Manual No.M01B(E)/1406-00

STAINLESS STEEL MAGNET DRIVE PUMP

STAINLESS MAG SERIES **M**

INSTRUCTION MANUAL

Requirements

This instruction manual is for the person who actually operates the pump. Please be sure this manual is provided to and understood by the operator on the scene. If the instruction manual is also needed by personnel who install the pump or by a staff of a plant constructor, please let us know. We will supply another copy.

Machine Number	Code	Lot Number

To the on-site operator: please enter the pump's code and lot number above and for future parts order and inquiry.

SANWA HYDROTECH CORPORATION

Preface

Thank you for purchasing our Sanwa Magnet Drive Pump. We manufacture our pumps with the utmost care so they may be used with confidence. However, mishandling can lead to deterioration of performance, or could cause an accident. We strongly urge you to use the pump properly as described in this manual.
Keep this instruction manual in a safe place, so it will be handy for you to consult any time the need arises.
Read the Motor Instruction Manual to learn about correct handling of the motor.

Important for safe handling

- Before operating, maintaining, or checking this pump, make sure you understand and follow the safety precautions stated in this manual, so you can use the pump safely and correctly. We are not liable for any injuries, damage, or accidents that may result from failure to follow these precautions.
- Three types of hazards are discussed in this manual, depending on the severity of their possible effects.

DANGER

! DANGER denotes an extreme hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, is likely to result in serious injury or death.

WARNING

! WARNING denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in serious injury or death.

CAUTION

! CAUTION denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury to people and may damage or destroy the product, or other property in the vicinity.

Depending on the circumstances, serious problems can occur at any hazard level, including  **CAUTION**. Important safety points are discussed in all of the following precaution sections. Be sure to take the precautions seriously.

⚠ DANGER

General precautions

- Do not use the pump in the presence of explosive gas or powder. You may cause an injury or start a fire. If you must use a pump under these conditions, use one that has a pressure-resistant and explosion-proof motor.
- If you will be pumping a liquid with a low flash point or ignition temperature, use an explosion-proof motor appropriate to the specific conditions.
- Do not work on the pump in the presence of electric power. Make sure to turn off the power to them. Otherwise, you could receive an electric shock.

Operation

- Never come close to or touch the rotating components while the pump is in operation. Your clothing could get entangled and you could be injured.
- Make sure you turn off the power if a power failure occurs. Otherwise, you may be injured when the power comes back on unexpectedly.

Precautions when performing maintenance and checking the pump

- Follow the connection diagram in the terminal box or the motor instruction manual when connecting the power cables. Otherwise, you may receive an electric shock or cause a fire.

⚠ WARNING

General precautions

- If you are using this pump in the food industry, the pump must always be kept clean. A dirty pump will support the growth of bacteria.
- Do not insert your fingers or objects into the openings of the pump or motor. Otherwise, you may receive an electric shock, be injured, or cause a fire.

Installation and Adjustment

- Do not allow any flammable objects near the pump. Otherwise, a fire may start.

Operation

Rotation hazard : Do not stick your fingers into the openings of the frame adapter while the pump is operating. You may seriously damage your fingers.

Disassembly and Assembly

- Liquid hazard : If hazardous chemicals are fed through the pump, wash the inside of the pump after draining off the liquid and before disassembling the pump. A small volume of liquid may remain on the screws, protrusions/dents, and joints inside the pump. Therefore, if the pump is used to feed hazardous chemicals, wear protective gear (goggles, rubber gloves, etc.) and disassemble the pump carefully.
- Crushing or pinching hazard : When you assemble or disassemble the magnet coupling, be aware that you are dealing with extremely strong magnets. Be careful to keep your hand or fingers from being trapped or pinched by the magnetic attraction of the parts.

⚠ CAUTION

General precautions

- Only people with special knowledge should transport, install, plumb, wire, operate, maintain, or check the pump. If you are not specially trained, you may receive an electric shock, be injured, or cause a fire.
- Use the motor with the rated voltage specified on the motor's nameplate. Otherwise, you may receive an electric shock, be injured, or damage the pump.

during transportation. However, do not use those eyebolts to lift a machine after the pump is mounted on that machine. Before suspending the pump from a ring, refer to our leaflet to check the weight of the pump. Never lift a pump if it exceeds the rated load of your suspension device. The eyebolts could become distorted, and the pump could drop or fall, and this could cause an injury or break the pump.

- The bearings and other parts of the pump are made of very hard material. However, they are vulnerable to vibration and shock. Therefore, handle the pump carefully when transporting it. If you mount the pump on a machine, install it with care.

Unpacking

- Identify the top and bottom of the pump packaging before opening it. Otherwise, you could be injured when opening it.
- Make sure the delivered products are what you have ordered, by checking the product specifications and nameplate. If you install a different product from what you had planned for, you could be injured or damage the product.

Plumbing and wiring

- Follow the connection diagram in the terminal box, or the instruction manual for the pump when connecting the power cables. Otherwise, you may receive an electric shock or cause a fire.
- Do not forcibly bend, pull, or insert the power cable and motor lead wires. Otherwise, you may receive an electric shock.

Installation and adjustment

- Fasten the ground terminal securely. Otherwise, you may receive an electric shock.

⚠ CAUTION

Operation

- Do not operate the pump while the terminal box cover is opened. After wiring, reinstall the cover on the terminal box in its original position. Otherwise, you may receive an electric shock.
- High temperature hazard : Do not put your hand close to the casing or frame adapter of the pump, because they get very hot. You may be burned.
- Dry runs are prohibited ⃠
  Never run the pump while dry. Otherwise, the pump may get very hot and the bearings may be damaged. Make sure you put liquid into the pump before starting to run it. This also applies when you check the direction of rotation.
  The “CAN” section may generate heat and the magnets can lose power.
- Operating the pump by shutting off is prohibited ⃠
  Do not run the pump with the valves to it shut off for longer than one minute. The temperature of the liquid in the pump may rise rapidly and can cause an accident.

Table of Contents

Preface

Important for safe handling

● Things to check and precautions to take to operate the pump safely

- Be sure you read this instruction manual and the attached documents before starting to use the pump. This includes installation of the pump, operation, maintenance, and checks. Make sure that before any use you understand thoroughly this pump, the safety information, and the safety precautions.

Things to check to prevent problems and accidents, and to operate safely

- Check these items before starting to operate the pump
  Check the power, wiring, plumbing, priming liquid, air release, and direction of rotation.
- Items to check before starting a trial run or main operation
  Check the electric current and voltage, suction pressure, discharge pressure, throughput, and look for vibration, abnormal sounds, or leaking liquid.

DANGER

- If you are pumping a hazardous, explosive or inflammable liquid, take special measures to prevent accidents during the trial run check.

Requirements and precautions when using a pump to feed special liquids

- Pumps are used in various industries. The Stainless Magnet pump is often used to transfer hazardous, explosive, inflammable, or bacteria-nutrient liquids. Incorrect handing of the pump can kill or seriously injure human beings, and can damage or destroy property. In order to prevent these accidents, we ask you to read this instruction manual carefully and thoroughly.

DANGER

- Take abundant care and prepare the safety facilities if the pump will be used to feed the following liquids.
  - Explosive liquids
  - Flammable liquids
  - Liquids that can cause chemical reactions
  - Liquids that are directly harmful to humans
  - Liquids that create potential hazards, such as supporting the growth of various bacteria that can spoil foodstuffs

- Pumps that are crucial to the operation of production lines should be backed up sufficiently such that serious losses will be prevented in case of disaster or accidents and problems. If appropriate countermeasures cannot be taken, we recommend having a spare pump on hand, and a spare motor is also highly recommended as well, if possible.

● Transportation and unpacking

1. Transportation

CAUTION

- When transporting the pump, be careful not to drop it or let it fall. Make sure the eyebolts (if the pump is equipped with them) are used to secure the pump during transportation. However, do not use the pump's eyebolts to lift a machine after the pump is mounted on it. Before suspending the pump, refer to our leaflet to check the weight of the pump. Never lift a pump that exceeds the rated load of your suspension device. If you fail to heed this advice, the eyebolts may be distorted, and the pump may drop or fall, and this may cause an injury or damage the pump.
- The bearings and other metal parts are made of very hard material. They are vulnerable to shock. Therefore, handle the pump carefully. When you mount the pump on a machine, install it with care.

2. Unpacking

CAUTION

- Identify the top and bottom of the pump packaging before opening it. Be aware that you could be injured if you open it upside down.
- Make sure the delivered products are what you have ordered, by referring to the product specifications and nameplate. If you install a different product from what you had planned for, you could be injured or damage the product.

● Before use

When the pump is delivered, check the following right away.

- Make sure all the accessories have been delivered.

CAUTION

- Make sure the pump that was delivered is the one you ordered, by checking the nameplate on the pump.
- Make sure the pump was not damaged during transportation, and check for loose nuts and bolts.

When you check these items, if anything is missing or you find a problem, please contact the shop where you purchased the pump.

● Installation

1. Installation

1. Suspend and move the pump where it will be used.
2. Install the pump.
   - After you have examined the suction head, select a place to install the pump.
   - Install the pump where it can be easily checked and maintained.
   - Prepare a base that can absorb vibration and that has enough strength and space to handle the weight and size of the pump and motor. Fasten the pump securely to the base using bolts.
   - Dirt and foreign material in the suction water tank and/or lines may cause the pump to develop problems. Clean these before putting liquid in the pump for operation.

CAUTION

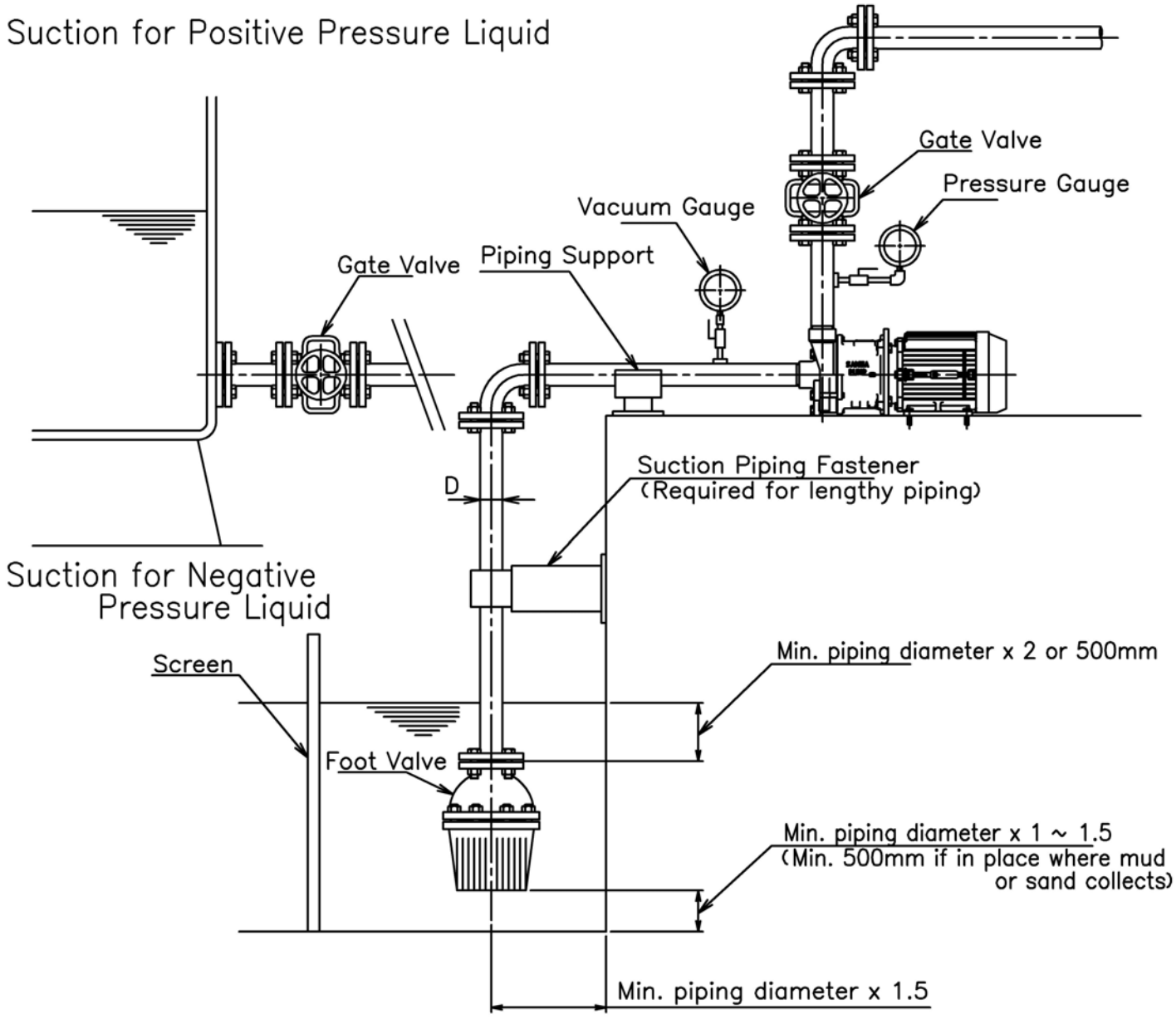
- When suspending the pump, check the weight of the pump (including the motor) and use suspension equipment that has sufficient capacity to handle the weight. Be careful not to drop or bang the pump.

2. Plumbing

- Arrange the horizontal run of the suction pipe so that it increases in height gradually as it approaches the pump suction inlet. (An inclination of 1/50 or more)
- Install a foot valve or strainer at the end of the suction pipe so that the pump does not suck up foreign debris.
- You will find it convenient to have a shutoff valve installed in the suction pipe for disassembly and to check if the suction is correct for free flow or pressure supply operation. Make sure this shutoff valve is fully open before starting to operate the pump.

Notes

- If the pump has to support the weight of the suction and/or discharge pipes, the plumbing may become misaligned or a problem could develop. Be sure these pipes are supported.
- Arrange the suction line run as short a distance as possible and make as few curves as possible.
- Never use a pipe for suction that has a smaller diameter than the pump inlet diameter.
- Do not allow any object to be attached to the pipe that stands above the horizontal line of the suction pipe, because air may be trapped in it.
- Be careful to prevent metal filings from cutting the pipes or any other foreign material from entering the line.



3. Wiring

DANGER

- Wire and ground the motor's power supply correctly, according to electrical facility technical standards and wiring norms. Wiring and grounding by unauthorized people is illegal and very dangerous. Never allow this. In order to prevent electrical shocks and fires, a ground fault interrupt and overload protection facilities are required to be installed, by law.

● Operation

1. Checks to make before starting to operate the pump. (Be sure to turn off the power, first.)

1. Retighten the flange and base bolts.
2. Thoroughly clean the pipe interiors and inside the tank. Then, fill the pipes and/or tank with liquid.
3. Turn the motor shaft with your hand and make sure it turns smoothly.
4. Clear all air from the plumbing.
   - If the suction feed is from a pressurized source:
     Fully open the valves on the suction pipe and discharge pipe, and completely evacuate any air in the pump casing.
   - If there is air left inside the pump casing after the valves on the discharge pipe are fully open, install a release pipe on the discharge pipe to release the air in the casing.

2. Operation

1. After priming is complete, close the valve on the discharge pipe. Then turn the power switch on and off briefly to check the direction of rotation of the motor shaft. It is correct if the shaft turns clockwise when you are looking at it from the motor side. Make sure all operating conditions are normal.
   - If the motor shaft is turning backwards, swap the connection of the three-phase power lines. (Check the direction of rotation by referring to the arrow mark on the frame adapter, and the direction of rotation of the motor fan.)
   - Before starting the pump, be sure to close the valve on the discharge pipe completely.
2. Open the discharge valve within one minute after the pump reaches its rated speed of rotation.
3. After starting the pump, check for any abnormal sounds or vibration, and read the discharge pressure. When the pump reaches its rated speed and the discharge pressure gauge rises to the specified shutoff pressure, gradually open the discharge valve until the pressure gauge points to the rated discharge pressure.

Notes

- Do not operate the pump for a long time with the discharge valve closed. (Normally, one minute is the limit of such operation.)
- If you open the discharge valve too far, the motor may become overloaded. Read the current ammeter to see if the motor is drawing too much current.

Notes on operating and handling the pump Precautions for operation

- Never run the pump dry or if cavitation occurs. If you do, the SiC bearings may be damaged. In either case above, stop the pump.
- If the magnetic coupling loses synchronicity, stop the pump within one minute. If the pump is left running while the magnetic coupling is out of synchronicity, the coupling may permanently lose some magnetic force.

Countermeasures: We recommend the installation of a "dry run monitor" in order to prevent cavitation and running dry.

WARNING

- Do not stick your fingers into the openings of the frame adapter while the motor is in operation. Your fingers may be seriously damaged.

CAUTION

- High temperature hazard
  Do not put your hand close to the casing or frame adapter of the pump as they are hot. You may be burned.
- Dry runs are prohibited ⃠
  The bearings of the STAINLESS MAG SERIES pumps are lubricated and cooled by the liquid being fed. Therefore, never try to run the pump while it is dry. If you run the pump for few seconds by mistake, do not pour liquid in rapidly. Let the pump cool down for one hour or longer. Then restart operation. (This is to protect parts, such as ceramic parts, that may be cracked by rapid cooling.)
- Shutoff running prohibited ⃠
  Operating the pump for a long time while the line is shut off may raise the temperature inside the pump and cause an accident.

Influence of temperature

- The pump's performance is not affected by temperature changes. However, temperature changes in the liquid fed by the pump can change the specific gravity, viscosity, vapor pressure, and corrosive nature of liquids. Therefore, you have to be aware of changes in the characteristics of the liquid being transferred. The temperature range of liquids fed using STAINLESS MAG SERIES pumps are as follows.

Pump	Operating temperature range (˚C)
M	-20 to +100˚C

- If the pump is used with a liquid at a temperature lower than 0˚C, and if the ambient humidity is high, condensation may occur inside the frame adapter.

Change in characteristics caused by specific gravity

- If the motor feeds a liquid with a heavy specific gravity, the discharge pressure and power consumption will change. If you try to feed a liquid with a heavy specific gravity, thoroughly review the required power and motor capacity.

Change in characteristics caused by viscosity

- If a centrifugal pump feeds a high viscosity liquid, the discharge flow rate and head will decrease, as compared with fresh water. On the other hand, the power requirement will increase. Thoroughly review the required power and motor capacity.

Handling a liquid slurry

- The pump is designed to cope with a small amount of slurry and sludge. However slurry contamination may lead to a problem with the pump. Make sure you understand the amount of slurry and grain sizes that will be involved, and consult the shop where you purchased the pump about your intended use.

3. Stopping operation

1. Close the discharge valve.
2. Stop the motor. Note whether the motor rotation slows smoothly. (If the motor does not slow smoothly, find out if there is anything abnormal about the pump.)
3. If a power failure occurs while the pump is operating, immediately turn off the pump's power switch and close the discharge valve.

● Checking and maintenance

1. Daily checks

Item to check	Criteria and precautions
Is the pump running smoothly and without vibration?	The allowable vibration, when a 2-pole motor is used, is 28μm at twice the amplitude (JIS-B8301). If you hear an abnormal sound from a bearing or other part, immediately stop the pump and check the part. If you cannot find the cause, contact the shop where you purchased the pump before restarting the motor.
Water level at the suction pipe and pressure at the suction inlet	The pressure gauge reading is in proportion to the specific gravity of the liquid. Only open the gauge cocks of the pressure gauge and compound gauge in order to measure the pressures. Make sure to close them afterwards.
Load on the pump while in operation	Check the pump discharge pressure while the pump is operating against the number shown on the nameplate. If the pressure is below the value on the motor nameplate, check the current consumption.

- Check the pump at least once per year, as a regular check. Make sure to store your records of the checks.
- If you will not use the pump for a long time, make sure to drain off any liquid inside the pump. (In cold climates, freezing can damage the pump.)
- Frequent starts and stops may shorten the service lives of the pump and motor. Limit starts and stops to less than 6 times per hour.

2. Construction, part names and assembly / disassembly procedures

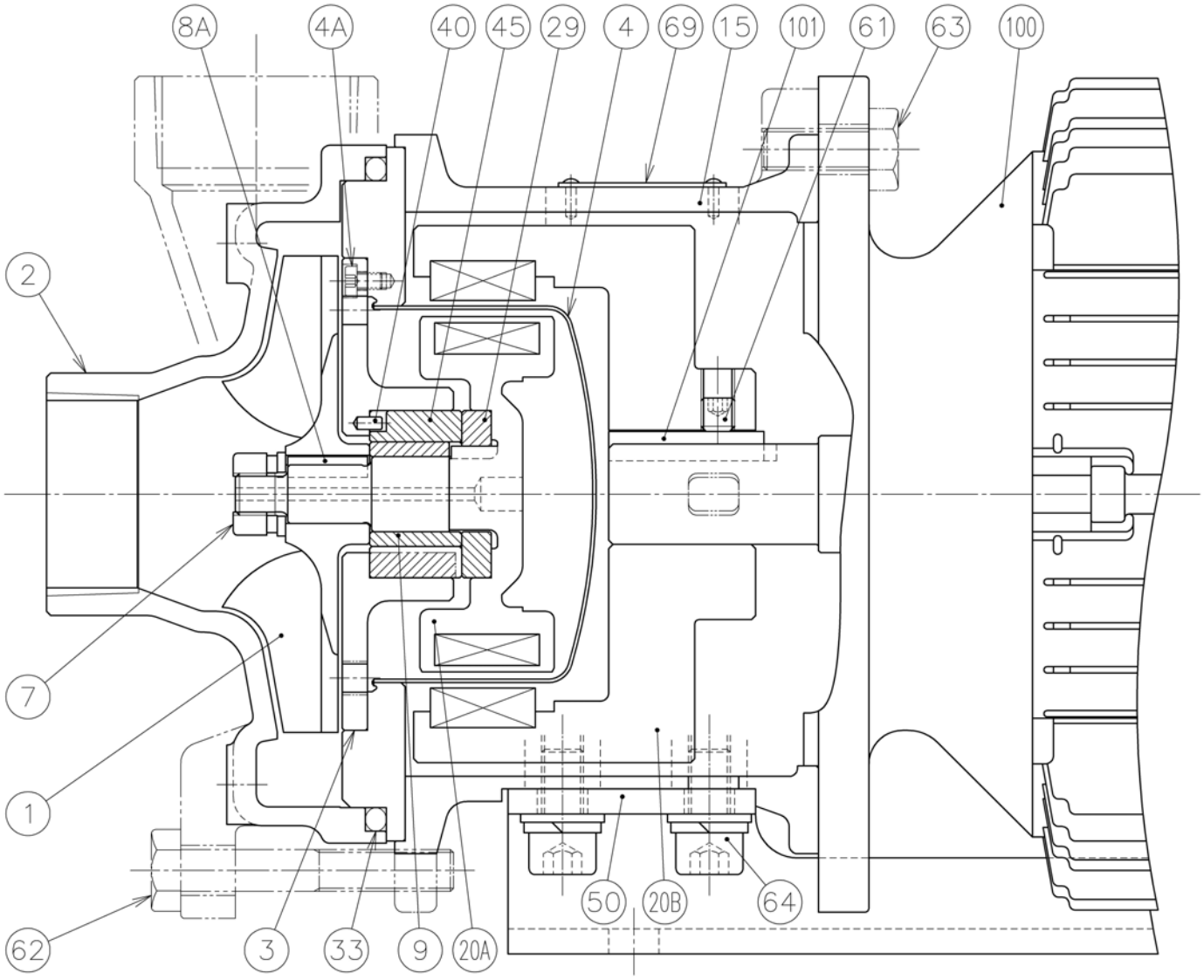
The part names, assembly and structural drawings are shown to enable you to understand generally how to handle the pump. Please refer to the table when you read the instruction manual. Also refer to the product specification sheet.

The specific design drawings for each pump size may be a little different.

Part name

No.	Part name	Material	Quantity	Remarks
101	MOTOR KEY	S45C	1	
100	MOTOR		1	
69	NAMEPLATE	SUS304	1	
64	BASE MOUNTING BOLT (HEXAGON SOCKET HEAD CAP SCREW)	SCM435	4	M10
63	MOTOR MOUNTING BOLT (HEXAGON HEAD BOLT)	SUS304	4	M10
62	CASING BOLT (HEXAGON HEAD BOLT)	SUS304	4	M10 or M8
61	SET SCREW	SCM435	1	M8x8L
50	BASE	SS400	1	
45	BUSHING	SiC	1	
40	TURN STOPPOR PIN	SUS316	1	Φ3x6L
33	O RING	EPDM (PO)	1	
29	THRUST RING	SiC	1	
20B	MAGNET	RARE EARTH	1^S	
	OUTER MAGNET COUPLING	SS400	1	
20A	MAGNET	Rare-earth	1^S	
	INNER MAGNET COUPLING	SCS13	1	
15	FRAME ADAPTER	FC200	1	
9	SLEEVE	SiC-D	1	
8A	IMPELLER KEY	SUS316	1	
7	IMPELLER NUT	SUS304	1	M10
4A	HEXAGON SOCKET HEAD CAP SCREW	SUS304	4	M4 Low Head
4	REAR CASING	SUS304	1	
3	CSING COVER	SUS304	1	
2	CASING	SCS13	1	
1	IMPELLER	SCS13	1	

Assembly and design drawings



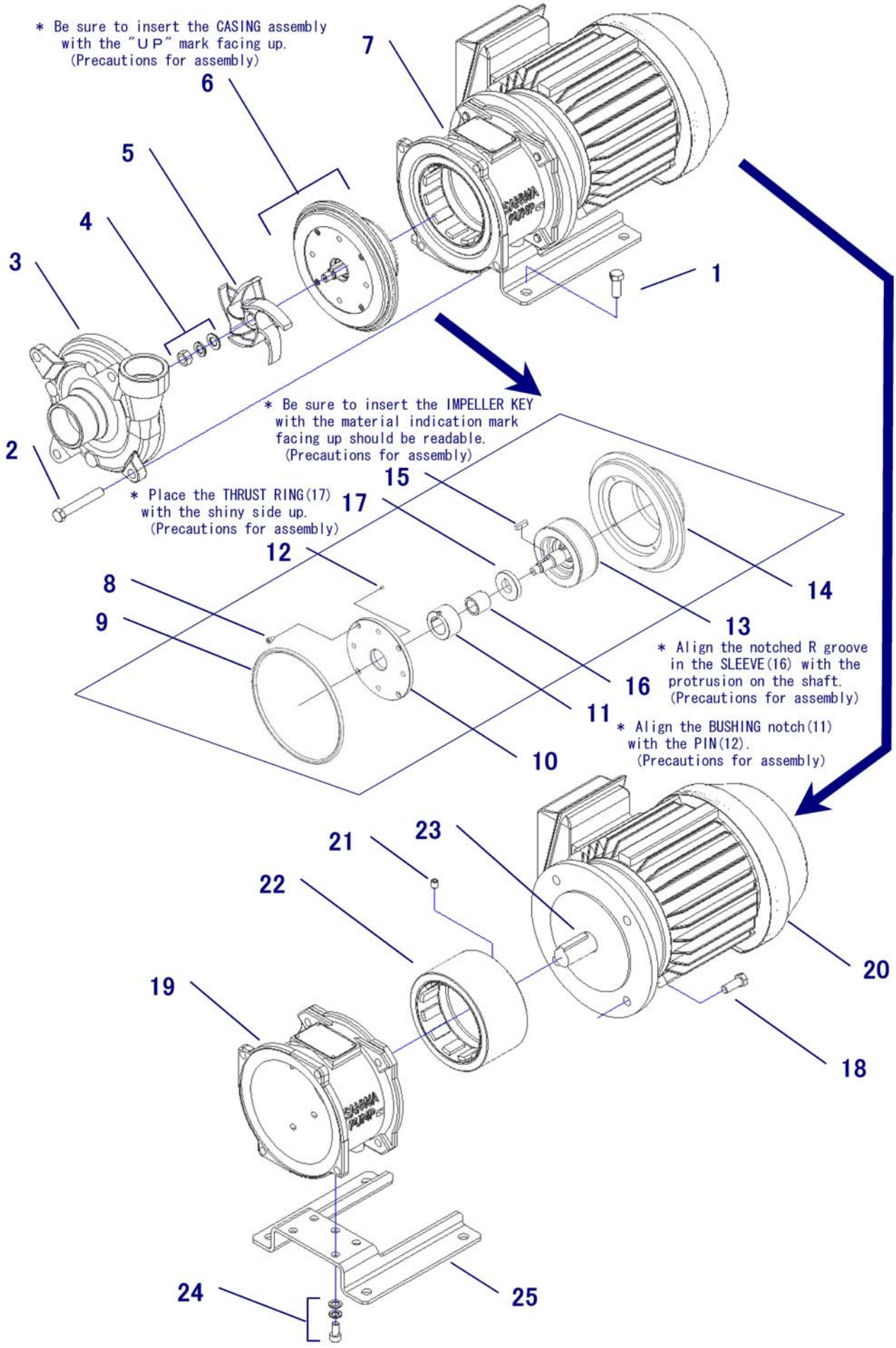
Assembly and disassembly procedures

CAUTION

- The magnetic coupling has a strong magnetic force which means that material such as iron is attracted to it. Therefore, a worktable made of wood or plastic is needed.
- We recommend using tools made of stainless steel for disassembly. If you use ordinary steel tools, do not bring them close to the magnet.

Disassembly procedures	Part number	Part name	Notes	Assembly procedures
1		HEXAGON HEAD BOLT		25
2	62	CASING BOLT (HEXAGON HEAD BOLT)		24
3	2	CASING		23
4	7	IMPELLER NUT	This is a right hand screw. Loosen it by turning it left.	22
5	1	IMPELLER	If this is hard to pull out, use two levers to push it out.	21
6	3～4	CASING COVER and REAR CASING	When you pull the assembly out, it will resist because of the magnetic force. Never release it in the middle. The ”CAN” section of the rear casing is very thin. Handle it carefully to avoid making dents or marks on it.	20
7	15	FRAME ADAPTER and MOTOR		19
8	4A	HEXAGON SOCKET HEAD CAP SCREW	Use a Hex. wrench (size M3).	18
9	33	O RING		17
10	3	CASING COVER	Screws (M8) are tightened at two of the four positions. If the cover is difficult to pull away from the rear casing, tighten the bolts and push the rear casing out.	16
11	45	BUSHING		15
12	40	TURN STOPPER PIN	You do not need to pull this pin out.	14
13	20A	INNER MAGNET COUPLING		13
14	4	REAR CASING		12
15	8A	IMPELLER KEY	The mark should be up.	11
16	9	SLEEVE		10
17	29	THRUST RING	Put the shiny side of the assembly up.	9
18	63	MOTOR MOUNTING BOLT (HEXAGON HEAD BOLT)		8
19	15	FRAME ADAPTER		7
20	100	MOTOR		6
21	61	SET SCREW		5
22	20B	OUTER MAGNET COUPLING		4
23	101	MOTOR KEY		3
24	64	BASE MOUNTING BOLT (HEXAGON SOCKET HEAD CAP SCREW)	No need to remove these.	2
25	50	BASE	No need to remove it.	1

The numbers on the drawings indicate the order of disassembly.

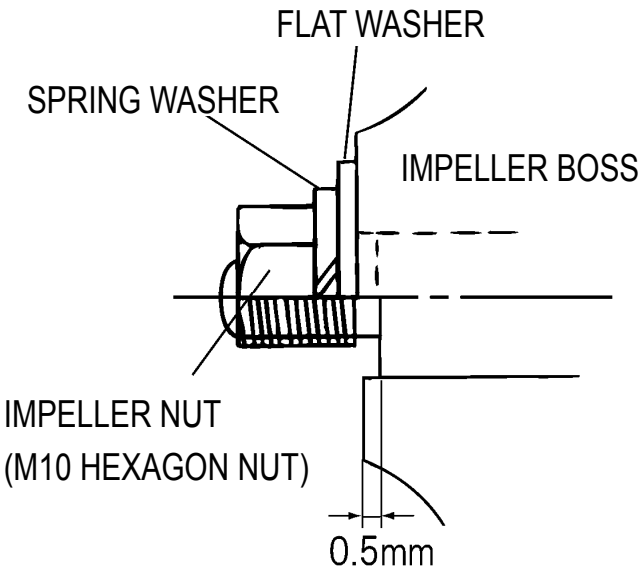


Check point 1

Make sure to check this before tightening the impeller nut. The normal condition is that the shaft is recessed approx. 0.5 mm from the impeller boss. If it is recessed more than 1.5 mm, the sleeve notch R groove will not match the protrusion on the shaft. If you tighten the impeller when this is the case it can crack the sleeve.)

Check point 2

After the impeller nut is correctly tightened, turn the impeller manually. The normal condition is for the impeller to turn smoothly and slide approx. 1.0 to 2.0mm back and forth.



CAUTION

- If you use the pump to feed hazardous chemicals, wash the inside of the pump after draining off the liquid before disassembling the pump. A small volume of liquid can remain on the screws, protrusions/dents, and joints inside the pump. Therefore, if the pump is used for feeding hazardous chemicals, wear protective gear (goggles, rubber gloves) and disassemble the pump carefully.
- Be careful as the magnets will pull strongly. Never let go off a magnet while pulling it out.
- Since the “CAN” section of the rear casing is thin, be very careful when handling it.

3. Torque table for tightening the nuts and bolts

Part No.	7	4A	62	61
Part name / Pump code	IMPELLER NUT	HEXAGON SOCKET HEAD CAP SCREW (Low Head)	CASING BOLT	SET SCREW
M 2007 M 2515	M10 / 16.7N·m (1.7kgf·m)	M4 / 2.0N·m (0.20kgf·m)	M8 / 12.0N·m (1.22kgf·m)	M8 / 6.0N·m (0.61kgf·m)
M 2522 M 4022	M10 / 16.7N·m (1.7kgf·m)	M4 / 2.0N·m (0.20kgf·m)	M10 / 24.0N·m (2.45kgf·m)	M8 / 6.0N·m (0.61kgf·m)

● Troubleshooting

General problems, their causes and countermeasures are listed in the table below. If there is a problem with the pump, see the table below. (Items specific to the magnet pump are marked with an open circle.)

Problem details	Possible cause	Countermeasures
The pump does not start.	● The motor is faulty.	● Repair the motor.
	● Power supply problem.	● Check the power supply.
	● A rotating part is corroded and has seized.	● Disassemble and repair.
	● Foreign material is caught in the sliding section.	● Remove the foreign material.
	○ The SiC bearing is broken.	○ Disassemble and replace the SiC bearing with a new one.
Slippage	○ Decreased force from the magnet	○ Replace the coupling with a new one.
	○ Specific gravity or viscosity of the liquid too high.	○ Replace with a coupling with a higher torque rating.
	○ Too high power voltage.	
	○ Too high motor output/speed.	○ Replace with a motor with the appropriate power output.
Liquid is discharged at first but it soon stops flowing.	● Not enough priming liquid.	● Add priming liquid.
	● The pump is sucking air.	● Check the suction pipe.
	● Too high a suction head.	● Reduce the suction head.
	○ Slippage.	○ See the slippage entry.
The pump does not feed at the specified flow rate, or does not feed the specified head.	● The strainer or foot valve is clogged.	● Disassemble and clean.
	● The impeller is clogged.	● Remove the foreign material.
	● The pump is sucking air.	● Check the suction pipe.
	● The direction of rotation is reversed.	● Swap the wires.
	● Too large a loss of pressure in the plumbing.	● Reexamine the design plan.
	● Liquid temperature too hot. Liquid is volatile.	
	● Cavitation occurs.	● Check the suction conditions.
	● The pipe is clogged.	● Remove the foreign material.
	● The rotation speed is too slow.	● Check the rotation speed using the revolution counter.
	● The supply power voltage drops.	● Check the power supply.
	● The inlet of the tank is blocked.	● Remove the foreign material.
Overload.	● Pump head too low. Flow rate too high.	● Partially close the discharge valve.
	● Liquid specific gravity too heavy or viscosity too high.	● Reexamine the design plan.

	● The rotor strikes the surrounding parts.	● Repair or replace the parts.
	○ The SiC bearing is broken.	○ See the SiC bearing entry.
The pump is vibrating. Too much noise.	● The impeller is clogged.	● Remove the foreign material.
	● Cavitation occurs.	● Check the suction conditions.
	● Flow rate too high.	● Partially close the discharge valve.
	● The direction of rotation is reversed.	● Check the wiring.
	● The pipe is resonating.	● Improve the plumbing.
	● The rotor is hitting the surrounding parts.	● Return the pump to the factory for repairs.
	● Shut off operation continues for a long time.	● Stop the shut off operation.
	● A bearing is broken.	● Replace the bearing with a new one.
	○ Slippage out .	○ See the slippage entry.
	○ The SiC bearing is broken.	○ See the SiC bearing entry.
The magnet force is reduced.	○ Dry run.	○ Replace the coupling with a new one.
	○ Shut off operation continues for a long time.	
	○ Started to operate the pump while the liquid was frozen	
Broken SiC shaft	○ Run dry. (Failed to suck liquid. Failed to open the suction valve. Direction of rotation was checked without sucking in liquid.)	○ Replace the SiC bearing with a new one.
	○ The pump was started before all the air was released.	
	○ Shut off operation continues for a long time.	
	○ Pump has cavitation when running.	○ Change the plumbing and check the NPSH (Net Positive Suction Head).
	○ Foreign material.	○ Clean and replace the SiC bearing with a new one.
	○ Started to operate the pump while the liquid was frozen.	

● Repair and warranty

Please contact the shop where you purchased the unit to have the pump repaired or maintained. The repair and warranty conditions of the pump are described below.

1. Free repair
If the pump becomes faulty or is damaged during appropriate use within the warrantee period (within one year of delivery), and the problem originates from our design or manufacture of the pump, we will repair the problem or replace damaged parts free of charge.

2. Repairs for a fee
The following repairs of problems or damage will be made, for a charge.
2-1) Problem or damage after the warranty period
2-2) Problem or damage due to inappropriate use or after long storage.
2-3) Problem or damage due to a disaster or an act of God, calamity, fire, or civil unrest
2-4) Problem or damage caused by repairs or modifications made by anyone other than us or our specified agent.

In all cases, we do not offer compensation for any expenditures or incidental losses that arise from problems with the pump.

If you have any questions concerning the product you have purchased, please contact the shop where you purchased it.

Manufacturer : SANWA HYDROTECH CORPORATION

Manual No.M01B(E)/1406-00