

# Rubber Lining Self-Priming Slurry Pump

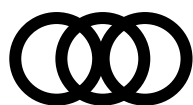
**SM—RZ Series**

## Instruction Manual



### Warnings and Precautions:

1. Before operating the pump, check the rotation direction of the motor and then attach either the belt or coupling bolt to the pump, depending on the type of pump.
2. Never touch the rotating parts.
3. Operate the pump with the cover placed on the pump at any time.



**MITSUWA PUMP CO.,LTD.**

## Introduction

Thank you for purchasing our self-priming slurry pump with rubber lining. (hereafter referred to as “pump”).

This instruction manual will provide guidance on proper operations of the pump, with descriptions on procedures for pump installation, operation, maintenance, and inspection, as well as an item check list. The manual is intended for use by operators who are overseeing operation of the pump. Before installing, operating, maintaining, or inspecting the pump, please read this manual carefully and follow the instructions.

There may be some minor difference between the actual product and the description of this instruction manual as we continue to improve our products to offer better service to our customers.

### 【Safety precautions】

The following pictograms are used in this manual so that you can safely and properly use the product and prevent bodily injuries to you and other people as well as damage to personal property.

After fully understanding the meaning of these pictograms, read the instructions.



**[DANGER]**

Indicates potential situation that may result in death or serious injury if user mishandles the product.



**[WARNING]**

Indicates potential situations that could result in minor injury or physical damage to product if the user mishandles the product.



**[CAUTION]**

Indicates potential situations that could result in physical damage to product or minimal injury to user if the user product is mishandled the product.

**[IMPORTANT]**

Indicates potential situations that may result in physical damage to product if mishandled.

## Instruction manual for self-priming slurry pump with rubber lining SM-RZ series

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### 1. For safety

Danger



- Before starting work, check the safety precautions and work procedures at the work site with the person responsible to perform the work safely according to the work plan.
- Before inspecting, maintaining, or overhauling the product, check and ensure both safety and easy accessibility of the work site.
- Before disassembling the product for repair, ensure that the motor is switched off.
- Keep unauthorized people away from the work site.

## 2.Handing and operation

Check each part of the pump carefully according to steps ① through ⑥ below.

After checking them, turn on the motor.

Note that it can take up to 10 minutes for the pump to draw up liquid for the first time after being installed, depending on the length of the suction pipe.

**Danger** 

- ⑤ Be sure to install an air vent valve on the discharge pipe.  
(The installation of an air vent valve will shorten the pump's self-priming time.)

A long continuous operation of the pump with the discharge valve fully closed can cause an abnormal rise in temperature of liquid in the pump, resulting in internal damage to the pump.  
Never operate the pump for long durations with the valve closed in order to avoid pipe clogging.

**Important** 

- ① For either suction or force pump, make sure the suction pipe is as short as possible and with minimum number of bends in the pipe.

Piping should be set up in such a way that air does not collect in the suction pipe and the pipe is ascending toward the pump.  
Make sure that no air is sucked in through the connection, as this will result in reduction of the pump's self-priming performance.

- ⑥ Prime the pump before operating it for the first time.  
Operation without liquid in the pump casing can lead to mechanical failure.

**Important**

Outlet

Inlet

No external adjustment is required because a special mechanical seal is used for the shaft seal unit.

- ② Be sure to attach the safety cover to the rotating parts of the pump.  
Do not touch the rotating parts during operation.  
The safety cover is intended to prevent accidental contact with the rotating parts.

**Danger** 

- ③ Check the tension of the V belt or coupling alignment.  
Improper calibration of the tension adjustment or coupling alignment will cause vibrations in the V belt that can lead to abnormal heat generation or premature fracture of its bearings.

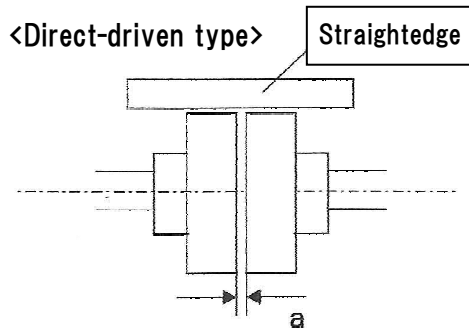
**Important**

- ④ Before tightening the coupling connector bolt on the pump or installing the V belt, check the rotation direction of the electric motor. (Rotating the motor backward can cause mechanical trouble.)  
After checking the rotation of the motor, turn off the motor and tighten the coupling connector bolt or install the V belt.  
Be careful not to get your clothing or fingers caught in the moving parts during operation.

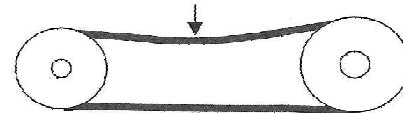
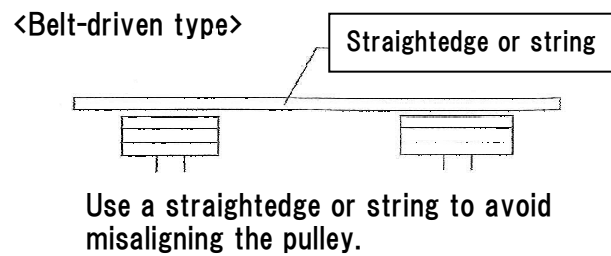
**Danger** 

## ● Alignment adjustment

The pump has been aligned at our factory prior to shipment. However, misalignment may occur during installation of the pump or piping. Check the pump for any misalignment once the installation is finished, and realign the pump when needed. Operating the pumps while misaligned can cause premature failure.



Make an adjustment with a straightedge so that the outer edges of the shaft couplings on the right and left can align with each other and clearance (a) can be uniform over the entire circumference.



Adjust the V belt tension. Avoid over-tension and under-tension.

## ● Start-up

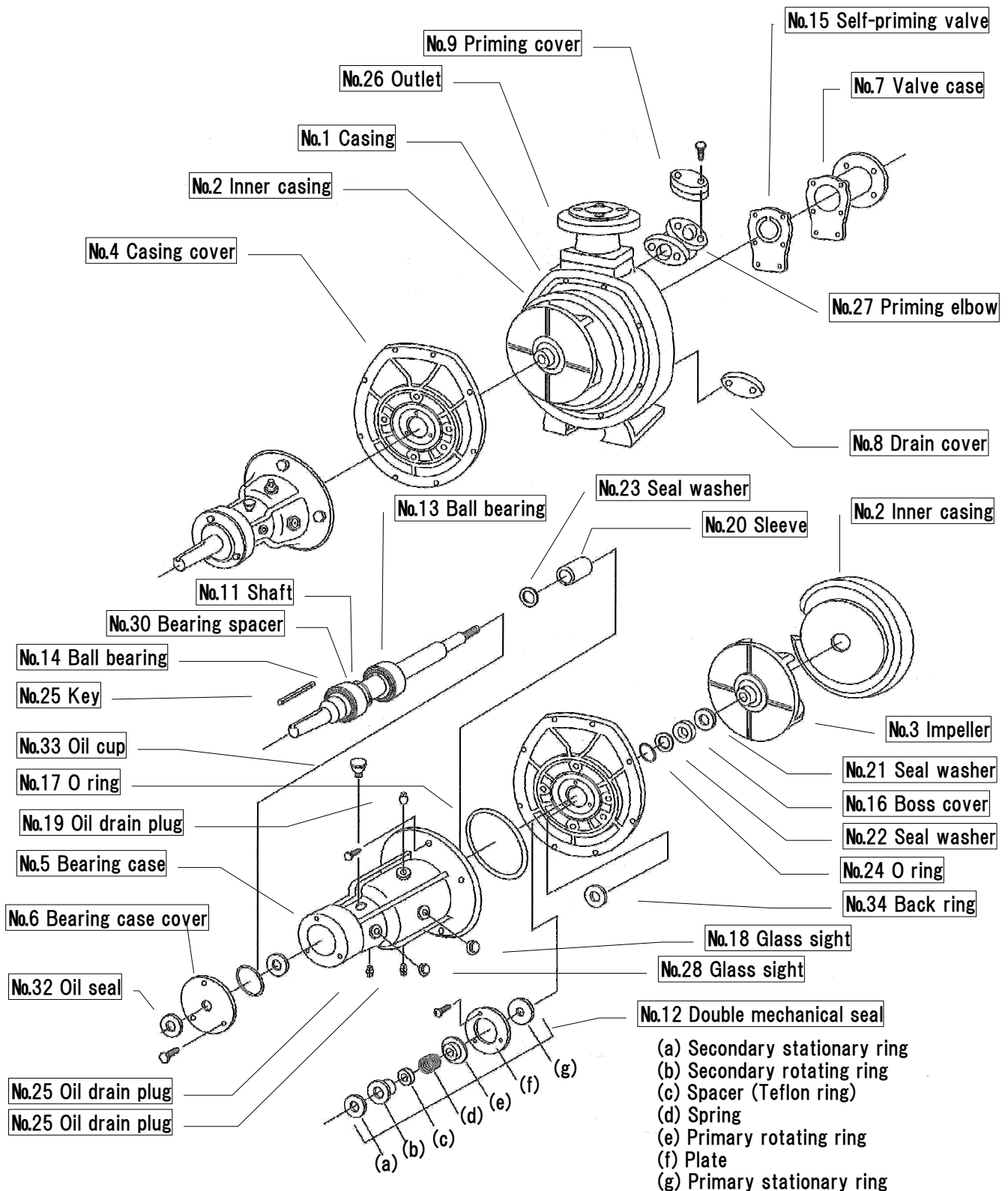
- (1) For both suction or force pumps, ensure the suction pipe is as short as possible and minimize bends in the pipe.
- (2) Piping should be configured so that air does not collect in the suction pipe and the pipe is ascending toward the pump.  
Make sure that air does not leak through the connections. Any leak will affect the pump's self-priming performance.
- (3) Turn the pump by hand to check whether or not it rotates smoothly and if there are any variations in the rotation speed.
- (4) Be sure to install an air vent valve on the discharge pipe.  
The installation of an air vent valve will shorten the self-priming time and ensure water pumping.
- (5) Before operating the pump for the first time, fill the pump casing with water through the opening of No. 9 priming cover.
- (6) Before tightening the coupling bolt on the pump or installing the V belt, turn on the motor and check the rotation direction.  
\*The rotation direction is shown with an arrow. The motor must rotate clockwise facing the pump seen from the bearing.
- (7) After checking the rotation of the motor, install the coupling rubber and bolt or V belt.
- (8) No external adjustment is required because a special mechanical seal is used for the shaft seal unit.

## ● Caution during operation and shutdown

- (1) Observe the No.18 sight glass occasionally during operation or shutdown to check for oil. If there are impurities seen in the oil or the oil level is running low, shut down the pump, remove No. 19 oil drain plug to replace the old oil with new oil. Check two to seven days later whether the impurities return or not. If the oil becomes dirty within a short period of time, replace the mechanical seal with a new one.  
(For the adequate amount of oil, see Table-1.)  
\*The mechanical chamber is filled with oil prior to shipment. If the pump is left unattended without operation for a long time after delivery, be sure to check the oil level before operation and fill up the oil to proper level.
- (2) Freezing temperatures during winter can damage the casing. Remove No.8) drain cover during the shutdown of the pump to drain water from the pump.

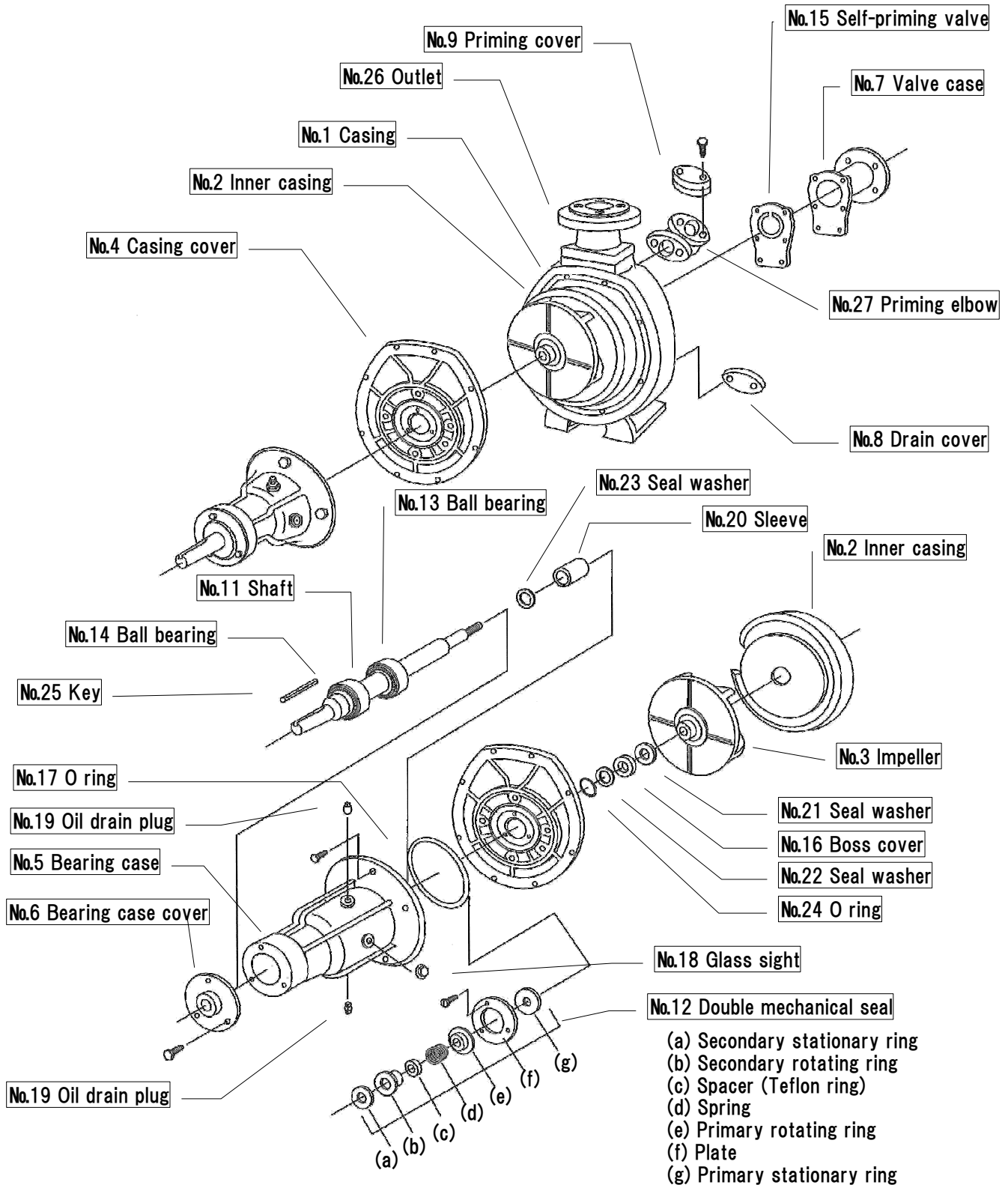
### 3. Product structure

Model : 1SM-RZ



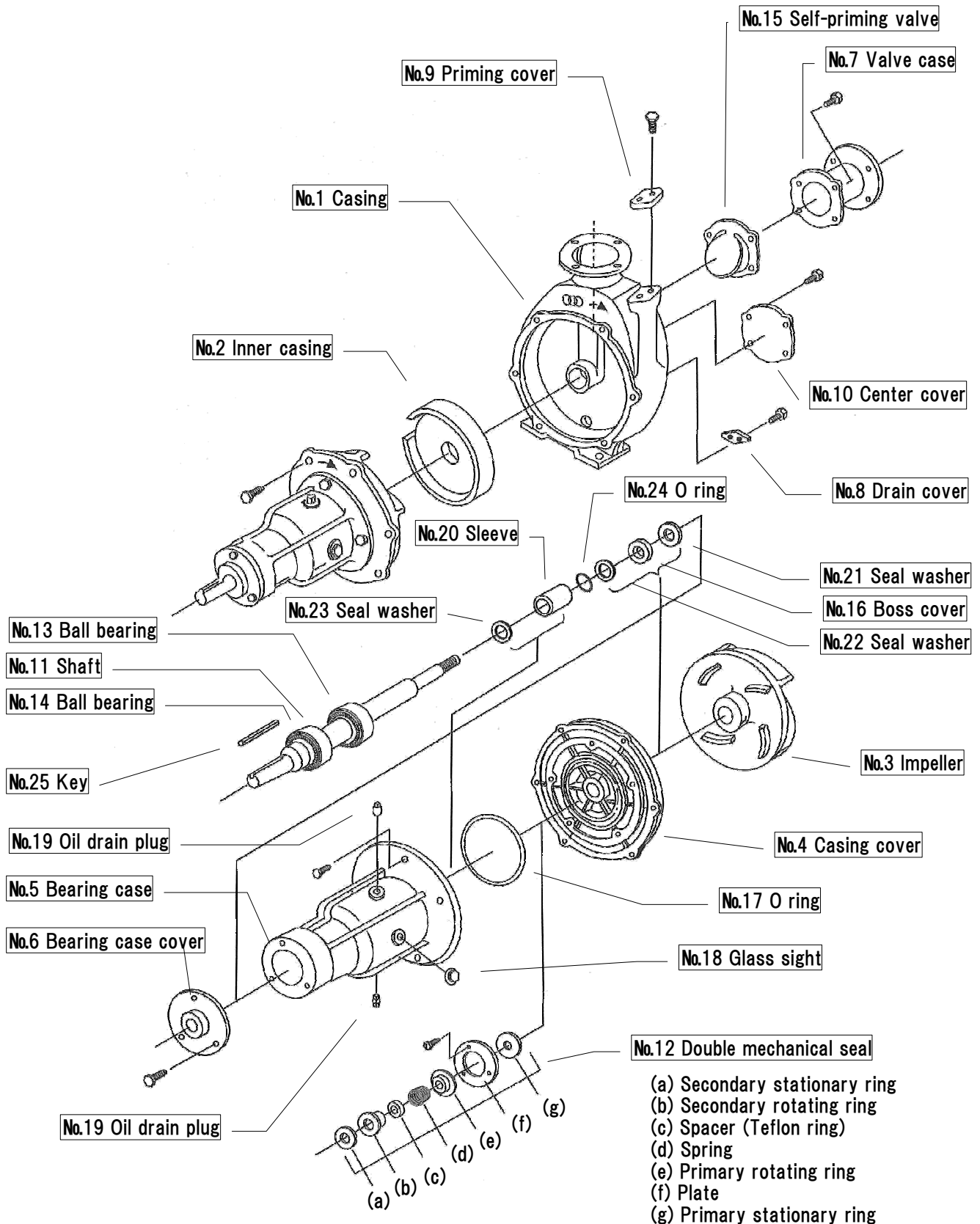
### 3. Product structure

Model : 2SM-RZ1



### 3. Product structure

Model : 3SM-RZ





### Self-Priming Slurry Pump with Rubber Lining SM-RZ Series

Table 1

Frequency	Check item	Check and action								
Every week	Check oil condition and level through the sight glass.	If the oil is very dirty or the oil level is very low (when the oil level is lower than the center point of the sight glass), change the oil. If more than one third of the oil drained from the pump is water or pumped up liquid, replace the mechanical seal.								
Every month	Check connection between pump and motor.	Direct-driven type: Check the coupling shock-absorbing rubber for wear. Belt-driven type: Check the belt for wear and belt tension.								
Every three months	Change oil in machine chamber.          Change oil in bearing chamber.	Oil recommended for the machine chamber: Oil ISO VG10 or equivalent Adequate amount of lubricating oil sealed in the machine chamber: <table><tr><td>Pump type</td><td>Adequate amount of oil</td></tr><tr><td>1SM-RZ</td><td>180cc</td></tr><tr><td>2SM-RZ1</td><td>245cc</td></tr><tr><td>3SM-RZ</td><td>255cc</td></tr></table> Note: Ethylene glycol or purified water can be used, depending on the pump specification. Recommended oil in the bearing chamber: ISO VG32	Pump type	Adequate amount of oil	1SM-RZ	180cc	2SM-RZ1	245cc	3SM-RZ	255cc
Pump type	Adequate amount of oil									
1SM-RZ	180cc									
2SM-RZ1	245cc									
3SM-RZ	255cc									
Every six months	Check for abnormal noise and vibration.	Retighten the bolts and nuts. When the bearings have high-pitched noise, replace the inner/outer bearings.								
Every year	Overhaul/inspection and maintenance	Replace worn parts. Inspect and maintain the piping system.								



## 5. Procedure for replacing spare parts for self-priming slurry pump with rubber lining SM-RZ series

Before disassembling the pump for a repair, be sure to follow the instructions below.

- (1) Turn off the motor.
- (2) Drain off the fluid from the pump. Parts wet from the pumped fluid can be slippery, depending on the fluid type. Be careful not to sustain injured by accidentally letting wet parts slip from your hands.
- (3) When using a chemical solution, put on rubber gloves to avoid direct contact with the solution.



Warning

### ● Procedure for replacing worn parts

#### (1) Impeller (No.3)

Remove the bolts for No. 4 casing cover and divide it into the casing and rotating parts. The impeller is a screw-in type. Loosen the impeller by turning it counterclockwise.

##### Caution

Do not hit the impeller with a hammer. Otherwise, the rubber lining can be damaged. Be careful not to damage other rubber lining parts, too.

#### (2) Inner casing

1SM-RZ and 2SM-RZ1

No. 2) inner casing is a built-in type. When replacing it, clean the casing, insert the inner casing straight into the casing, and incorporate the casing into the pump.

2SM-RZ and 3SM-RZ

No. 2) inner casing is a built-in type. When replacing it, clean the casing, insert the inner casing straight into the casing, and turn it clockwise as far as the stop ring on the back side will go.

#### (3) Double mechanical seal

- ① Remove the bolt for No. 4 casing cover to pull out the rotating part from No. 1) casing.
  - ② Remove No. 3 impeller.
  - ③ Remove No. 19 oil drain plug to drain oil.
  - ④ Remove No. 28 hexagonal head bolt from the casing cover.
  - ⑤ Remove double mechanical seal (c), (d), (f), and (g), together with No. 20 sleeve.
  - ⑥ Pull out double mechanical seal (a), (b), and (e).
  - ⑦ Clean the parts. Reversing the removal order from ① to ⑥, install them.
- \* When installing the double mechanical seal, pay attention to the orientation.



### Important

#### <Caution>

- As a double mechanical seal is constructed with a set of parts, replace the entire set.
- When replacing the double mechanical seal, be sure to also replace the seal washer and O ring.
- After disassembling the pump, be sure to replace the double mechanical seal regardless of whether it is damaged or not.
- Never touch the sliding surfaces of the double mechanical seal.  
Check the sliding surfaces for dust. After coating the sliding surfaces with oil such as lubricant and rust-prevention spray, install the double mechanical seal.

(4) Bearings (Nos. 14 and 15)

- ① Disassemble the double mechanical seal, following procedure (3) above.
- ② Remove the coupling or V pulley from No. 11 shaft.
- ③ Remove No. 19 bolt to take out No. 6 bearing case cover.
- ④ Remove the shaft and bearing by pulling them toward the V pulley.
- ⑤ Remove No. 13 bearing from the shaft by pulling it toward the mechanical seal and No. 14 bearing from the shaft by pulling it toward the V pulley.
- ⑥ Clean the parts, and reinstall them in reverse of the removal order from ① to ⑤, install them.



**Important**

**Caution**

- Note that a bearing can be damaged by strong impact.
  - If a damaged bearing goes into a freewheeling condition, the bearing case can be worn.
- If there are signs of wear or damage on the bearing case surface that comes in contact with the bearing, replace the bearing case, too.

## 6. Troubleshooting

Problems	Causes	Remedies
The pump does not rotate.	The engine (motor) does not turn over.	Contact your dealer to request repair.
	Rusty pump.	Overhaul the pump.
	Foreign object caught in the impeller.	Disassemble the pump to remove the foreign material.
The pump won't draw water.	Insufficient priming water.	Add priming water or pumped-up liquid to the casing.
	The pump sucks air on the suction side.	Check the suction side and retighten the parts.
	RPMs too low.	Rev up to the prescribed RPMs.
Low discharge pressure or discharge rate	Air leak.	Check the suction side and retighten the parts.
	Clogged strainer or suction pipe.	Clean it.
	Water lift too high.	Bring the pump closer to the water.
	Inadequate impeller clearance.	Adjust the clearance to 0.5 to 1 mm.
	Worn impeller.	Disassemble it for replacement.
The pump does not draw water at all.	Air sucked in on the suction side.	Check the suction side and retighten the parts.
	Insufficient priming water.	Add priming water or pumped-up liquid to the casing.
	The motor rotates in the reverse direction	Correct the direction of rotation.
	Inadequate pump installation.	Install the pump properly.
	Clogged suction pipe.	Clean the pipe.
	Clogged strainer.	Clean the strainer.
	Closed discharge valve.	Open the valve.
	The impeller came off due to reverse rotation.	Disassemble the casing and casing cover to check the impeller.
Abnormal noise or vibration.	Discharge rate too high.	Adjust the valve opening.
	Water lift too high.	Bring the pump closer to the water.
	The impeller is out of balance.	Replace the impeller.
	Misalignment between pump and drive shaft.	Adjust alignment.
	Overload applied to bearings.	Adjust connection between pump and piping.
	Strained piping.	Adjust the pump installation.
	Improper pump installation.	Adjust the pump installation.
Abnormal motor or engine condition	RPMs too high.	Adjust the RPM speed.
	Overload.	Check and adjust the pump discharge rate.
	Misalignment of the drive system.	Adjust alignment between pump and drive system.
	Motor or engine malfunction.	Contact your dealer for repair or replacement.



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