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OPERATION AND MAINTENANCE

MDG-H15 and MDG-L15

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FOREWORD

This publication is a reference for the new operator and a refresher for the experienced one. Read - study - and keep it handy.

WARNING

When dealing with hazardous material it is the responsibility of the equipment user to obtain and follow all safety precautions recommended by the material manufacturer/supplier.

PRECAUTIONS

- * Do not shut the discharge or suction line off and do not run pump dry. Lack of liquid lubrication may cause excessive wear and tear of the gears or bearings.
- * Do not exceed the range of permissible liquid temperature :
0 - 45°C for type T and R
0 - 95°C for type K and B

Discharge amount varies according to the liquid temperature.

- * Do not install the pump outdoors. Permissible ambient temperature and humidity are max. 40°C and max. 85% R.H. respectively.
- * Liquids containing slurry should be prohibited, especially ferric or nickel powder because strong magnets are built in the pump.
- * A viscous fluid with more than 30 cP (5 cP for type B) cannot be handled.
- * Do not allow crystals to form in the pump.
- * Splashing on the motor may cause electric leak or burning. Provide ground wiring and a ground leakage circuit breaker.
- * Never place inflammable articles near the pump.
- * Select type R or B for haloid solvent such as flon etc. PTFE gears are swelled for such a liquid.

MODEL IDENTIFICATION

M D G - H 1 5 T A 220
[1] [2] [3] [4] [5]

[1] : Discharge pressure

H ... High pressure type

L ... Low pressure type

[2] : Pump size

15 ... 5.5 mL/rev.

[3] : Pumped liquid temp. limit and gear material

T ... 0 - 45°C PTFE gear (available for high pressure type H only)

R ... 0 - 45°C PPS gear (same as above)

K ... 0 - 95°C PTFE gear

B ... 0 - 95°C PPS gear

[4] : Motor

A ... AC

[5] : Power supply voltage

220 : 220V (single phase)

SPECIFICATIONS

Pump Model	Inlet/ Outlet	Max. capacity L/min		Max. Pressure kgf/cm ²	Max. Vacuum mmHg	Liquid viscosity Limit (CP)	Motor Output (W)	
		50Hz	60Hz				50Hz	60Hz
MDG-L15KA	PT3/8	12.5	15	2	-700	30	90	90
MDG-L15BA	PT3/8	12.5	15	2	-700	5	90	90
MDG-H15TA	PT3/8	14	17	3	-720	30	150	180
MDG-H15RA	PT3/8	14	17	3	-720	30	150	180
MDG-H15KA	PT3/8	12.5	15	3	-700	30	150	180
MDG-H15BA	PT3/8	12.5	15	3	-700	5	150	180

UNPACKING

Upon receiving the goods, inspect for external damage and check that the goods agree with your order and no bolts have become loose during shipment.

INSTALLATION

1. Install the pump as near to a suction tank as possible and be sure it is readily accessible for inspection and maintenance. The ambient temperature should be between 0°C and 40°C. Permissible humidity is max. 85% R.H.

ATTENTION

Before installing the pump, install tube connectors on the pump. Refer to 'piping'.

2. The pump should be installed lower than the liquid level of a suction tank when using open piping system.

[Note] Only types T and R can be installed higher than the liquid level, provided the liquid temperature is low. Permissible height is 0.3m while pumping water of 25°C. When installing in this manner, confirm before every start up that the pump interior is wet. If suction line is filled with water, the pump can suck up to 5m when the temperature is lower than 25°C.

3. Firmly fix the pump with screws on a foundation. Facing in any direction is permitted for installation. It is recommended that a padded sheet be placed between the pump base and the foundation to absorb vibration of the pump.

PIPING

1. Prepare two PT3/8" tube connectors. Tape tem with PTFE seal tapes.
2. Screw the connectors into the inlet and outlet ports. When screwing, hold the pump head up to prevent the mounting plate (5) from undergoing excessive force. Do not press down on the pump.
3. Prepare corrosion - and pressure - resistant tubes.

A polyethylene, PTFE or spring - reinforced PVC tube is recommended for flexible tubing. Do not use a soft vinyl hose for the suction line because it may become deformed, when pumping hot water especially. To absorb vibration of the pump, flexible tubing is always recommended.

4. Firmly fix the tubes with the tube connectors.

If the suction line is incompletely connected, the pumping performance will deteriorate due to air leakage.

5. The best piping arrangement for minimum loss is based on straight runs with as few bends and fittings as possible.

WIRING

1. After the power voltage is checked, install wiring in accordance with the job standard for indoor wiring.
2. Connect a ground wire securely.

OPERATION

1. Fully open the discharge valve after confirming that a suction tank is filled with a liquid.
2. Fully open the suction valve and fill the pump with the liquid. If the pump is installed higher than the liquid level, pour the liquid into the pump from the discharge line.
3. Turn on the power. The liquid flows out instantly. Should no liquid be discharged, turn off the power immediately. Check piping system. If it is in order, disassemble the pump head and clean its interior with fresh water and remove foreign matter.
4. Close the discharge valve gradually to adjust the flow rate.

CAUTION

- * Always operate the valve gradually. Rapid operation may cause disengagement of magnet coupling.
- * Turn off the power immediately when the magnet coupling is disengaged or the gears are locked with foreign matter. Do not turn on the power again while the rotor of motor still rotates by inertia after turning off the power.
- * Avoid controlling flow rate by closing the suction valve. Closing of the suction valve makes the operation noise louder and shortens the life of bearings due to cavitation.

MAINTENANCE

1. Periodically check flow rate, suction/discharge pressure, amperage, vibration and noise.
2. Replace the gears (12 & 15) and the bearings (11) when the pump performance is excessively lowered or noise becomes louder. The seal (14) should be replaced with every disassembling.

[Reference] When pumping water of 25°C temperature at 2kgf/cm² pressure, the decrease in performance is less than 20% after 5,000 hours of operation.

3. The SPARE KIT is provided as an option. It consists of drive gear, driven gear, bearing and seal.

DISASSEMBLING

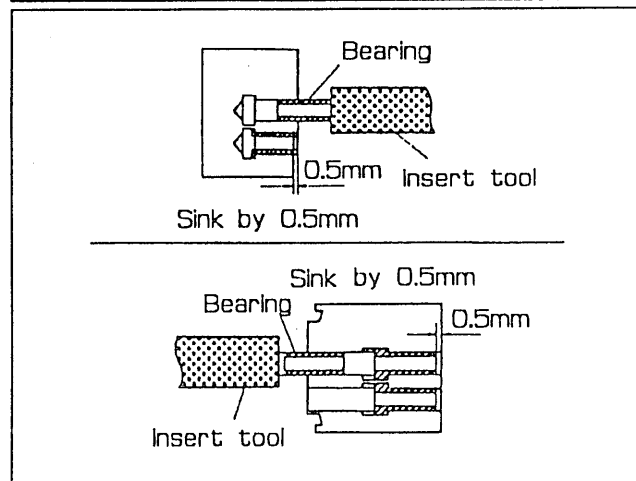
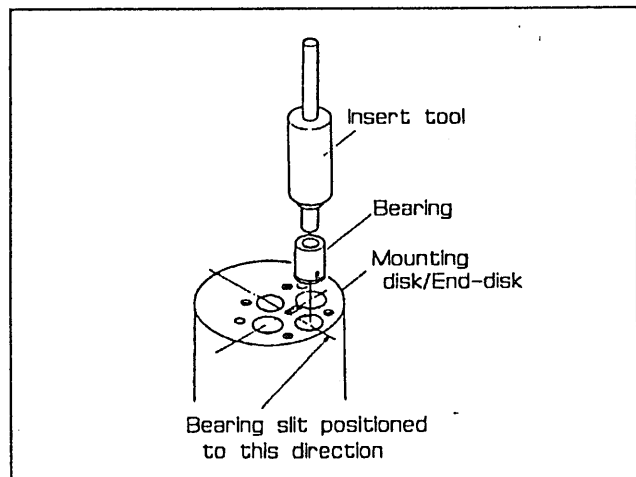
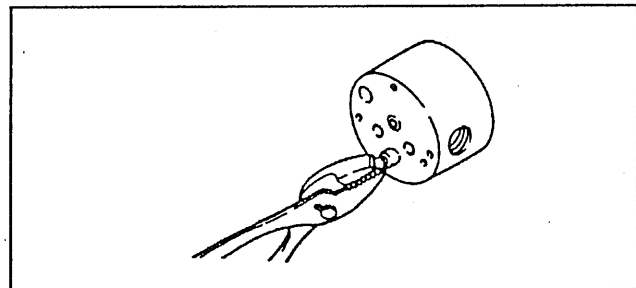
WARNING

Protect yourself by using protective equipment such as chemical gloves, face shield, chemical apron, etc. when disassembling a pump which has handled any hazardous liquid. Close all valves and turn off the power before disassembly.

1. Drain the pump by disconnecting tubing.
2. Remove six screws (19) and disconnect the pump unit from motor (1).
3. Remove six screws (17) and disconnect mounting plate (5) and rear casing (7) from the pump unit.
4. Remove a screw (6) and remove a magnet capsule (8) from driving gear shaft (15). Keep magnet capsule (8) in a clean place free from iron powder.
5. Loosen four screws (18) with a hexagon key, and remove end-disk (16), gear case (13), mounting disk (10), four straight pins (20), two seals (14), driving gear (15), driven gear (12) (driven gear shaft (23), spacer (24) for type R and B).
6. Be careful not to bruise the seal surface of any part. Keep every part in a clean place free from dust after cleaning.

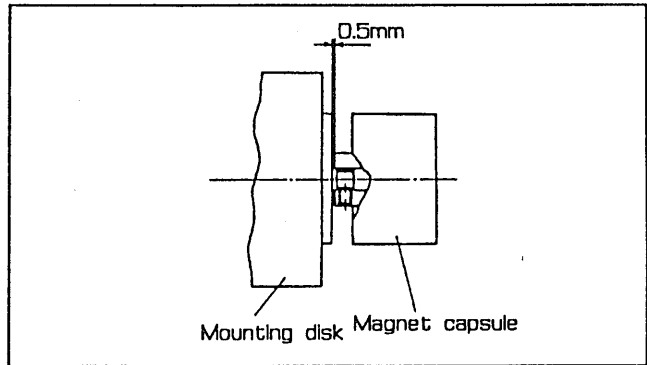
REPLACEMENT OF BEARING

1. Remove six bearings (11) (three pcs for type R and B) from mounting disk (10) and end-disk (16). To draw them out easily, screw an M8 bolt into each worn bearing by about 5mm and pull it out together with the bearing.
2. Insert a new bearing into mounting disk (10) and end-disk (16). In this case, position the slit of bearing as shown on the fig. right and insert the bearing in the manner that the slit is pressed by fingers. The bearing end is sunk by 0.5mm from the disk end. Care to be taken that the bearing goes straight into bearing hole.
3. The bearings are inserted on the mounting-disk (10) from both sides.
4. After new six bearings (three pcs for type R & B) are mounted, the reamer of 7.15mm dia. is inserted into bearing to make bearing surface smooth.



ASSEMBLING

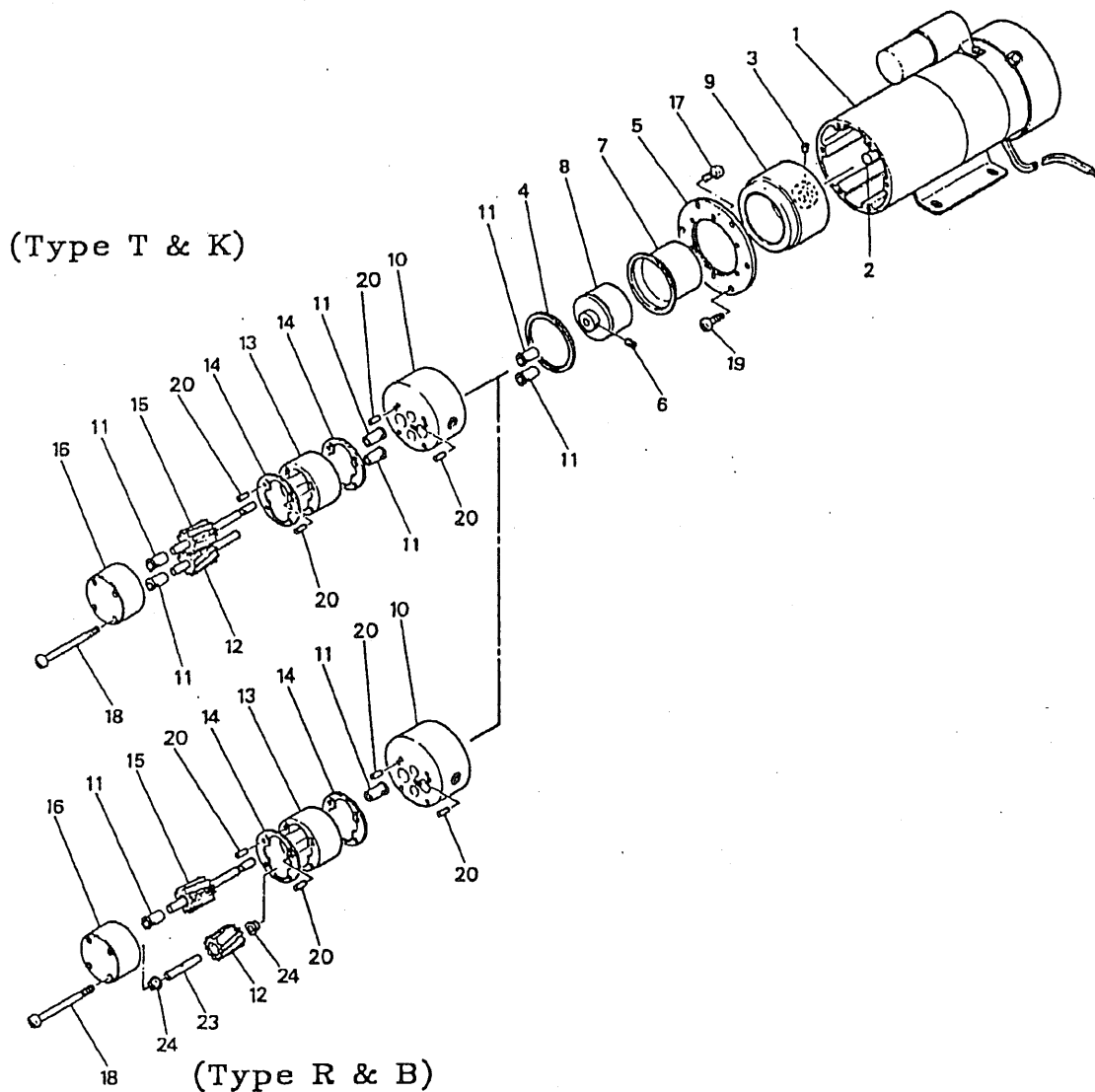
1. Insert driving gear (15) and driven gear (12) (driven gear shaft 23 & spacer 24 for type R & B) into the mounting disk (10).
2. Stand two straight pins (20) on the mounting disk (10), and put a piece of seal (14) and gear case (14) on it. Stand two straight pins (20) on gear case (13) and put a piece of seal (14) and end-disk. And these end-disk, seal and gear case are put and tightened on mounting disk by the screws (18).
3. Magnet capsule (8) is fixed to the shaft of driving gear (15) by screw (6). In this case, the magnet capsule should be apart from the mounting disk by 0.5mm (the screw hole of magnet capsule is positioned to the groove of the shaft).
4. Rear casing (7) and mounting plate (5) are mounted on the so far assembled pump head by six screws (2). In this case, chamfered side of mounting plate is faced to mounting disk. When the screws are tightened, take care of the concentricity of each part. Mount the pump end on the motor (1) with drive magnet (9) by six screws (19).



TROUBLESHOOTING

Trouble	Cause	Remedy
Motor does not start	<ul style="list-style-type: none"> * Plug is disconnected from plug receptacle. * Break of wire of motor. * Electric leakage or too small capacity of breaker. 	<ul style="list-style-type: none"> * Plug in receptacle. * Repair or change motor. * Check the cause and restart.
Motor starts but speed does not increase and overloaded	<ul style="list-style-type: none"> * Too high liquid viscosity * Completely closed valve * Too high friction loss of piping 	<ul style="list-style-type: none"> * Open valve * Improve piping system
Motor stops during operation	<ul style="list-style-type: none"> * Disconnected wiring * Thermal overload protection operated due to over load. * Breaker operated due to leakage 	<ul style="list-style-type: none"> * Check wiring * Lower liquid viscosity or discharge pressure * Check wiring & motor
No pumping up or insufficient pumping up	<ul style="list-style-type: none"> * Short of liquid in suction tank. * Air enters suction line * Suction hose is deformed. * Suction pressure is lower than saturated vapour pressure of liquid. * Gears worn. 	<ul style="list-style-type: none"> * Fill suction tank. * Check suction line piping and upgrade. * Replace with hose that cannot be deformed. * Lower liquid temperature and/or friction loss in suction piping. * Replace gear unit.
Magnet coupling is disconnected.	<ul style="list-style-type: none"> * Foreign matter sticks to gear. * Magnet capsule contacts rear casing due to excessive wear of bearing and/or drive gear shaft. * Gear is damaged due to dry running etc. 	<ul style="list-style-type: none"> * Remove foreign matter * Replace gear with bearing and/or drive gear shaft. * Replace gear
Loud noise or vibration	<ul style="list-style-type: none"> * Pump runs dry. * Foreign matter sticks to gear. * Driven magnet contacts rear casing due to wear of drive shaft. * Gear is damaged. 	<ul style="list-style-type: none"> * Check that pump is filled with liquid. * Remove foreign matter. * Change drive shaft. * Replace gear.
Leakage from pump body	<ul style="list-style-type: none"> * O-ring is deformed. * Screw is loose. 	<ul style="list-style-type: none"> * Replace O-ring. * Tighten screw.

CONSTRUCTION



Item	Part Name	Req'd Q'ty
1	Motor	1
2	Motor shaft	1
3	Hex. hole screw	1
4	Gasket	1
5	Mounting plate	1
6	Hex. hole screw	1
7	Rear Casing	1
8	Magnet capsule	1
9	Drive magnet	1
10	Mounting disk	1
11	Bearing * three for type R & B	6

Item	Part Name	Req'd Q'ty
12	Driven gear	1
13	Gear case	1
14	Seal	2
15	Drive gear	1
16	End disk	1
17	Screw M4x8	6
18	Screw M4x55	4
19	Screw M5x12	6
20	Straight pin	4
23	Driven gear shaft (for type R & B only)	1
24	Spacer (for type R & B only)	2