	9
	Worn ball-bearings	Request repair from a facility specializing in this procedure	—
Water leakage occurs	Damaged Mechanical seal	Replace the Mechanical seal	—
	Damaged O-ring	Replace the O-ring	—

The pump may emit a squeaking sound at starts and stops, but this is normal. 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.

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