Seal Self-Priming Slurry Pump

ESM 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 seal self-priming slurry pump (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 dittrence between the actual product and the description of this instruction manual as we continue to improve our products to offer better serrices 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 a potential situation that could result in death or a serious injury if the user mishandles the product.
[WARNING]	Indicates a potential situation that could result in minor injury or physical damage to the product if the user mishandles the product.
[CAUTION]	Indicates a potential situation that could result in physical damage to the product or minimal injury if the user mishandles the product.
[IMPORTANT]	Indicates a potential situation that could result in physical damage to the product if the user mishandles the product.

Instruction manual for seal self-priming slurry pumps SM/SMC/SMS series

Contents

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 safty and easy accessbillity 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.
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.)

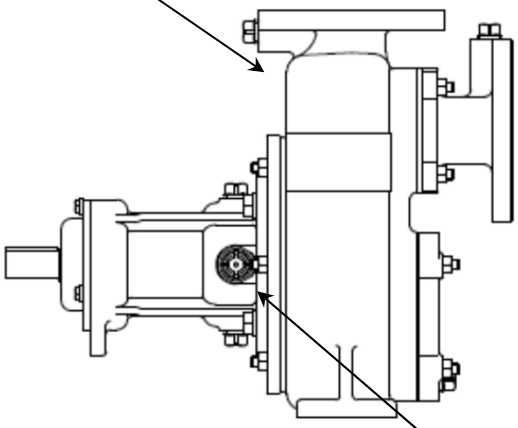
A long continuous operation of the pump with the discharge valve fully closed can cause an abnormal rise in temperature of liquid in the pump, resulting in internal damage to the pump.
Never operate the pump for long durations with the valve closed. Important

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. Danger
Do not touch the rotating parts carelessly during operation.
The safety cover is intended to prevent accidental contact with the rotating parts.

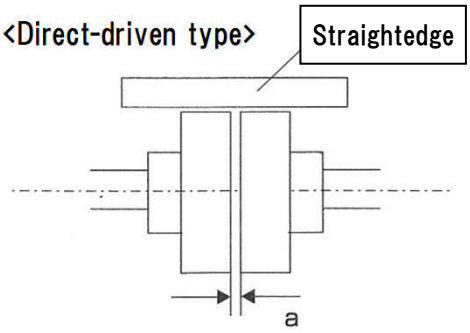
③ Check the tension of the V belt or coupling alignment.
Improper calibration of the tension adjustment or coupling alignment will cause vibrations in the V belt that can lead to abnormal heat generation or premature fracture of its bearings. Important

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

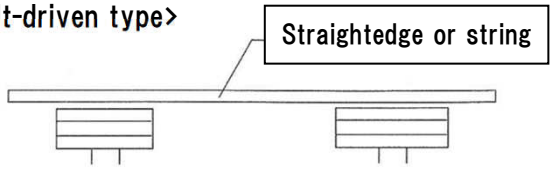
The pump has been aligned at our factory prior to shipment. However, misalignment may occur during installation of the pump or piping. Check the pump for any misalignment once the installation is finished, and realign the pump when needed. Operating the while misaligned pumps can cause premature failure.

<Direct-driven type>

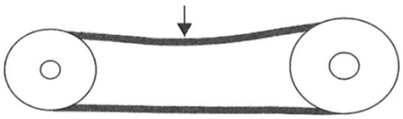


Make an adjustment with a straightedge so that the outer edges of the shaft couplings on the right and left can align with each other and clearance (a) can be uniform over the entire circumference.

<Belt-driven type>



Use a straightedge or string to avoid misaligning the pulley.



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 contigared 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.

(6) Check the rotation direction. The motor must rotate clockwise facing the pump seen from the bearing.
(Note that a prolonged continuous operation of the pump in the reverse direction can cause the impeller to loosen.

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

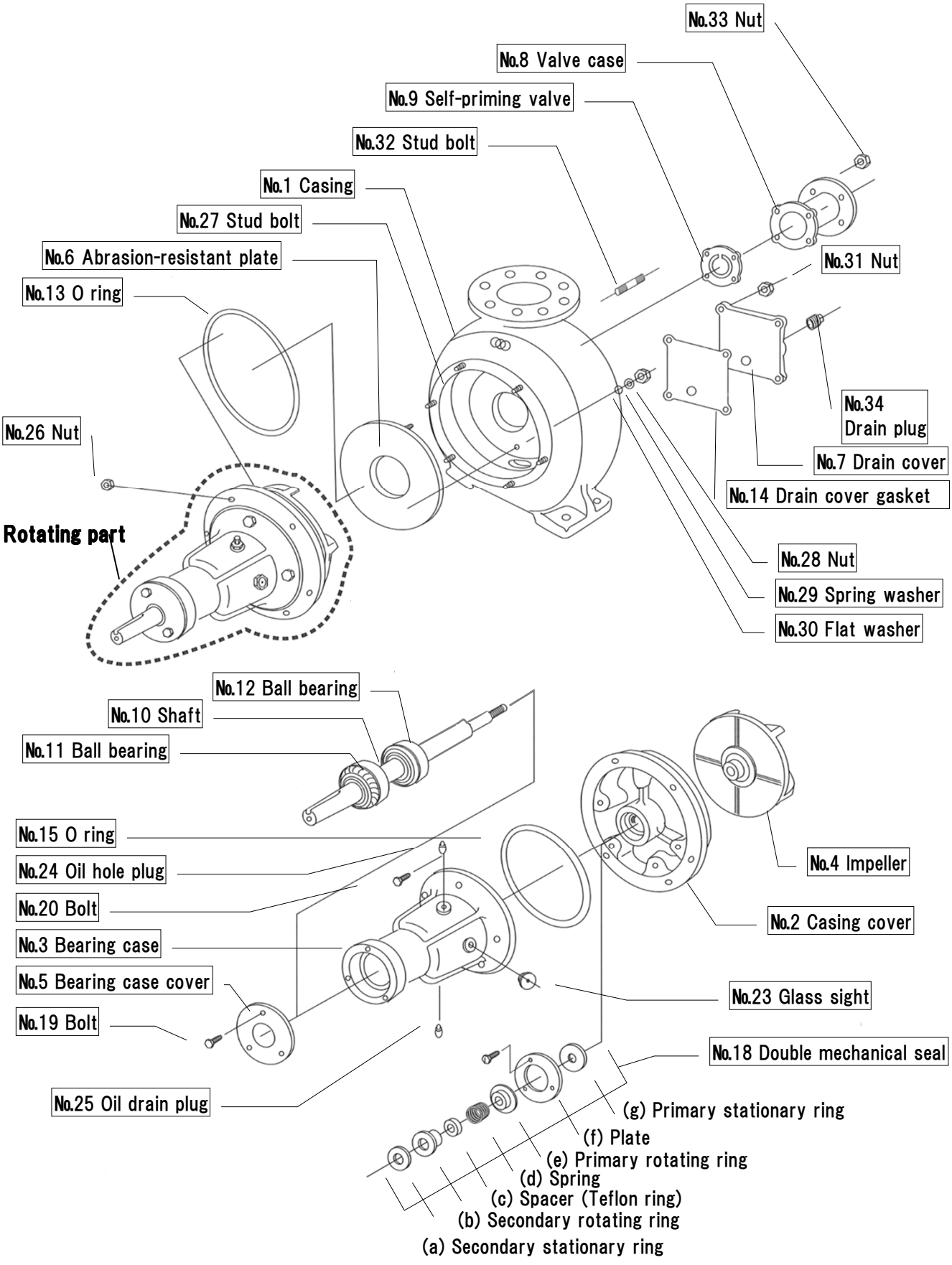
● Caution during operation and shutdown

(1) Observe the No.23) 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 and remove No.24 and No.25) oil drain plug to replace the 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.34) drain plug during the shutdown of the pump to drain water from the pump.

3. Prodct structure

ESM series



4. Regular check and maintenance

Important

Seal self-priming slurry pump ESM 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.
	Check correct operational status	Check for : any changes in the pump's performance (flow rate,pressure), abnormal vibration, abnormal sounds, and changes in electriacl current. If any irregularities are found,please contact us as soon as possible.
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.	Oil recommended for the machine chamber: Oil ISO VG10 or equivalent Adequate amount of lubricating oil sealed in the machine chamber:
	Change oil in bearing chamber.	Note: Ethylene glycol or purified water can be used, depending on the pump specification. Recommended oil in the bearing chamber: ISO VG32
Every year	Overhaul/inspection and maintenance	Replace worn parts. Inspect and maintain the piping system.

Pump type	Adequate amount of oil
40ESM	130cc

【Cautions】

Important

- After a new belt is fit, the belt may stretch. Check the belt tension in 15 to 30 days and adjust the tension if necessary.
- Before checking the oil level or changing oil, stop the pump. Air bubbles may form in the oil during operation; this is not unusual.
- Overhaul the pump once a year and check the interior of the pump, pipes, and instruments. All the components have different life expectancies depending on liquid or slurry properties. Check the components for wear and tear and replace them in an appropriate manner.

5. Procedure for replacing spare parts for seal self-priming slurry pumps ESM series

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

(1) Turn off the motor.

(2) Close the suction and discharge valves.

(3) Drain off the fluid from the pump. Components wet from the pumped fluid can be slippery, depending on the fluid type. Be careful not to sustain injury by accidentally letting wet parts slip from your hands.

● Procedure for replacing worn parts

(1) Impeller

Impeller is screw-in type.
First, remove 26) nut to pull out the rotating part from the casing.
Loosen the impeller screw by turning it counterclockwise.

(2) Abrasion-resistant plate

Remove 26) nut and pull out the rotating part
Next, remove 31) and 33) nuts to take out 8) valve case and 7) drain cover. Remove 28) nut, 29) spring washer, and 30) flat washer to pull out 6) abrasion-resistant plate toward the rotating part.
For 40ESM, the plate is fastened with two bolts.

(3) Mechanical seal

① Remove 26) nut to pull out the rotating part from the casing.
② Remove the impeller in the same manner as in the above procedure for replacing the impeller.
③ Remove 25) oil drain plug to drain oil.
④ Remove 20) bolt from 2) casing cover.
⑤ Remove (e) plate and (b) primary stationary ring.
⑥ Pull out (d) primary rotating ring, (g) spring, (f) spacer, and (c) secondary rotating ring from the shaft in this order.
⑦ Remove 19) bolt to take out 5) bearing case cover.
⑧ Pull out 10) shaft toward the drive unit.
⑨ Remove (a) secondary stationary ring.
⑩ Clean the parts. Reversing the removal order from ① to ⑨, install them.

<Caution>

- As a double mechanical seal is constructed with a set of parts, replace the set.
- When replacing the double mechanical seal, be sure to also replace the O ring, too.
- 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, install the mechanical seal.

(4) Bearings (Nos. 11 and 12)

① Loosen the set bolt for the coupling or pulley to remove the coupling or pulley from No. 10) shaft.

② Disassemble the double mechanical seal, following procedure (3) above.

③ Remove No. 12) bearing from the shaft by pulling it toward the mechanical seal. Remove No. 11) bearing from the shaft by pulling it toward the V pulley.

④ Clean the parts, then reinstall them in reverse of the removal order from ① to ③

Important

Caution

■ Note that a bearing can be damaged by a strong impact.

■ If a damaged bearing goes into a free-wheeling condition, the bearing case can wear out.
If there are signs of wear or damage to 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 motor does not turn over.	Contact your dealer to request repair.
	Rusty pump.	Overhaul the pump.
	Foreign material caught in the impeller.	Disassemble the pump to remove the foreign object.
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 ㎜.
	Worn impeller.	Disassemble it for replacement.
The pump does not draw water.	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.
	RPMs too low.	Rev up to the prescribed RPMs.
	Inadequate pump installation.	Install the pump properly.
	Clogged suction pipe.	Clean the pipe.
	Clogged strainer.	Clean the strainer.
	Closed discharge valve.	Open the valve.
Abnormal noise or vibration	Discharge rate too high.	Adjust the valve opening.
	Water lift too high.	Bring the pump closer to the water.
	Worn bearings or inadequate lubrication.	Repair the pump.
	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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