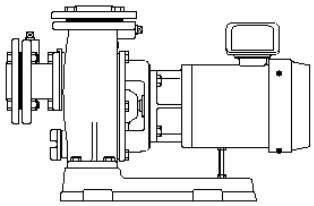
Kawamoto

No.	87102810

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

Self-Priming Turbine Pump

GS2-C Type Instruction Manual



Thank you for purchasing the GS2-C type self-priming turbine pump.
This instruction manual provides information for the constructor to safely use this pump unit. Always read this manual thoroughly and fully comprehend the contents before starting work.
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 on the power supply side.
   Failure to observe this could result in earth leakages, electric shocks or fires.
2. The electrical work must be completed according to the "Electrical Installation Technical Standards", "Wiring Regulations" and any other applicable regulations. Improper wiring and connections could lead to earth leakages or fires.
3. Do not run the pump in a dry mode (without water in the pump) or in a shutoff mode (without water inflow to, or discharge from, the pump). Such operations could cause the pump to become extremely hot, possibly resulting in burns.
4. Do not install this pump unit in a place that has not been treated for drainage or waterproofing. Major disasters could occur if water leaks.

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 units shown in brackets are given for 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 output, etc.

(2) Check that no parts have been damaged during transportation, and that none of the bolts, nuts, etc., are loose. Tighten any part that is loose.

(3) Check that all ordered accessories have been delivered.

<<If there is any problems, contact your dealer>>

[2] Specifications

⚠ Caution

● Always use this pump within the specified product specifications.
Failure to do so could result in electric shocks, fires, water leaks, etc.

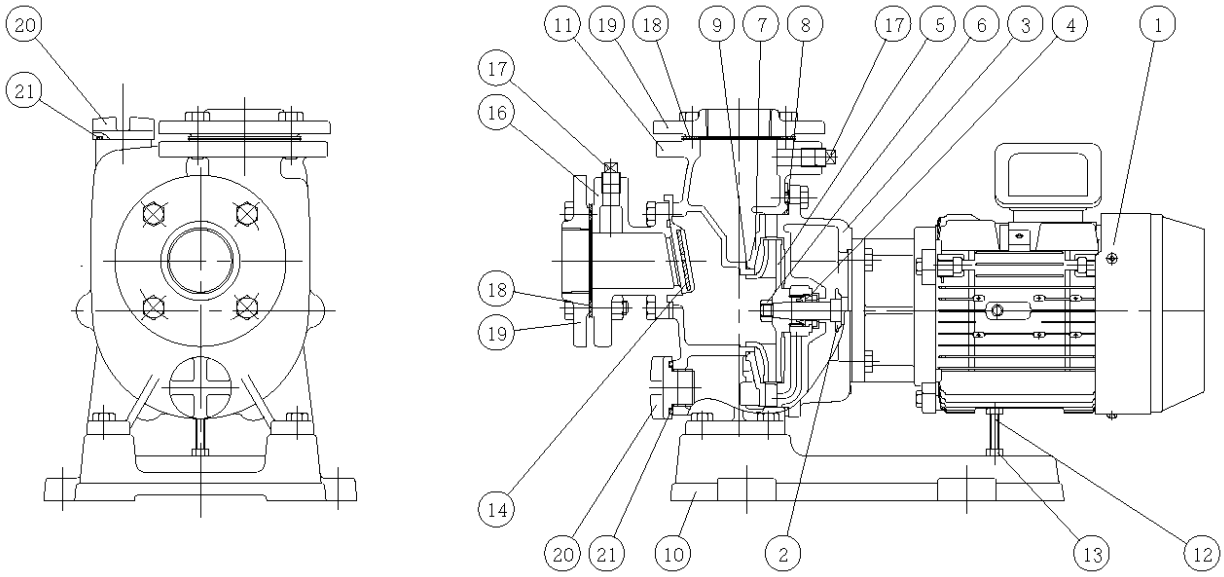
2.1 Specifications

Pumped fluid	Fluid quality	Fresh water (PH 6.5 to 8)
	Fluid temp.	0 to 40°C
Installation location		Indoor
Ambient temp./humidity		0 to 40°C / 90% RH or less
Suction total head		Within –6m (20°C)
Permissible back pressure		0.1 MPa {1kgf/cm^2}
Motor	Type	Enclosed fan-cooled outdoor type 2 pole
	Frequency	50/60 Hz
	Phase	3-phase
	Voltage	200V, 220V, 380V, 400V,415V,440V

[3] Product Configuration

3.1 Structure

The following figure shows a main example of the GS2-C type.
The actual model may differ slightly from this figure.



No.	Name	Q'ty	No.	Name	Q'ty	No.	Name	Q'ty
1	Motor	1	9	O-ring	1	17	Plug	1
2	Deflector	1	10	Base	1	18	Gasket	1
3	Casing cover	1	11	Casing	1	19	Flange	1
4	Mechanical seal	1	12	Bolt	1	20	Plug	1
5	Impeller	1	13	Nut	1	21	Ring packing	1
6	Nut	1	14	Packing with valving element	1			
7	Guide vane	1	15	Flange with washer	1			
8	O-ring	1	16	Coupling pipe with washer	1			

[4] Installation

⚠ Warning

- Before hoisting the pump unit during unloading, loading, and installation, check the product catalog, the installation drawing, and the instruction manual, etc., to verify the pump unit weight and the hoist method. Do not attempt to hoist a pump unit that exceeds the hoist's rated load.
  Incorrect hoisting can result in drops and injuries.
- Securely install the pump as explained in the instruction manual. Incomplete installation could result in electric shocks, fires or injuries from dropping.

4.1 Installation Cautions

(1) Use a nylon sling attached to the coupling pipe with washer 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.
(The foundation bolts must be purchased separately.)
An uneven foundation (not horizontal) can cause base twisting damage.

4.2 Selecting the Installation Place

⚠ Caution

- Do not install this pump unit in a place that has not been treated for drainage or waterproofing. Major disasters could occur if water leaks.
- Do not install this pump in a highly humid place such as a bathroom. Failure to observe this could result in electric shocks if the earth leakages occur.
- Do not install this pump in places such as machine and chemical factories where toxic gases including acid, alkaline, organic solvents or paint are present, where gases containing corrosive elements are generated, or where there are high levels of dust. Failure to observe this could result in earth leakages or fires.

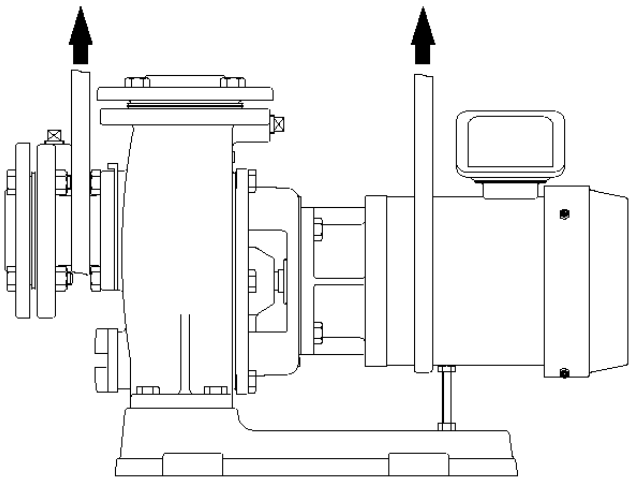
(1) Install in a cool, well ventilated location which permits easy disassembly and assembly, and which is not exposed to rain or direct sunlight.

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

(3) Install in 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 piping is as short as possible.

(5) Keep the suction total head to within –6m.



<Fig. 1>

[5] Piping

⚠ Caution

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

Refer to Fig. 2.

5.1 Suction Piping

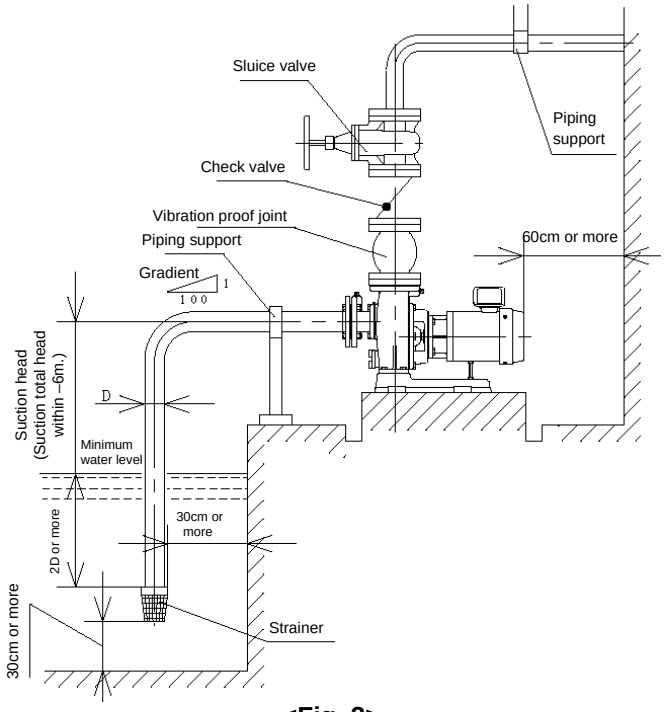
(1) The piping should be as short as possible, with no bends.
(2) Always attach a strainer to the end of the suction piping so that foreign matter is not sucked up.
(3) The end of the suction piping must be two or more times deeper than the piping diameter (D), and separated by 30cm or more from the bottom and walls.
(4) Lay the suction piping with a gradient (1/100 or more) leading upward toward the pump so that air traps do not form.

5.2 Discharge Piping

(1) Install a sluice valve near the discharge port for maintenance purposes.
(2) Be sure to install a check valve in cases where the piping 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.
(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 in cases where air could trap in the piping.

5.3 Common Items

(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. Installation of a heater onto the pump is recommended. (Use the optional heater installation phase flange.)



<Fig. 2>

[6] Electrical Work

⚠ Warning

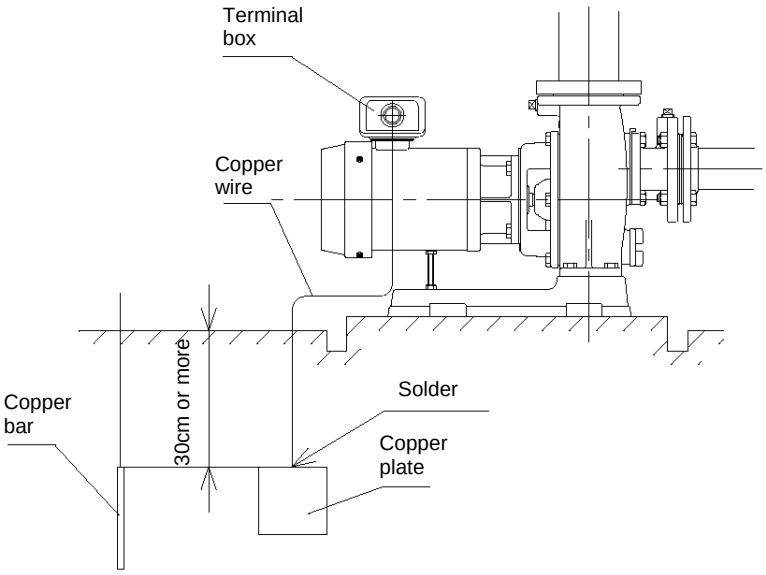
- The electrical work must be completed according to the "Electrical Installation Technical Standards", "Wiring Regulations" and any other applicable regulations.
  Improper wiring and connections could lead to earth leakages or fires.
- Securely earth the equipment, and install a dedicated residual current circuit breaker on the power supply side.
  Failure to observe this could result in earth leakages, electric shocks or fires.
- 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.

6.1 Power Supply

(1) Install a residual current circuit breaker at the power supply.

6.2 Earth

(1) Perform the necessary earth connection work with Class D (Class 3) for the earth terminal in the motor's terminal box.
As shown in Fig.3, solder a copper plate that is 30cm square or more or a copper bar that is 1cm thick and 40cm or more long to the end, and then bury 30cm or more under ground in a moist area.
Always turn the source power supply OFF when handling the earth wire.



<Fig. 3>

[7] Operation

⚠ 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 shocks.

⚠ Caution

- Do not use this product out of the rated voltage. Failure to observe this could result in fires or electric shocks.
- Verify that the motor is rotating in the prescribed direction. Rotation in the wrong direction can cause water leaks, etc.
- Do not touch the rotating areas during operation, and do not insert fingers or rods, etc., into the motor openings. This could cause electrical shocks and injuries.
- Do not touch the pump or motor during operation. The pump could reach high temperatures and lead to burns.
- Turn OFF the power when not using the pump for long periods of time. Failure to observe this could result in electric shocks, earth leakages, or fires due to deterioration of the insulation.
- Do not run the pump in a dry mode (without water in the pump) or in a shutoff mode (without water inflow to, or discharge from, the pump). Such operations could cause the pump to become extremely hot, possibly resulting in burn injuries.

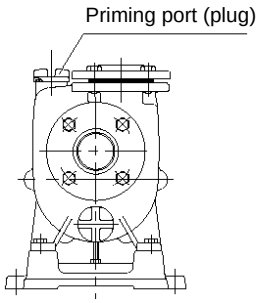
7.1 Before Operation

(1) Verify that the residual current circuit breaker capacity, the power supply voltage, and the wiring are correct.

(2) Turn the pump by hand and confirm that it rotates lightly. Stiff or uneven rotation can be caused by internal rust, etc., and the pump should be inspected in such cases. To turn by hand, remove the fan cover's rubber bushing and turn the shaft end with a flat-tip screwdriver.

(3) The pump must be primed. Do not perform dry operation, as this can cause a pump failure.
Remove the priming port plug, and fill water until the casing is full. Then, tighten the plug.

(4) Attach the fan cover’s rubber bushing.



7.2 Trial Operation

(1) Turn the power ON, then turn the switch ON and OFF one or two times to verify the rotation direction (CW direction as viewed from motor side).
If 3-phase rotation is reversed, turn the source power supply OFF, then replace the connections of 2 of the 3 wires.

(2) If there is no abnormality, continuous operation will start.
Water will be pumped for four to five minutes. (Water will be discharged from the priming port when pumping is completed.)
If the water is not pumped even after six minutes, check again that air is not being sucked in from the piping or joints.

(3) Stop the pump once, tighten the priming port plug, and restart to begin continuous operation.
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 cocks, compound gauge cocks, etc. should be closed except when performing measurements. Leaving these cocks open will increase the risk of damage.

[8] Maintenance and Inspection

⚠ Warning

- If the pump does not operate or if an abnormality is sensed (such as a burning smell), stop operation immediately and turn OFF the main power. Then, contact the place of purchase or a designated Kawamoto Pump service center for inspections and repairs. Failure to do so could result in electric shocks, fires, water leaks, etc.
- Always turn OFF the power and ensure that no power is being supplied to the pump before starting maintenance servicing. Failure to observe this could result in electric shocks or injuries.

8.1 Daily Inspection

Check Item		Determination Reference
Mechanical seal		There must be no dripping (leakage) from the seal.
Motor	Surface temperature	Ambient temperature + 75°C
	Ball-bearing	Operation noise & vibration should be unchanged from initial condition.
Pressure		No increase 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.

8.2.1 O-ring

Part name	Part No.	Application	Replacement guideline	Remarks
O-ring G60	30400117	GS2-32-C0.4	At each disassembly inspection	Casing × Guide vane
O-ring AN6230-3	30400910	GS2-325-C0.75 GS2-326-C0.75 more than		
O-ring AN6230-11	30400912	GS2-405-C1.5 less than GS2-406-C2.2 less than		
O-ring AN6230-14	30400913	GS2-505-C2.2 less than GS2-506-C3.7 less than		
O-ring AN6230-16	30400914	GS2-405-C2.2 GS2-505-C3.7		
O-ring AN6230-19	30400915	GS-65-C (all models)		
O-ring AN6230-22	30400916	GS-80-C (all models)		
O-ring AN6230-25	30400917	GS-100-C (all models)		

Part name	Part No.	Application	Replacement guideline	Remarks
O-ring K170	30400312	GS2-32-C0.4 GS2-405-C0.75 less than GS2-406-C1.5 less than GS2-505-C1.5 less than GS2-506-C2.2 less than	At each disassembly inspection	Casing × Casing cover
O-ring K190	30400314	GS2-32-C0.75 GS2-326-C1.5		
O-ring K200	30400315	GS2-655-C2.2 less than GS2-656-C3.7 less than GS2-80-C3.7 less than		
O-ring K210	30400316	GS2-405-C1.5 GS2-406-C2.2		
O-ring K220	30400317	GS2-505-C2.2 GS2-506-C3.7		
O-ring K235	30400318	GS2-405-C2.2 GS2-505-C3.7		
O-ring K250	30400319	GS2-655-C3.7 more than GS2-656-C5.5 GS2-80-C5.5 GS2-100-C (all models)		

8.2.2 Packing

Part name	Part No.	Application	Replacement guideline
Flange packing 32	31400910	GS2-32-C (all models)	At each disassembly inspection
Flange packing 40	31000610	GS2-40-C (all models)	
Flange packing 50	31001010	GS2-50-C (all models)	
Flange packing 65	31001310	GS2-65-C (all models)	
Flange packing 80	31001510	GS2-80-C (all models)	
Flange packing100	31001710	GS2-100-C (all models)	
Suction check valve 32	31800410	GS2-32-C (all models)	
Suction check valve 40	31701410	GS2-40-C (all models)	
Suction check valve 50	31701510	GS2-50-C (all models)	
Suction check valve 65	31700910	GS2-65-C (all models)	
Suction check valve 80	31701110	GS2-80-C (all models)	
Suction check valve 100	31701210	GS2-100-C (all models)	
Ring packing	30703210		

8.2.3 Mechanical seal

Motor power	Part No.	Part name	Replacement guideline
~ 0.4 kW	30000420	Mechanical seal 13	1 year
0.75 ~ 3.7kW	30001010	Mechanical seal 16	
5.5kW ~	30001410	Mechanical seal 25	

8.2.4 Ball-bearing

Motor output	Position	Part No.	Name	Replacement guideline
0.4 kW	Load side	35201514	Ball-bearing 6204ZZC3	3 years
	Opposite load side	35201513	Ball-bearing 6203ZZC3	
0.75 kW	Load side	35201515	Ball-bearing 6205ZZC3	
	Opposite load side	35201514	Ball-bearing 6204ZZC3	
1.5 kW	Load side	35201916	Ball-bearing 6306ZZC3	
	Opposite load side	35201914	Ball-bearing 6304ZZC3	
2.2 kW	Load side	35201916	Ball-bearing 6306ZZC3	
	Opposite load side	35201914	Ball-bearing 6304ZZC3	
3.7kW	Load side	35201916	Ball-bearing 6306ZZC3	
	Opposite load side	35201515	Ball-bearing 6205ZZC3	
5.5kW	Load side	35201918	Ball-bearing 6308ZZC3	
	Opposite load side	35201516	Ball-bearing 6206ZZC3	
7.5kW	Load side	35201918	Ball-bearing 6308ZZC3	
	Opposite load side	35201518	Ball-bearing 6206ZZC3	

[9] Disassembly and Assembly

⚠ Warning

- This product must never be disassembled, repaired or modified by any person other than a qualified repair technician. Improper repairs could lead to electric shocks, fires or water leaks.
- When desiring to reinstall the pump in a new location, please contact either the place of purchase or a designated Kawamoto Pump service center for assistance. Improper installation could lead to electric shocks, fires or water leaks.

9.1 Before Disassembling

(1) Turn the source power supply OFF.
(2) Close the sluice valves at the discharge sides.
(3) Drain (at drain port) all water from the pump.

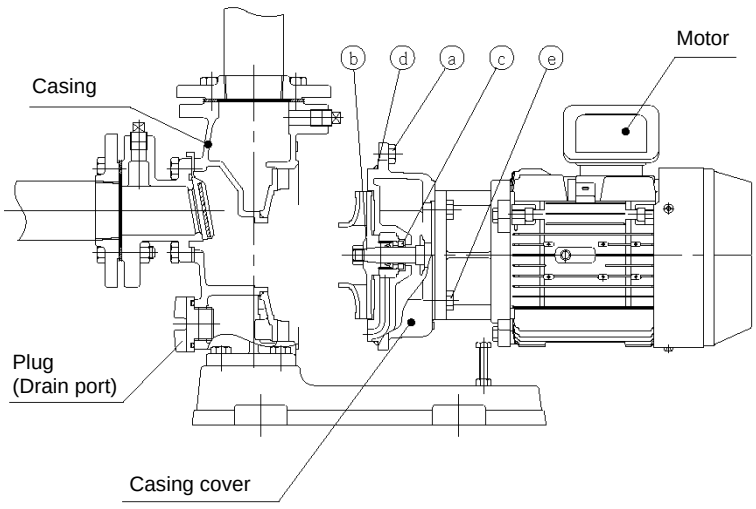
9.2 Mechanical Seal Replacements: Refer to Fig. 4.

(1) Remove the bolt (a) which is fixing the casing and casing cover, and separate the motor section.
(2) Remove the impeller nut (b).
(3) Remove the impeller, and then remove the mechanical seal (c).
(4) Attach a new mechanical seal. Wet the periphery of the cushion rubber to facilitate insertion. When inserting the mechanical seal, use care to avoid scratching the slideway. Also be sure to wipe away any foreign matter or dust which may be adhered to the seal.
(5) Reassemble in the reverse order of the disassembly procedure.
(6) Replace the O-ring (d) with a new item.
(7) After reassembling, verify that the main shaft turns without obstruction.

9.3 Ball-Bearing Replacement: Refer to Fig. 4.

(1) In the same manner as the mechanical seal replacement procedure, disassemble down to the mechanical seal level. When removing the mechanical seal, use care to avoid scratching the slideway.
(2) Remove the bolt (e) which is fixing the motor and casing cover.
(3) Remove the motor, and have the ball bearings replaced by a specialist.
(4) Reassemble in the reverse order of the disassembly procedure.
(5) Replace the O-ring (d) with a new item.
(6) After reassembling, verify that the main shaft turns without obstruction.

<<Purchase replacement parts from your dealer>>



<Fig. 4>

[10] Troubleshooting

Problem	Cause	Countermeasure	Manual page No.
Pump does not run	Power supply problem.	Inspect and repair.	7
	Single-phase connection is being used (for 3-phase).	Correct the wiring.	6
	Foreign matter embedded in slideway.	Remove the foreign matter.	10
	Rust at rotating area.	Disassemble and repair.	10
Pump rotates, but no water is discharged. Prescribed discharge amount/pressure is not obtained.	Sluice valve is closed.	Open the sluice valve.	7
	Impeller is clogged with foreign matter.	Remove the foreign matter.	7
	Strainer is clogged with foreign matter	Remove the foreign matter.	10
	Piping is clogged	Inspect the inside of the piping, and remove the foreign matter	5
	The pump is not filled	Fill the pump	7
	Air is trapped in the suction side	Prime, and fill the pump with water.	5
	The suction piping does not reach the water	Extend the suction piping so it is submerged in the water	5
	The actual head is too high	Review the plan	5
	The piping loss is too high	Review the plan	5
	Pump rotation direction is reversed.	Correct the wiring.	7
	Worn parts.	Replace the worn parts.	10
Overload (over-current) occurs	Voltage drop, or unbalanced phase conditions exist.	Check the power supply.	2, 7
	Obstruction at rotating area. Shaft is bent.	Request repair from a facility specializing in this procedure.	7
Pump vibrates/abnormal noise	Improper installation.	Check the installation condition.	4
	Clogged impeller.	Remove the foreign matter.	10
	Pump rotation direction is reversed.	Correct the wiring.	7
	Obstruction at rotating area. Shaft is bent.	Request repair from a facility specializing in this procedure.	7
	The motor's ball-bearings are worn	Request repair from a facility specializing in this procedure.	9, 10
Water leakage occurs	Damaged mechanical seal.	Replace the mechanical seal.	10
	Damaged O-ring.	Replace the O-ring.	10

◎ 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.

Kawamoto Pump Mfg. Co., Ltd.
Head office: 4-11 Ohsu Naka-ku Nagoya, 460-8650 Japan
Okazaki plant: 1 Goryoden Hashime-cho Okazaki, 444-8530 Japan