INSTRUCTION MANUAL

EBARA Self Priming Pumps
(Agricultural Use)

MODEL SQPB

Introduction

Check the following points upon receipt of your pump:

(1) Is the pump exactly what you ordered? Check the nameplate. It is especially important that you check whether the pump is to be used with 50 Hz or 60 Hz.

(2) Has any damage occurred during shipment? Are any bolts or nuts loose?

(3) Have all necessary accessories been supplied? (For a list of standard accessories see Construction).

We recommend that you keep a spare pump on hand in case of emergencies. Keep this instruction manual in a safe place for future reference.

Specifications

Check the nameplate for your pump's head (HEAD), discharge volume (CAPACITY), and speed (SPEED). Other specification are listed in the chart below.

Standard Specifications		
Liquid	Type Temperature	Fresh water 0 ~ 40^0 C (32 ~ 104^{0}F)
Suction head		- 6 m (20^0 C)
Installation		Indoors
Construction	Impeller	Semi open
	Shaft sealing	Packing
	Bearings	Sealed ball
piping Connections	Suction	Screw (gas pipe threads: PS …. equv. ISO R228)
	Discharge Size ϕ 40 ~ ϕ 50	Screw (gas pipe threads: PS …. equv. ISO R228)
	Discharge Size ϕ 65 ~ ϕ 100	Flange (JIS 10 kgf/cm^2 thin type)

Note : Be careful not to exceed the given specifications in the use of your pump.

Installation

1. Location

(1) This pump should be installed indoors. If it is to be used outdoors, some type of roof or covering will be required to protect the pump from the weather.
(2) Install in a well-ventilated area with low humidity. Ambient temperature should be 40^0C or less.
(3) Install where inspection and maintenance procedures can be easily performed.
(4) Provide a suitable enclosure to prevent entry of unauthorized persons.
(5) Install pump as close to water source as possible. Suction height (height from surface of liquid to center of pump) should be as low as possible, and suction piping should be short. Suction head should be less than 6 meters. To minimize suction piping loss, excessive use of elbows and valves should be avoided.

2. Piping

(1) Use adequate support for suction and discharge piping to avoid excessive piping load on pump.
(2) The end of the suction piping should be submerged to a depth of at least twice the diameter (D) ot the piping, and should be at a distance between 1 to 1.5 times the diameter of the piping from the bottom of the pit.
(3) Install a strainer at the end of the suction piping to block the entrance of foreign matter.
(4) Install an air-release valve in piping to prevent the formation of air pockets due to construction. Note, however, that an air-release valve must not be installed where pressure may drop below atmospheric pressure since the valve may suck in air instead of expelling it.
(5) Suction piping should be inclined upward (over 1/100) in relation to the pump to prevent formation of air pockets. Pipe joints must be tight so that there will be no possibility of air leakage.
(6) Keep suction piping as short and straight as possible. Do not attach a sluice valve.
(7) A check valve must be installed between the pump and the discharge valve in the following cases: when suction piping is long; when actual head is high; when pump is automatic; when water is being pumped to pressure tank; and when two or more pumps are in parallel operation.
(8) If there is a bend or joint in the piping between the check valve and the pump, air pockets may develop. In such a case, install an air-release valve just below the check valve. As water will be discharge from the air–release valve after priming has been completed, be sure to close air-release valve.
(9) To reduce effect of water hammer install such a device as a quick-closing check valve.
(10) An example of piping installation is shown in fig.1

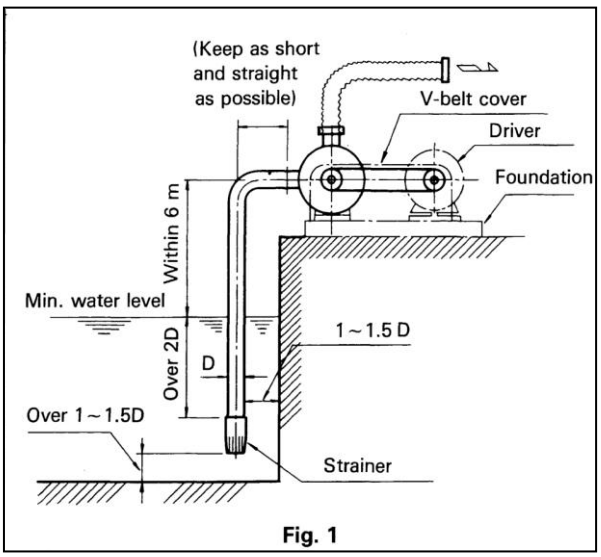


Fig. 1

3. Attaching V-Belt

(1) Refer to the catalogue for the respective speeds of the driver and pump pulleys to determine their appropriate size and the number of V-belts that will be required.
(2) Stretch a piece of string between the driver and pump pulleys. The string should be in a straight line as shown in Fig. 2.
(3) As pump must rotate counterclockwise viewed from drive shaft, couple driver so that belt tension is applied to lower portion.
(4) The belt should not be too tight or too loose. With a V-belt, allow for a slack of about 10 milimeters when the belt is depressed.
(5) Before beginning operation, rotate pulleys by hand to ensure that belt will stay in place.
(6) If the belt slips or makes an abnormally loud sound, adjust tension.
(7) As the belt may stretch and slip or come off when the motor is continuously operated for an extended period of time, pump and driver may need occasional repositioning.
Attach a belt cover to prevent accidents.

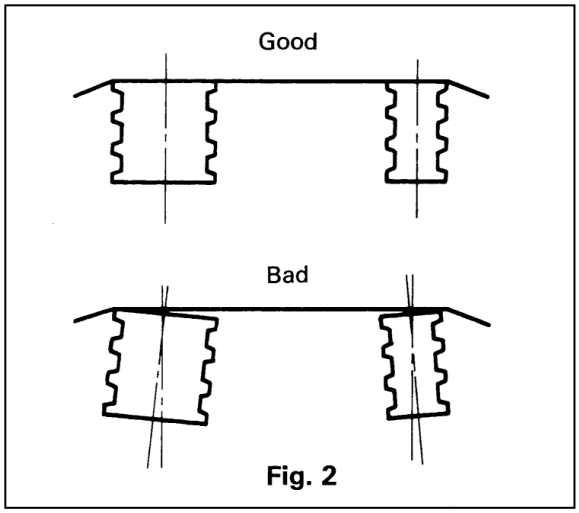


Fig. 2

4. Electrical Wiring

(1) Refer to Fig.3 for correct wiring. It is important that wiring be correct and that motor is properly grounded.
(2) Check the following points before turning on operation switch.
1. Is the fuse the right type?
2. Is the wiring correct?
3. Has motor been grounded?
4. With a three-phase motor, check for a loose or completely detached connection. Operating on only two terminals will result in phase omission, causing motor burn out.
(3) Terminal voltage in motors bearing the EBARA nameplate may be within ± 10% of the rated voltage. Exceeding this range will lead to breakdown.
(4) Overloading the motor beyond the prescribed limit will reduce its efficiency, is not economical and will eventually lead to motor malfunction.
We recommend that a protective motor relay be installed to prevent burnout caused by overloading

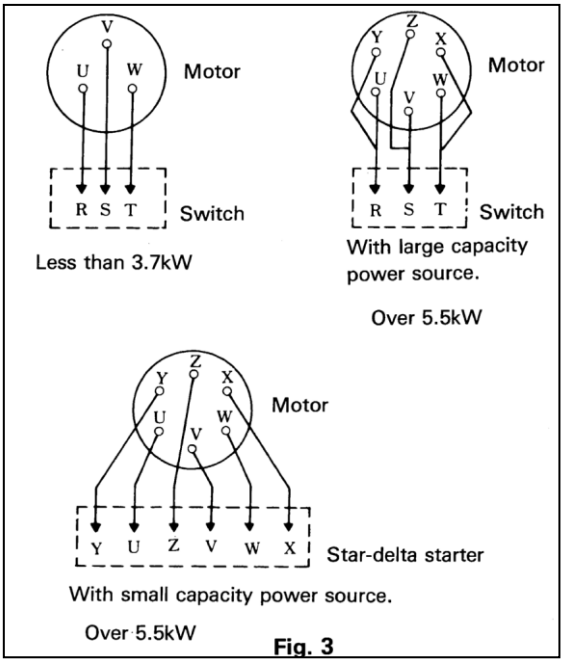


Fig. 3

Operation

1. Before starting

(1) Turn pump by hand to check for smooth rotation. If movement is sluggish or uneven, components inside the pump may be rusted or the packing may be too tight.

(2) Operate the motor without the V-belt to check rotation direction. **The pump should rotate in a counterclockwise direction when viewed from the pulley side.** Attach the V-belt after you have completed the rotation direction check.

(3) Prime the pump. Operating the pump without priming will cause breakdown.

(4) Rotate the pump by hand when priming to remove internal air from casing.

2. Operation

(1) When the end of the discharge piping is exposed and a discharge valve is installed, keep the valve open to allow air to escape. If an air-release valve is installed, keep it open to allow air to escape.

(2) Turn operation switch on and off two or three times to check operating condition. Attach V-belt cover after operation check has been completed.

(3) If no water is pumped up within 10 minutes after operation has begun, there may be malfunction. Stop the pump immediately and inspect pump and piping carefully.

(4) Check that pressure, current, vibration and noise (refer to **Maintenance**) are at normal levels. Both the pressure gauge and compound gauge cocks should be kept closed except at specified times. Leaving them open may lead to gauge malfunction.

(5) If there is no check valve on the discharge piping, close the discharge sluice valve slowly when stopping pump operation. Turn off operation switch after the sluice valve has been completely closed.

(6) Follow the procedures listed under **Maintenance** each time before beginning operation. Ensure that all conditions are normal before starting pump operation.

Maintenance

Ensure that pump operation switch is off before making inspections; the pump may suddenly start if it is an automatic operation type.

1. Daily inspection

(1) Pressure or current variations, abnormal vibration or noise are signs of malfunction. Refer to Troubleshooting and make necessary repairs as soon as possible. We recommend that you keep a record of daily operating conditions so that you will be able to detect early signs of trouble.

(2) The maximum allowable bearing operating temperature should not exceed 80^0C. As long as the bearing frame is not too hot to touch with the hand there is no problem. Stop operation immediately an inspect if bearing frame become too hot.

(3) Packing leakage should be kept to a steady drip or trickle (approx. 20ml/min) do not tighten excessively or unevenly or when pump is stopped.

2. Carefully observe the following points:

(1) Operating the pump for an extended period of time with the discharge valve closed will eventually cause pump components to be damaged.

(2) Frequent starting and stopping of the pump will eventually cause damage. Pump starting frequency should not exceed approximately 6 times per hour.

(3) Be sure to turn off operation switch in the event of a power failure. It is dangerous to leave the switch on as the pump will suddenly start when power is restored.

3. Carefully observe the following when the pump is to be stored or remains idle for any length of time.

(1) Water remaining inside an idle pump will freeze in cold weather her cause the pump casing to burst. Be sure to insulate pump or drain water completely.

(2) Operate any auxiliary pumps occasionally to maintain best usable condition.

4. Replaceable parts

(1) Replace parts indicated in following chart as necessary.

Replaceable part	Packing	Sealed ball bearings	"O" ring
Replacement guide	When no longer able to control leakage	When there is an abnormally loud sound or grease flow	Whenever disassembling for inspection
Average replacement frequency	Annually	Once every 2 to 3 years	

The above average replacement frequency is for normal operating conditions.

(2) Replaceable parts measurements for this pump are as follows:

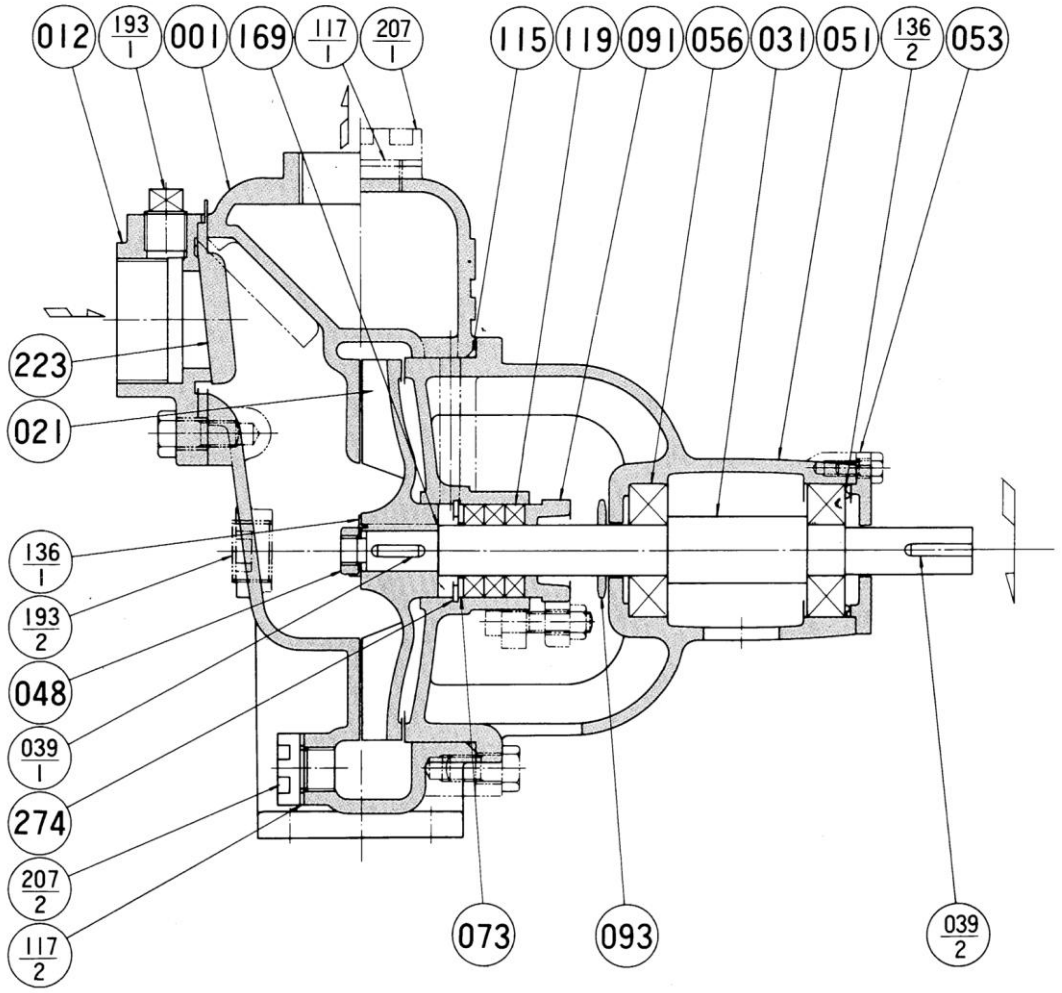
Unit: mm

Model	Packing (Inner dia. X ect. Dia. X width)	Sealed ball bearings	"O" ring (Inner dia. X circumference)
40 SQPB	20X36X8	6304ZZ	150X3
50 SQPB	20X36X8	6304ZZ	150X3
65 SQPB	20X36X8	6305ZZ	160X3
80 SQPB	20X36X8	6305ZZ	160X3
100 SQPB	28X44X8	6306ZZ	180X3
150 SQPB	35X51X8	6307ZZ	225X3

Troubleshooting

Trouble	Cause	Remedy
Motor does not start. Motor makes abnormal sound and will not start.	(1) Motor malfunction. (2) Power source malfunction. (3) Rotating parts in contact, rusted, burnt out.	(1) Repair motor. (2) Inspect, repair (3) Rotate by hand. Reassemble. Have repaired in specialist shop.
Does not prime automatically. Does not obtain specified discharge volume.	(1) Pump not primed for initial operation. (2) Sluice valve closed, half open. (3) Actual head greater than pump head. (4) Suction height too high for pump. (5) Discharge piping end not exposed. (6) Suction piping end not submerged. (7) Rotation direction reversed (8) Rotation speed low • Wrong number of poles in motor. • Voltage drop • Belt not positioned correctly. • Wrong size pulley (pump or driver). (9) Strainer clogged (10) Impeller clogged. (11) Piping clogged. (12) Air Suction. (13) Leak in discharge piping. (14) Excessive piping length in suction pipe. (15) Impeller worn (16) Impeller corroded (17) Excessive piping loss. (18) Cavitation (19) Excessive wear of moving parts. (20) Excessive space between impeller and side plate.	(1) Prime. (2) Open Valve. (3) Re-examine original plan. (4) Re-examine original plan. (5) Open discharge piping end. (6) Submerge suction piping end. (7) Check and rewire (8) Check with tachometer • Check nameplate • Check power source • Readjust belt. • Re-calculate pulley size. (9) Remove foreign matter. (10) Remove foreign matter. (11) Remove foreign matter. (12) Inspect and repair suction piping and shaft sealing. (13) Inspect, repair. (14) Re-examine original plan. (15) Check quality of liquid used and change (16) Replace impeller. (17) Re-examine original plan. (18) Consult specialist (19) Replace worn parts. (20) Adjust spacing to within 3 mm.
Water Discharge but then stops	(1) Insufficient priming. (2) Air suction. (3) Air pocket in suction piping. (4) Suction height too high for pump.	(1) Prime sufficiently. (2) Inspect, repair suction piping, shaft sealing. (3) Re-install piping. (4) Re-examine original plan.
Overloads	(1) Excessive rotation speed. • Wrong number of poles in motor. • Wrong size pulley (pump or driver) (2) Voltage drop, phase inbalance (3) Head low. Excessive volume flow. (4) Belt not pulling correctly. (5) Foreign matter clogging pump. (6) Packing too tight. (7) Bearing damaged (8) Rotating parts touching. Shaft bent. (9) Excessive liquid specific gravity, density.	(1) Check with tachometer. • Check nameplate. • Re-calculate pulley size. (2) Check power source (3) Partially close discharge valve. (4) Adjust belt (5) Remove foreign matter (6) Loosen packing (7) Replace bearing (8) Have repaired in specialist shop. (9) Re-examine original plan.
Bearing Overhead	(1) V-Belt too tight. (2) Bearing damaged (3) Excessive pump operation with valve closed.	(1) Adjust belt (2) Replace bearing (3) Stop operation with valve closed
Excessive vibration & noise	(1) Foundation not stable (2) Incorrect installation. V-belt not adjusted properly (3) Bearing damaged (4) Excessive volume flow (5) Discharge volume too flow. (6) Impeller clogged (7) Rotation direction reversed (8) Rotating parts touching, shaft bent. (9) Cavitation (10) Piping vibrating	(1) Repair foundation (2) Reinstall, adjust (3) Replace ball bearings. (4) Partially close discharge valve. (5) Operate as close as possible to specified flow level (6) Remove foreign matter (7) Check with arrow and rewire (8) Have repaired in specialist shop (9) Consult specialist (10) Improve piping
Water leak from shaft sealing	(1) Packing not inserted properly (2) Packing damaged (3) Shaft or sleeve worn	(1) Replace packing (2) Replace packing (3) Have Repaired in specialist shop.
Shaft sealing overheat	(1) Packing too tight. (2) Packing unbalanced	(1) Adjust (2) Adjust

Construction



NO. PART	PART NAME	MATERIAL	NO. FOR 1 UNIT
001	CASING	CAST IRON	1
012	SUCTION COVER	CAST IRON	1
021	IMPELLER	CAST IRON	1
031	SHAFT	CARBON STEEL	1
039-1	KEY	CARBON STEEL	1
039-2	KEY	CARBON STEEL	1
048	IMPELLER NUT	STEEL	1
051	BEARING HOUSING	CAST IRON	1
053	BEARING COVER	CAST IRON	1
056	BALL BEARING		2
073	SPACER	STEEL	1
091	GLAND	CAST IRON	1
093	DEFLECTOR	RUBBER	1

NO. PART	PART NAME	MATERIAL	NO. FOR 1 UNIT
115	O-RING	RUBBER	1
117-1	GASKET	RUBBER	1
117-2	GASKET	RUBBER	1
119	PACKING	ASBESTOS	3
136-1	WASHER	BRASS	1
136-2	WASHER	CARBON STEEL	1
169	SHIM	STEEL	1 SET
193-1	PLUG	STEEL	2
193-2	PLUG	CARBON STEEL	2
207-1	PRIMING PLUG	PLASTIC	1
207-2	DRAIN PLUG	PLASTIC	1
223	CHECK VALVE	RUBBER	1
274	STOP RING	CARBON STEEL	1

Disassembly and Assembly

1. Disassembly

When disassembling pump, provide a piece of cardboard or plywood to place the different parts on as you work.

Do not pile parts on top of each other. They should be laid out neatly in rows. As the “O” ring and gasket cannot be used again once the are removed, have replacement parts ready.

Disassemble in the following order, referring to the sectional view.

Be sure to cut off power source before beginning disassembly.

(1) Drain all water from casing.
(2) Remove driver from foundation. Inspect V-belt.
(3) Remove the casing cover bolts, and remove bearing housing from casing. You will now be able to inspect the inside of the pump. Check for wear and other unusual signs.
(4) Remove impeller nut (left hand thread) and washer. Remove impeller. If the impeller has rusted and is difficult to remove, tap shaft end lightly with a wooden hammer. Remove key after impeller has been removed.
(5) Remove bearing cover and remove shaft along with ball bearings.

2. Assembly

Reassemble in reserve order of disassembly.

Re careful of the following points.

(1) If V-belt is worn, replace
(2) Replace “O” rings and gland packing.
(3) Check condition of ball bearings, replace if necessary or if they fail to retain grease.
(4) Carefully insert the gland packing, turning the joints 180^0C, place the last joint facing downwards. Also, lightly secure the gland bolts.
(5) Secure the bolts slowly and symmetrically so as to prevent one-sided tightening.
(6) After completion of assembly, ensure pump can be turned smoothly by hand.

Please obtain “O” rings, gland packing and other parts from pump dealer. The table of dimension is given in **“Maintenance”.**

MEMO :