

Thank you for having selected Iwaki's bellows pump KBR series. This manual deals with the correct handling and operation procedures and troubleshooting methods for the pump. To make maximum use of the pump and to ensure safe, long operation, please read this manual carefully prior to operating the pump. Pay special attention to the "Warning" and "Caution" sections as they relate to matters of safety and proper usage of the pump.



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# Important Instruction

## For the Safe and Correct Handling of the Pump

- Read the "Safety Instructions" sections carefully to prevent accidents involving your customers or other personnel and to avoid damage or loss of other assets. Always follow the instructions and advice found in these sections.
- Observe and abide by the instructions described in this manual. These instructions are very important for protecting pump users from dangerous conditions and situations related with the use of the pump system.
- The symbols relate to the following meanings described below:

 <b>Warning</b>	<b>Nonobservance or misapplication of the contents of the "Warning" section could lead to a serious accident, including death or injury.</b>
 <b>Caution</b>	<b>Nonobservance or misapplication of the contents of the "Caution" section could lead to serious physical injury to the user or serious damage to the product.</b>

### Types of Symbols



Indicates that "Warning" or "Caution" must be exercised. Inside this triangle, a concrete and practical image provided as a warning or caution message is depicted.



Indicates a prohibited action or procedure. Inside or near this circle, a concrete and practical image of the activity to be avoided is depicted.



Indicates an important action or procedure which must be performed or carried out without fail. Failure to follow the instructions herein can lead to malfunction or damage to the pump.

# Safety Instruction

## Warning

- **Turn off the power supply.**

Working without disconnecting the power supply may cause an electrical shock. Before engaging upon any working procedures involving the pump, make sure to turn the power supply switch off and to stop the pump and other related devices.



- **Terminate operation.**

When you detect or become aware of a dangerous sign or abnormal condition during operation, terminate the operation immediately and start it from the beginning again.



## Caution

- **Do not wet or dampen.**

If the motor or wiring cable becomes wet or dampened with the operating liquid by mistake, this may result in a fire or cause an electrical shock. Install the motor and wiring cable in positions which are not likely to become wet or dampened with any liquid.



- **Ventilate.**

Poisoning may result during an operation which involves toxic or odorous liquid. Ventilate the operating site sufficiently.



- **Spill-out accident.**

Protective measures should be taken against any accidental spill-out or leakage of the operating liquid as a result of unexpected damage on the pump or the related piping.



- **Operating site must be free of water and humidity.**

The pump is not designed to be water-proof or dust-proof. The use of the pump in places where water splashes or humidity is high may result in an electrical shock or short circuit.



- **Arrange grounding.**

Do not operate the pump without connecting the grounding wire. Otherwise, an electrical shock may result. Make sure the grounding wire is connected with the grounding terminal.



- **Limited operating site and storage.**

Do not install or store the pump in the following places:  
\* Places where a flammable gas or material is used or stored.  
\* Places where the ambient temperature is extremely high (40°C or higher) or extremely low (0°C or lower).



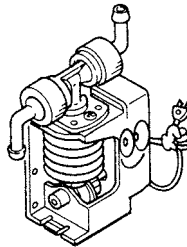
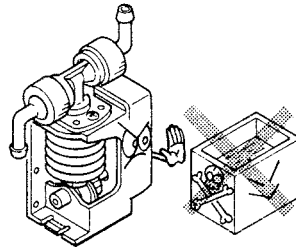
- **Disposal of used pump.**

Disposal of used or damaged pumps must be done in accordance with the relevant local laws and regulations. (Consult a licensed industrial waste products disposing company.)



## 1. Before use

- Prohibited liquid
  - Dangerous liquid such as strong acid/alkali solution.
  - Harmful liquid
  - Gasoline, Hydro carbon such as kerosene.
  - Halogen hydro carbon such as trichloroethylene and carbon tetrachloride.
  - Ethel and ester.
- Adjustment of flow rate (in case of adjustable cam)
  - When the flow rate is adjusted, switch off the power to stop the pump. (Adjustment can not be done during the operation.)



### Caution

**Do not turn the pump by hand but turn it by switching on the power. Motor may be broken if it is rotated in reverse by force.**

- Permissible pressure of the pump
  - The pump can be operated at the pressure range of : -0.01 to +0.01 MPa
  - When the suction is flooded suction, its height must be 50cm or less.

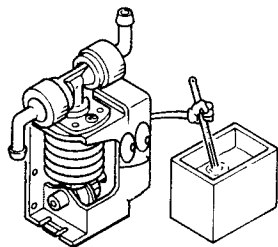
### Caution

**If the pump is operated beyond the above mentioned range, it may happen that the motor does not rotate or other failure or damage.**

## 2. Installation

### (1) Place to be installed

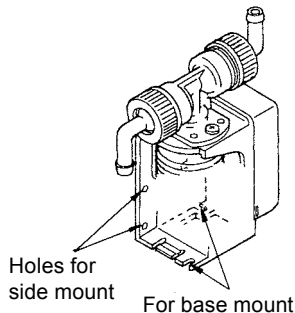
- Install the pump at the place of ambient temperature of 5 - 40°C, relative humidity 35 - 90%wt and at the place of easy maintenance.
- Install the pump at place well ventilated.



### (2) Fixing of base

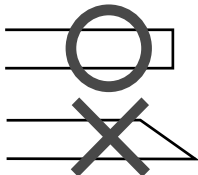
To mount the pump fix the base using two M4 screws. Mounting holes are at the bottom and side.

- ⚠ Caution**  
Do not install the pump on the unstable plate.



### (3) Preparation of hose

Before the installation of pump, cut the hose end flat.



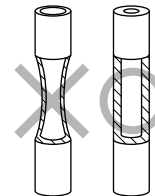
## 3. Piping

- (1) To minimize the pipe resistance of the liquid, employ the plumbing as short as possible and as less bends as possible. Also, to avoid the cavitation phenomenon (phenomenon which the bubbles are generated), employ the suction hose which corresponds to pump suction port and the suction hose must be as short as possible.

As reference, the suction hose must be less than 2 meters if ID 8 mm hose is used.

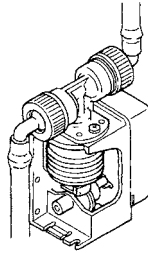
- (2) Employ the vinyl hose which is chemically resistible to the liquid and can endure the pressure which the pump makes.

- ⚠ Caution**  
It may possible that the suction hose is squashed by pump suction force. Use braided hose or like. (Especially, pay attention when the warm liquid is pumped.)

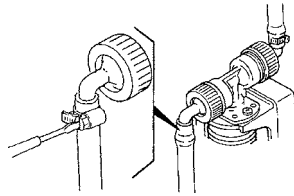


Applied hose: ID 8mm

- (3) Connection of hose  
Insert the hose by force till the end of discharge and suction ports.  
If the suction side is wrongly connected, it may suck the air which may cause insufficient pump performance.



- (4) Securely fix the hoses using hose clamp to avoid the liquid leakage.

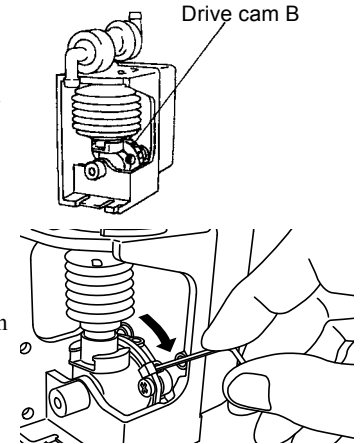


- ⚠ Caution**  
Pay attention not to tighten excessively the suction and discharge ports because they are made of plastics.

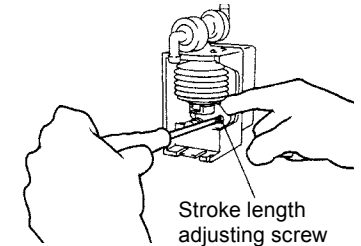
## 4. Adjustment of flow rate (for adjustable cam)

Flow rate can be adjusted by changing the stroke length. Follow the procedure mentioned below.

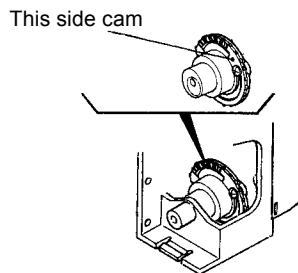
- (1) Stop the pump so that the stroke adjusting screw can come to the right side of the pump frame. If the drive cam B can not stop at the desired position, run the pump again to stop the cam at desired position, or you can adjust it by insert a bar (2 mm set wrench or like) into the side hole of drive cam B to turn it clockwise till it comes to desired position. You can turn it by 45 degree by one turn. (Never turn drive cam B to counter-clockwise.)



- (2) Turn counterclockwise the stroke adjusting screw by 1/4 - 1/2 turns to loosen it. Pay attention not to turn excessively.



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- (3) Turn the cam of this side by hand to adjust the dial (%).



- (4) After the adjustment is finished, tighten the adjusting screw.

## 5. Troubleshooting

The handling, maintenance and inspection is limited to the extent written on this manual.

Phenomenon	Cause	Countermeasures
Liquid is not sucked in.	<ul style="list-style-type: none"> <li>• Wrong mounting direction of valve</li> <li>• Foreign matters adhered to the valve</li> <li>• Damaged or broken valve</li> <li>• Cap A is insufficiently tightened.</li> <li>• Pump head is insufficiently tightened.</li> <li>• Broken bellows</li> <li>• Pump is air locked.</li> <li>• Air is sucked in through the suction port.</li> <li>• Motor does not rotate.</li> <li>• No liquid to be pumped</li> <li>• Too short stroke length*</li> </ul>	<ul style="list-style-type: none"> <li>• Mount the valve in correct direction.</li> <li>• Clean valve</li> <li>• Replace valve</li> <li>• Tighten Cap A.</li> <li>• Securely tighten pump head mounting screws.</li> <li>• Replace the pump</li> <li>• Remove the discharge side hose, fill liquid in the bellows and connect the hose.</li> <li>• Connect the hoses correctly.</li> <li>• Check the power source or replace the pump.</li> <li>• Fill the liquid in the tank.</li> <li>• Operate the pump at full stroke length (100%) and then adjust the stroke length.</li> </ul>
Liquid is not discharged.	<ul style="list-style-type: none"> <li>• Wrong mounting direction of valve</li> <li>• Foreign matters adhered to the valve</li> <li>• Damaged or broken valve</li> <li>• Broken bellows</li> <li>• Pump is air locked.</li> <li>• Motor does not rotate.</li> <li>• No liquid to be pumped</li> </ul>	<ul style="list-style-type: none"> <li>• Mount the valve in correct direction.</li> <li>• Clean valve</li> <li>• Replace valve</li> <li>• Replace the pump</li> <li>• Remove the discharge side hose, fill liquid in the bellows and connect the hose.</li> <li>• Check the power source or replace the pump.</li> <li>• Fill the liquid in the tank.</li> </ul>
Too small flow rate.	<ul style="list-style-type: none"> <li>• Foreign matters adhered to the valve</li> <li>• Cap A is insufficiently tightened.</li> <li>• Pump head is insufficiently tightened.</li> <li>• Air is sucked in through the suction port.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean valve</li> <li>• Tighten Cap A.</li> <li>• Securely tighten pump head mounting screws.</li> <li>• Connect the hoses correctly.</li> </ul>
Liquid leaks.	<ul style="list-style-type: none"> <li>• Cap A is insufficiently tightened.</li> <li>• Pump head is insufficiently tightened.</li> <li>• Broken bellows</li> </ul>	<ul style="list-style-type: none"> <li>• Tighten Cap A.</li> <li>• Securely tighten pump head mounting screws.</li> <li>• Replace the pump</li> </ul>





\* For KBR - □□ B

## 6. Maintenance and inspection

- Always pay attention to the operating condition and liquid leakage. Also disassemble and inspect the pump once a year. Switch off the power when any abnormality is found and check the cause referring to the Troubleshooting.
- When the time comes for the parts to be replaced or when the pump performance gets lowered considerably, replace the parts or pump.

## 7. Expendable parts

If the pump is continuously operated for a long period, it is recommended the following expendable parts are always stocked by the user.

No.	Parts name		Estimated time to be replaced
7 8 9	Poppet valve A (*) Poppet valve B (*) Valve gasket (*)		3,000 hours
10	O ring		When valve is replaced.
11	Bellows		5 millions strokes or 3,000 hours
12	Geared motor		3,000 hours

Note 1: Parts marked by \* are available as a unit (valve unit).

2: Above mentioned estimated life time is obtained by continuous pumping of clear water of 20 ~ 25 deg. C temperature and the life time depends on characteristics, pressure, temperature and other conditions of pumped liquid.



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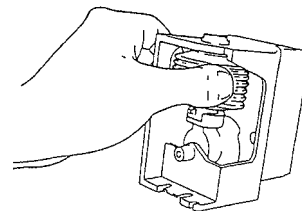
## 8. Disassembling and assembling

In most cases, prior to the disassembly of a pump there is liquid remaining in it. Particularly when using dangerous liquids, clean the inside of the pump. Be careful not to loose the small parts.

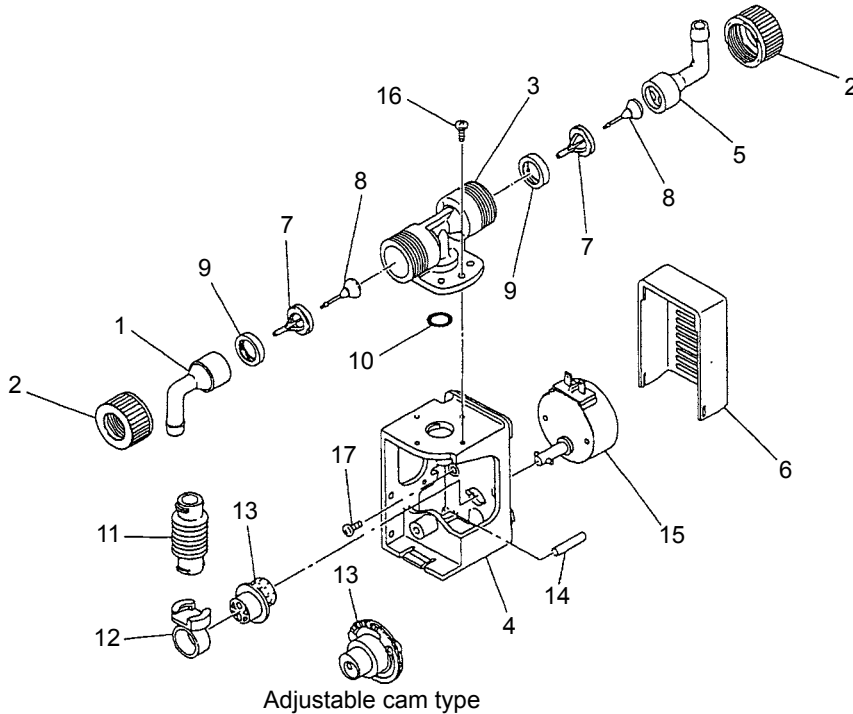
- Replacement of poppet valve
  - (1) Disconnect the hoses on both the discharge and suction sides.
  - (2) Rotate cap A (2) counterclockwise, then take out outlet (5), inlet (1), and pump head (3).
  - (3) Take out the valve set (consisting of poppet valve (7), poppet valve B (8) and valve gasket (9)). (This completes the disassembling process.)
  - (4) Replace the old valve set with a new one, and assemble the parts in the reverse order of disassembly.
    - Pay close attention to the direction of the poppet valve in the assembling process. (Refer to the “Name of parts and structure” section.)
- Replacement of bellows
  - (1) Use a philips-head screwdriver to loosen the tapping screw (16) and remove the pump head (3). Be careful not to lose the O ring (10) attached in the section where the bellows (1) come in contact with the pump head.
  - (2) If there is liquid remaining in the bellows, get rid of it with the use of a syringe.
  - (3) Rotate the bellows (11) 90° counterclockwise.
  - (4) Turn ON the power switch, turn the geared motor (15), and stop the connecting rod (12) at the lower dead point.
  - (5) Contract the bellows (11) and pull them out. (This completes the disassembling process.)

(6) Assemble new bellows (11) in accordance with the following steps.

- ① Set the bellows on the connecting rod (12).
- ② Turn ON the power supply to the geared motor (15) to stop the connecting rod (12) at the upper dead point.
- ③ With this condition maintained, push the bellows (11) toward the connecting rod slightly and rotate the bellows 90°.



## 9. Name of parts and structure



No.	Element	Quantity	Remarks
1	Inlet	1	
2	Cap A	2	
3	Pump head	1	
4	Frame	1	
5	Outlet	1	
6	Motor cover	1	
7	Poppet valve A	2	
8	Poppet valve B	2	
9	Valve gasket	2	
10	O ring	1	P-11
11	Bellows	1	
12	Connecting rod	1	
13	Drive cam	1	
14	Cam shaft	1	
15	Motor	1	
16	Tapping screw	2	M4
17	Nut	2	M4