IWAKI PUMPS

IWAKI Magnetic Drive Pump

MDK Series

Instruction Manual (European Edition)

⚠ Read this manual before use of product

Thank you for selecting IWAKI Magnetic Drive Pump MDK Series. This instruction manual, which is divided into five sections, namely “Safety”, “Outline of Product”, “Installation”, “Operation” and “Maintenance”, deals with the correct handling and operation procedures for the pump. To make maximum use of the pump and to ensure safe and long time operation of the pump, please read this manual thoroughly and carefully prior to operating the pump.

Contents

Safety section

For the Safe and Correct Handling of the Pump

- Before use of the pump, read carefully this "Safety Section" to prevent accidents and to avoid the damage or loss of other assets.
- Observe and abide by the instructions described in this "Safety Section". These instructions are very important for protecting pump users or other persons from hazard or from loss of assets.
- Meaning of symbols
  Following two symbols describe the extent of hazards and loss which may brought if the instructions are not observed or if the pump is wrongly used.

 **Warning**	**Nonobservance or misapplication of the contents of the "Warning" could lead to a death or heavy injury of person.**
 **Caution**	**Nonobservance or misapplication of the contents of the "Caution" could lead to a injury of person or damage of assets.**

Following two symbols describe the content to be observed.

	**Prohibited action or procedure is indicated. Inside or near this circle, a concrete activity to be prohibited is depicted.**
	**Action or procedure which must be performed without fail is indicated. Inside this circle, a concrete activity to be performed is depicted.**

Safety section

⚠ Warning

- **Always turn off the power supply prior to works.** Make special provisions so that no other operator mistakenly turns on the power supply while someone is working on the pump. In a noisy or poor visibity environment, display a sign near the power supply switch to notify others that someone is "WORKING" on the pump. Power supply mistakenly turned on during maintenance may lead to personal injury.

Power off

- **Use of protectors:** When disassembling, assembling, and conducting maintenance or when handling a dangerous type of liquid or a liquid of unknown property, be sure to wear safety gloves, a helmet, and protective shoes. In addition, when handling wet-end parts, always wear protective goggles, masks, etc.

Wear protective gear

- **To prevent death or injury from a falling pump,** make sure the rope or chain used for lifting the pump is not accidentally cut or disconnected during installation. Make sure the rope or the chain used to lift the pump has sufficient strength in relation to the pump load. Also, be sure not to stand underneath a lifted or suspended pump.

Caution

- **When fixing the pump with rope or chain,** be sure to use special bolts (or rings) for lifting. Never use any other points for lifting the pump.

Prohibited

- **No remodeling**
  Remodeling of the pump by the user may result in serious personal injury, electric shock, or damage to the pump. Do not attempt remodeling as it is very dangerous.

No Remodeling

- **Magnetic field hazard**
  The magnetic drive pumps contain strong magnets which are located in magnet capsule and drive magnet cylinder. The powerful magnetic fields could adversely affect persons who are assisted by electronic devices such as pacemaker. etc.

Caution

Safety section

⚠ Caution

- **Qualified operators only**
  The pump operator and pump operation supervisor must not allow any operators who have little or no knowledge of the pump to run operate the pump. Pump operators must have a sound knowledge of the pump and its operation.

- **For specified application only**
  The pump is designed and manufactured to the specifications agreed upon by the user and Iwaki. The use of a pump in any application other than those clearly specified may result in injury or damage to the pump. Use the pump strictly in accordance with the pump specifications and application range.

- **Run the pump at the specified power supply voltage on the nameplate only.**
  Otherwise, fire or electric shock may result.

- **Ventilate the site**
  When handling the liquid which may generate toxic gas, safety measures such as ventilation must be taken to prepare for the accidental liquid leakage.

- **Countermeasure to liquid flowing out**
  Protective measurement must be taken against liquid flowing out caused by damage of pump or pipe by accident. Also, appropriate measurement must be taken so that the liquid can not directly flow out on the ground.

- **Do not run pump dry**
  Do not run pump dry (without liquid). If the pump run dry, heat is generated by rubbing, which causes pump damage. If the pump is operated with suction side valve closed, the pump runs dry.

- **Keep away from heat or flame.**
  Do not place any open flame or flammable object near the pump.

- **Do not stand on the pump.**
  Do not stand on the pump or use the pump as a step under any circumstances. Otherwise, you may experience a serious injury.

- **Do not touch the pump.**
  When the pump is used to feed a hot liquid, do not touch the pump or the piping with your bare hands during and immediately after operation as their surfaces are dangerously hot.

Safety section

⚠ Caution

- **Arrange grounding**
  Do not operate the pump without connecting the grounding wire. Otherwise, an electrical shock may result. Make sure the grounding wire is connected with the grounding terminal.


Grounding

- **Install an earth leakage breaker**
  The operation of a pump without using an earth leakage breaker may cause an electrical shock. Please install an optional leakage breaker in the system.


Electrical Shock

- **Do not install or store the pump in the following places.**
  - Places where flammable gas, dust or material is used or placed.
  - Places where corrosive gas (chlorine gas or the like) is generated.
  - Places where the ambient temperature is extremely high (40 °C or higher) or extremely low, 0 °C or lower.
  - Places where the pump is exposed to extreme dust or humidity. (Excluding the outdoor type)
  - Places where vibrations occur.


Prohibited

- **Pump start-up**
  When connecting a power supply to the pump, make sure there is no person around the pump. The pump has no ON/OFF switch. The pump starts operation when the power is supplied by connecting the power supply cable.


Caution

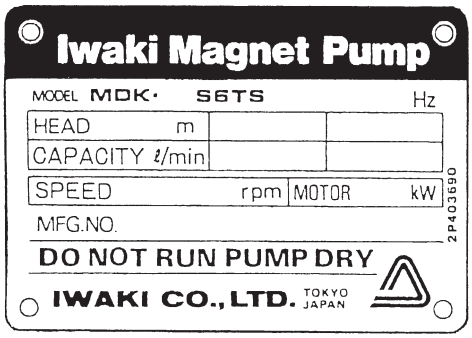
- **Foreign matter**
  Should foreign matter enter the pump, turn off the power at once and remove the obstruction. Using the pump with foreign matter inside may cause damage to the pump or a malfunction.


Caution

- **Disposal of used pump**
  Disposal of used or damaged pumps must be done in accordance with local laws and regulations. (Consult a licensed industrial waste products disposing company.)

OUTLINE OF PRODUCT

1. Unpacking and inspection



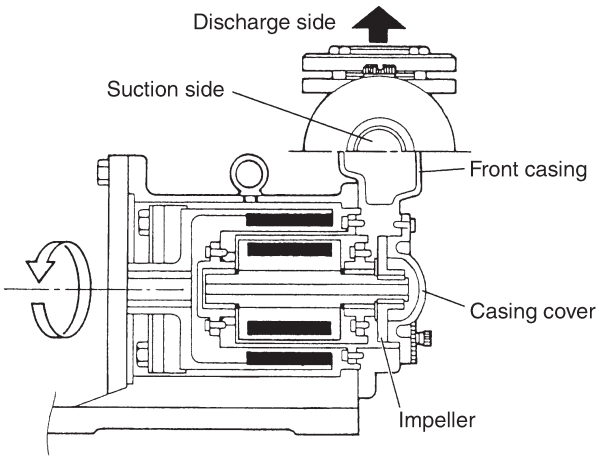
After the product is unpacked, check followings.

1) Identify the product
   Check nameplate if pump model, head, frequency, discharge capacity, motor power, voltage etc. are correct.

2) Damage during transportation
   Check if the product is not damaged and bolts and nuts are not loosened during transportation.

3) Discharge and suction ports are plugged so that foreign matters do not get into pump chamber. Remove the plug when the product is installed.

2. Operating principle



MDK Series pumps are magnetically driven turbine pump. Impeller is rotated in pump chamber by the magnetic coupling force to suck liquid from suction port and to discharge to outlet.

3. Model identification

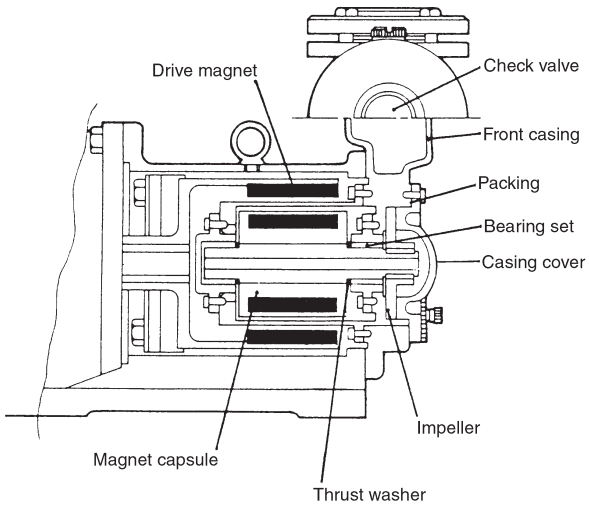
MDK – 32 S6 TS EUR
(1) (2) (3) (4)

(1) Pump bore : 20 … 20mm, 25 … 25mm, 32 … 32mm, 40 …40mm
(2) Pump material : S6 … SCS14, SUS316, SUS329J1
(3) Check valve material : TS … PTFE, SUS316
(4) Bearing material : EUR … Carbon
EUR-R … PTFE

4. Specification

Model	Bore	Standard flow rate (L/min.)		Specific gravity limit	Motor power (kW)
		50Hz	60Hz		
MDK-20	20mm (Rp3/4)	9 - 10	12 - 12.5	1.3	0.2
MDK-25	25mm (Rp1)	12 - 15	16 - 18.5	1.3	0.37
MDK-32	32mm (Rp1-1/4)	25 - 29	30 - 36	1.3	1.5
MDK-40	40mm (Rp1-1/2)	30 - 45	40 - 60	1.3	4.0

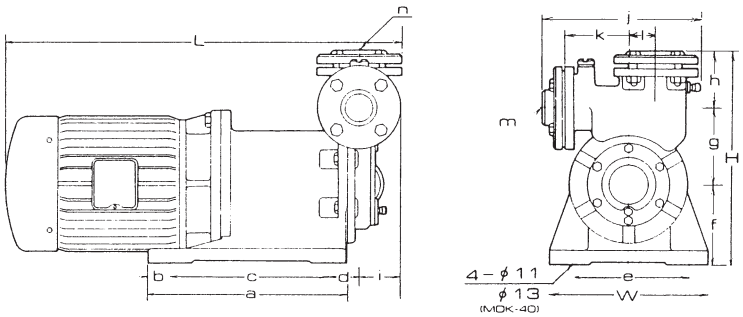
5. Construction and material



■ Wet end material

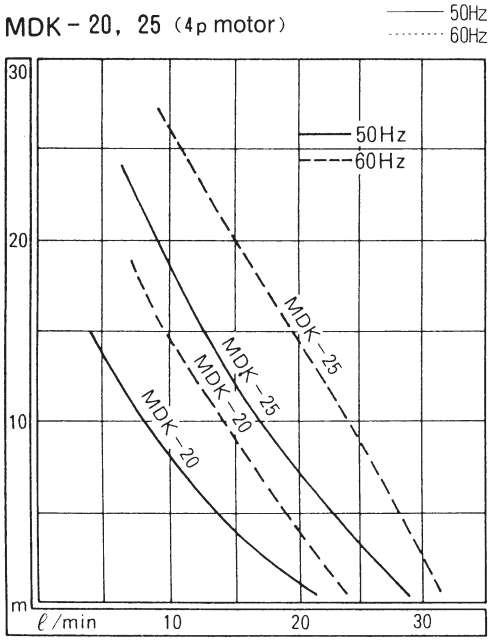
Parts	Material
Casing	SCS14
Casing cover	
Impeller	SUS316
Magnet capsule unit	SUS329J1 + SUS316
Thrust washer	PTFE
Bearing set	Carbon/SCS14,SUS316 or PTFE/SCS14,SUS316
Cover packing	PTFE
Check valve	PTFE/SUS316

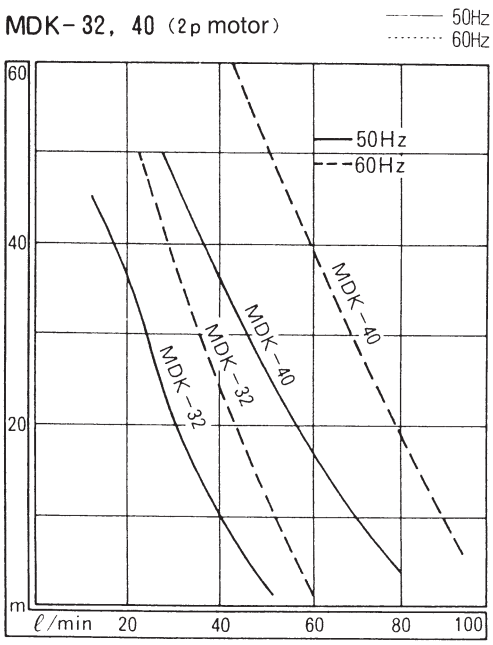
6. Outline dimension



Model	W	H	a	b	c	d	e	f	g	h	i	j	k	l	m	n
MDK-20	180	260	140	30	80	44	150	90	95	75	50	201	90	20	(Rp3/4)	
MDK-25		267	200		140	50			100	77	63	222	96	27	(Rp1)	
MDK-32		317	235		175	46		110	110	97	68	234	90	40	(Rp1-1/4)	
MDK-40	270	362	310	20	270	44	230	135	135		70	264	110	45	(Rp1-1/2)	

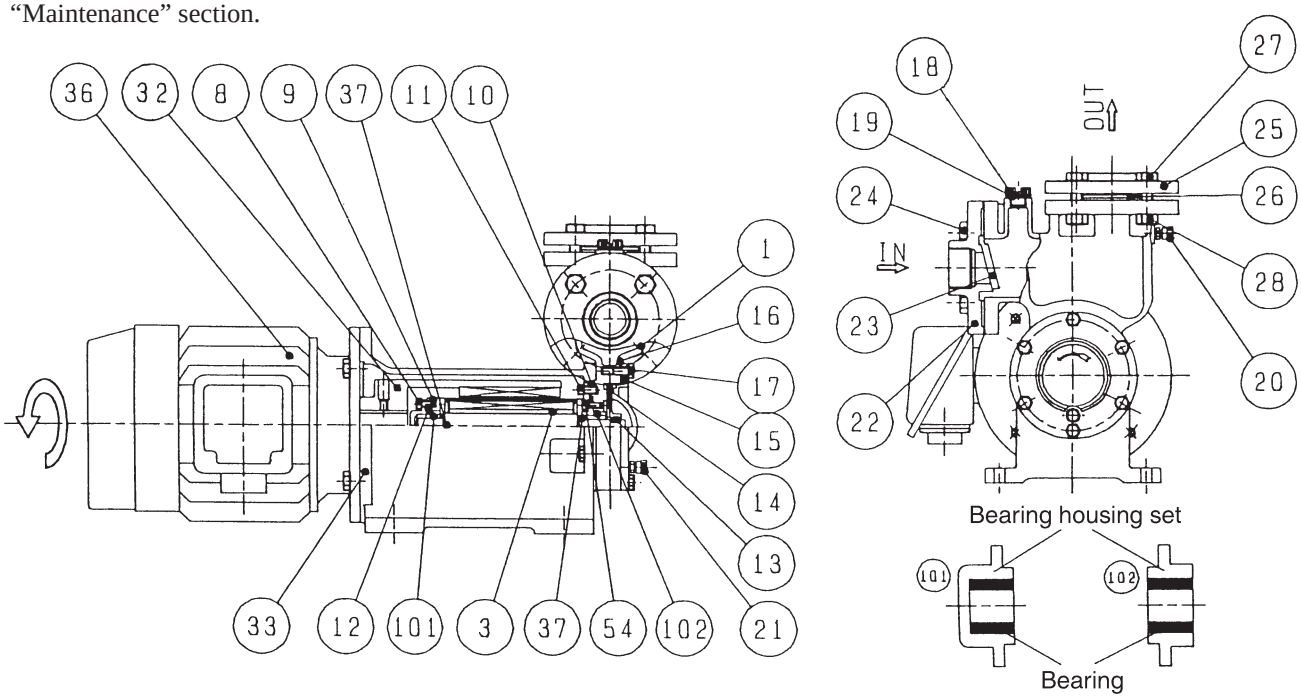
7. Performance curves





8. Construction and parts names

The drawing shows every composing parts. Disassembling of pump must be limited to the extent shown on "Maintenance" section.



No.	Parts	Q'ty	Material	Remarks			
				MDK-20	MDK-25	MDK-32	MDK-40
1	Front casing	1	SCS14				
3	Magnet capsule	1	SUS316/SUS329J1				
8	Hex. socket head bolt	4	Stainless steel	M6 × 12			M8 × 16
9	Rear casing	1	SUS316				
10	Packing	1	PTFE				
11	Hex. socket head bolt	4	Stainless steel	M6 × 12	M8 × 16		
12	O ring	1	PTFE				
13	Key	1	SUS316				
14	Impeller	1	SUS316				
15	Casing cover	1	SCS14				
16	Gasket	5	PTFE				
17	Hex. head bolt	6	Stainless steel	M8 × 16			
18	Priming plug	1	SUS316	Rp 3/8"			
19	Gasket	1	PTFE				
20	Air vent plug	1	SUS316	Rp 1/8"			
21	Drain plug	1	SUS316	Rp 1/8"			
22	Suction flange	1	SCS14	Rp3/4"	Rp1"	Rp1-1/4"	Rp1-1/2"
23	Check valve	1	PTFE/SUS316				
24	Hex. head bolt	4	Stainless steel	M12 × 30			
25	Discharge flange	1	SCS14	Rp3/4"	Rp1"	Rp1-1/4"	Rp1-1/2"
26	Flange gasket	1	PTFE				
27	Hex. head bolt	4	Stainless steel	M12 × 45		M12 × 50	
28	Hex. nut	4	Stainless steel	M12			
32	Drive magnet	1	SS400				
33	Bracket	1	FC150				
36	Motor	1					
37	Thrust washer	2	PTFE				
54	Hex. socket head bolt	4	SUS316	M6 × 12			M8 × 16
101	Bearing housing set B	1	Carbon/SUS316 or PTFE/SUS316				
102	Bearing housing set A	1	Carbon/ SCS14 or PTFE/SCS14				

INSTALLATION

⚠ Caution

- **Do not run pump dry**
  When you operate pump first time after the installation or after repair works, prime the pump to start. Dry running (running with no liquid) will cause the seizure of rubbing parts resulting in pump failure.
  Running parts are self-lubricated and cooled by pumped liquid. Dry running or running with valve closed will damage the impeller because the automatic balancing mechanism does not work.
  • If pump runs dry by mistake, turn off power and leave it for one more than one hour without pouring liquid into pump.
  • Dry running protective device is recommended to avoid dry running.


Prohibited

- **Keep pump away from fire**
  For your safety, do not put dangerous or flammable substance near to pump.


Prohibited

- **Do not use pump for transferring dangerous liquids mentioned as below.**
  Explosive and flammable liquids
  Corrosive and irritating odor toxic liquid


Prohibited

- **Do not remodel pump**
  Remodeled pump may cause accident, electrical shock or pump failure.
  Do not remodel pump.


Prohibited

1. Precautions before use of pump

1) Precautions when pump is started or stopped

To avoid water hammer phenomenon, pay attention to followings when pump is started or stopped. Especially, pay special attention in case discharge piping is long.

(1) When pump is started

After pump is primed, open the discharge valve and then turn on power to start pump. After pump starts, gradually close the valve to get desired duty point.

(2) When pump is stopped

When pump is stopped, close the discharge valve gradually to go to minimum flow and then turn off power. The discharge valve must be closed completely after the pump stopped.

Never close the flow suddenly by solenoid valve or so. Sudden shut-down may cause excessive pressure increase resulting in pump damage.

2) Do not install nor store pump at following places

- Places where ambient temperature becomes zero deg. C or below.
- Corrosive or explosive gas environment
- Places where dew drops
- Ambient temperature more than 40 deg. C
- High humid place (Allowable humidity is 35 to 85%RH.)
- Dusty place or place influenced by external shock or vibration

3) Prime pump

Both air-liquid separation tank located top part of pump body and pump chamber must be primed. Before start pump, fill them with liquid. Dry running (pump operation without liquid) may cause pump seizure or shortened pump parts.

4) Max. pressure limit of pump

Max. pressure limit of pump is 0.6MPa for MDK-20,25 and 32, and 0.8MPa for MDK-40.

5) Pumped liquid

1) Slurry liquid

Liquid which contains slurry (solid substance) can not be pumped.

2) Performance influenced by specific gravity and viscosity of pumped liquid

In case handled liquid is heavier and more viscous than water, the shaft power , discharge capacity and head are not the same as pumping water. The pump is made according to the information given to us when we received order from you. If you change the liquid or operating condition, please consult us to confirm if the pump can be used for the changed liquid or conditions.

3) Change of temperature of pumped liquid

Pump performance is not influenced by the change of temperature of pumped liquid but the temperature change of pumped liquid influences viscosity, vapor pressure and corrosiveness of liquid. Pay attention to the change of characteristics of pumped liquid.

● Pumped liquid temperature range : 0 – 80 deg.C (in case of water)
● Allowable ambient temperature range: 0 – 40 deg.C
● Allowable humidity range : 35 – 85% RH

Ask us for the allowable liquid temperature range of chemical liquids.

6) Dimension of bearing

Radial direction wear limit of bearing is 2 mm. Temperature rise value of bearing in standard performance range is s3 deg. C or less.

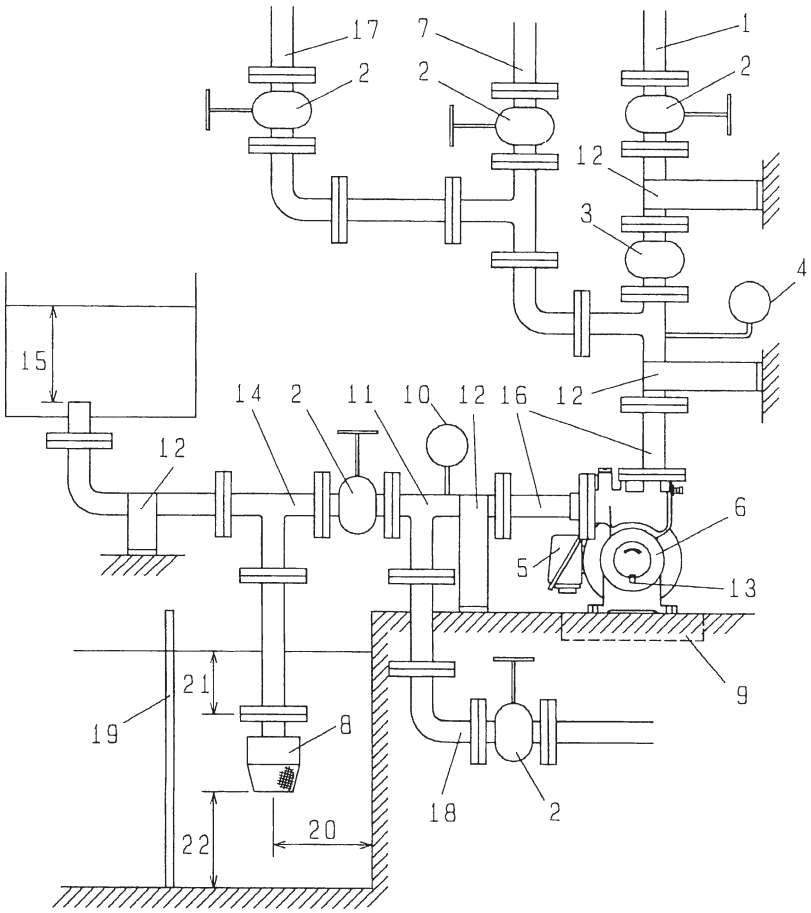
7) Intermittent operation

So often repeated pump starting and stopping cause pump damage. Starting and stopping pump is limited to six times or less an hour.

8) Dislocated magnet coupling

When the magnet coupling is dislocated, stop the pump within a minute. If pump runs with magnet coupling disconnected, the coupling force is reduced.

Example of recommended plumbing



(1) Discharge pipe
(Install pipe support so that piping load can not be put on pump.)
(2) Gate valve
(3) Check valve
(4) Pressure gauge
(5) Motor
(6) Pump
(7) Priming pipe, air vent
(8) Strainer
(9) Drainage ditch
(10) Compound gauge
(11) Suction pipe (Pipe dia.: D)
(Horizontal part is as short as possible and take an ascending inclination approx. 1/100 towards pump.)
(12) Pipe support
(13) Pump drain
(14) Suction pipe (Pipe dia. : D)
(15) 2D or more than 500mm
(16) Expansion joint
(17) Flushing piping (Discharge side)
(18) Flushing piping (Suction side)
(19) Screen
(20) More than 1.5D
(21) 2D or more than 500mm
(22) More than 1.5D

2. Plumbing

2-1. Suction side plumbing

● Suction lift height depends on liquid temperature. Refer to following table.

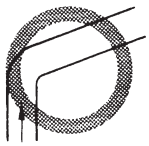
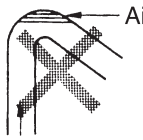
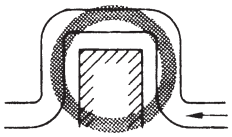
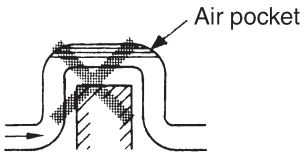
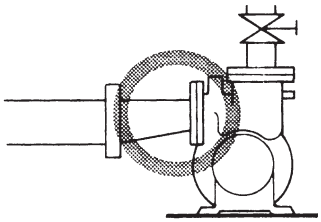
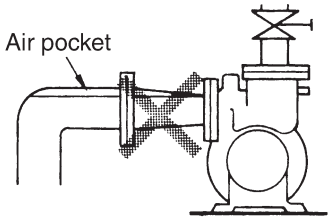
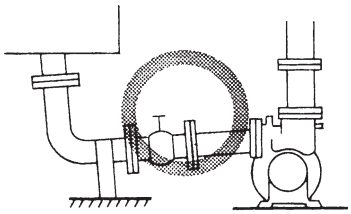
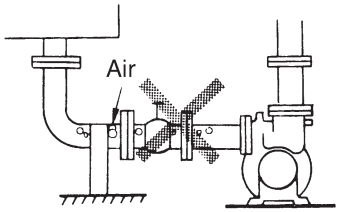
Liquid temperature (deg.C)	0	20	40	60	70	80
Suction lift height (m)	7.6	7.2	5.4	3.2	1.7	0.3

(1) Flooded suction is recommended if possible. Employ shorter and less bends as possible. Install pipe supports so that the pipe load can not be added to the pump.

(2) Do not make the air trap where the air stays. Arrange 1/100 or more inclination towards pump.

(3) Suction pipe must be connected with care so that the air can not get into pump. The air sucked in pump may cause malfunction of pump. When suction flange is removed, pay attention not to damage the polished surface of check valve.

(4) If the suction pipe is installed underground, test it with approx. 1.6MPa pressure.

Good	No Good
	
	
	
	

(5) Sink the suction pipe end in the liquid of suction tank by depth of 500mm or double of pipe diameter.

(6) Install a reducer in case the pump suction port bore is not the same as suction pipe diameter. Install the reducer so that the upper part becomes horizontal as shown above. Do not use the suction pipe of which the diameter is smaller than pump suction bore.

(7) If slurries or foreign matters possibly get into, install a strainer at the end of suction pipe.

(8) Install a compound gauge near to pump to check the excessive vacuum due to clogging by foreign matters.

(9) Take any measure for the foreign matters not to get into the suction tank. Foreign matters may cause pump failure. Keep sufficient distance between the end of suction pipe and the bottom or side wall of suction tank or liquid surface.

(10) In case of severe suction condition (pressure of suction tank is lower than atmospheric pressure, suction lift is high, long suction side piping), it is recommended that NPSH available value is larger than “1.2 x NPSH required value”.

(11) In case of suction lift application (Pump sucks up liquid.), prime the pump when the pump is operated for the first time.

(12) In case of suction lift application, incline the suction piping ascending towards pump so that no air pocket is made in suction piping.

(13) In case of flooded suction (Pumps suction port is below the liquid level.), it is recommended that the valve is installed in suction piping so that the maintenance works can be done easily. Always open this valve during pump operation because it is installed for maintenance works only.

2-2. Discharge side plumbing

(1) Install pipe support so that the pipe load can not be added to the pump.

(2) Long piping will increase pipe resistance which may prevent pump from desired performance. Calculate pipe resistance to get suitable pipe size.

(3) It is recommended to install a check valve in the following cases. Take the permissible pressure into consideration for the selection of check valve.

- Long discharge piping
- Discharge head exceeds 15 meters.
- Discharge pipe end is located at 9 meters or more higher than the liquid level of suction tank.
- In case two pumps are connected in parallel

(4) It is recommended to install a gate valve in the discharge piping to adjust flow rate or to avoid overloaded motor. If both check valve and gate valve are installed, it is recommended that they are installed in order of pump → check valve → gate valve.

(5) Install a pressure gauge in discharge piping.

(6) If discharge pipe is long horizontally, install a air vent on the way.

(7) If it is possible the liquid in the discharge piping is frozen, install a drain to remove the liquid in the discharge piping.

3. Electrical wiring

Electrical works must be done by qualified person using quality wiring products observing local laws or shop standard.

(1) Use a electromagnetic switch suitable for the specification of used motor.
(Voltage and capacity etc.)

(2) If pump is installed outdoor, take measures so that rain or water can not get into the switch.

(3) Electromagnetic switch and push button switch should be securely installed at the place apart from pump.

OPERATION

1. Precautions on operation

⚠ Caution

- **Dry running or operation with suction side valve closed cause pump damage.**

- **If pump is operated in cavitation condition, stop it within a minute. Do not run pump with air being sucked in suction port.**

- **If magnet coupling is disconnected, stop the pump within a minute. If pump runs with magnet coupling disconnected, magnet coupling force is reduced.**

- **If the pump is operated for a long time with discharge valve closed, liquid temperature increases resulting in pump damage.**

- **If power supply is discontinued during the pump operation, turn off the power switch and open the discharge valve.**

- **Pay attention so that the discharge pressure does not exceed the pump max. allowable pressure during the pump operation. (See page 12 for max. allowable pressure of pump)**

- **When high temperature liquid is pumped, the surface of pump body is very hot. Take protective measures to avoid the burn.**

2. Preparation for operation

When the pump is operated first time after it was installed or after a long time of rest, do the preparation works as mentioned below.

(1) Clean piping and tank before liquid is supplied.

(2) Re-tighten bolts to connect flange and pump fixing bolts.

(3) After the pump is primed, fully open the discharge valve. Check to confirm if air vent valve or valve for flushing is closed.

(4) Direction of rotation of motor

After the pump is primed, check the direction of rotation of motor by rotating it instantly. The direction of rotation is shown on the pump by arrow. If you find the rotation is in reverse, change two phases wires among three phases.

3. Operation

(1) To start pump, fully open the discharge valve and turn on the switch.
Pump sucks up liquid in a few minutes. When pump starts discharging, choke the discharge valve (gate valve) several times to increase the pressure and to check if pump operates normally. If the pump does not suck up liquid within five or six minutes, prime and start pump several times. If the pump still does not suck up liquid, then, check the built-in check valve and check if there is no air leakage through suction piping.

(2) After the pump starts operation without any abnormality, gradually close the discharge valve to get desired pressure. If the valve is closed too much, the motor may be overloaded. Close the valve watching an ammeter. Following is the allowable lowest flow rate of each pump model. Operate the pump at the flow rate more than shown as below.

Pump model	Allowable minimum flow rate (50/60Hz)
MDK-20	4.7/7.5 Litters/min.
MDK-25	7/9 Litters/min.
MDK-32	16/22 Litters/min.
MDK-40	26/43 Litters/min.

(3) When the pump starts to run at the specified duty point, check with flow meter if the pump runs at specified flow rate.

⚠ Caution

Do not change the pressure suddenly during pump operation. The sudden pressure change may cause the disconnection of magnet coupling.
It may happen that the magnetic coupling is disconnected if slurries or foreign matters get into pump. If the magnetic coupling is disconnected, turn off motor switch and wait till the motor completely stops to turn on switch again. If the pump is operated with magnetic coupling disconnected, the magnetic force is reduced.

4. To stop pump

(1) Turn off the switch to stop the pump. Check if the pump stops rotation smoothly and if not, check pump inside.

(2) Gradually close the discharge valve. Do not close the valve suddenly by solenoid valve or so.

(3) 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 cap, drain cap and priming plug.

(4) If power is failed, turn off motor switch.

MAINTENANCE

1. Troubleshooting

If you find any abnormality on the pump, stop the pump immediately and inspect the pump according to following procedure.

Trouble		Cause	Countermeasure
Pump does not discharge liquid.	Motor does not rotate.	• Disconnected wires. • Failed motor	• Check fuse wiring. • Repair or replacement
	Pump does not rotate.	• Rubbing parts stick or are broken. • Frozen pump	• Repair or replace. • Warm pump.
	Both motor and pump rotate.	• Lack of priming water. • Air gets in suction pipe. • Excessive total head compared to pump available performance.	• Prime pump again. • Correct suction piping. • Use the pump of higher total head ability or reduce the required total head.
	Liquid is not kept in pump during it is stopped.	• Failed or wrongly mounted built-in check valve	• Repair or replace.
Flow rate is not enough.		• Air gets in suction pipe. • Worn impeller. • Reduced rpm due to drop of power voltage.	• Correct suction piping. • Repair or replace. • Check voltage and take measure.
Motor is overheated.		• Voltage is reduced. • Overload • Too high ambient temperatures.	• Check voltage and take measure. • Check if voltage and frequency are correct. • Check if specific gravity or viscosity of liquid is within allowable limit. • Check if bearing is not locked or if motor fan rotates smoothly. • Ventilate the operation site.
Pump vibrates.		• Installation foundation is not perfect. • Loosened mounting bolts. • Clogged suction pipe or cavitation occurs. • Pump bearing is worn or melted. • Damaged magnet capsule or spindle. • Drive magnet is not balanced. • Impeller or magnet capsule touches other part. • Worn motor bearing.	• Correct foundation and mounting. • Tighten. • Clean or settle reason of cavitation. • Replace • Replace • Replace • Replace • Replace bearing or motor

2. Maintenance and inspection

⚠ Warning

- **Wear protector**
  Chemical liquid or toxic liquid may harm your eyes or skin. When you work on pump, wear protectors such as protective mask, goggles, gloves.

- **Turn off switch**
  If you work with power turn on, you may be electrically shocked. When the works are done, turn off main power to stop pump and relative equipment.

Power off

- **Pay attention to strong magnetic field**
  The magnet drive pump contains strong magnet. The strong magnet field could adversely affect persons who are assisted by electronic devices such as pacemakers etc.

Caution

2-1. Daily inspection

(1) Before the pump is operated, check if no liquid is leaked. If any leakage is found, never start the pump.

(2) Check if the pump runs smoothly without vibration and abnormal sound.

(3) Check liquid level of suction side tank and suction pressure.

(4) Compare the discharge pressure and amperage during pump operation with those shown on nameplate of motor to check if pump load is normal.
Open the cocks of pressure gauge and vacuum gauge only when measurement is done and close them when the measurement is finished.

(5) Sometimes operate stand-by pump for ready to be used always.

(6) During pump is running, check the discharge pressure, discharge flow rate, power source voltage of motor if they are not changed. If you find large change, settle the change referring to “Trouble shooting”.

2-2. Periodical inspection

To use the pump without problem, inspect the pump periodically according to the procedure shown as below. When the pump is disassembled, take care of handling rubbing parts and plastics parts not to damage them.

⚠ Caution

Magnet force of driving magnet and magnet capsule is strong. Pay attention for your fingers not to be pinched.

⚠ Caution

The magnet drive pump contains strong magnet. Do not put electronic devices which do not like magnet field close to the magnet.

Inspection period	Inspected parts	Inspection item	Remarks
Overhaul once six months	Drive magnet set	• Check rubbed trace. • Check if drive magnet set is fixed at correct position of motor shaft and if set screws are not loosened. • Inner surface of magnet and motor shaft are eccentric.	• Consult us if trace is found. • Mount drive magnet on motor shaft and tighten screws again • Max. 5/100mm
Overhaul once three months	Rear casing	• Check rubbed trace in inside surface • Check wear of bearing and measure dimensions. • Check dirt and clogging of inside and bearing groove • Check swelling or cracks in PTFE packing.	• Consult us if trace is found. • Replace if it comes to wear limit. • Clean •Replace if swelled or cracked.
	Magnet capsule unit	• Check rubbed trace • Check wear, dimension and crack of spindle.	• Consult us if trace is found. • Consult us if abnormal is found.
	Impeller	• Check trace of cavitation (wear, seizure) • Check dirt and clog of blades • Check if balance groove is not clogged.	• Settle reason. Replace if abnormality is found. • Clean • Clean
	Front casing	• Check rubbed trace • Check dirt, crystal at wet-end • Check cracks in built-in check valve • Check crystal in drain part • Check swelling or cracks in PTFE packing	• Consult us if any abnormality is found. • Clean • Consult us if any abnormality is found. • Clean • Replace if any abnormality is found.

Note: When the overhaul is done, pay attention to rubbing parts and plastic parts not to damage them. Magnet force of drive magnet and magnet capsule is strong. When pump is disassembled, pay attention for them not to attract metallic powder.

2-3. Wear limit of bearing

Wear limit of bearing is 2 mm for all models. Wear limit means: Bearing inner diameter minus spindle outer diameter.

3. Consumable parts

Bearing and magnet capsule unit are consumable parts. Replace them by new ones at every life time to be replaced (actual running time) shown as below.

Pump model	Parts (Material)	Life time to be replaced	Pump model	Parts (Material)	Life time to be replaced
MDK-20 S6 TS EUR	Bearing (carbon)	4500 hrs	MDK-20 S6 TS EUR-R	Bearing (PTFE)	3500 hrs
	Mag. capsule unit	9000 hrs		Mag. capsule unit	7000 hrs
MDK-25 S6 TS EUR	Bearing (carbon)	4000 hrs	MDK-25 S6 TS EUR-R	Bearing (PTFE)	3000 hrs
	Mag. capsule unit	8000 hrs		Mag. capsule unit	6000 hrs
MDK-32 S6 TS EUR	Bearing (carbon)	3500 hrs	MDK-32 S6 TS EUR-R	Bearing (PTFE)	2500 hrs
	Mag. capsule unit	7000 hrs		Mag. capsule unit	5000 hrs
MDK-40 S6 TS EUR	Bearing (carbon)	2000 hrs	MDK-40 S6 TS EUR-R	Bearing (PTFE)	1500 hrs
	Mag. capsule unit	4000 hrs		Mag. capsule unit	3000 hrs

Note 1. Above mentioned life time to be replaced (actual running time) is based on pumping clear water at ambient temperature and the life time is influenced by the pumped liquid, its temperature and other conditions.

2. Bearing must be replaced by new one according to above item “2-3. Bearing wear limit” on page 22 regardless of the life time mentioned as above.
3. Bearing must be replaced as bearing housing set.
4. Gasket and O ring are not consumable parts but replace them every time when pump is disassembled.

4. Disassembling and assembling

⚠ Warning

- **Wear protector**
  Chemical liquid or toxic liquid may harm your eyes or skin. When you work on pump, wear protectors such as protective mask, goggles, gloves.

- **Turn off switch**
  If you work with power turn on, you may be electrically shocked. When the works are done, turn off main power to stop pump and relative equipment.

Power off

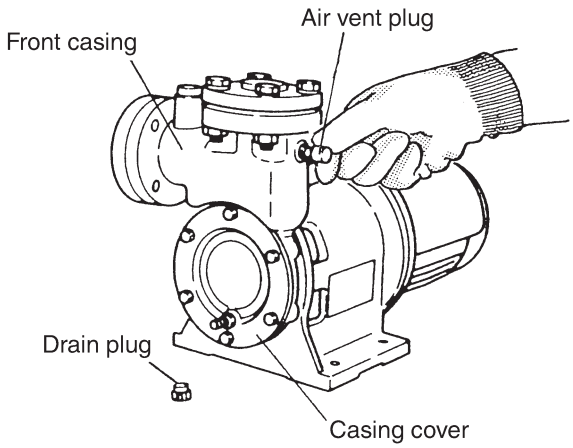
- **Strong magnetic field**
  The magnet drive pump contains strong magnet. The strong magnet field could adversely affect persons who are assisted by electronic devices such as pacemakers etc.

Caution

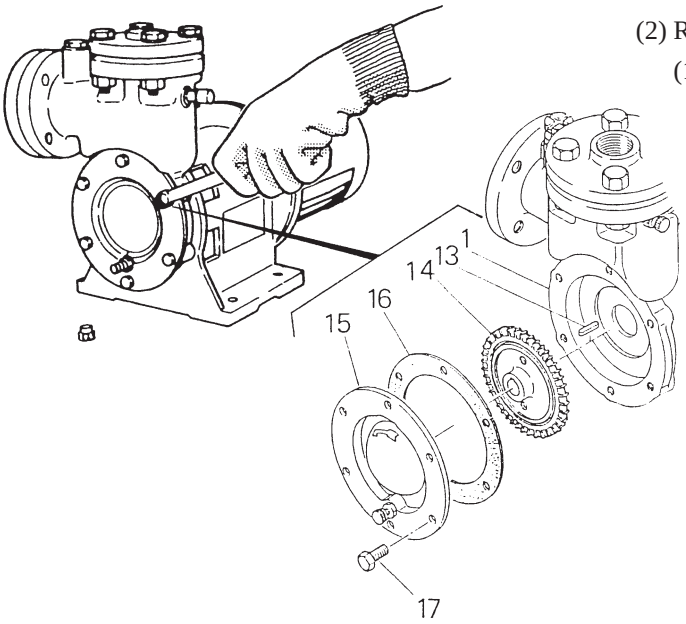
Caution

- Strong magnet is used in the pump. Pay attention not to pinch your fingers when you disassemble or assemble the pump. Also pay attention so that iron powder or so can not be attracted by the magnet.
- Do not put the electronic device which does not like magnetic field near to the magnet (drive magnet and magnet capsule).
- Close suction and discharge side valves before the pump is disassembled and assembled.

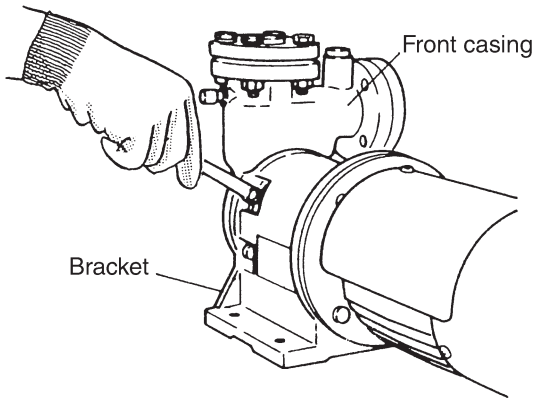
4-1. Disassembling



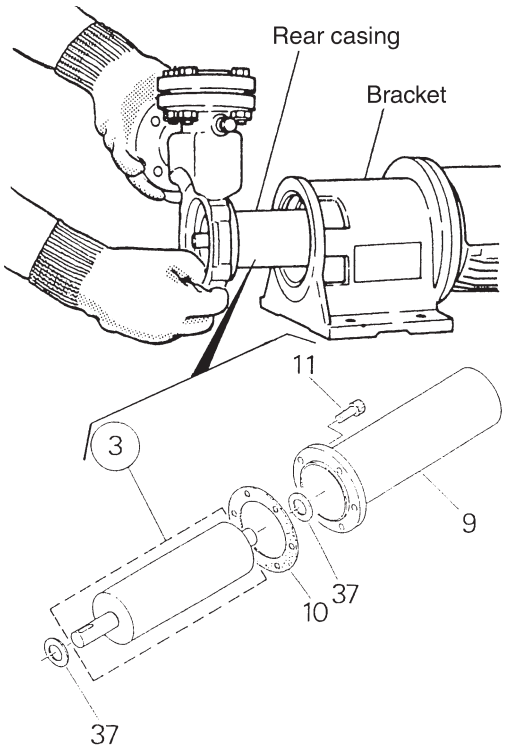
(1) Close the suction and discharge sides valves and remove a drain cap (21).
And loosen air vent cap (20) to drain the liquid from front casing (1). And flush the pump inside with clear water.



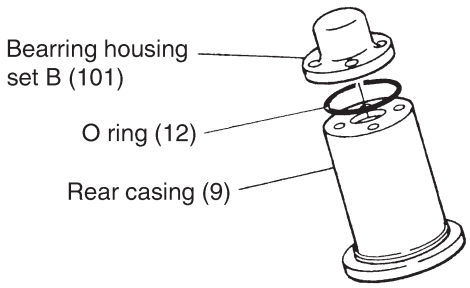
(2) Remove hex. head bolts (17) to take out a casing cover (15), gasket (16), impeller (14) and impeller key (13).



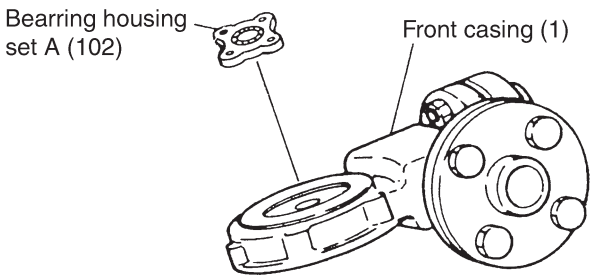
(3) Remove suction and discharge pipes and remove hex. head bolts (34) and pull out front casing (1) together with rear casing (9). If the suction flange (22) is removed, pay attention not to scratch the polished surface of check valve (23).



(4) Remove hex. socket head bolts (11) to remove rear casing (9), magnet capsule unit (3), packing (10) and thrust washers (37).



(5) Remove hex. socket head bolts (8) to remove bearing housing set B (101) and O ring (12).



(6) Remove hex. socket head bolts (8) to remove bearing housing set A (102).

4-2. Assembling

Assemble the pump in the reverse order of disassembling.

● Replacement of O ring and gasket

O ring and gasket must be replaced by new ones every time when pump is disassembled. When putting O ring and gasket, clean the sealing surface and pay attention so that O ring and gaskets can not be distorted or bitten.

● Tightening of bolts

Tighten bolts diagonally and evenly at following tightening torque.

Model	Kind of bolt	Tightening torque (N·m)	Bolt size
MDK-20, 25, 32, 40	Hex. bolt	5.2	M6 × 12L
		12.5	M8 × 12L, M8 × 16L
	Hex. socket head bolt	5.2	M6 × 12L
		12.5	M8 × 12L

● The place where the packing is inserted must be cleaned so that it can not be scratched by dust etc.
● Magnet capsule is magnetized. Before it is assembled, remove iron powder or so.
● After the assembling is finished, turn the motor or drive magnet by hand to check if it rotates smoothly.

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