

***IWAKI Magnet Gear
Pump***

Model MDG-M4

***I N S T R U C T I O N
M A N U A L***

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This instruction manual includes descriptions of the correct handling of the pump, maintenance and inspection procedures and troubleshooting. You are requested to read the manual carefully so that the pump can safely be used to the full extent of its capacity for a long period of time.

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① Inspection after Unpacking

Upon unpacking, check the following points to confirm that the product is what you have ordered. If you find anything wrong, please refer to the dealer you placed your order with.

- ① Do the model of pump, discharge, discharge pressure, voltage and other items shown on the nameplate represent those of the pump ordered by you?
- ② Has the product been damaged or nuts and bolts been loosened during delivery? Please examine by sight or touch.

② Principle of Operation

The Iwaki magnet gear pump comprises a pair of gears driven by a magnet coupling and casing in which the gears are fitted exactly.

(Fig. A)

Liquid introduced from the IN side feeds into the grooves between the teeth of the gears and is transferred to the OUT side by rotation of the gears. (Fig. B)

This liquid is forced out of the grooves between the gear teeth by meshing of the gears. (Fig. C)

3 Pump Identification Codes

MDG-M4 S 6 B 100 H
① ② ③ ④ ⑤

① Represents the temperature range and viscosity limit of the liquid to be handled.

S: Temperature between 0 and 50°C

Viscosity below 30cSt

T: Temperature between 0 to 95°C

Viscosity below 80cSt (100W motor)

below 200cSt (150W motor)

② Represents the maximum discharge pressure.

6: 6kgf/cm²

③ Connection

B: 1/4 NPT

④ Line voltage

100: AC100V single phase

115: AC115V single phase

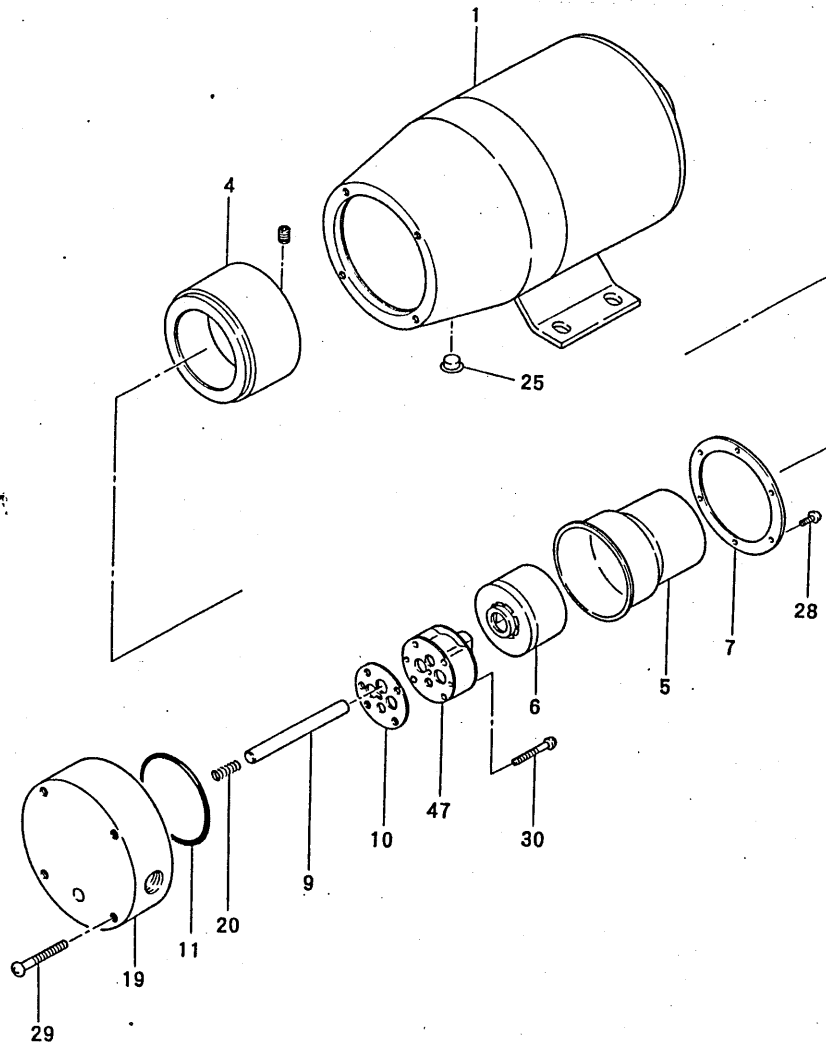
220: AC220/240V single phase

⑤ Non-standard specification code

Without code: Equipped with a 100W motor

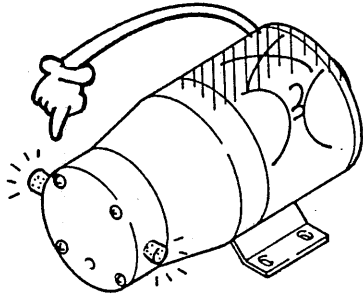
H: Equipped with a 150W motor

4 Names of Parts and Structure

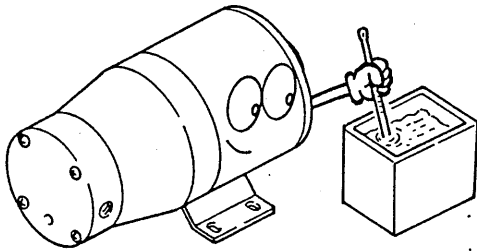


No.	Name	Number	No.	Name	Number
1	Motor	1	11	O ring	1
4	Driving magnet ass'y	1 set	19	Pump body	1
5	Rear casing	1	20	Shaft spring	1
6	Magnet capsule	1	28	Screw M3×10	6
7	Mounting plate	1	29	Screw M4×35	4
9	Driving gear shaft	1	30	Screw M3×25	4
10	Gasket	1	47	Gear case unit	1 set

5 Precautionary measures



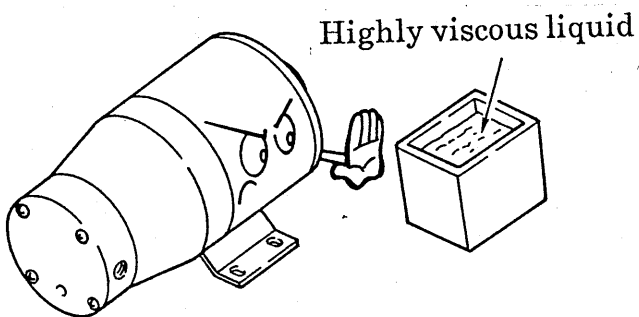
- ① Do not operate the pump dry.
The pump should not be operated dry or while the suction side is closed. This will wear out the gears and bearings.



- ② Range of liquid temperatures
The pump can be used with liquids in the following temperature range. The performance will change depending on the temperature of the liquid.

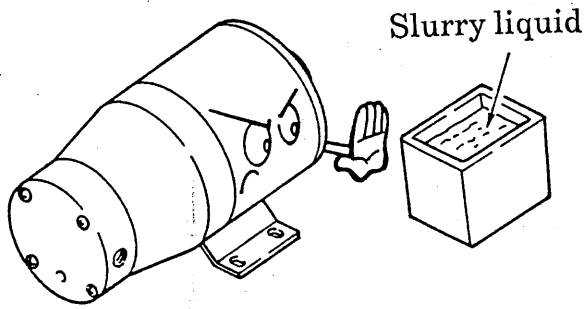
- Type S: 0~50°C
- Type T: 0~95°C

In case the liquid being handled is a solvent, the gears may swell to force the pump to stop, in the worst case. For further information, please contact us.



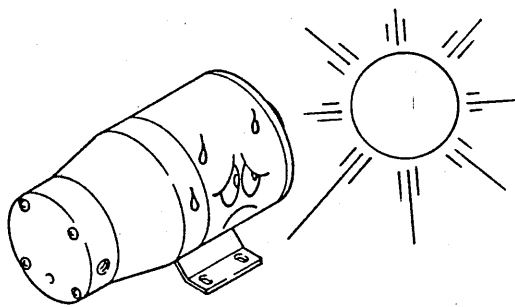
- ③ Liquid viscosity
Take care, as highly viscous liquid cannot be transferred.

- Type S: up to 30cSt
- Type T: 80cSt (with a 100W motor)
200cSt (with a 150W motor)



④ Do not use the pump for transferring slurry liquid or liquid which begins to crystallize when stationary.

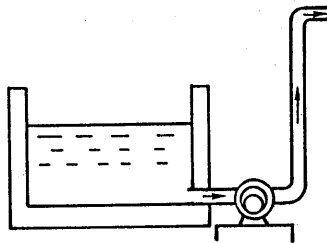
⑤ Since there are powerful magnets inside the pump, it cannot be used for liquid containing powder of iron, nickel etc.



⑥ Do not cover the motor unit tightly with a cover, etc. Avoid operating the pump at an ambient temperature above 40°C. The relative humidity should be below 85%. Do not splash water on the motor. It may cause an electric leak or damage by fire.

6 Installation, Piping and Wiring

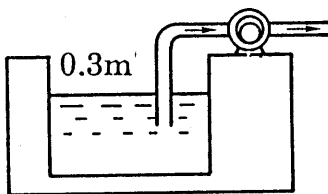
Flooded suction



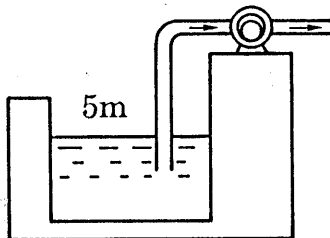
Priming method

(In case the pump chamber is wet)

- ① There is no liquid in the suction piping
(This is not allowed for the T type).



- ② There is liquid inside the suction piping.



■ Installation

- ① Choose a place which has an ambient temperature below 40°C and a relative humidity less than 85%, and is convenient for maintenance and checking. The pump must not be installed outdoors without suitable protection.
- ② To prevent dry running, install the pump in a position lower than the surface of the liquid in the tank on the suction side (Flooded suction).
- ③ In case it is necessary to install an S type pump in a position in which the inlet of the pump remains higher than the liquid surface (a suction lift), refer to the illustrations opposite. In this position, the pump does not suck if the pump chamber is not wet. (The T type pumps do not function on a suction lift.)

- ④ For fixing the pump, use M6 small screws. In the event the floor on which the pump is installed is resonant and causes a loud noise, fix the pump with rubber mountings.

■ Piping

- ① In order to reduce the friction resistance of liquid, the piping should be as short and with as few bends as possible.
- ② The inlet and outlet joints of the pump should be completely sealed with sealing tape, etc. to prevent them from sucking air. If sealing is incomplete on the suction side, in particular, air is sucked in and lowers the performance of the pump.
- ③ For connection, use a thick hose which can withstand pump pressure. Since the hose on the suction side, particularly, tends to be crushed by sucking force, the use of, for example, a Teflon hose is recommended. (In the case of hot liquid, particular care should be taken.)

■ Wiring

- ① Use proper wiring connections. Wiring should be carried out in accordance with the technical standard of electric installation and interior wiring regulations, referring to the opposite diagram.
- ② Make sure to include a ground wire or a ground terminal in the wiring.

● Rated Electric Current Value/Starting Current Value 50/60Hz

Model of pump	Voltage (V)	Rated Current (A)	Starting Current (A)
MDG-M4□220	AC220/240	0.8/0.85	1.9/1.7
MDG-M4□220H	AC220/240	1.2/1.3	2.0/1.8
MDG-M4□115H	AC115	2.2/2.6	6.0/5.4

7 Operation

■ Notes on Operation

- ① Dry running is strictly prohibited. This will damage the inside of the pump.
- ② The pump should not be operated with closed valves. If this happens, the bearing will abnormally worn away.
- ③ In case liquid which solidifies or causes precipitation is handled, the pump should be flushed clean when it is out of operation.
- ④ In cold weather, the pump should be kept warm so as not to be frozen.
- ⑤ When operation is restarted after having been stopped for a long time, the same points as in starting up should be confirmed.

■ Starting Up

The following items need attention in starting up the pump:

No.	Item	Remarks
1	Confirmation of piping, wiring and voltage	<ul style="list-style-type: none"> ● Confirm piping and electrical wiring, referring to descriptions in piping and wiring sections. ● Confirm that line voltage is appropriate, referring to nameplate.
2	Confirmation of valves	<ul style="list-style-type: none"> ● Valves on suction side and discharge side should be fully opened.
3	Confirmation of liquid in pump	<ul style="list-style-type: none"> ● When S type pump is used by lifting method, prime pump sufficiently. T type pumps cannot be used by lifting method. Fill piping with liquid before starting operation.
4	Starting up	<ul style="list-style-type: none"> ● After confirming items 1~3 above, start operation. ● During operation, watch for items listed in following section.

■ Points to Note During Operation

The following points need attention while the pump is in operation. If something abnormal occurs, stop the operation immediately and take proper measures by referring to the section “Causes of Trouble and Troubleshooting“ (Page14). In case the pump still cannot be restored to normal condition, please contact your supplier.

No.	Check Point	Remarks
1	Is pump lifting liquid properly?	<ul style="list-style-type: none"> ● Whether liquid is transferred ● Whether suction and discharge pressures are at normal levels
2	Is there abnormal noise or vibration?	<ul style="list-style-type: none"> ● If pump does not function normally, abnormal noise or vibration tends to be generated. ● Base on which pump is mounted sometimes becomes resonant, increasing noise. If separation of pump from base decreases noise, anti-vibration measure such as attaching anti-vibration rubber mounts to pump should be taken.
3	Is liquid leaking or air being sucked out from joints of pump?	<ul style="list-style-type: none"> ● Clamp connections more tightly. ● If many air bubbles are found in discharged liquid, air is being sucked out. Examine piping and clamp connection more tightly.
4	Is temperature of pump unit surface, motor surface, etc., abnormally high?	<ul style="list-style-type: none"> ● Pump unit surface temperature is same as that of liquid handled. ● Temperature of motor surface is within about 40°C above ambient temperature. Sometimes it is too hot to touch, but it is normal if temperature is within this range.

8

Maintenance and Inspection

■ Daily Inspection

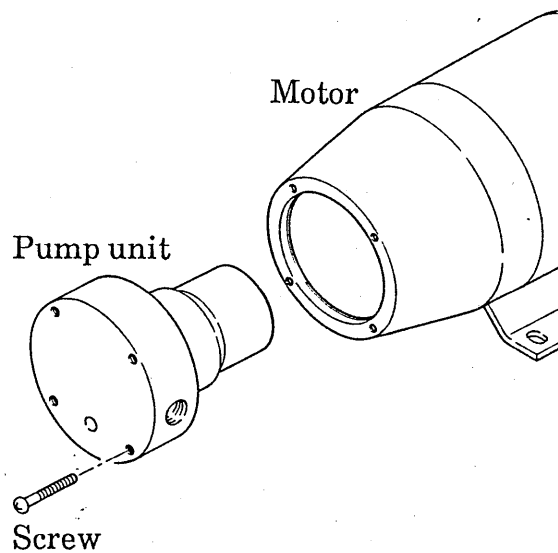
- ◇ Pay attention to the operating condition, referring to “Points to Be Attended to During Operation”. When any of the consumable parts reaches its replacement time or the performance is noticeably lowered, substitute the gear case unit and the drive gear shaft with new ones.

■ Consumable Parts

No.	Part		Number	Replacement Time
47	Gear Case Unit		1 set	5,000 hours
9	Drive Gear Shaft		1	
10	Gasket		1	Every maintenance internal

The above replacement periods have been estimated based on the length of time in which the initial flow rate of clear water at normal temperature under a pressure of 5kgf/cm² lowers by 20%.

9 Disassembling and Reassembling



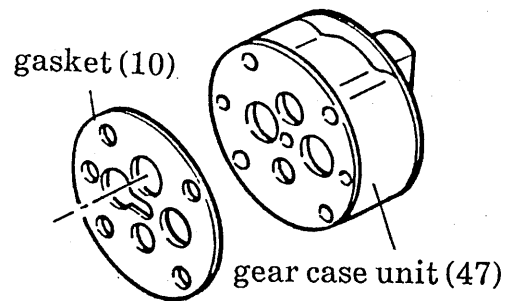
■ Disassembling Procedure

- ① Unscrew 4 screws (29) to detach the pump unit from the motor unit.
- ② Unscrew the screws (28) and remove the mounting plate (7), rear casing (5) and magnet capsule (6) in this order.
- ③ Unscrew the screws (30) and remove the gear unit (47), gasket (10), drive gear shaft (9) and shaft spring (20) in this order.
- ④ Remove the O ring (11).
 - Put the dismantled parts in a clean place. Take care that they do not get scratched. Particular care is required for the magnet capsule (6) which contains powerful magnets and easily attracts iron powder, etc. Its storage should be chosen carefully.

■ Reassembling Procedure

Follow the disassembling steps in reverse, while attending to the following points.

- ① Position the gasket (19) corresponding to the gear case unit (47) as illustrated.
- ② In attaching the gear unit (47), tighten the small screws (39) uniformly. (Clamping torque: 10kfg·cm)
- ③ If the O ring is flawed, replace it with a new one.
- ④ When the life of any of the consumable parts expires, replace the gear case unit (47), gasket (10) and drive gear shaft (9) simultaneously.



10 Causes of Trouble and Troubleshooting

Countermeasure	Liquid leaks.	Too much noise or vibration	Magnet coupling comes off.	Liquid cannot be pumped up or pumping is insufficient.	Motor stops while in operation.	Motor starts but rpm does not increase and excess current is generated.	Motor cannot be started.	Troubles	Causes
Insert plug into socket.							<input type="radio"/>	Plug is out of socket.	
Examine and repair defective part.					<input type="radio"/>			Contact is bad or broken somewhere in wiring.	
Repair or replace.							<input type="radio"/>	Motor malfunctions. (Break, malfunctioning of capacitor, etc.)	
Lower viscosity of liquid handled and/or discharge pressure.					<input type="radio"/>		<input type="radio"/>	Thermal protector activated by overload.	
Inspect wiring and motor, and repair or replace.					<input type="radio"/>		<input type="radio"/>	Earth leakage circuit breaker activated by leak.	
Confirm pump is filled with liquid.		<input type="radio"/>		<input type="radio"/>				Dry running	
Take necessary steps to prevent air from getting in.				<input type="radio"/>				Air gets in through inlet port.	
Substitute with crush-proof pipe.				<input type="radio"/>				Inlet pipe is crushed.	
Lower either liquid temperature or piping resistance.				<input type="radio"/>				Pressure in inlet portion is lowered to saturated vapor pressure of liquid.	
Lower viscosity.						<input type="radio"/>		Viscosity of liquid handled is too high.	
Disassemble and remove foreign matter.		<input type="radio"/>	<input type="radio"/>					Foreign matter sticks to gears.	
Replace gear.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>				Gear is damaged.	
Disassemble and repair or replace parts.		<input type="radio"/>	<input type="radio"/>				<input type="radio"/>	Magnet capsule hits rear casing.	
Increase thickness of seal.			<input type="radio"/>		<input type="radio"/>			Gears are locked because liquid temperature is too high.	
Replace seal.	<input type="radio"/>							Seal is damaged.	
Tighten bolt.	<input type="radio"/>							Bolt is loosened.	
Open valve.			<input type="radio"/>			<input type="radio"/>		Valve is closed.	
Alter piping to reduce resistance.			<input type="radio"/>			<input type="radio"/>		High resistance of piping	
Raise liquid temperature or change specification.				<input type="radio"/>				Performance of pump lowered by decrease in liquid temperature.	

11 Performance and Sizes

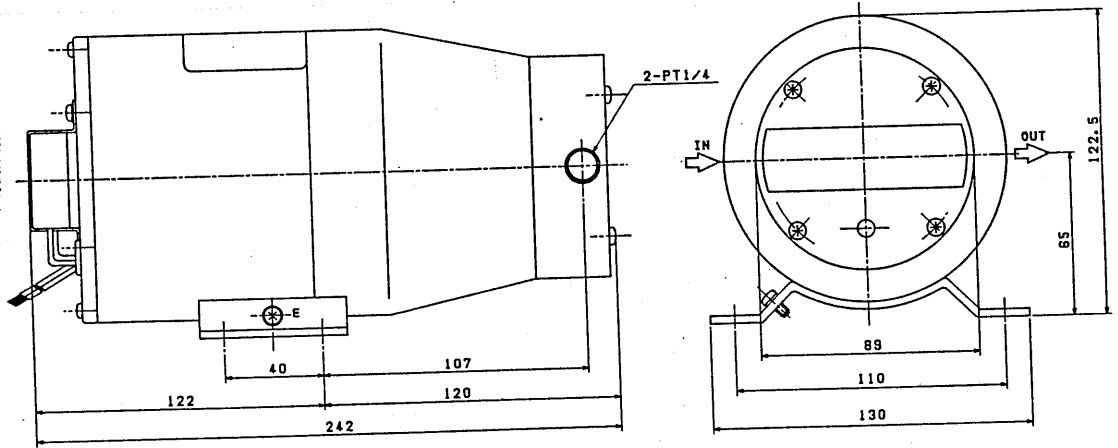
■ Performance

Model	Diameter	Maximum Flow rate (ℓ/min)	Maximum Discharge Pressure (kgf/cm ²)	Attainable Degree of Vacuum (mm Hg)	Motor Specifications					
					Rated Voltage (V)	Rated Current (A)	Rated Output (W)	Type	Weight (Kg)	
MDG-M4 S6B220	1/4 NPT	4/4.8	6	-720	1φ 220/ 240	0.8/ 0.85	100	2P induc- tion motor, capa- citor- run type	7.9	
MDG-M4 S6B220H						1.2/1.3				150/ 180
MDG-M4 S6B115H					2.2/2.6	7.9				
MDG-M4 T6B220		3.8/4.6		-700	1φ 220/ 240		0.8/ 0.85		100	8.2
MDG-M4 T6B220H							1.2/1.3			
MDG-M4 T6B115H					2.2/2.6					

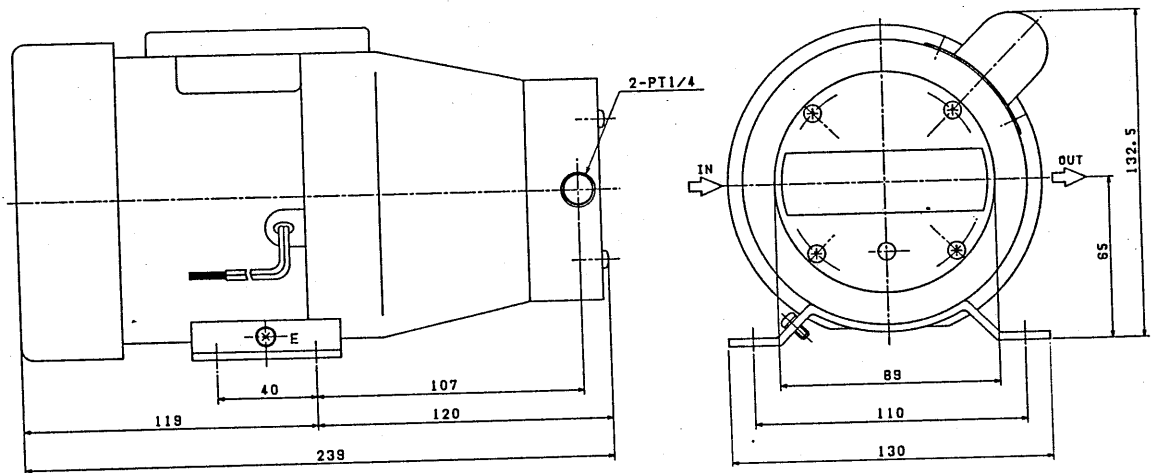
- [Note]
1. Above is the performance on a test of clear water at 25°C. (The discharge changes depending on the temperature of liquid handled. Further information will be supplied on request.)
 2. The pumps can be used in an ambient temperature between 0 and 40°C.

■ Outer Sizes

- Models MDG-M4□



- Models MDG-M4□H



12 Guarantee and Repair Service

■ Guarantee and Period and Coverage

- ① The guarantee period of this product is a year from the date of delivery.
- ② If the product falls or becomes defective during your guarantee period due to a design or manufacture fault, despite proper use by you, we will repair the malfunctioning or damaged part or deliver a substitute free of charge.
- ③ You are requested to pay for repair and replacement in the following cases:
 - ① Trouble or damage after the expiration of the guarantee period.
 - ② Trouble or damage resulting from abnormal use or storage.
 - ③ Trouble or damage caused while using parts of grades other than those designated by us.
 - ④ Trouble or damage due to repair or modification not carried out by us or those designated by us.
 - ⑤ Trouble or damage caused by such disasters as a fire, earthquake or other natural calamity, or an Act of God.
- ④ Please note that we will not take responsibility for any trouble or damage in a product manufactured with the standard or material designated by the customer.
- ⑤ We are not in a position to assume responsibility for chemical or fluid corrosion due to the liquid handled. Please note that the material we select at the time of concluding a contract means the recommended one, but we do not guarantee its anticorrosiveness.
- ⑥ The cause of trouble or damage shall be ascertained based on the result of deliberation between the customer and our service engineers.
- ⑦ Please understand that we are unable to indemnify various expenses and other losses originating from a mishap occurring while this pump is in use.

■ Repair

In case something unusual comes to your notice while you are using the pump, stop operation immediately and check whether anything is out of order. (Refer to the chapter on “Causes of Trouble and Troubleshooting”.)

- ① For repair work, please contact us or the dealer with whom you placed your order.
- ② Before requesting repair, peruse this instruction manual again and recheck the product.
- ③ When you request repair, the following information is needed:
 - ① Model code and manufacturing number
 - ② Period of use and conditions under which the product has been used.
 - ③ Details of the problem

In the event you return your pump, please ship it only after thoroughly washing the inside to prevent residual liquid from flowing out in transit, which is very dangerous.