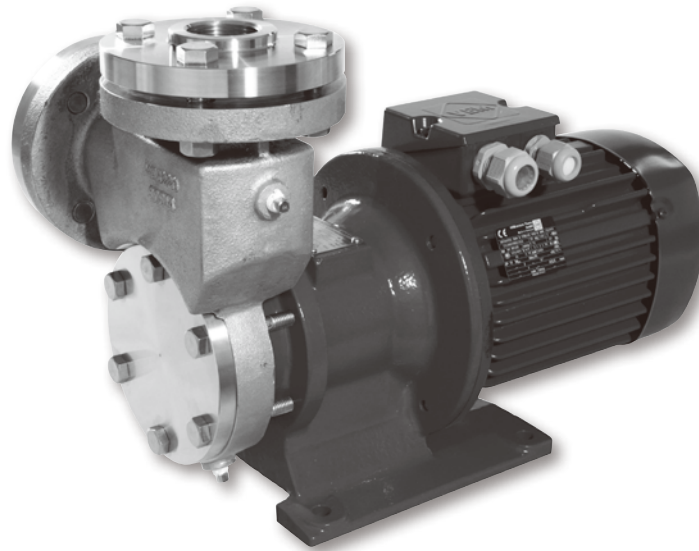


STAINLESS STEEL MAGNET DRIVE PUMP
SELF-PRIMING TURBINE PUMP
MEK

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	MFG No.

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



Introduction

Thank you very much for selecting Sanwa Magnet Drive Pump. Our pumps are manufactured under strict quality control standards to ensure that your pump is in perfect operating condition. Improper handling or operation could however inhibit the pump's performance or lead to accidents. To use your Sanwa Magnet Drive Pump in the manner for which it was designed, be sure to closely follow the instructions contained herein. The instruction manual should be kept in a safe place where it can be referred to whenever necessary. For information concerning handling and operation of motor, refer to the instruction manual for the motor.

Safety

- Sanwa Hydrotech does not assume responsibility for damage or injury resulting from failure to follow the safety instructions contained herein. Be sure therefore to follow the instructions for safe and correct usage when operating, performing maintenance, or inspecting the pump.
- The degree of potential danger as a result of improper handling or operation is indicated by the following three classifications:

DANGER

Situation where improper handling or operation would almost certainly result in death or serious bodily injury.

WARNING

Situation where improper handling or operation could result in death or serious bodily injury.

ATTENTION

Situation where improper handling or operation could result in bodily injury or equipment damage.

WARNING

WARNING

Situation where even normal handling or operation could result in bodily injury by hot or cold liquid.



WARNING

Situation where improper handling or operation in hazardous location could result ignition or explosion.

- Items indicated by **ATTENTION** could also lead to serious consequences according to the circumstances. Be sure therefore to strictly observe items indicated by any of these labels.



DANGER

General

- Do not use the pump in the presence of explosive gas or powder. You may cause an injury or start a fire.
- Do not use the pump for pumping liquid with a low flash point or ignition temperature.
- Be sure to turn the power off before performing any type of maintenance, repair or inspection. Failure to do so could result in electrical shock.
- Use the material which is suitable to specification of liquid. Otherwise leakage occurs.

Operation

- Absolutely do not touch or come close to turning parts. Doing so could result in injury caused by entanglement in the rotating parts.
- In case of power failure, be sure to turn the power off to prevent the pump from starting unexpectedly when the power is restored.

Maintenance and Inspection

- Be sure to connect the power cable in accordance with instruction manual for the motor and the connection diagram in the terminal box. Failure to do so could result in electrical shock or fire.
- Magnet drives cause strong magnetic fields. Persons with a pacemaker should not stay close to the magnet drive or come into close bodily contact with parts of it.

WARNING

General

- Do not insert your fingers or any other objects in the openings of the pump motor. Doing so could result in electrical shock, injury or fire.

Installation and Adjustment

- Absolutely do not place inflammable materials in the area surrounding the pump. Doing so could result in fire.

Operation

- Be careful of rotating parts.
Do not insert your fingers, etc., in the openings of the frame adaptor while the pump is operating. Touching turning parts could result in injury.

Disassembly and Assembly

- Be careful with hazardous liquids.
If pumping dangerous chemicals, be sure to drain and wash well before disassembling. A small amount of fluid may however remain in the screw, faucet joint and engaged parts inside the pump. If handling hazardous chemicals, be sure to wear protective equipment such as safety glasses and rubber gloves, and proceed with caution while disassembling the pump.
- Be careful not to get your hands or fingers pinched by machine parts.
Parts may be strongly attracted by magnetism when disassembling or assembling the magnet coupling. Be careful not to let your hands or fingers get pinched by magnetized parts.

ATTENTION

General

- Transport, installation, piping and wiring connections, operation, adjustment, maintenance and inspection should be carried out by qualified personnel. Having unqualified personnel perform these tasks could result in electrical shock, injury or fire.
- Be sure to use only a power source of the voltage indicated on the name plate of the motor. Not doing so could result in electrical shock, injury or equipment damage.
- Do not use a damaged motor. Doing so could result in injury or fire.
- The customer should not modify the pump under any circumstances. Doing so could result in unexpected accidents. Sanwa Hydrotech shall not be responsible for accidents or damage resulting from equipment modified by the customer.
- Do not block name plate or warning labels from view.
- Do not remove the name plate or warning labels.

Transport

- Beware of equipment falling or turning over during transport. Be sure to use hanger bolt if the pump is equipped with one. After installation, however, you should avoid hoisting the entire machine by the hanger bolt. Before lifting, check the weight of the pump by referring to the catalog, etc. Do not lift the pump which exceeds the rated weight of the hoist. Doing so could result in injury or equipment damage caused by bolt damage, falling or turning over.
- The pump bearing is made of extremely rigid material, and cannot endure rigorous vibration. The pump should be handled with care during transport. The pump should also be handled with care when installing.

Unpacking

- Check the top and bottom of the package before unpacking. Failure to do so could result in injury.
- Check the delivery specifications and name plate to make sure the merchandise is as ordered. Installing wrong equipment could result in injury or equipment damage.

ATTENTION

Piping and Wiring

- Be sure to connect the power cable in accordance with instruction manual for the motor and the connection diagram in the terminal box. Failure to do so could result in electrical shock or fire.
- Do not forcibly bend, pull or crimp the power cable or motor lead wires. Doing so could result in electrical shock.

Installation and Adjustment

- Be sure to connect the earth terminal securely. Failure to do so could result in electrical shock.

Operation

- Do not operate with the terminal box cover off. After wiring, be sure to replace the terminal box cover in its original position. Failure to do so could result in electrical shock.

- Beware of high temperatures.

If handling high temperature fluids, do not place your hands, etc., near the casing or frame adapter. Doing so could result in skin burning.

- Do not operate the pump for pumping gases. This pump is designed for pumping liquids. Otherwise, the pump may have a high temperature or SiC bearings and the rear casing shell may be broken.

- No-Load Operation ⊘

Absolutely do not operate the pump without a load. Doing so will cause the inside to heat up and damage the bearings. Never operate the pump without liquid inside of the pump. (This applies to when checking rotation direction as well.) If heat is produced in the can, the temperature rises may cause magnetism to reduce.

- Shut-Off Operation ⊘

Do not perform shut-off operation for more than one minute. Doing so will cause a radical rise in temperature of the liquid in the pump, and could result in an accident.

**WARNING****WARNING**

- If the temperature of pumping liquid is very low, the casing, the rear casing and the frame adapter would be very cold. So do not touch them. Otherwise person will suffer an injury in a body.
- If the temperature of pumping liquid is very high, the casing, the rear casing and the frame adapter would be very hot. So do not touch them. Otherwise person will suffer an injury in a body.

**WARNING**

General

- The magnetic pump is designed for liquid only.
- If the pump is modified or changed without authority and/or other than original spare parts are used for repair works, the explosion protection will be forfeited.

Inadmissible mode of operation

- Driving motor must have approval for the use in areas subject to explosion hazards.

Temperature limits

- When being operated to its designated use, the pump's maximum surface temperature must not exceed the temperature category of the explosion protection zone.

Speed limits

- The maximum allowable speed is 1800rpm (MEK201,251) or 3600rpm (MEK322,402). If the pump is operated with a speed exceeding the maximum speed, explosion protection is no longer granted.
- Prior to operating the pump unit with a frequency converter, it must be checked, whether the driving motor is appropriate for that purpose.

Disassembly and Assembly

- Ensure that the driving motor and/or the entire equipment have been approved for the prevailing explosion protection zone.
- Instruction given in the operation manuals of the driving motor is to be observed.

- If the pump is fitted with a heating jacket, the temperature of heating medium must not exceed the maximum allowable surface temperature of the pump.

Operation

- When a pump is operated while not been completely filled, an ignition source can develop due to heat input. The pump must be completely filled. If cannot ensure that, appropriate monitoring must be taken.
- When the pump is operated in the closed circuit system, the temperature of liquid and the surface of the pump will be increased. Use the monitor to prevent the pump from excessively heating up.
- The situations below will increase the temperature of the pump surface. Do not operate the pump under these situations.
 - Shut-off operation • Low-flow operation • Dry run
 - Operating with “decoupling”

Maintenance

- If the clearance between rotating and stationary components is out of limitation, it may happen that these component contact and resulting frictional heat entail excessive temperatures.
- Ensure that bypass-hole of casing and shaft is not interrupted.
- Ensure that pump parts are not corroded. If corrosion occurred, examine the change of material. Give priority to experience on selection of material.

To Prevent sparks

- To avoid the potential hazards from random induced current generating a spark, the earth contact on the pump and motor must be used.
- To avoid electrostatic charge, do not rub non-metallic surfaces with a dry cloth. Make sure the cloth is damp.

Unit Description

Units described in this instruction manual are as per the following table,

Category	Unit abbreviation	Unit description
Length	m	Meter
	μm	Micrometer
	mm	Millimeter
Flow	m ³ /hr	Cubic meter per hour
	L/min	Liter per a minute
Pressure	MPaG	Megapascal gauge
Temperature	°C	Celsius
	°F	Fahrenheit
Speed	rpm	Rotation per minute
A-weighted sound pressure level	dB(A)	Decibel
Power	kW	Kilowatt
Torque	N.m	Newton meter
	kgf.m	Kilogram-force meter
Frequency	Hz	Hertz
Viscosity	mPa.s	Millipascal-second

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● Instructions for Safe Usage

- In order to use your Sanwa Magnet Drive Pump in the manner for which it was designed, be sure to read through and get a thorough understanding of the contents of this manual and the installation instructions before attempting to install, operate, perform maintenance or inspections. You should also have a good understanding of the equipment itself, matters concerning safe operation and handling, and other matters requiring attention before attempting to use the pump.

Equipment Failure / Accident Prevention and Safe Operation Checks

- Pre-Operation Checks
The power source, wiring and connection, piping, priming, air purging and rotation direction should be checked before starting operation.
- Checks for Test Operation and Actual Operation
Current, voltage, suction pressure, discharge pressure, and discharge flow rate should be checked when starting test or actual operation. The pump should also be checked for vibration, abnormal noise and leaks when operation is started.

DANGER

- Be sure to take special precautions when performing test operation checks if using hazardous, explosive or inflammable liquids.

Precautions When Pumping Special Liquids

- Sanwa pumps are used in various industries. Our stainless steel magnet drive pumps in particular are frequently used for pumping hazardous, explosive or inflammable liquids. Mishandling in any of these cases could lead to serious consequences such as bodily injury, loss of life or property damage. To prevent these from occurring, you should get a thorough understanding of the information contained herein and use the pump in the manner for which it was designed.

DANGER

- **Special care and safety equipment are required for the following types of liquid:**
 - **Liquids which could produce a chemical reaction**
 - **Liquids which could produce germs liquids which are of a dangerous nature**
 - **Liquids which could directly harm the human body**
- Preventative measures should be taken to protect special pumps and pumps used in the main production line from natural disasters, unexpected accidents or equipment failure, the event of which could have a disastrous effect on your production. If these are impossible, you should keep a spare pump on hand for emergency use. (A pump with a suitable motor unit will be better.)

A General Description of The Machinery

This “MEK” pump is magnetically driven turbine pump. Impeller is rotated in pump chamber by the magnetic coupling force to suck liquid from suction port and to discharge outlet.

A Description of The Intended Use of The Machinery

This “MEK” pump cannot operate air, gases or solids. This pump is for liquid only.

● Transport and Unpacking

1. Transport



ATTENTION

- When transporting the pump, be careful not to drop it or let it fall. Take the appropriate method, such as picking up by two people or lifting by belt, to avoid risk.
- 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. In case of no such eyebolt, sling around the pump frame adapter and the motor. Before suspending the pump, refer to leaflet or drawings to check the weight of the pump and the motor. 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 pump bearing is made of extremely rigid material, and cannot endure rigorous vibration. The pump should be handled with care during transport. The pump should also be handled with care when installing.

2. Unpacking



ATTENTION

- Check the top and bottom of the package before unpacking. Failure to do so could result in injury.
- Check the delivery specifications and name plate to make sure the merchandise is as ordered.
Installing the wrong equipment could result in injury or equipment damage.

● Preliminary Check

When your pump is delivered, you should check the following items:

- Are all of the accessories included in the package?

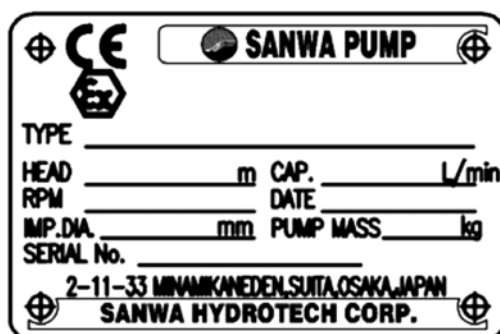


ATTENTION

- Check the name plate to make sure the merchandise is as ordered.
- Check to make sure the pump has not been damaged or the bolts and nuts not loosened during transport.

If you discover any accessories to be missing or you find something wrong with the merchandise, please contact your dealer or you may contact us directly.

Nameplate of pump



ATEX marking: See Page.17

TYPE: Pump Model and Pump Code.

(See next page)

DATE: Manufactured year and month.

IMP.DIA.: Diameter of impeller inside the pump.

PUMP MASS: The mass of pump. Not include motor.

● Pump Model Identification

1. Pump Size and Motor

MODEL	SUCTION (mm)	DISCHARGE (mm)	MOTOR (FRAME)
201	20	20	4Pole , 0.25 kW (71)
251	25	25	4Pole , 0.37 kW (71)
322	32	32	2Pole , 1.5 kW (90) 2Pole , 2.2 kW (90)
402	40	40	2Pole , 3.0 kW (100) 2Pole , 4.0 kW (112)

※ Motor “4Pole, 0.55kW(80) for MEK251” is available as an option.

In this case, the exclusive parts (frame adapter and magnet coupling (M)) are necessary.

● Type (Pump Code)

MEK 201 - 6 TS KD 025
[1] [2] [3] [4] [5]

[1] Pump Model (See Page 14)

[2] Wet-end main Material
"6" : 316SS

[3] Material of Check valve
"TS" : PTFE + 316SS

[4] Material of Bearing(Bushing, Sleeve)
"KD" : SiC/SiC-D

[5] Motor Output
"025" : 0.25kW
"03" : 0.37kW
"15" : 1.5 kW
"22" : 2.2 kW
"30" : 3.0 kW
"40" : 4.0 kW

● Pump Specification

1. Design Pressure

PUMP	SIZE	DESIGN PRESSURE (MPaG)
MEK	201	1.0
	251	
	322	
	402	

2. Casing Piping Connection

Suction and Discharge : Rc threads (taper pipe threads JIS B 0203/ISO 7-1)

Drain, Priming inlet and Air vent :

Rc threads (taper pipe threads JIS B 0203/ISO 7-1)

3. Viscosity

$\leq 30\text{mPa}\cdot\text{s}$ (application base: $\leq 120\text{mPa}\cdot\text{s}$)

Note: When viscosity is over $30\text{mPa}\cdot\text{s}$, please consult your distributor.

4. Magnet coupling

PUMP	SIZE	MAGNET COUPLING
MEK	201	T-06-26
	251	T-12-26
	322	T-12-26
	402	T-12-38

5. Motor

PUMP	SIZE	MOTOR PUTPUT(kW)	FRAME
MEK	201	0.25	71
	251	0.37	71
	322	1.5 2.2	90 90
	402	3.0 4.0	100 112

※ Motor “4Pole, 0.55kW(80) for MEK251” is available as an option.

In this case, the exclusive parts (frame adapter and magnet coupling (M)) are necessary.

6. Parts Specifications of Liquid Temperature Range

Parts	RANGE
	-20~+120°C(-4~248°F)
SHAFT	STANDARD MODEL
MAGNET COUPLING	STANDARD MODEL (MAGNET: Nd)
FRAME ADAPTER	STANDARD MODEL

Note: When temperature fluctuates between extreme high and low, please consult your distributor.

7. Ambient Temperature

Ambient temperature: min. -20 ~ max. 40 °C (-4 ~ max. 104°F)

8. Speed Limit

Operating speed: MEK 201,251 - max. 1800 rpm

MEK 322,402 - max. 3600 rpm

9. Minimum and Maximum Flow rate

Minimum Flow rate: see “data sheet”

Maximum Flow rate: 1.1 x Q_{opt}

※ Q_{opt} = Flow rate at Best Efficiency Point

10. Temperature Classification

Refer to the following table for maximum allowable temperature of the pumped liquid in accordance with the applicable temperature category.

The maximum surface temperature of the pump is the highest temperature ascertained from any one of the following conditions:

1. the temperature of the liquid plus, 20°C (68°F)
2. the temperature of the ambient temperature, plus 20°C (68°F)

Thus, the maximum liquid temperature for each temperature class is below.

Temperature class	Maximum temperature of liquid
T3	175°C (347°F)
T4	110°C (230°F)

In case of categories T5 or T6, contact us for further information.

11. Marking

An example of ATEX equipment marking is shown below. The actual classification of the pump will be engraved on the name plate.

For Gas atmosphere

 **II 2 G c IIC T3/T4**
[1] [2] [3] [4] [5] [6]

[1] Equipment Group: II (non-mining)

[2] Category: 2

[3] Gas: G

[4] Protection measure: c construction safety

[5] Gas Group: IIC

[6] Temperature Class: (see above chapter 10) It depends on the temperature of pump liquid and ambient temperature.

For Dust atmosphere

 **II 2 D c T* °C**
[1] [2] [3] [4] [5]

[1] Equipment Group: II (non-mining)

[2] Category: 2

[3] Dust: D

[4] Protection measure: c construction safety

[5] Maximum surface Temperature: (see above chapter 10) It depends on the temperature of pump liquid and ambient temperature.

● Declaration of Conformity



SANWA HYDROTECH CORPORATION

11-33, MINAMIKANEDEN 2 CHOME, SUITA, OSAKA 564-0044 JAPAN
TEL: 81-6-6330-4793 FAX: 81-6-6330-4924
Web site : www.sanwapump.com

EU DECLARATION OF CONFORMITY

**According to EC Machinery Directive 2006/42/EC
and ATEX Directive 2014/34/EU**

Manufacturer :

SANWA HYDROTECH CORPORATION

**2-11-33 MINAMIKANEDEN
SUITA OSAKA 564-0044
JAPAN**

Name and address of the authorized representative to compile the Technical file :

**SANWA HYDROTECH CORPORATION declares under our sole responsibility that the
product described as :**

Equipment Name : Self-priming cascade pump for liquid

Generic Equipment Description : SANWA PUMP

Model / Type : MEK 201 , MEK 251 , MEK 322 , MEK 402

Serial No. :

CA-MEK-1605-1/2



SANWA HYDROTECH CORPORATION

11-33, MINAMIKANEDEN 2 CHOME, SUITA, OSAKA 564-0044 JAPAN
TEL: 81-6-6330-4793 FAX: 81-6-6330-4924
Web site : www.sanwapump.com

Compiles with the requirements of the Machinery Directive 2006/42/EC
the ATEX Directive 2014/34/EU
Equipment Group II Category 2G or 2D ;

II 2G c II C T3/T4
II 2D c T*°C * : Liquid temp. plus 20°C
Or Ambient temp. plus 20°C

And furthermore declares that the following (parts / clause of) harmonized standards have been applied :

EN ISO12100 : 2010

Safety of machinery basic concepts, general principles for design

- Part 1 : basic terminology, methodology
- Part 2 : technical principles

EN 809 : 2009 Pumps and pump units for liquids - Common Safety requirement

EN 60204-1 : 2009 Electrical equipment of machines - Part 1 : general requirement.

EN 13463-1:2009 Non-electrical equipment for use in potentially explosive atmospheres

EN 13463-5:2011 Protection by constructional safety 'c'

Place and Date of declaration :

JAPAN May 31, 2016

Hajime Miyakoshi

Manager of Engineering Dept.

Company name : SANWA HYDROTECH CORPORATION.

CA-MEK-1605-2/2



SANWA HYDROTECH CORPORATION
2-11-33, Minamikaneden, Suita, Osaka,
5640044, Japan

Your ref. Your order dated 28 April 2016
Our ref. 20310400-1602/LvdE
Tel. +31 88 96 83008
Fax +31 88 9683100
E-mail ex.nl@dekra.com

Arnhem, 18 May 2016

Subject: **Confirmation letter**

Dear Mr. Miyakoshi,

We are pleased to inform you that the technical documentation according to Annex VIII, point 2 of the ATEX Directive of your Self-priming cascade Pump for Liquid Type MEK has been received in good order.

DEKRA Certification B.V., Notified Body No. 0344 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 24 February 2014, confirms that you have complied with the conformity assessment procedure of Chapter 3, Article 13 (1) (b) (ii) of this Directive.

The technical documentation will be retained for at least 10 years after the last piece of equipment was manufactured.

In case of any questions, please contact our Business Support Office.

Yours sincerely,

DEKRA Certification B.V.

Lianne van den Enk
Business Support Office Explosion & Safety

Form 121
Version 4 (2016-5)

● Pump Installation

1. Installation

- Position of the pump should be finalized after considering pump suction capacity. If suction head is not enough, cavitations and abnormal vibration/noise will occur.
- Pump should be installed in a place which provides sufficient space for maintenance and inspections.
- Foundation should be strong enough against vibration and should provide enough volume and area to support weight of pump and motor. Pump base should be securely fastened to the foundation by anchor bolts.
- Dirt and foreign objects in suction tank and piping could cause equipment failure. Be sure to clean tank and piping before introducing liquid.
- Suction lift height depends on liquid temperature. Refer to following table.

Liquid temperature (°C) (°F)	0 (32)	20 (68)	40 (104)	60 (140)	70 (158)	80 (176)
Suction lift height (m)	7.6	7.2	5.4	3.2	1.7	0.3

※ In the case of a liquid except the water, suction height changes by saturated steam pressure and viscosity, specific gravity, density of liquid.

- When liquid temperature is more than 80°C, it is necessary to apply pressure in suction side of the pump.
- When high back pressure depends on discharge side, please use a ventilation valve to discharge flange of pump. When pipe of case and discharge side that established check valve in the discharge side is considerably long or because there is not refuge of the air, and it is with an air lock state, and it may be with lift inability, I attach an automatic ventilation dialect, or the cases that discharge lift is high in please attach a hose for exhaust to the discharge side.



ATTENTION

- Before attempting to hoist the pump, find out weight of the pump including the motor, and use a rope or hoisting equipment capable of supporting the weight load in order to prevent the pump from falling.

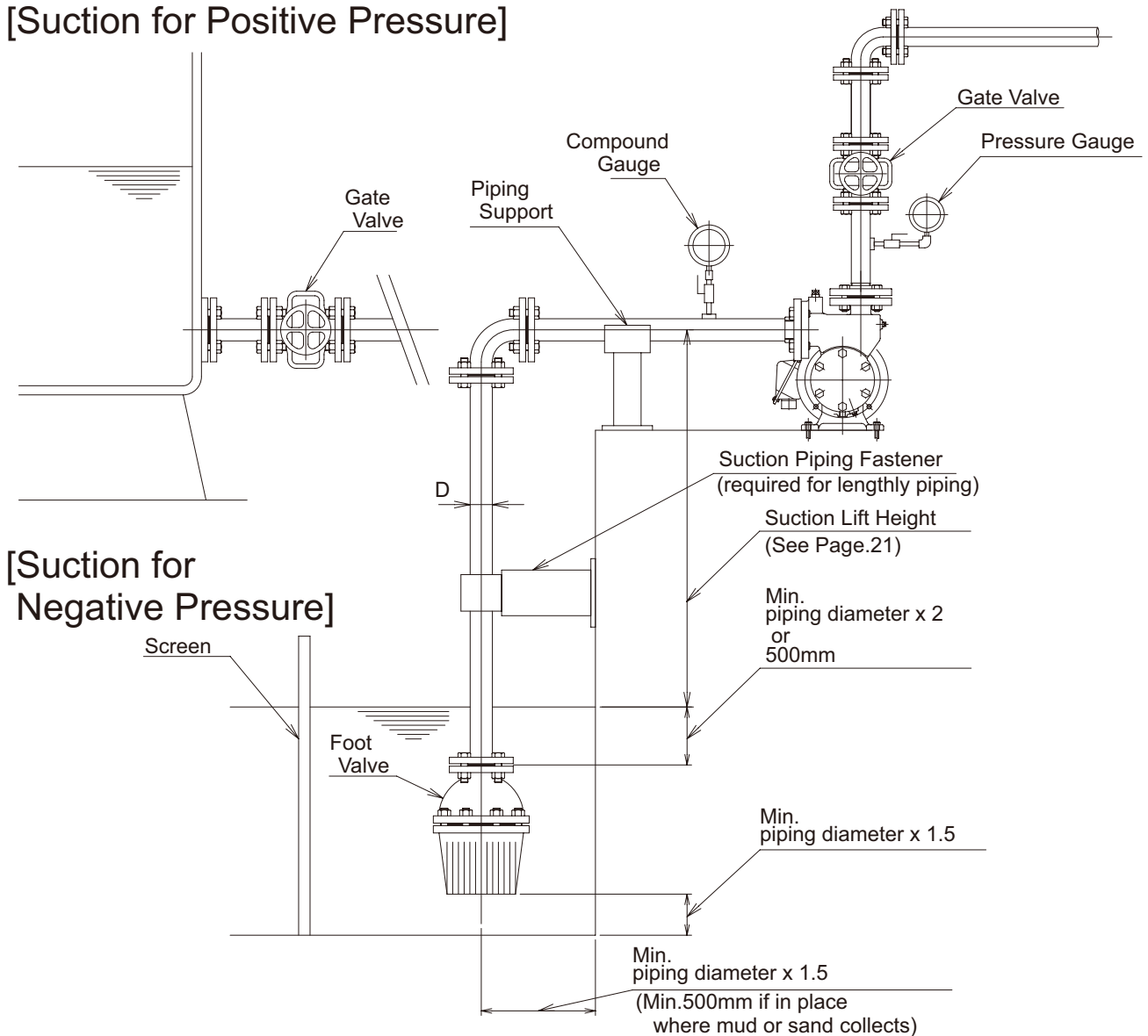
2. Piping

- Horizontal suction piping should gradually rise toward the inlet port of the pump. (Minimum gradient of 1/50)
- A foot valve or strainer should be mounted on the ends of pipes to prevent foreign objects from being sucked in.
- Suction piping may be provided with a gate valve to facilitate disassembly and inspection in case of positive pressure of the liquid at suction port. The valve should be fully open while the pump is operating.
- As much as suction height rises, as much as a suction pipe becomes big, the air which the pump must exhaust increases and the time to become the designed pressure gets longer.
- When use the gate valve to suction piping, the spindle part of valve must face horizontally, or downward vertically. Because the spindle part may become air pocket.
- If it is possible the liquid in the discharge piping is frozen, install a drain to remove the liquid in the discharge piping.

NOTE

- Weight of the suction and discharge piping can cause misalignment or equipment failure. Be sure to provide sufficient support for the piping.
- The piping should be as short as possible, with a minimum of bends.
- Absolutely do not use piping of a diameter smaller than that of the pump suction bore.
- Do not provide protrusions which can form air pockets in horizontal piping.
- Be careful not to allow pipe thread cuttings or other foreign objects to enter when laying and fitting piping.

[Suction for Positive Pressure]



[Suction for Negative Pressure]

3. Wiring

! DANGER

- Power supply equipment, wiring and the earth terminal connection should be in accordance with technical standards for electrical equipment and inner wiring diagrams. Piping or the earth terminal connecting work performed by unqualified personnel is not only in violation of the law, but is extremely dangerous. Absolutely do not allow piping or the earth terminal connecting to be performed by unqualified persons. You are also obligated by law to provide an earth leakage breaker and overload protection equipment to prevent electrical shock or fire.

4. Earthing

Pumps that have been supplied in accordance to the ATEX Directive (2014/34/EC) will be identified by a label with the following symbol on it;



Once pump has been installed, the earth of motor terminal box should be wired to the earth with a suitable earthing cable. In addition, please carry out the bonding of the plumbing, if necessary.

Note: Please ground wiring according to instruction manual of motor.

● Operation

1. Pre-Operation Inspections (Be sure to turn the power off before performing inspections!)

1. Tighten flange bolts and machine base bolts.
2. Supply liquid after thoroughly cleaning inside of piping and tanks.
3. Check if you can turn the motor's fan by hand or thin stick without supplying power.
4. Purge all the air from the pump.

- Pumping liquids with positive pressure;

Fully open the suction and discharge valves, and purge all the air remaining in the pump casing. Be sure to install and use the optional cock or valve in case pipe layout might cause air purge difficulty.

- Pumping liquids with negative pressure;

A vacuum pump is used for suction pumping. The pump can also be filled with liquid from the discharge piping. When doing so, purge all the air by opening the air purge cock while being careful not to allow high pressure to the suction piping or foot valve.

2. Operation

1. After priming, turn the switch on and off one or two times, and make sure the rotation direction (clock wise direction when viewed from the motor side) is correct and that the pump operates normally.



- When check the direction of rotation, the pump must be fully filled. Otherwise the temperature of the pump will rise.

- If it works in reverse, check inside wiring connection of the terminal box of the motor and change wiring connection accordingly. (motor rotation will be checked by “arrow” indication at motor frame adaptor and motor fan's rotating direction.)



- Make sure that the valve of discharge pipe is fully opened. And then turn on the switch.

2. When the pump arrives at the specified speed, gradually close the gate valve to get designed pressure.
3. After the pump starts, check for abnormal noises, vibration, or rising discharge pressure.

NOTE



- Do not operate the pump with the discharge valve shut-off.
- Do not operate the pump at the flow that is lower than Minimum Continuous Flow. Otherwise the temperature of pump surface will increase, and may exceed the maximum allowable temperature. Minimum Continuous Flow is indicated in datasheet. Take the appropriate measure like below to prevent this;
- Bypass-line (return from the discharge pipe to the suction tank) enough to Minimum Continuous Flow

Operation and handling

- Never perform cavitation or no-load operation. Doing so could damage the bushings. Shut the pump off immediately if you discover the pump to be operating in such conditions.
- When perform no-load operation, the temperature of the surface of rear-casing and the journal bearing will rise.
- If the magnet coupling slips, stop the pump immediately within one minute. Continuing to operate with the magnet coupling slipping may demagnetize the magnet coupling, resulting in failure.

Protection: We recommend installing the dry-run monitor, for protecting the pump from the problem such as the lowering of magnetic force, and the cavitation and the dry run operation.



ATTENTION

- **High Temperature**

If pumping hot liquids, do not place your hands or other parts of your body near the casing or frame adapter. Doing so could result in skin burns.

- **No-Load Operation Prohibited** ⓧ

The bearings are lubricated by liquid pumped. Running the pump without liquid to be pumped should be avoided. If for some reason no-load operation is happened for several seconds, do not introduce liquid right away, but rather let the pump cool for at least an hour before restarting operation with liquid. (Suddenly introducing cool liquid can crack ceramic parts, etc.)

- **Shut-Off Operation Prohibited** ⓧ

Performing shut-off operation for an extended period of time can heat the pump resulting in an accident.

Effects of Temperature

- Although the performance of the pump itself is not affected by temperature, the specific gravity, viscosity, vapor pressure and corrosiveness of the liquid are affected. You must therefore be aware of changes in the properties of the liquids handled.

Variation of Performance by Specific Gravity

- Pump performance is affected by specific gravity of the liquids, then a suitable power unit (motor, inner-magnet coupling and outer magnet coupling) must be applied by considering the specific gravity of the liquid.



- If a power unit does not meet the power required, “decoupling” will be occurred and then the temperature of pump surface will rise up.

Slurry

- The pump is designed to handle some slurry and sludge. Before attempting to pump liquids containing slurry or sludge, find out the slurry content and size of the particles, and consult with us.



- The slurry with abrasion characteristics lets an impeller wear. If flow quantity becomes smaller than a permission level by the abrasion of the impeller, the surface temperature of the pump rises, and the risk of the ignition grows.

Specific heat capacity



- Pump performance itself is not affected by specific heat capacity. But in case of operation with low specific heat capacity liquid in closed circuit system, the temperature of liquid is easy to rise. Use the appropriate measures to prevent the pump from excessively heating up.

Noise Level

- Typical sound pressure levels measured in dB(A)(at distance 1m from the motor and a height 1.6m from the floor) are shown in the table below. (In case of using typical motor)
- Pump noise level depends on a number of factors – the type of driver, the operating capacity, piping design and acoustic characteristics of the building. If the motor is driven by inverter, noise level will be increased.

		60Hz dB(A)	50Hz dB(A)
MEK	201	70	70
	251	70	70
	322	72	71
	402	73	72

3. Shutting Down

1. Shut the discharge valve gradually.
2. Stop the motor. When turned off, the motor should gradually slow down to a smooth stop. (If it does not stop smoothly, check the inside of the pump to see if everything is as it should be.)
3. In case of power failure during operation, turn off the switch and shut the discharge gate valve.

4. Precautions when pump is not used

When pump is not operated in the cold season, remove the liquid inside pump to avoid the pump damage due to frozen pump.

If the liquid inside can not be removed, warm the pump by band heater or so for the inside liquid can not be frozen.

Open suction or discharge valve, or open air vent plug, drain plug and priming plug.

● Maintenance and Inspection

1. Routine Inspection

Item	Advice
Does the pump run smoothly without vibration?	Permissible amplitude of vibration for the pump with 2P motor is 28/33 μ m as maximum and 47/54 μ m, maximum for the pump equipped with 4P motor(60/50Hz). If abnormal noise is produced by the bearings or other parts, stop the pump immediately and check each part. Please contact us immediately if you can not find reasons of such noise and vibration.
Suction liquid level and suction port pressure	The pressure gauge reading is proportional to the specific gravity of the liquid. The gauge cock for the pressure and vacuum gauges is to be opened for measurement only. Shut the gauge cock after measuring.
Pump operating load	Discharge pressure under operation must be checked according to the figure showed on the specification plate of the pump. Electric current must be lower than figure showed on the specification plate of the motor.

- A periodic inspection should be performed at least once a year. A record of periodic inspections should be kept.
- If the pump is not to be used for an extended period of time, be sure to remove the drain plug and drain the liquid from the pump. (In frigid regions, the pump could be damaged if liquid freezes in the pump.
- To preserve the life of the pump and motor, be sure not to start the pump more than six times per hour.
- About the motor, maintain it regularly according to the instruction manual of the motor.

2. Configuration and Location of Part

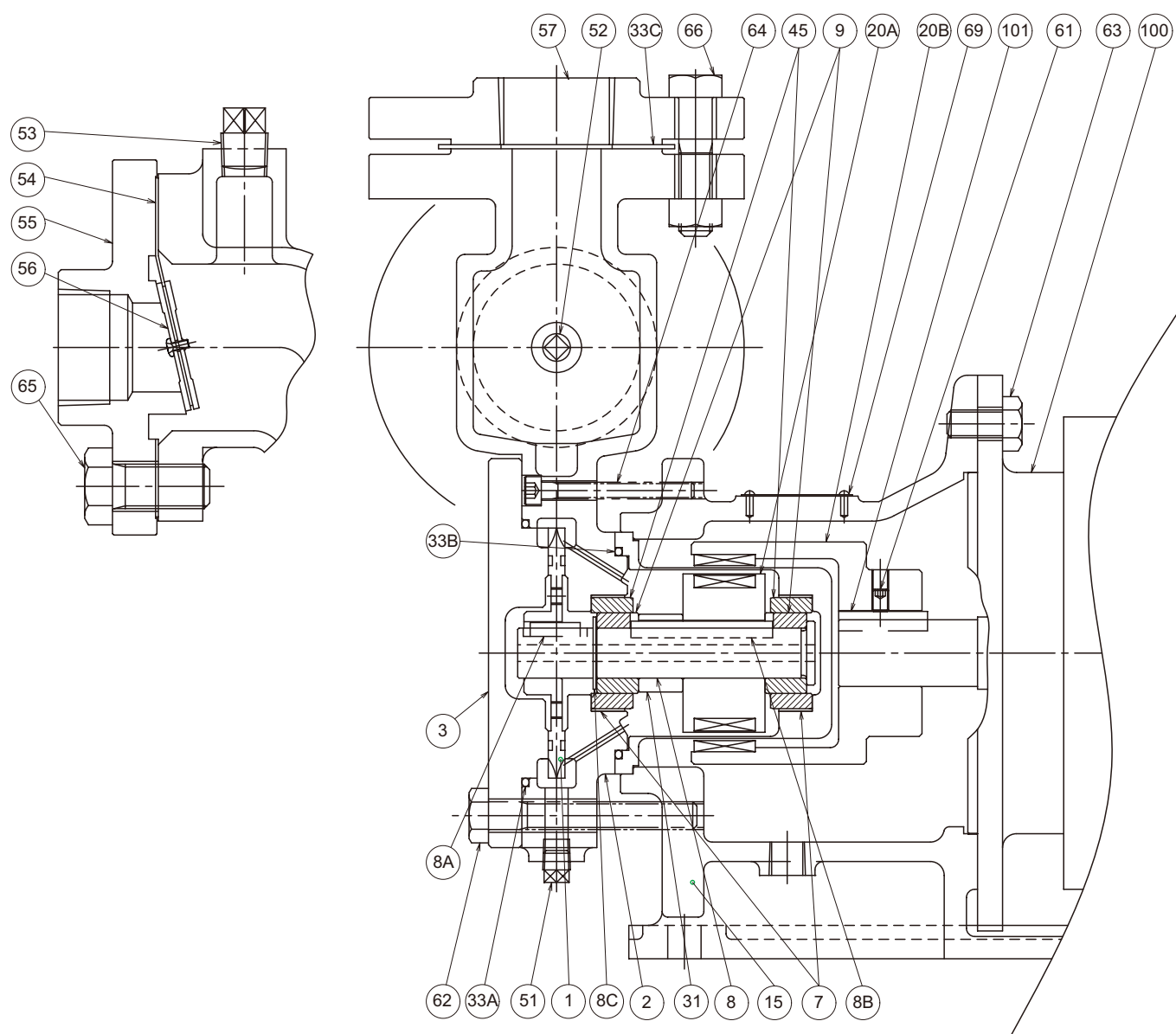
A list of parts (below) and a configuration diagram (following page) are given to provide a general description of the pump. You may refer to these as you read the instruction manual.

Parts (all size)

No.	Parts	Materials	Qty	Remark
100	Motor		1	
69	Name plate	304SS	1	
66	Hexagon head bolt & Nut (discharge flange)	316SS	4 ^s	
65	Hexagon head bolt (suction flange)	316SS	4	
64	Hexagon socket head cap screw	316SS	2	
63	Hexagon head bolt (motor)	316SS	4	
62	Hexagon bolt (casing)	316SS	6	
61	Set screw	Steel	1	
57	Flange (discharge)	316SS	1	
56	Check valve	316SS	1	This part cannot be separated with gasket (No.54).
55	Flange (suction)	316SS	1	
54	Gasket	PTFF	1	This part cannot be separated with check valve (No.56).
53	Plug (priming port)	316SS	1	R3/8
52	Plug (air vent port)	316SS	1	R1/8
51	Plug (casing drain port)	316SS	1	R1/8
45	Bushing	SiC	2	This part can be replaced by manufacturer.
40	Tolerance Ring	316SS	2	This part can be replaced by manufacturer.
33C	Gasket	PTFF	1	
33B	O Ring	PTFF	1	
33A	O Ring	PTFF	1	
31	Spacer	316SS	1	"MEK 402" does not have this part.
20B	Magnet	RARE EARTH	1 ^s	
	Magnet coupling (outer)	Cast Iron	1	
20A	Magnet	REAR EARTH	1 ^s	
	Magnet coupling (inner)	316SS	1	
15	Frame adapter	Cast Iron	1	
9	Sleeve	SiC-D	2	
8C	Retaining ring	316SS	1	

8B	Coupling key	316SS	1	
8A	Impeller key	316SS	1	
8	Shaft	316SS	1	
4	Rear casing	316SS	1	
3	Casing cover	316SS	1	
2	Casing	316SS	1	
1	Impeller	316SS	1	

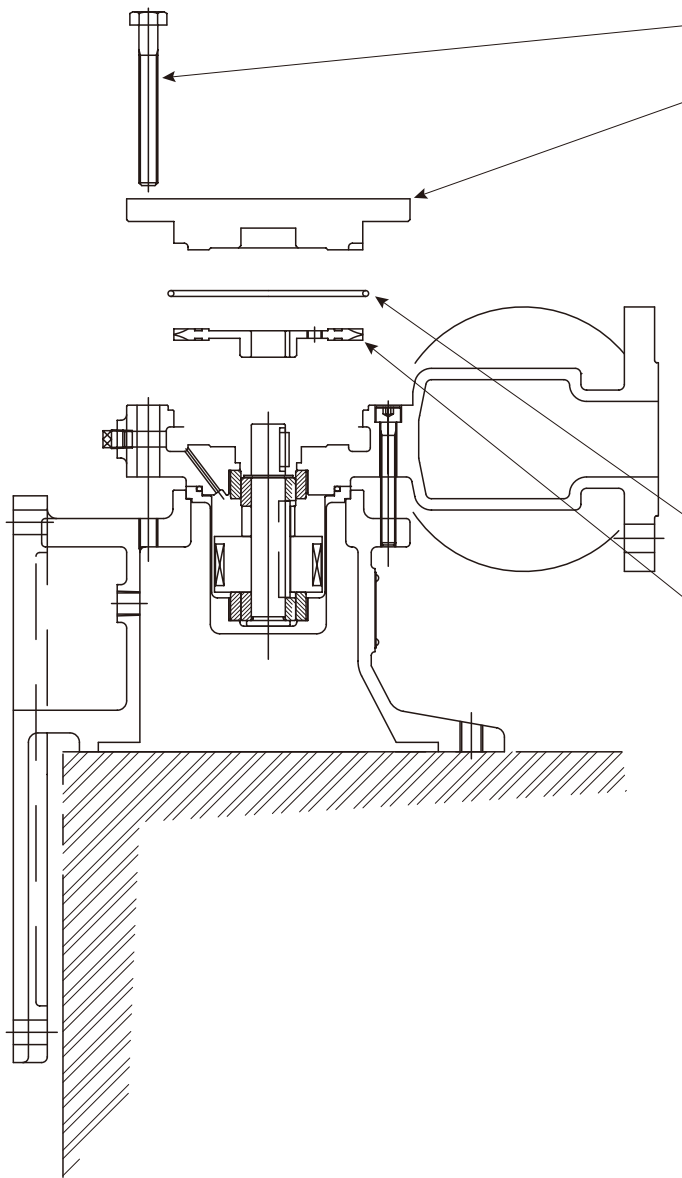
Configuration



3. Procedure of Disassembly and Assembly

Note

Disassembling and assembling can be easily carried out when you put the pump separately on work stand.



62 Hexagon head bolt

3 Casing cover

When disassembling, if hard to pull out the casing cover, please screw the bolt into the screw holes of the casing cover and lift it.

When assembling, be sure to face the “UP” mark for discharge direction.

33A O ring

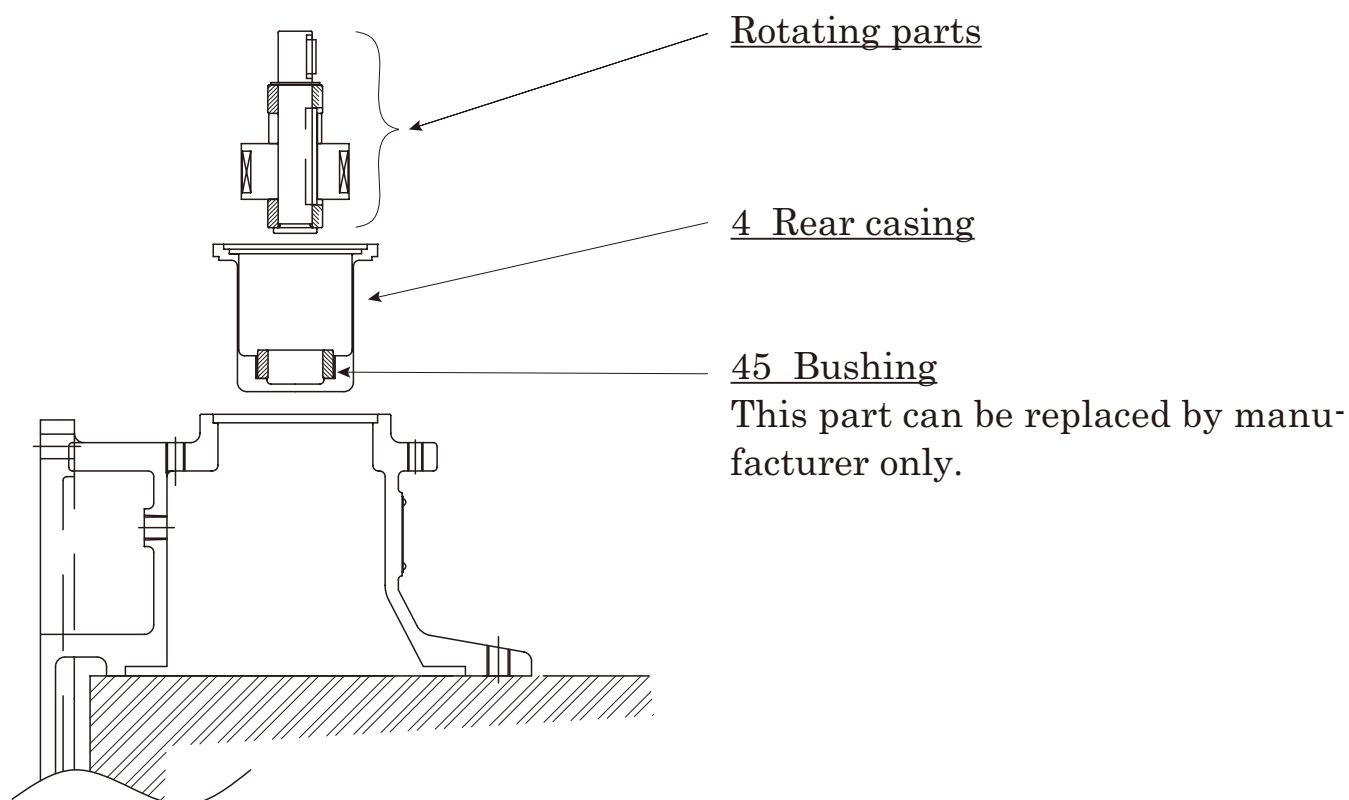
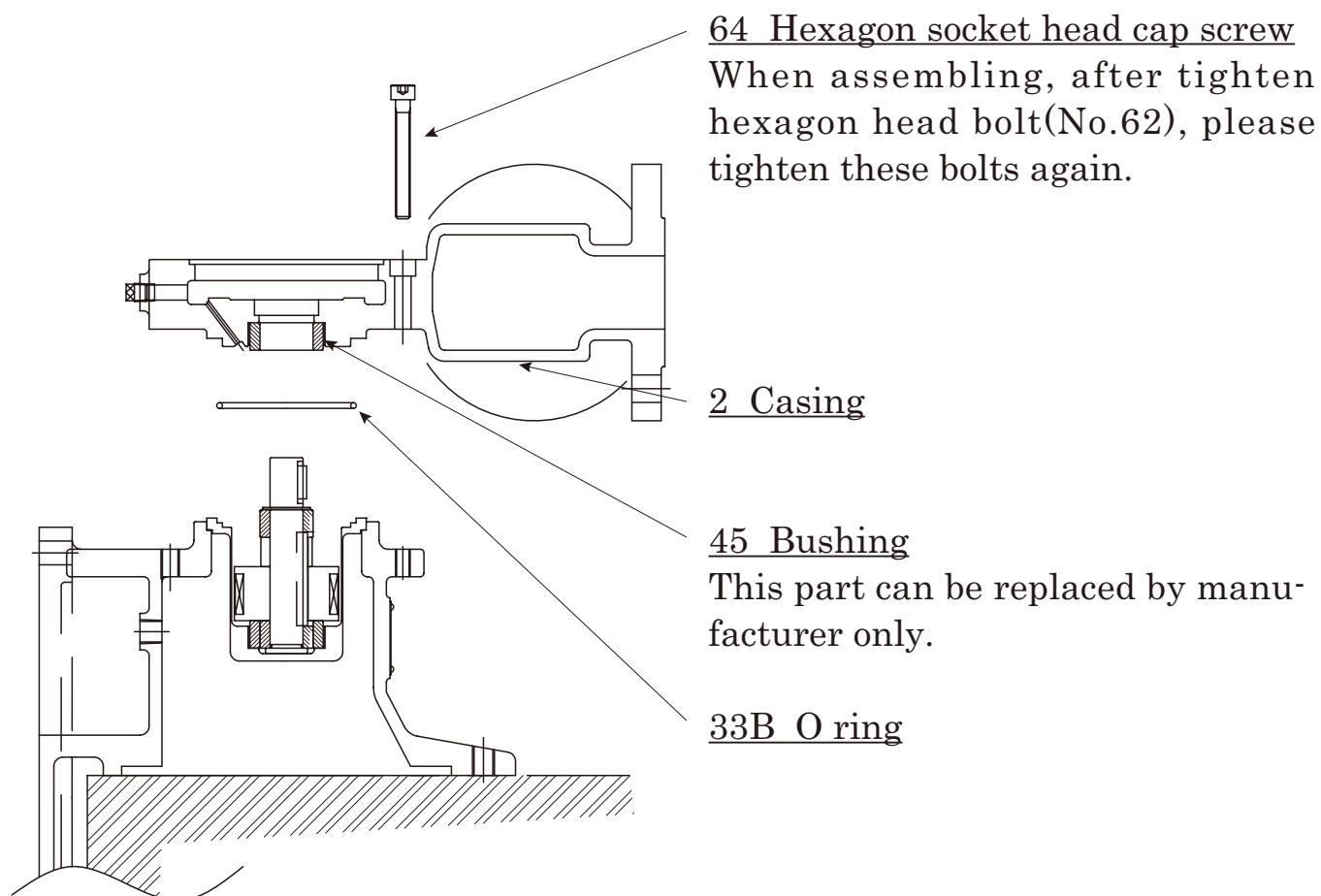
1 Impeller

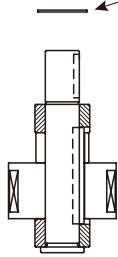
Be careful to the direction of the hub. When assembling, please refer to the cross section drawing.

When hard to pull out the impeller, please screw the bolt into the screw hole of the impeller and lift it.

ATTENTION

Please work with care to the sharp corner part. Please wear a glove, if necessary. Touching the impeller's sharp edge could result in injury.





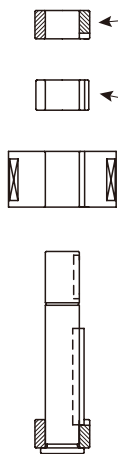
8C Retaining ring

When assembling, be sure to retain ring fits in into groove of shaft.

When assembling and disassembling retaining ring, please use appropriate tool like the snap ring plier.

8A Impeller key

Be sure the surface with the material mark faces upward (side which can be seen) when assembling.



9 Sleeve

When assembling, please align the notch with the coupling key.

31 Spacer

The pump “MEK 402” does not have this part.

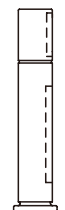
20A Magnet coupling(P)

Please attention. This part has “Pow-erful magnetic force”.



9 Sleeve

When assembling, please align the notch with the coupling key.

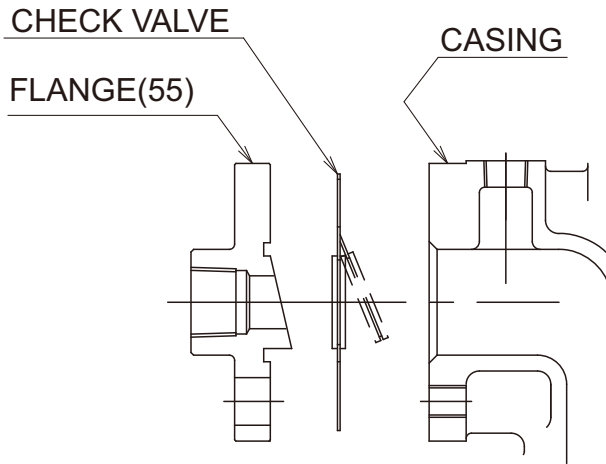


8B Coupling key

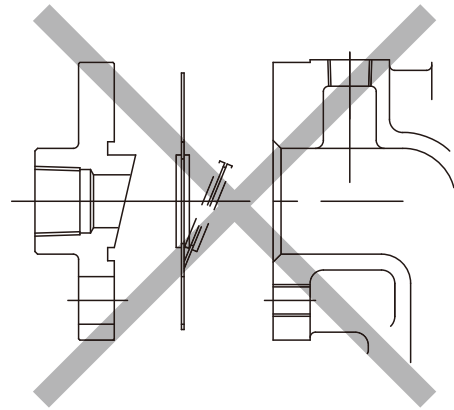
Be sure the surface with the material mark faces upward (side which can be seen) when assembling.

Note

The flange of Suction side (No.55) and the check valve (No.56) must be fitted to the casing as below. Otherwise pump cannot self-prim because the check valve cannot work well.

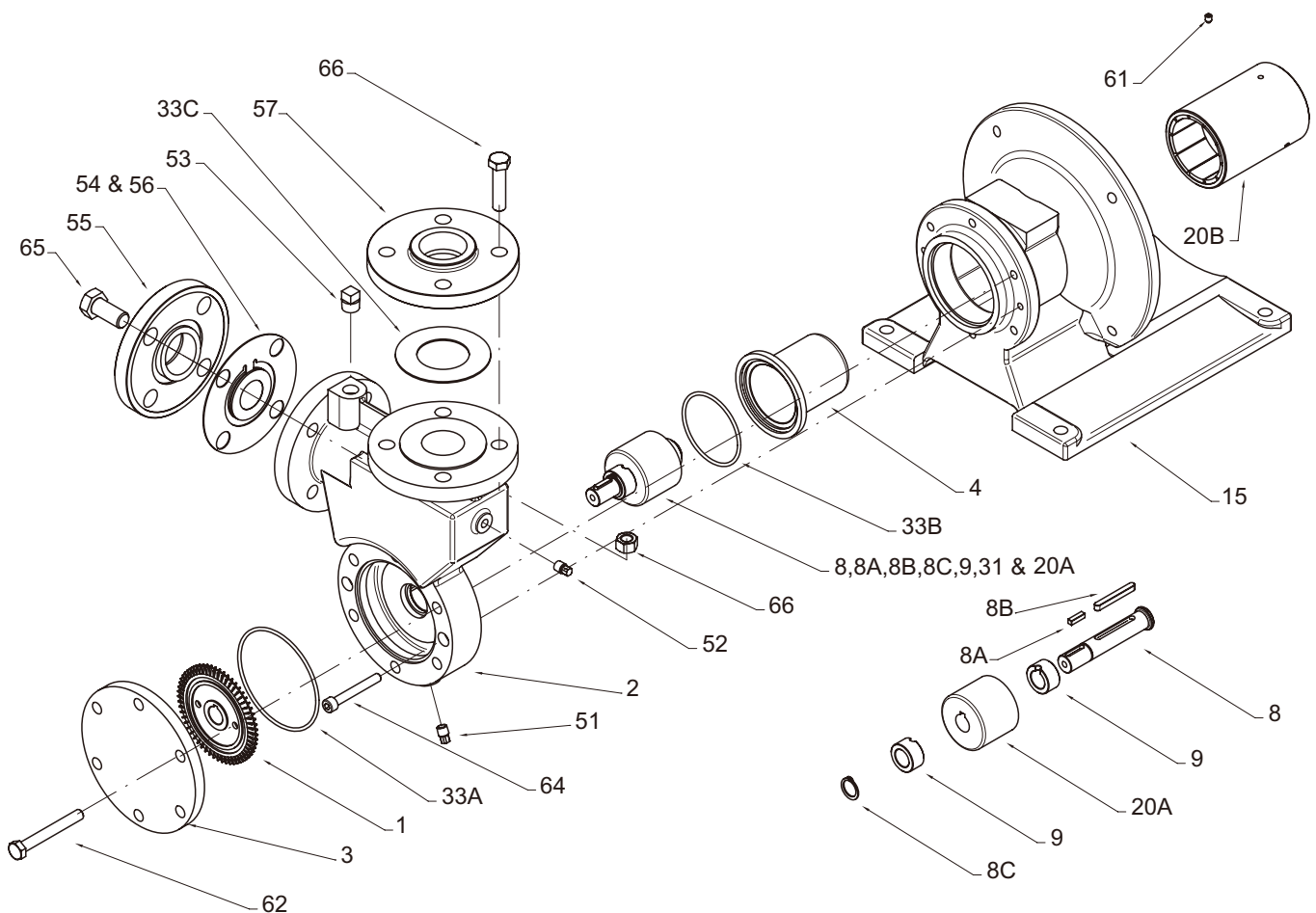


Good



Not Good

The part number



WARNING

- Magnet drives cause strong magnetic fields. Persons with a pacemaker should not stay close to the magnet drive or come into close bodily contact with parts of it.

ATTENTION

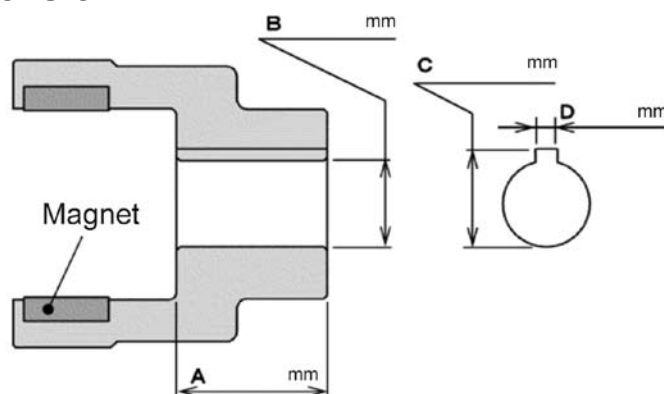
- The magnet coupling uses powerful magnets which attract metal and other magnetic materials. The workbench, therefore, should be made of wood or plastic.
- We recommend the use of non-magnetic stainless steel tools for disassembling the pump. If using tools made of a material subject to magnetic attraction such as iron, be careful not to allow them to get near the magnetic parts.(at least 1m)

Disassembly Order	Part No.	Part	Important Suggestions	Assembly Order
1	100 20B	Motor Magnet coupling(M)		17
2	51	Plug	Completely drain liquid from the casing.	16
3	62	Hexagon head bolt	Tighten each bolt equally when assembling.	15
4	3	Casing Cover		14
5	33A	O Ring		13
6	1	Impeller	Be careful to the direction of the hub. When assembling, please refer to the cross section drawing. When hard to pull out the impeller, screw the bolt into the screw hole of the impeller and lift it.	12
7	64	Hexagon socket head cap screw		11
8	2	Casing		10
	40 45	Tolerance ring Bushing	These parts can be replaced by manufacturer.	
9	8,8A,8B 8C,9,31 ,20A ,33B	Rotating parts (Shaft , Magnet Coupling(P), Spacer, Key, sleeve)	When assembling or disassembling in the state that the motor with the magnet coupling(M) is installed to the frame adapter, rotating parts are attracted by magnetic force, so be extremely careful not to relax your grip until it is completely out of reach of the magnetic force. The can of the rear casing is very thin. Be careful not to damage it while handling.	9

Disassembly Order	Part No.	Part	Important Suggestions	Assembly Order
10	4	Rear Casing		8
	40 45	Tolerance Ring Bushing	These parts can be replaced by manufacturer.	
11	8A	Impeller key	Material mark on the key should face upward.	7
12	8C	Retaining ring		6
13	9	Sleeve	When assembling, please align the notch of the sleeve with the key.	5
14	31	Spacer	The pump “MEK 402” does not have this part.	4
15	20A	Magnet coupling(P)	Please attention. This part has “Powerful magnetic force”.	3
16	8B	Coupling key	Material mark on the key should face upward.	2
17	9	Sleeve	When assembling, please align the notch of the sleeve with the coupling key.	1

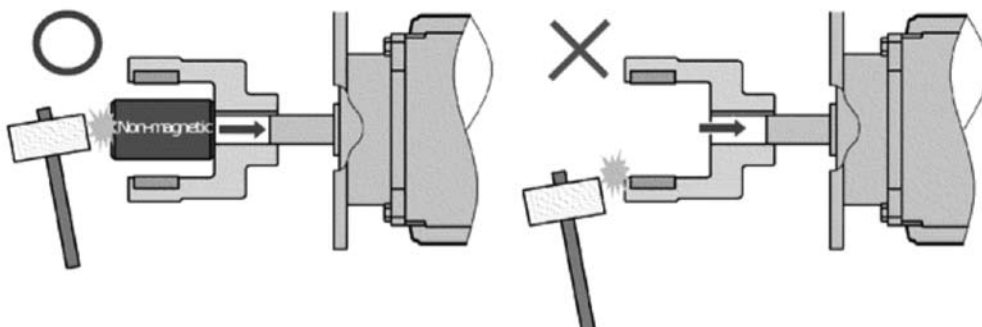
※ Points to ponder when mounting outer magnet coupling

1. Check the dimension.

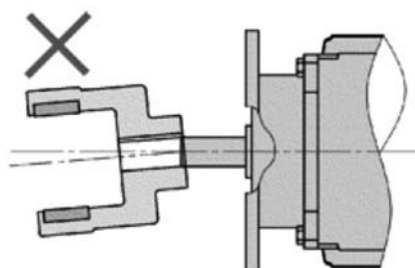


2. Points to ponder.

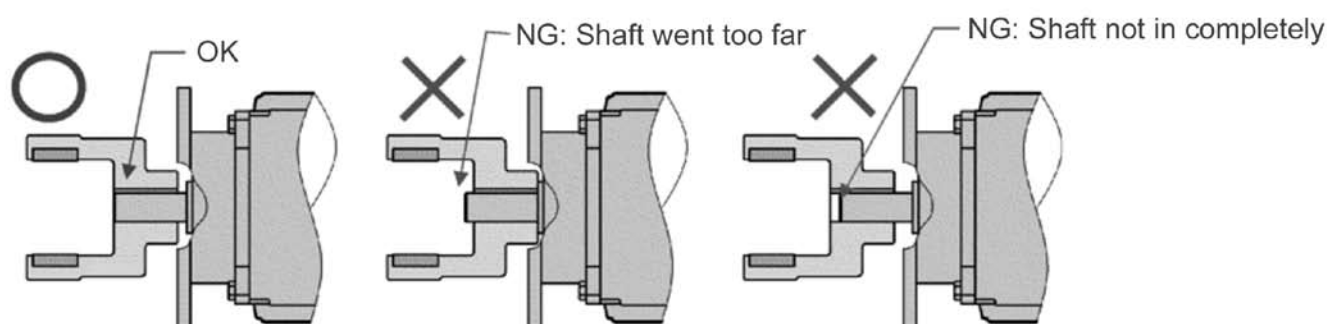
2-1 When it's difficult to mount, please lubricant the shaft with oil or other lubricant. Tapping magnet coupling (M) directly is prohibited. Doing so may break the magnet.



2-2 Please insert motor shaft accurately parallel to magnet coupling (M).
Nothing so may result in scratch or crank on the motor shaft.



2-3 Please make sure that the motor shaft end is straight (flush) with the inside bottom of magnet coupling (M).



ATTENTION

- If pumping hazardous chemicals, be sure to wash the pump thoroughly after draining the liquid. A small amount of liquid will however remain in the screw, faucet joint and engaged parts inside the pump. If handling hazardous chemicals, be sure to wear protective equipment such as glasses and rubber gloves, and proceed with caution while disassembling the pump.
- Be careful of the powerful pull of the magnet. When removing part, be careful not to relax your grip until safely out of range of the magnetic force.
- Be careful when handling the thin can of the rear casing.
- Be sure to note the orientation of the inner coupling shaft when assembling. The end marked [FRONT] should face the front.
- The cascade type impeller has sharp edges. When assemble or disassemble the pump, you should use the gloves to not get hurt.

Specific heat capacity



- Use the suitable tools for assembly/disassembly in explosion hazard area. (EN1127-1 ANNEX A) And use the tools which are not attracted to magnet.
- The bypass-hole of casing and center-hole of shaft must be cleaned and not be interrupted. Otherwise the flow into the rear casing will be low. Then an ignition source can develop due to heat input. Because the heat by eddy-current and the journal bearing does not be cooled.
- When assembling, be sure that the rotary parts rotate smoothly by turning motor's fan by hand before operating.

4. Checking parts dimension

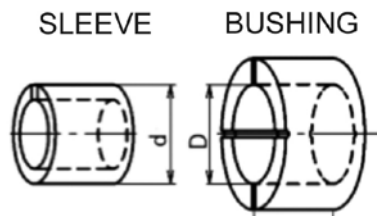


- If the clearance between rotating and stationary components is out of limitation, it may happen that these component contact and resulting in excessive frictional heat increase.

Check the following dimensions, when disassembled. If measured dimension exceed the allowance, replace damaged parts by new original spare parts.

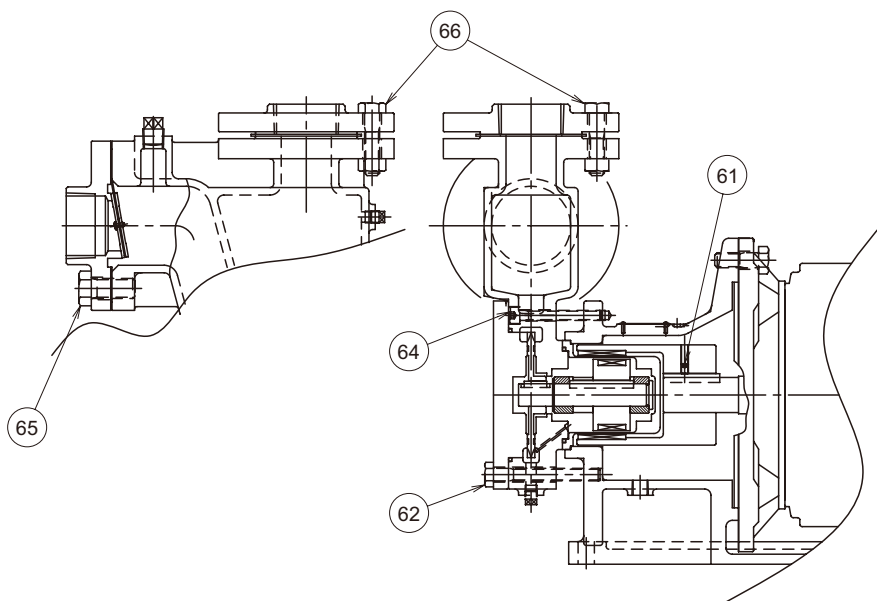
Dimension of Wet bearing

PUMP SIZE	BUSHING	SLEEVE
	D	d
MEK201,251,322,402	ø29.098	ø28.967



5. Optimal Tightening Torque for Bolts and Nuts

Parts No.	61	62	64	65	66
Part Pump Size	Set screw	Casing bolts (hexagon socket head bolt)	Hexagon socket head bolt	Flange bolts (hexagon head bolt)	Flange bolts (hexagon head bolt)
201	M6/ 2.4 N•m (0.24kgf•m)	M8/ 12.0N•m (1.22kgf•m)	M6 4.8N•m (0.49kgf•m)	M16 107.8N•m (11kgf•m)	M12/ 42.1N•m (4.3kgf•m)
251		M10/ 24.0N•m (2.45kgf•m)			
322					
402			M8/ 12.0 N•m (1.22kgf•m)		



● Troubleshooting

The following table contains the causes and countermeasures for typical problems that may occur. You may refer to the table when there seems to be something wrong with your pump. (Items particular to magnet pumps are indicated by a circle (○)).

Problem	Possible Causes	Countermeasures
Pump won't start	● Motor not operating properly	● Repair motor.
	● Wrong power supply	● Inspect.
	● Foreign matters in rotating parts	● Disassemble and repair.
	● Foreign matters caught in sliding part	● Remove foreign matter
	○ Damaged SiC bearing etc.	○ Disassemble and replace SiC bearing.
Magnet coupling slip	○ Demagnetization	○ Change the coupling.
	○ Specific gravity or viscosity of liquid is too high.	○ Replace with high torque coupling.
	○ Power source voltage is too high.	
	○ Motor output is too high.	○ Replace with proper motor.
Liquid is initially discharged but soon stops.	● Priming is inadequate.	● Prime the pump properly.
	● Air is being sucked in.	● Check the suction piping.
	● Head of liquid suction is too high.	● Lower the head of liquid suction.
	○ Magnet coupling is slipping.	○ See item concerning magnet decoupling.
Specified liquid discharge or head cannot be obtained.	● Strainer or foot valve is clogged with foreign matter.	● Disassemble strainer or foot valve for cleaning.
	● Clogged casing	● Remove foreign matter
	● Air is being sucked in.	● Check the suction piping.
	● Rotation is in reverse.	● Interchange of two leads of 3-phase motor.
	● Piping loss is too large.	● Reconsider planning.
	● Liquid is volatile or is too hot.	
	● Cavitation	● Check suction condition
	● Clogged piping	● Remove foreign matter from piping
	● Speed is too low.	● Check indication of tachometer.
	● Voltage drop	● Check power source
	● Discharge port of supply tank is blocked.	● Remove foreign matters

Problem	Possible Causes	Countermeasures
Overloading	● Head of liquid is too low or too much discharge flow rate.	● Throttle discharge valve.
	● Specific gravity or viscosity of liquid is too high.	● Reconsider planning.
	● Irregular contact at rotating part	● Repair or replace part.
	○ Damaged SiC bearings	○ See item concerning SiC bearings.
Pump vibrates and produces noise.	● Clogged impeller	● Remove foreign matter
	● Cavitation	● Checking suction condition
	● Too much discharge flow rate.	● Throttle discharge valve.
	● Rotation is in reverse.	● Check wiring connections.
	● Resonation of piping	● Improve the piping arrangement.
	● Irregular contact at rotating part	● Be repaired by specified factory.
	● Shut off operation performed for extended period of time	● Stop shut off operation.
	● Damaged bearing	● Replace bearings.
	○ Magnet coupling slipping	○ See item concerning magnet slipping.
	○ Damaged SiC bearings	○ See item concerning SiC bearings.
Demagnetization	○ No-load operation	○ Change coupling.
	○ Shut off operation performed for extended period of time	
	○ Operation with magnet coupling slipping with coagulated liquid	
SiC bearing damage	○ No-load operation (forgot to introduce pumping liquid, forgot to open suction valve, checked rotation direction without introducing pumping liquid, etc.)	○ Replace SiC bearing
	○ Operation started without complete discharge of air inside of the pump.	
	○ Shut off operation performed for extended period of time	
	○ Cavitation	○ Modify piping and check
	○ Solid or other foreign matter caught in SiC bearing.	○ Clean and replace SiC bearing
	○ Operating with coagulated liquid	

● Repairs and Warranty

Sanwa Hydrotech Corporation provides repair and maintenance service for your Sanwa Magnet Drive Pump. Terms and conditions of repair and warranty are stated thereto:

1. Warranty Repair

Equipment failure and/or damage resulting from defective design or workmanship shall be repaired at no cost to the owner. This warranty repair shall not cover failure and/or damage of equipment resulting from improper usage, long-term storage, natural disasters, accidents or unauthorized modification/attachment on/to the equipment.

2. Repair With Charge

The following repairs or parts replacements are available for a fee:

- 2-1) Equipment failure or damage occurring after the period of guarantee expires
- 2-2) Equipment failure or damage occurring as a result of improper usage or long-term storage
- 2-3) Equipment failure or damage occurring as a result of natural disaster, fire or unpreventable accident
- 2-4) Equipment failure or damage occurring as a result of repairs or modifications performed by anyone other than Sanwa Hydrotech Corp., or contractor appointed by Sanwa Hydrotech Corp.,

3. Sanwa Hydrotech Corporation shall not assume responsibility for expenses or damage incurred as a result of failure of this product while being used.

If you have any questions concerning the pump, please contact the local representative where you purchased it.

Manufacturer:

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