



IWAKI Magnet Gear Pump

MDG-M15

Instruction Manual

 Δ Read this manual before use of product

This instruction manual provides you with details of the correct handling method, maintenance and inspection procedure, and troubleshooting guide for the pump. Read this manual carefully to ensure the maximum performance and safe and long service of the pump.

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Export Restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control.

Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

Safety Instruction

Warning

• Turn off power before service Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed



Stop operation

If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.



• Do not use the pump in any condition other than its intended purpose



Do not rework

or alter

The use of the pump in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.

• Do not modify the pump

Alterations to the pump carries a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the pump.

Wear protective clothing

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific Wear protection solution will dictate the degree of protection. Refer to SDS precautions from the solution supplier.

Caution

- Do not use a damaged pump Use of a damaged pump could lead to leakage or electric shock.
- Do not use the pump in a wet location The pump is not waterproof or dust-proof. Use of the pump in wet or extremely humid locations could lead to electric shock or short circuit.
- Do not damage the power cable Do not pull, knot, or crush the power cable. Damage to the power cable could lead to a fire or electrical shock if cut or broken.
- Do not cover the motor

The cover may accumulate heat inside the motor, resulting in a fire or failure. Ventilate the motor sufficiently.

Grounding

Risk of electric shock. Always properly ground the pump. Conform to local electric codes.



Caution

Qualified personnel only

The pump should be handled or operated by qualified personnel with a full understanding of the pump. Any person not familiar with the product should not take part in the operation or maintenance of the pump.

Use specified power only

Do not apply power other than that specified on the nameplate. Otherwise, failure or fire may result. Ensure the pump is properly grounded.

· Keep electric parts and wiring dry Risk of fire or electric shock. Install the pump where it can be kept dry.

Ventilation

Fumes or vapors can be hazardous with certain solutions. Ensure proper ventilation at the operation site.

Spill precautions

Ensure protection and containment of solution in the event of plumbing or pump damage (secondary containment).



Power cable cannot be replaced

(earth leakage breaker) separately.

Install a GFCI (earth leakage breaker)

Risk of electric shock. Purchase and install a GFCI

Do not use any damaged power cable for the prevention of a fire or electrical shock. The cable is not replaceable, so that the whole pump unit needs to be replaced when the cable is damaged.

Caution

- **Flectrical Shock**
- Preventative maintenance Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.
- Do not install/store the pump:
 - In a flammable atmosphere.

• Where ambient temperature can exceed 0-40°C.

• Disposal of a used pump

Dispose of any used or damaged pump in accordance with local rules and regulations. If necessary, consult a licensed industrial waste disposal company.



Electrical Shock







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Prohibited





Inspection and Unpacking

1

MAY DDECOUDE		2/min
MMA. PRESSURE		MPa
SINGLE PHASE INDUCT	ION MOTOR	
POLES	SPEED	rpm
VOLTAGE V	RATING	CONT.
CURRENT A		
OUTPUT W	INSULATION CL	ASS E
POWER CONSUMPTION	THERMALLY PROT	ECTED
W	INDOOR USE ONI	Y
FREQUENCY Hz	Year :	
OUTPUT W POWER CONSUMPTION W FREQUENCY Hz	INSULATION CL THERMALLY PROT INDOOR USE ONI Year :	ASS E Ectei Ly

After unpacking the pump, check the following points to confirm that the product conforms with your order. If you find anything wrong, please contact the dealer you placed your order with.

- Do the model of the pump, discharge, discharge pressure, voltage, and other specifications indicated on the nameplate correspond with those of the pump ordered by you?
- Is the product not damaged or are the nuts and bolts not loosened during delivery? Please examine by sigrt or touch.

) Principle of Operation



The Iwaki Magnet Gear Pump comprises a pair of gears driven by a magnet coupling and casing in which the gears are precisely fitted. (Fig. A) Liquid sent from the IN side is fed into the grooves between the teeth of the gears and is transferred to the OUT side by the rotation of the gears. (Fig. B)

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Then, the liquid is forced out of the grooves between the gear teeth by meshing of the gears. (Fig. C)

Pump Identification Codes MDG— M15 <u>S</u><u>3</u><u>B</u> ① ② ③ (1)Applicable liquid temperature ranges S: For a temperature range of 0~50°C T: For a temperature range of 0~95°C 2 Maximum discharge pressure (Note) 3: 0.3MPa 2: 0.2MPa ③ Connection B: 3/8NPT A: RC3/8 ④ Power voltage 115: AC115V single phase 100: AC100V single phase 220: AC220 \sim 240V single phase 200: AC200V single phase 203: AC200V three phases

Note: The MDG-M15S·T3 type uses different motor, magnet coupling, and gear assembly elements from the MDG-M15T2 type. These parts are not interchangeable between the two types.

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No.	Name	Name	Num- ber		
1	Motor	1	25	Cap	1
4	Driving magnet ass'y	1	28	Screw M3×10	6
5	Rear casing	4			
6	Magnet capsule	1	30	Screw (Note 2)	4
7	Mounting plate	1	36	Plate B	1
9	Driving gear shaft	1			
10	Gasket (Note 1)	(1)	38	Driving gear	1
11	Oring	1	39	Driven gear	1
19	Pump body	1	40	Pin A	1
20	Shaft spring	1	41	Pin B	2

Note 1: Only in MDG-M15T3 type

Note 2: M4 \times 35: MDG – M15S \cdot T3 type, M4 \times 30: MDG – M15T2 type

5) Precautionary measures



■ Do not operate the pump dry or with the discharge or suction side closed. Otherwise, the gears and bearings are worn out rapidly.



Applicable liquid temperature ranges

- S type: 0~50°C
- T type: 0~95°C

If a solvent is pumped, the pump may stop due to gear expansion. Contact your dealer for details.



- Viscosity of liquid
- S type: Max. 30mPa.s
- T type: Max. 50mPa.s



■ Do not use the pump for the circulation of slurry liquid or liquid that begins to crystallize when stationary.



Do not cover the motor unit tightly with a cover, etc. Avoid operating the pump at an ambient temperature above 40°C. The relative humidity should be below 85%.

■ Do not splash water on the motor. This may cause an electric leak or burning. 6) Installation, Piping and Wiring



Flooded suction method



Installation

- Choose a place which has an ambient temperature below40°C and a relative humidity less than 85%, and is convenient for maintenance and checking. The pump must not be installed outdoors.
- Install the pump in a position lower than the surface of the liquid in the tank on the suction side, to prevent dry running (flooded suction method).

Priming method

(If the pump chamber is wet)

 There is no liquid in the suction piping. (This is not permitted in the T type.)



② There is liquid inside the suction piping.



If it is necessary to install an S type pump in a position in which the inlet of the pump remains higher than the liquid surface (a suction lift), refer to the illustrations on the left. In this position, the pump does not suck unless the pump chamber is wet. (The T type pumps do not function on a suction lift.)







Use M6 screws to fix the pump. If the floor on which it is installed is resonant and causes a loud noise, fix the pump with rubber mountings.

Piping

- ✤In order to reduce the friction resistance of liquid, the piping should be as short and with as few bends as possible.
- The inlet and outlet joints of the pump should be completely sealed with sealing tape, etc., to prevent them from sucking in air. If sealing is inadequate on the suction side, in particular, air is sucked in and the performance of the pump is lowered.
- For connection, use a thick-walled hose which can withstand pump pressure. Since the hose on the suction side, in particular, tends to be crushed by sucking force, the use of a Teflon hose or something similar is recommended. (In the case of hot liquid, special care should be taken.)

- Connection Diagram
- Single-phase 100V
- Single-phase 200V

Thermal protector



• Three-phase 200V



Be careful, during piping, not to allow the entry of small piece(s) of seal tape or any adhesive into the pump or the piping.

Wiring

- Use proper wiring elements. Wiring should be carried out in accordance with the technical standard of electric installation and interior wiring regulations, referring to the diagram presented herein.
- Make sure to arrange a ground wire or make use of the ground terminal provided (marked E).
- Single-phase 115V



• Single-phase 220V~240V



Rated Current Starting Current Type of Pump Voltage (A) (A) $MDG-M15 \square 3 \square 100$ 1ø100V 3.3/3.7 8.5/8.2 MDG-M15 🗆 3 🗆 115 1ø115V 7.8/7.4 3.2/3.31ø200V MDG-M15 🗆 3 🗆 200 1.86/1.96 5.2/4.6 $1\phi 220/240V$ $MDG-M15 \square 3 \square 220$ 1.5/1.664.2/3.73¢200V $MDG-M15 \square 3 \square 203$ 1.12/1.16 3.5/3.4

Rated Electric Current Value/Starting Current Value

Operation

Notes on Operation

- Running the pump dry is strictly prohibited. This will damage the inside of the pump.
- Never operate the pump with the valves closed. The bearing will be abnormally worn out.
- If the liquid is subject to solidification or settlement, carry out the cleaning of the system at a halt.
- Ouring he cold weather season, keep the system at a certain ambient temperature to prevent freezing.
- When restarting pump operation after a long period of stop, carry out a check in the same manner as when initially starting up the pump.

Operation

After pump installation, piping, and wiring, carry out the following start-up procedure.

No.	Item	Checkpoints
1	Piping, wiring, and voltage check	 Check piping and electrical wiring, referring to descriptions in piping and wiring sections. Confirm that power voltage is appropriate.
2	Valve check	 Valves on suction side and discharge side should be fully opened.
3	Check liquid in pump.	 When pump is used to suck up liquid, prime pump sufficiently.
4	Starting up	• After checking items 1~3 above, turn ON pump power supply. Check whether pump feeds liquid smoothly. If not, turn OFF power supply at once and eliminate cause of trouble, referring to section "Causes of Trouble and Troubleshooting" on page 16.
5	Operation	 Adjust valve gradually, to obtain specified values of discharge, pressure, or degree of vacuum. Do not open/close suction port and discharge port suddenly. This may lead to disengagement of magnet coupling, resulting in stoppage of gear rotation. If this happens, turn OFF power supply. After confirming that motor has completely stopped, restart motor operation. Do not operate pump with discharge valve and/or suction valve completely or almost closed.
6	During operation	 Be careful not to allow foreign matters to enter pump. Foreign matters may lead to gear lock or abnormal wear of gear. If earth leakage breaker is actuated, reset it only after carefully examining cause of actuation. Be sure to turn OFF power supply before examining cause.

8) Maintenance and Inspection

■ Daily inspection

Pay attention to the following points while the pump is in operation. If an abnormality occurs, immediately stop the operation and take the appropriate measures by referring to the "Causes of Trouble and Troubleshooting" section on page 16. In addition, observe the replacement timing specified for each consumable part.

No.	CheckPoint	Details of Check	Checking Method
1	Is pump transferring liquid properly?	 Whether liquid is transferred Whether suction and discharge pressures are at normal levels 	 Flow meter or visual check Collation with nameplate
2	Is there abnormal noise or vibration?	 If pump does not function normally, abnormal noise or vibration tends to be generated. Base on which pump is mounted sometimes becomes resonant, increasing noise. If separation of pump from base decreases noise, antivibration measure such as anti-vibration rubber should be mounted. 	 Visual and hearing check Visual and hearing check
3	Is liquid leaking or air being sucked out from joints of pump?	 Clamp connections more tightly. If many air bubbles are found in discharged liquid, air is being sucked out. Examine piping and clamp connection more tightly. 	• Visual check
4	Is temperature of pump unit surface, motor surface, etc., abnormally high?	 Pump unit surface temperature is same as that of liquid handled. Temperature of motor surface is usually within 40°C above ambient temperature. Sometimes it is too hot to touch, but it is normal if temperature is within this range. 	• By touching or with thermo- meter

Consumable Parts

No.	Part Na	Part Name Replacement Period (Note)				
38	Driving gear					
39	Driven gear			 SK-M15-3 for MDG-M15S·T3 		
9	Driving gear shaft		5,000 hours	• SK-M15-2 for MDG-M15T2		
40	Pin A					

Note: The above replacement period has been estimated based on the length of time in which the initial flow rate of clear water at normal temperature under a pressure of 0.2MPa is lowered by 20%.

Motor can be Motor Annual Company Company Company Company Common Press Anna Common Press Anna Commanda Comman	rpm does not started. increase,	resulting in Cause overcurrent	O Power plug is out of socket.	O Contact is poor or broken somewhere in wiring.	O Motor malfunction (wire disconnection, capacitor malfunction)	Thermal protector is activated by overload.	O Earth leakage breaker is activated by leak.	Dry running	Aîr enters through suction side.	Suction piping is crushed.	Pressure in inlet portion is lowered below saturated vapor pressure of liquid.	O Viscosity of liquid is too high.	Foreign matter sticks to gears.	O Gear is damaged.	O Magnet capsule hits rear casing.	High temperature causes gear lock.	O ring is damaged.	Bolt is loosed.		O Valve is closed.
fotor Mot tons sta	uring rpm sration in	resi		0		0	0									0				-
Liquid cannot be numped up	or pumping is insufficient. op							0	0	0	0			0						
Magnet	comes				4								0	0	0	0			С	,
Liquid								0					0	0	0					
Too much noise or	vibration		1														0	0		
/	/	Countermeasure	Insert plug into socket.	Check and repair as necessary.	Repair or replace as necessary.	Lower viscosity of liquid and discharge pressure.	Check wiring and motor, and repair or replace as necessary.	Confirm that pump is supplied with sufficient liquid.	Fix suction so that air will not enter.	Fix piping so that no leakage will occur.	Lower liquid temperature or decrease piping resistance.	Lower viscosity.	Disassemble to remove foreign matter.	Replace gear.	Disassemble, and repair or replace parts as necessary.	Assemble S type gasket	Replace O ring.	Tighten bolt.	Open valve	

9 Causes of Trouble and Troubleshooting

10) Disassembling and Reassembling



Disassembling Procedure

There may be some liquid remaining in the pump. Take special care while disassembling the pump.

- Our Strews four screws (29) to detach the pump unit from the motor unit.
- ③ Unscrew the screw (28) to remove the mounting plate (7), rear casing (5), magnet capsule (6), in that order.
- ③ Unscrew the screw (30) to remove the plate B (36), gear case (37), driving gear (38), driven gear (39), gasket (10) (Note), pin A (40), pin B (41), driving gear shaft (9), and shaft spring (20), in that order. (Note: Used only in MDG-M15T3 type)
- Remove the O ring (11). Place all the disassembled elements in a clean place and make sure they do not get scratched or damaged. Pay special attention in choosing the place for the magnet capsule (6), to prevent iron powder from adhering inside it.

Reassembling Procedure

Follow the reverse sequence of disassembling, and note the following instructions.

- ♦ Insert pin B (41) into the pump body (19). On the basis of this result, assemble the gasket (10), gear case (37), etc., as shown in the figure. Make sure the polished surface of plate B (36) is directed to the gear case.
- ♦ Screw the screws (30) with equal tightening torque (Torque: 1N.m)
- If the O ring is scratched or damaged, replace it with a new one.
- When any of the consumable parts driving gear (38), driven gear (39), pin A (40), and driving gear shaft (9) reaches its life limit, replace all of the parts with new ones.

11) Performance and Sizes

			Max.	Attaina-	Mot	or Specific	ations (50	(60Hz)	
Туре	Pump Bore Diameter	Max. Discharge (ℓ/min)	Discharge Pressure MPa	ble Degree of Vacuum kPa(abs.)	Rated Voltage (V)	Rated Current (A)	Rated Output (W)	Туре	Weight (kg)
MDG-M15S3A100	RC 3/8	14/17	0.3	5.33	1 ¢ 100V	3.3/3.7	150/180	÷ ه پ ه	9.6
MDG-M15T3A100	RC 3/8	12.5/15	0.3	8.00	1 ø 100V	3.3/3.7	150/180	2P induction motor	9.6
MDG-M15S3B220	3/8NPT	14/17	0.3	5.33	3 ¢ 220/240V	1.5/1.66	150/180	capacitor run	9.8
MDG-M15T3B220	3/8NPT	12.5/15	0.3	8.00	3 ¢ 220/240V	1.5/1.66	150/180		9.8

Performance

Outer Dimensions



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