

IWAKI
Magnet Gear Pump

Model MDG-R2

Instruction Manual

 Read this manual before use of product

Thank you for having selected the Iwaki Magnetic Gear Pump Model MDG-R2. This manual deals with the correct handling and operation procedures and troubleshooting methods for the pump. To make maximum use of the pump and to ensure safe, long operation, please read this manual carefully prior to operating the pump. Pay special attention to the "Warning" and "Caution" sections as they relate to matters of safety and proper usage of the pump. This instruction manual should be kept on hand by the end user for quick reference.



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Important Instruction

For the Safe and Correct Handling of the Pump

- Read the "Safety Instructions" sections carefully to prevent accidents involving your customers or other personnel and to avoid damage or loss of other assets. Always follow the instructions and advice found in these sections.
- Observe and abide by the instructions described in this manual. These instructions are very important for protecting pump users from dangerous conditions and situations related with the use of the pump system.
- The symbols relate to the following meanings described below:

 Warning	Nonobservance or misapplication of the contents of the "Warning" section could lead to a serious accident, including death or injury.
 Caution	Nonobservance or misapplication of the contents of the "Caution" section could lead to serious physical injury to the user or serious damage to the product.

Types of Symbols



Indicates that "Warning" or "Caution" must be exercised. Inside this triangle, a concrete and practical image provided as a warning or caution message is depicted.



Indicates a prohibited action or procedure. Inside or near this circle, a concrete and practical image of the activity to be avoided is depicted.



Indicates an important action or procedure which must be performed or carried out without fail. Failure to follow the instructions herein can lead to malfunction or damage to the pump.

1. Safety Instruction

Warning

- **Turn off power supply.**
Working without disconnecting the power supply may cause an electrical shock. Before engaging upon any working procedures involving the pump, make sure to turn the power supply switch off and to stop the pump and other related devices.
- **Terminate operation.**
When you detect or become aware of a dangerous sign or abnormal condition during operation, terminate the operation immediately and start it from the beginning again.
- **For specified application only.**
The use of a pump in an 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.
- **No remodeling.**
Never remodel a pump. Otherwise, a serious accident may result. Iwaki will not be responsible for any accident or damage of any kind which is caused by the user remodeling the pump without first obtaining permission or instructions from Iwaki.
- **Wear protectors.**
If you touch or come in contact with any type of hazardous chemical liquid, including but not limited to chemicals, you may experience a serious injury. Wear protective gear (protective mask, gloves, etc.) during the pump operation.



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 or operate the pump. Pump operators must have a sound knowledge of the pump and its operation.
- **Specified power only.**
Do not operate the pump on voltage which is not specified on the nameplate. Failure to do so may result in damage or fire. Only the specified power level is to be applied.
- **Do not wet or dampen.**
If the motor or wiring cable becomes wet or dampened with the operating liquid by mistake, this may result in a fire or cause an electrical shock. Install the motor and wiring cable in positions which are not likely to become wet or dampened with any liquid.
- **Ventilate.**
Poisoning may result during an operation which involves toxic or odorous liquid. Ventilate the operating site sufficiently.
- **Spill-out accident.**
Protective measures should be taken against any accidental spill-out or leakage of the operating liquid as a result of unexpected damage on the pump or the related piping.



Caution

● **Damaged pump.**

Never operate a damaged pump. A damaged pump may cause leakage or electrical shock.



Prohibited

● **Operating site must be free of water and humidity.**

The pump is not designed to be water-proof or dust-proof. The use of the pump in places where water splashes or humidity is high may result in an electrical shock or short circuit.



Prohibited

● **Do not damage or change power cable.**

Do not scratch, damage, process, or pull the power cable forcibly. An extra load onto the cable, such as heating the cable or placing something heavy on the cable, may damage the cable and finally cause a fire or an electrical shock.



Caution

● **Do not cover the motor.**

Running a covered motor may accumulate heat inside the motor and cause a fire or a mechanical failure. Ventilate the motor sufficiently.



● **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

Caution

● **Install an earth leakage breaker (option).**

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



Electrical Shock

● **Power cable cannot be replaced.**

Never use a damaged or affected power cable. Otherwise, a fire or an electrical shock may result. Handle the power cable carefully, as it cannot be replaced with a new cable. (The pump unit itself must be replaced in that circumstance.)



Caution

● **Limited operating site and storage.**

Do not install or store the pump in the following places:

- * Places where a flammable gas or material is used or stored.
- * Places where the ambient temperature is extremely high (40°C or higher) or extremely low (0°C or lower).



Prohibited

● **Do not drain the liquid in the site.**

The liquid discharged out of the pump, including a hazardous chemical liquid, must be drained into a special container. Never drain such liquid directly onto the floor in or near the operation site.



Prohibited

● **Disposal of used pump.**

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



2. Inspection and Unpacking

For safe use and correct handling of the pump, confirm the application purpose and performance limits of the pump as well as the dangerous aspects of the operation before using the pump.

- [1] Do the model of the pump, discharge, discharge pressure, voltage, and other items marked on the nameplate represent what you ordered?
- [2] Has the product been damaged or nuts and bolts been loosened during delivery? Please examine visually or by touch.

※ **Contact your dealer if you have any questions or if you have found any discrepancy in the contents of the delivered package.**

- [3] The third numeral of MFG.No. shows the year the product was manufactured.
(e.g.) ×××6×××
"6" Shows the product was manufactured in the year 1996



With AC motor



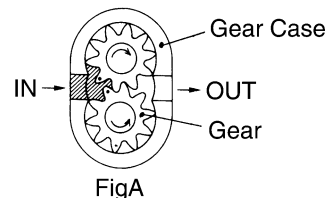
With DC motor

3. Principle of Operation

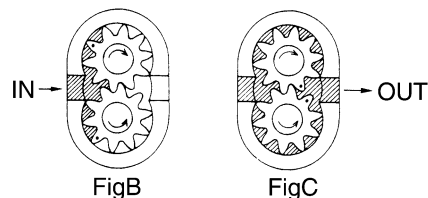
The Iwaki Magnet Gear Pump comprises a pair of gears driven by a magnet coupling and casing in which the gears are fitted exactly. (Fig. A)

Liquid introduced from the IN side feeds into the grooves between the teeth of the gears and is transferred to the OUT side by rotation of the gears. (Fig. B)

Then, the liquid is forced out of the grooves between the gear teeth in engagement. (Fig. C)



FigA



FigB

FigC

4. Pump Identification Codes

MDG - R 2 R V A 230 - 01

(1) (2) (3) (4) (5) (6) (7)

- (1) Pump model
- (2) Nominal discharge
2:0.7ml/rev
- (3) Liquid temperature
R: 0~50deg.C
B: 0~95deg.C
- (4) Relief valve
No code: without relief valve
V: with relief valve
- (5) Connection
A: Rc 1/8
B: 1/8 NPT
C: G 1/4
- (6) Line voltage
115: AC115V
230: AC220~240V
24: DC24V
24H: DC24V
- (7) Non-standard specification code
01~99: Non-standard
No code: Standard

4-1. Specification

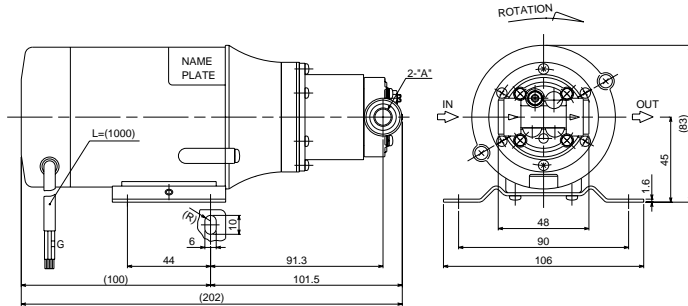
50/60Hz

Model	Max. discharge (l/min)	Max. discharge pressure (Mpa)	Attainable vacuum (Kpa)	Rated speed (rpm)	Motor specification		Mass (kgf)
					Rated voltage (V)	Rated current (A)	
MDG-R2RV()115	1.8/2.1	0.3	5.33	2600/ 3200	AC115	0.45/0.45	2.1
MDG-R2RV()230					AC220~240	0.25/0.26	
MDG-R2BV()115	1.6/1.9				AC115	0.45/0.45	
MDG-R2BV()230					AC220~240	0.25/0.26	
MDG-R2B()115					AC115	0.45/0.45	
MDG-R2B()230					AC220~240	0.25/0.26	
MDG-R2B()24	1.7	0.15		2800		1.0	1.1
MDG-R2RV()24H	1.8	0.3	2000	DC24	1.2		
MDG-R2B()24H	1.7						

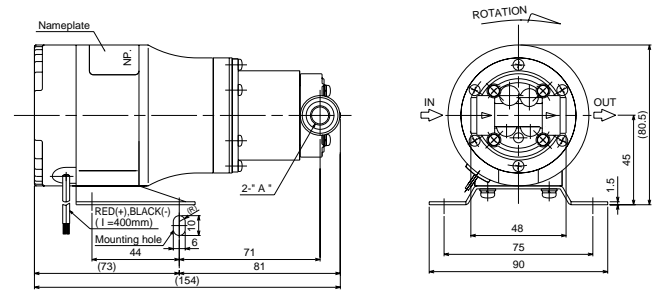
- Note 1. The above is the performance based on a test of clean water at 25deg.C.
(The discharge changes depending on the temperature of the liquid used. Further information is available on request.)
- 2. The liquid viscosity applicable to the pump is 50mPa-s or lower for pump with AC motor and 10mPa-s for pump with DC motor.
 - 3. The ambient temperature should be 0~40deg.C.
 - 4. The MDG-R2()V pump is equipped with a built-in relief valve.

5. External Dimensions

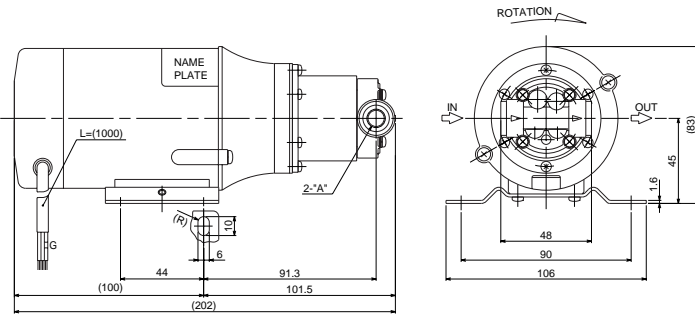
With AC motor
 MDG-R2BV()type
 MDG-R2RV()type



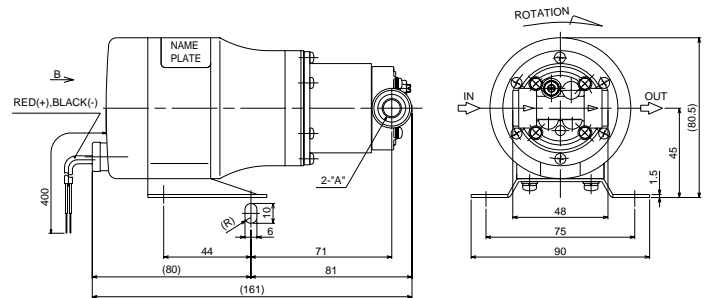
With DC motor
 MDG-R2B()24



MDG-R2B()type

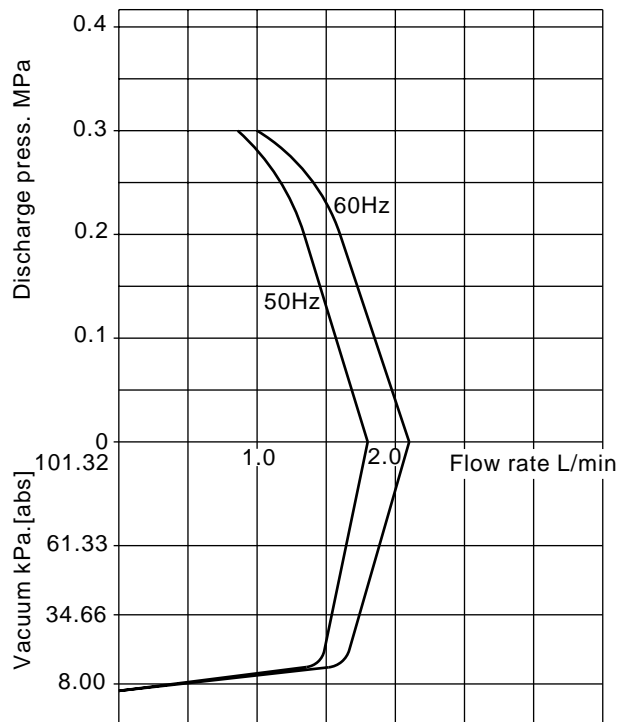


MDG-R2RV()24H
 MDG-R2B()24H



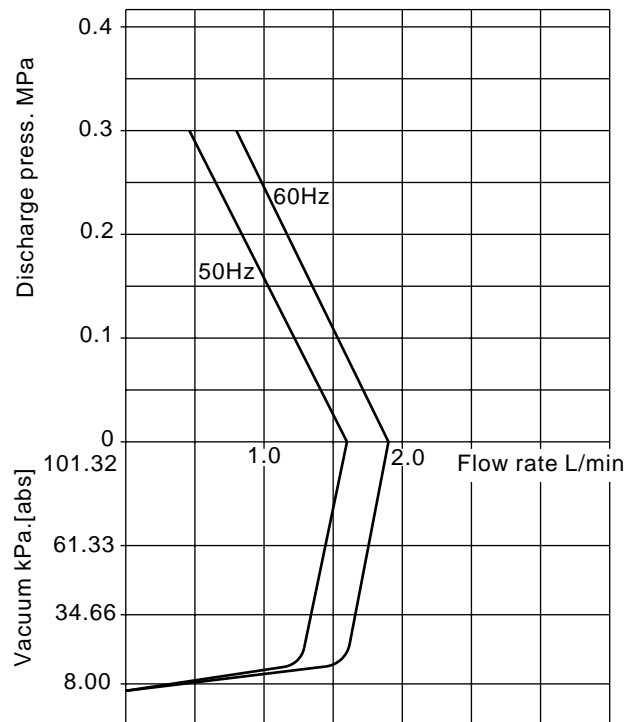
6. Standard Performance Curve

MDG-R2RV()type (with AC motor)

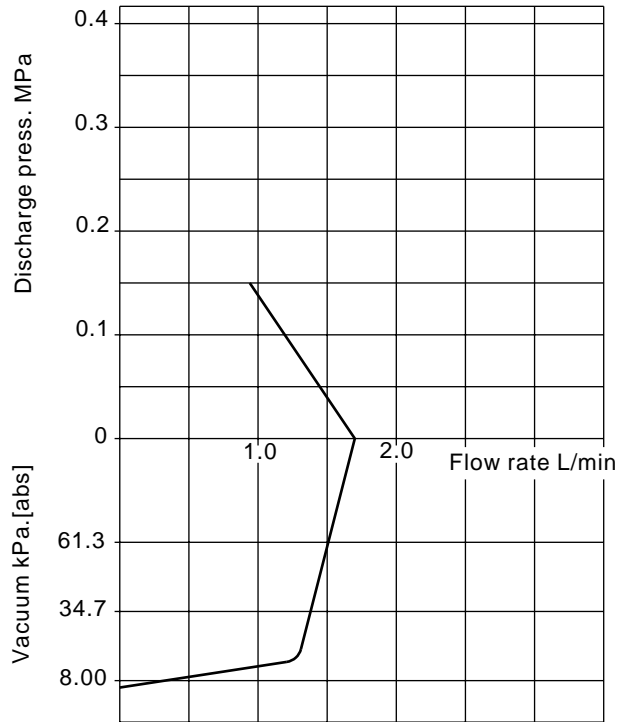


MDG-R2BV()type (with AC motor)

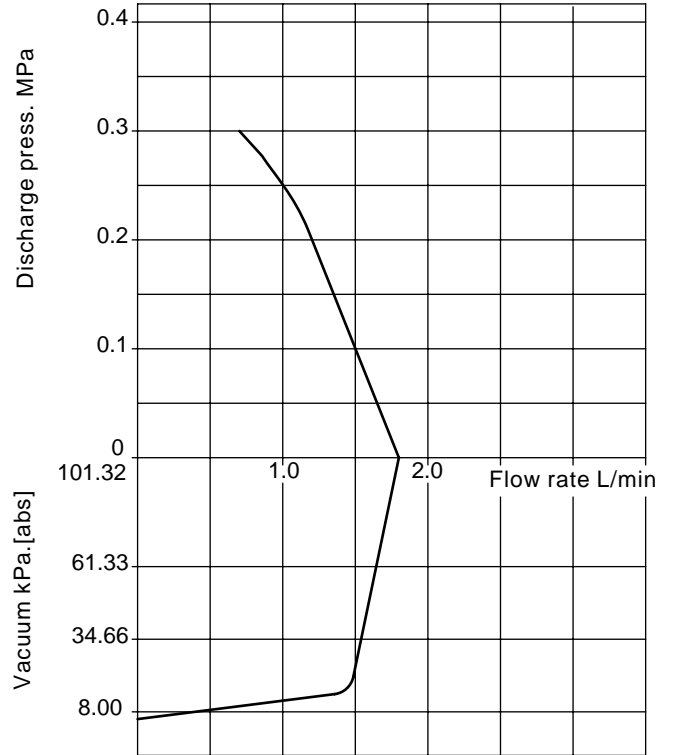
MDG-R2B()type (with AC motor)



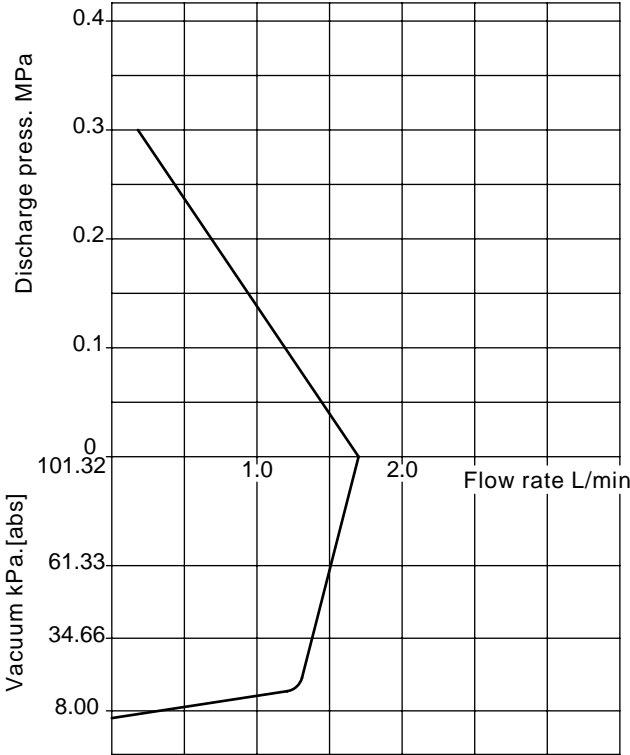
MDG-R2B()24 (with DC motor)



MDG-R2RV()24H (with DC motor)



MDG-R2B()24H (with DC motor)



7. Descriptions of Parts

Motor (Driving unit)

Install the motor in a dry place free from water splashes.

“Specifications” label

Use the pump by observing the specifications described on the label.

Pump unit (Liquid circulating unit)

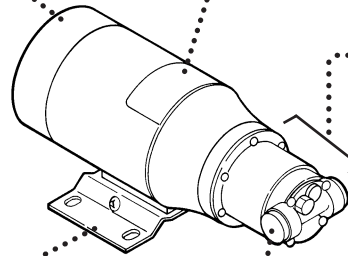
The pump is not self-priming type. Before operating the pump, be sure to fill the pump with liquid.

Discharge port

Base

Be sure to anchor the base onto the floor.

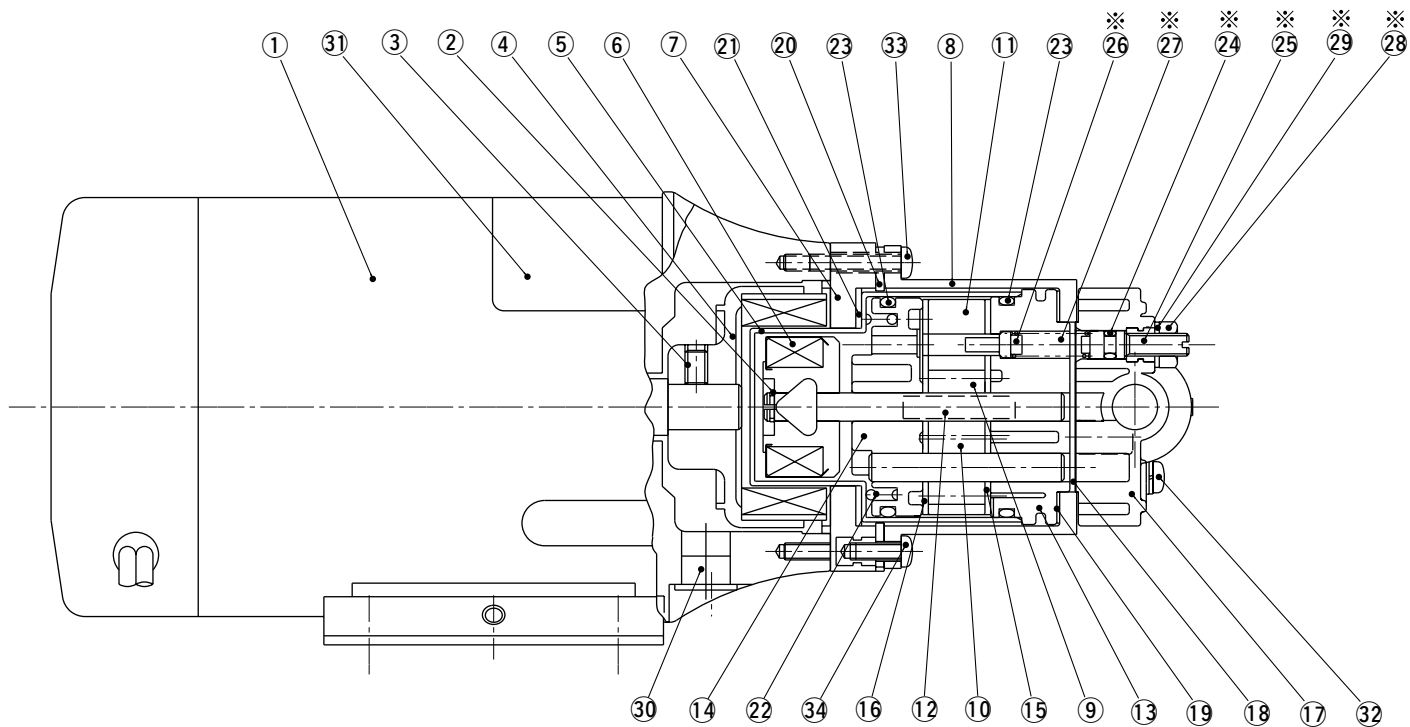
Suction port



MDG-R2()V type

Relief valve is built in.
Refer to page17.

8. Name of Parts



This figure shows MDG-R2()V type.

- MDG-R2RV()type
- MDG-R2B()type
- MDG-R2BV()type

No.	Parts Name	Q'ty	Material	Remarks	No.	Parts Name	Q'ty	Material	Remarks
1	Motor	1			21	Packing C	1	EPDM	
2	Stop Ring	1	SUS316-WPA		22	Retaining Spring	1	SUS316-WPA	
3	Screw	1	SNCM	M4×6	23	O Ring	2	FKM	S36
4	Drive Magnet	1	FERRITE, ADC-12		24	O Ring	1	FKM	S3 ※
5	Rear Casing	1	SUS316 or SUS316L		25	Adjusting Screw	1	SUS316	※
6	Driven Magnet	1	FERRITE, GFRPPS, SUS316 or SUS316L		26	Relief Valve	1	(CF+PTFE) PPS	※
7	Mounting Plate	1	GFRPPS		27	Relief ValveSpring	1	SUS316-WPA	※
8	Bracket	1	SUS304		28	Nut	1	STNLS STL	M4 ※
9	Drive Gear	1	PPS, SUS316		29	Plain Washer	1	STNLS STL	M4 ※
10	Driven Gear	1	PPS, SUS316		30	Cap	1	PE	G12.2
11	Gear Case	1	SUS316		31	Nameplate	1	PET	
12	Parallel Pin	2	SUS316		32	Screw	4	STNLS STL	M3×20SW, PW
13	Front Bearing	1	(CF+PTFE) PPS		33	Screw	3	STNLS STL	M3×16
14	Rear Bearing	1	(CF+PTFE) PPS		34	Screw	3	STNLS STL	M3×8
15	Front Plate	1	SUS316						
16	Rear Plate	1	SUS316						
17	Pump Head	1	GFRPPS						
18	Gasket A	1	FKM						
19	Gasket B	1	FKM						
20	Packing B	1	EPDM						

※ For MDG-R2()V type (with Relief valve) only

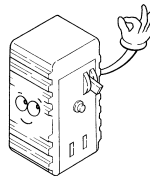
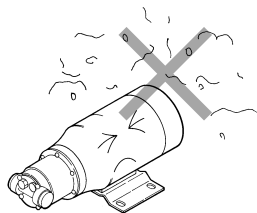
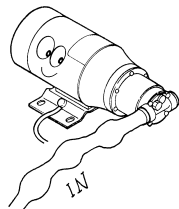
9 Handling Instructions

■ Handling Instructions

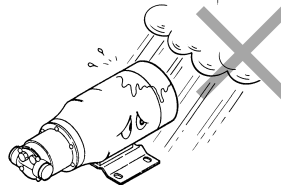
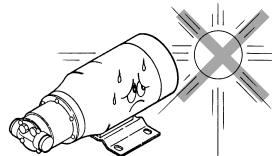
- Handle the pump carefully. A strong impact caused by dropping the pump on the floor, striking it, etc., may result in faulty performance or damage to the pump.
- The pump is not self-priming type. Before operating the pump, be sure to fill the pump with liquid by operating priming.

⚠ Caution!

- Do not operate the pump dry or with the discharge or suction side closed. If this is done, the gears and bearings will be worn out. Particularly, if the pump is operated with the discharge side closed, the discharge pressure will be increased and the relief valve will be activated. This will cause the liquid to circulate in the pump chamber. If this happens the temperature will rise rapidly, causing abnormal wear, seizure, etc., between contacting parts.

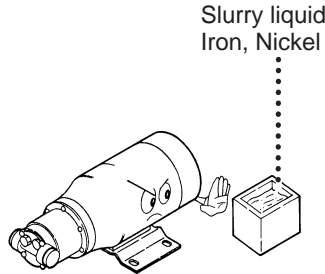


Electrical Shock



- The pump structure is not designed to be dust-proof or water-proof. Try not to wet or dampen the motor unit.
- For the prevention of electric shock accident, be sure to purchase an optional earth leakage breaker and install it in the system.
- Grounding must be set with the use of a grounding wire. For the prevention of electric shock, it is recommended that an earth leakage breaker also be installed.
- 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 electrical short or burning.

- Since there are powerful magnets inside the pump, any liquid containing powder of iron, nickel, etc. cannot be used. Also, the pump cannot be used for the transfer of slurry liquid or liquid which begins to crystallize when stationary.



- To ensure safety, do not place any inflammable material or other dangerous substance near the pump.

- The pump motor is not designed to be explosion-proof. Do not operate the pump in the places where filled with or likely to be filled with explosive atmosphere.

- The power cable cannot be replaced. When the power cable is destroyed or damaged, sometimes as a result of dropping it on the floor or the like, do not operate the pump. Otherwise, the pump itself may be damaged.



- Cleaning of the pump
Do not use benzene, alcohol, thinner or the like for cleaning the pump. These liquids may cause discoloring or peeling off of the coat.
- Handling of a damaged pump
Do not operate a damaged pump. A damaged pump causes electricity leakage or electric shock accident.
- Do not touch the pump directly
The surface temperature of the motor or the pump may be extremely high during system operation. Do not touch the directly or place any items near the pump which are easily deformed by only.

10 Installation, Piping and Wiring

⚠ CAUTION!

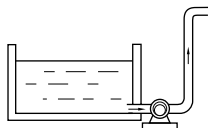
When any abnormality or irregularity is noticed, stop the pump immediately and restart it from the first step.

10-1. Installation

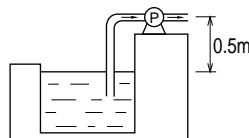
- (1) Choose a place which has an ambient temperature below 40°C and a relative humidity less than 85%, and is convenient for maintenance and checking. The pump must not be installed outdoors.
- (2) Install the pump in a position lower than the surface of the liquid in the tank on the suction side, to prevent dry running (flooded suction method).

If it is necessary to install an *R* 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 right. In this position, the pump does not suck unless the pump chamber is wet. (The MDG-R2B type pumps do not function on a suction lift.)

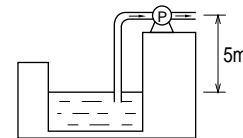
[Flooded suction method]



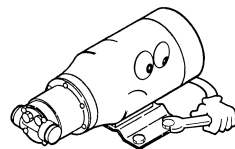
[Priming method] (In case the pump chamber is wet)



In case there is no liquid in the suction piping.
(This is not allowed for the B type.)

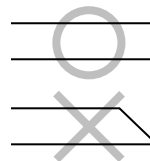


In case there is liquid inside the suction piping.



- (3) Use M5 machine screws for fitting the pump. If the floor on which the pump is installed is resonant and causes a loud noise, fix the pump with rubber mountings

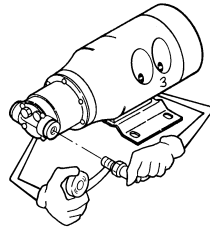
(Side view of hose)



- (4) Preparation of hoses
Cut the ends of hoses flat before starting pump installation.
- (5) Do not install the pump vertically.
This cause damage of pump.

10-2. Piping

- (1) In order to reduce the friction resistance of liquid, the piping should be as short and with as few bends as possible.
- (2) The inlet and outlet joints of the pump should be completely sealed with sealing tape, etc., to prevent them from sucking air. If the sealing is incomplete on the suction side, in particular, air is sucked in and the performance of the pump is lowered.

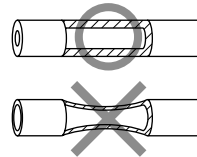
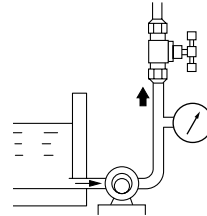


Joint size

Refer to "Identification Code."

- (3) When screwing the joint to the pump, hold the pump body rather than the motor by hand, to avoid applying excessive force on the motor and pump attachment section. For screwing the joint, the fastening torque shall be 4.9 N·m or lower.

Discharge valve
Pressure gauge



- (4) A pressure gauge must be attached on the discharge piping to ease the pressure setting of the relief valve. This attachment also helps in the early detection of pump abnormality.
- (5) For connection, use a thick 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. (When handling hot liquid, special care should be taken.)

10-3. Wiring

The power source handling during wiring work must be done by a licensed electric specialist only. Iwaki will not be responsible for any accident or mechanical damage if such an accident or damage results from the user's failure to observe the instructions above. For more information on wiring by a specialist, contact your dealer.

■ Before wiring

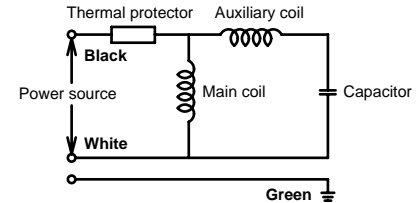
- [1] Be sure to confirm before wiring that the main power supply is turned off (power supply is disconnected).
- [2] Wiring shall be done in accordance with the local electric work regulations. (Use high-quality wiring elements and carry out wiring in accordance with the technical standards of electrical installation and related interior wiring rules.
- [3] Use the power source voltage indicated on the "Specifications" label.
- [4] The pump is not provided with an ON/OFF switch. The pump starts operation when power is supplied by connecting the power cable of the pump with the power source.
- [5] Make sure to include a ground wire in the wiring. Select a well-ventilated place for pump installation. The pump must not be allowed to become wet or damp with splashed water.



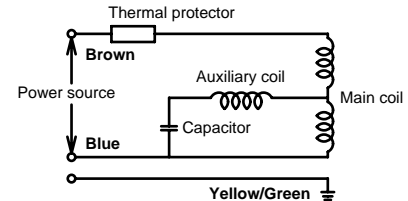
- [6] If the pump is installed with an earth leakage breaker and the breaker is activated, eliminate the cause of the breaker activation first, before resetting the condition. When checking the pump for the said cause, be sure to turn off the power supply.

wiring diagram

● AC115V



● AC220~240V



■ Rated Electric Current Value • Starting Current Value

50/60Hz

Model of Pump	Voltage (V)	Rated Current (A)	Starting Current (A)
MDG-R2RV()115	AC115	0.45/0.45	0.92/0.90
MDG-R2BV()115			
MDG-R2B()115			
MDG-R2RV()230	AC220~240	0.25/0.26	0.49/0.48
MDG-R2BV()230			
MDG-R2B()230			
MDG-R2B()24	DC24	1.0	4
MDG-R2RV()24H		1.2	
MDG-R2B()24H			

Note: If DC24V motor is locked, a fuse built in motor melts. In this case the motor should be replaced by new one because the fuse can not be replaced.

11. Operation

11-1. Operation

After pump installation, piping, and wiring, follow the start-up procedure described below.

CAUTION!

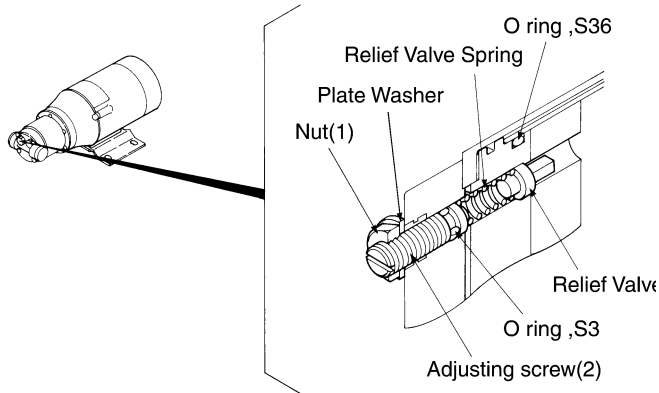
Never operate the pump dry or operate the pump with the discharge and/or suction port closed (with the valve closed). Such an operation damages the pump.

No.	Item	Remarks
1	Confirmation of piping, wiring, and voltage	<ul style="list-style-type: none"> ● Confirm piping and electrical wiring, referring to descriptions in piping and wiring sections. ● Confirm that line voltage is appropriate, referring to nameplate.
2	Confirmation of valves	<ul style="list-style-type: none"> ● Valves on suction side and discharge side should be fully opened.
3	Confirmation of liquid in pump	<ul style="list-style-type: none"> ● When pump is used by priming method, prime pump sufficiently.
4	Starting up	<ul style="list-style-type: none"> ● After confirming items 1~3 above, turn ON pump power supply, then check whether liquid is being fed smoothly. If not, immediately turn off power supply and eliminate cause of problem, referring to "Causes of Trouble and Troubleshooting" section on page 20.

No.	Item	Remarks
5	Operation	<ul style="list-style-type: none"> ● Adjust valve gradually to obtain specified values of discharge, discharge pressure, or vacuum. ● Do not open/close suction port and discharge port suddenly. This may lead to disconnection of magnet coupling, so that gears cannot rotate. If this happens, turn off power supply. As motor stops, normal coupling will be restored. ● Do not operate pump with discharge valve and/or suction valve completely or almost completely closed. Set operating pressure to at least 0.1MPa lower than set value of relief valve pressure in case of MDG-R2()V type.
6	During operation	<ul style="list-style-type: none"> ● Be careful not to allow any foreign matter to enter pump. Foreign matter may cause gear locking 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.

11-2. Relief valve set up

The MDG-R2()V model is equipped with a built-in relief valve. The pressure set upon shipping is 0.4MPa. The pressure value can be adjusted within the range of approximately 0.3~0.4MPa. Prior to resetting the pressure, please contact us and follow the procedure described below.



- [1] Loosen the clamp nut (1) with a spanner (M4).
 - [2] Adjust the pressure for the desired value by turning the set pressure adjustment screw (2) with a flat head driver (Watch the pressure gauge installed on the discharge piping in advance for reaching the target value.)
 - [3] Fasten the clamp nut (1) tightly with the spanner (M4). Be sure to check for liquid leakage after resetting the relief valve(3).
- (Note) The pump performance varies with the relief valve pressure set point.

12. Causes of Trouble and Troubleshooting

Problem	Cause	Countermeasure
Motor stops while in operation.	<ul style="list-style-type: none"> ● Wiring contact is bad. ● Thermal protector is activated by overload. ● Earth leakage breaker is activated by leak. 	<ul style="list-style-type: none"> ○ Examine and repair defective part. ○ Lower viscosity of liquid or discharge pressure. ○ Examine and repair or replace.
Liquid cannot be pumped up, or capacity is insufficient.	<ul style="list-style-type: none"> ● Dry running without liquid on suction side. ● Air enters through suction side. ● Suction port is crushed. ● Pressure in inlet portion is as low as or lower than vapor pressure of the liquid. ● Liquid viscosity is too high. ● Valve is closed. ● Piping resistance is too high ● Gear is worn out. 	<ul style="list-style-type: none"> ○ Supply liquid or open suction side valve. ○ Examine suction side piping and repair. ○ Replace with a new, uncrushable pipe. ○ Lower liquid temperature or piping resistance. ○ Lower viscosity. ○ Open valve. ○ Adjust piping. ○ Replace with new gear.
Magnet coupling disconnects.	<ul style="list-style-type: none"> ● Dry running without liquid on suction side. ● Lock due to gear swelled ● Locking due to expanded gear. ● Foreign matter sticks to gear ● Gear is damaged. ● Magnet capsule hits rear casing. ● Valve is closed. ● Piping resistance is too high. ● Pump selection on chemical(corrosion) resistance is wrong. 	<ul style="list-style-type: none"> ○ Supply liquid or open suction side valve. ○ Select a correct pump material. ○ Lower liquid temperature. ○ Disassemble and remove foreign matter. ○ Replace with new gear case unit. ○ Disassemble and repair or replace parts. ○ Open valve. ○ Adjust piping. ○ Select a correct pump material.

Problem	Cause	Countermeasure
Motor cannot be started.	<ul style="list-style-type: none"> ● Plug is out of socket. ● Contact is bad or there is a break in wiring. ● Motor is malfunctioning, wire in motor is broken. ● Earth leakage breaker is activated by leak. ● Breaker is activated due to lack in power capacity. 	<ul style="list-style-type: none"> ○ Insert plug into socket. ○ Examine and repair defective part. ○ Repair or replace. ○ Examine and repair or replace. ○ Increase capacity.
Too much noise or vibration	<ul style="list-style-type: none"> ● Dry running without liquid on suction side. ● Foreign matter sticks to gear. ● Gear is damaged. ● Magnet capsule hits rear casing. ● Gear is worn out. 	<ul style="list-style-type: none"> ○ Supply liquid or open suction side valve. ○ Disassemble and remove foreign matter. ○ Replace with new gear case unit. ○ Disassemble and repair or replace parts. ○ Replace with new gear.
Liquid leaks.	<ul style="list-style-type: none"> ● O ring is damaged. ● Bolt is loosened. ● Corrosion resistance is unsuitable. 	<ul style="list-style-type: none"> ○ Replace with new O ring. ○ Fasten tightly again. ○ Select correct pump material.
Self-priming cannot be made	<ul style="list-style-type: none"> ● Dry running without liquid on suction side ● Air enters through suction side. ● Suction port is crushed. ● Inside of pump is dry. ● Pressure in inlet portion is as low as or lower than vapor pressure of the liquid. ● Gear is worn out. ● Suction height is too high. 	<ul style="list-style-type: none"> ○ Supply liquid or open suction side valve. ○ Examine suction side piping and repair. ○ Replace with new, uncrushable pipe. ○ Supply liquid through discharge side or suction side. ○ Lower liquid temperature or piping resistance. ○ Replace with new gear. ○ Lower the suction height.

13. Maintenance and Inspection

Follow the contents of this instruction manual when carrying out the maintenance, inspection, disassembling, and assembling of the pump and/or related components. Never operate the pump out of the ranges specified in this instruction manual. Iwaki will not be responsible for any accident or mechanical damage if such an accident or damage results from the user's failure to observe the instruction above.



Wear protective gear



Wear protectors.

When carrying out the maintenance, inspection, disassembling, and assembling of the pump and/or related components, always wear safety gloves, helmet, safety shoes, and the like.

If making access to a wet-end part of the pump in particular, never fail to wear protective goggles, protective headgear, mask, etc., depending on the type of the operation.

■ Maintenance and Inspection

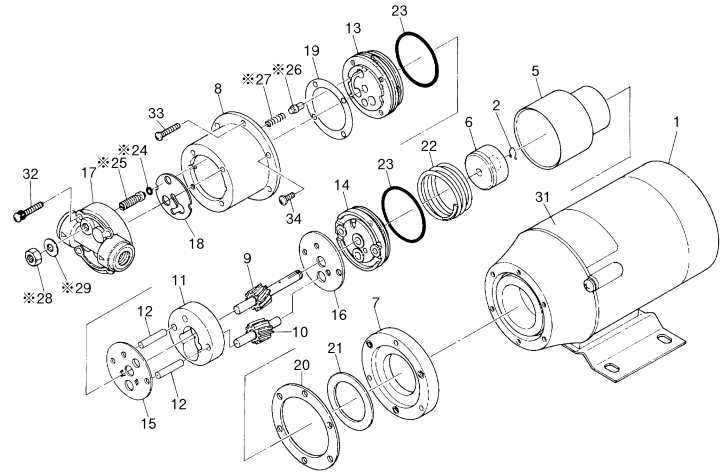
No.	Check Point	Remarks	Check method
1	Is pump lifting liquid properly?	<ul style="list-style-type: none"> ● Whether liquid is being transferred. ● Whether suction and discharge pressures are at normal levels. 	<ul style="list-style-type: none"> ● Flow meter or visual check. ● Collation with nameplate.
2	Is there abnormal noise or vibration?	<ul style="list-style-type: none"> ● If pump does not function normally, abnormal noise or vibration tends to be generated. ● Base on which pump is mounted sometimes becomes resonant to increase noise. If separation of pump from the base decreases noise, anti-vibration measure such as attaching anti-vibration rubber mounts to pump should be taken. 	<ul style="list-style-type: none"> ● Visual check and hearing check. ● Visual check and hearing check.
3	Is liquid leaking or air being sucked in from joints of pump?	<ul style="list-style-type: none"> ● Clamp connections more tightly. ● If many air bubbles are found in discharged liquid, air is being sucked in. Examine piping and clamp connection more closely. 	<ul style="list-style-type: none"> ● Visual check.
4	Is temperature of pump unit surface, motor surface, etc., abnormally high?	<ul style="list-style-type: none"> ● Pump unit surface temperature is same as that of liquid handled. ● Temperature of motor surface is within about 40deg.above ambient temperature. Sometimes it is too hot to touch, but it is normal if temperature is within this range. 	<ul style="list-style-type: none"> ● By touch or by thermometer.

■ Spare parts

For a long continuous operation of the pump system, spare parts must be replaced timely. The expendable parts in particular must be supplied at hand constantly. For details, contact your dealer.

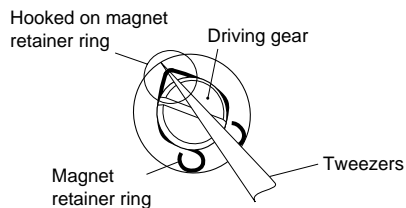
No.	Parts	Parts cord	Q'ty	Replacement time
9	Drive gear	MDG0523	1	5000 hours
10	Driven gear	MDG0524	1	
13	Front bearing	MDG0529	1	
14	Rear bearing	MDG0530	1	
15	Front plate	MDG0531	1	
16	Rear plate	MDG0532	1	
18	Gasket A	MDG0533	1	Every maintenance interval
23	O ring	MDG0536	2	

■ Disassembling and Assembling



<Disassembling>

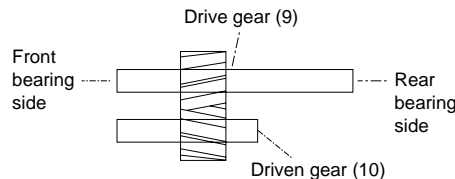
1. Remove the 3 machine screws (33) and detach the pump unit off the motor (1).
2. Remove the screw (32) with spring washer, and plate washer to detach the pump head (17). In the case of MDG-R2()V type, never disassemble the adjusting screw (25), O ring (24), nut (28), and plain washer (29). Touching these parts may change the set pressure of the relief valve.
3. Remove the gasket A (18), relief valve (26), and relief valve spring (27).
4. Remove the 3 screws (34) and detach the mounting plate (7), packing B (20), bracket (8), and gasket B (19) off the pump unit.
5. Remove the rear casing (5). Leave the packing C (21) on the rear case as it is. In this step, be careful with the liquid which may remain inside the rear casing.
6. Use tweezers or the like to detach the stop ring (2) and remove the retaining spring (22). (See the figure below)



7. Detach the driven magnet (6) from the drive gear (9). Store the removed driven magnet in a place free of steel powder or dust.
8. Disassemble the rear bearing (14), rear plate (16), drive gear (9), driven gear (10), gear case (11), parallel pins (12), front plate (15), and front bearing (13) in the order described. Handle these parts carefully so as not to cause scratches on the surfaces. Store them in a dust-free place after cleaning them.

<Assembling>

1. Attach the O ring (23) to the front bearing (13) and the rear bearing (14) each. Apply silicone grease to the O ring beforehand.
2. Attach the parallel pins (12) onto the front bearing (13). Then, assemble the front plate (15), gear case (11), drive gear (9), driven gear (10), rear plate (16), and rear bearing (14) in the order described. In this step, be careful to match the hole positions of the respective parts. In addition, be sure to insert the drive gear (9) and the driven gear (10) in the directions shown in the figure on the left.

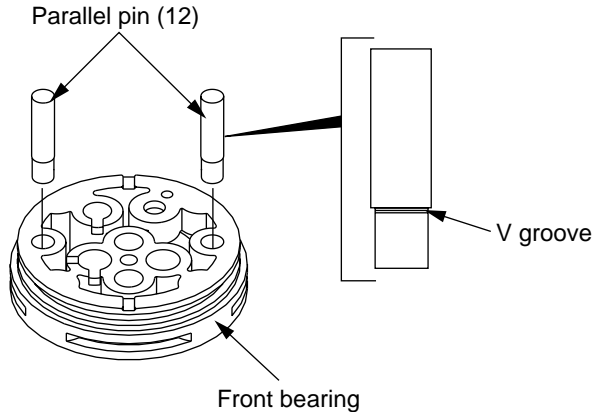


· How to mount parallel pins

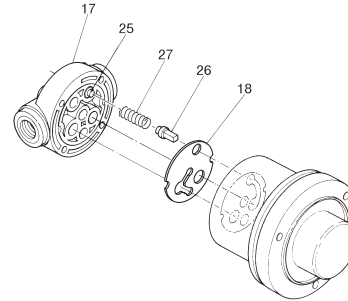
When you mount parallel pin on front bearing, face the V groove side to the front bearing. See illustration below.

Caution

- Parallel pin put in reverse may cause lack of suction liquid resulting in failed discharge and damaged pump. Be sure to put V groove side to front bearing.



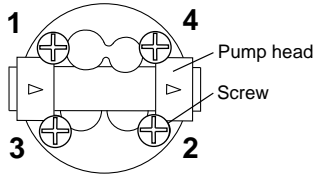
3. Insert the driven magnet(6) onto the drive gear (9) and attach the stop ring (2). Caulk the stop.
4. Attach the retaining spring (22) so that it is inserted in the groove of the rear bearing (14). Attach the rear casing (5) firmly over them.
5. Put the gasket B (19) on the front bearing (13) with the holes aligned exactly. Then, attach the bracket (8) to meet with the 2 grooves.




6. Insert the relief valve (26) and relief valve spring (27) into the front bearing (13). Then, attach the gasket A (18) and the pump head (17) by tightening the 4 screws (with P.W. and S.W.) (32). (Note: Fastening torque at 0.78 N·m) In this step, be careful with the positioning of the bracket, gasket A, and pump head. In the case of MDG-R2()V type only, make sure that the adjusting screw (25) and relief valve spring (27) are inserted in position. (See the figure on the left.)

-
-
- Attach the packing B (20) and mounting plate (7) to the bracket (8) by tightening the 3 screws (34). (Note: Fastening torque of 0.6 N·m)
 - Mount 4 screws with P.W & S.W (32) on pump head (17) and tighten them. (Note: Fastening torque of 0.8 N·m)

· **Screws tightening order**



 Caution
<ul style="list-style-type: none">· When you mount pump head, do not tighten screws with more than specified tightening torque.· Evenly tighten screws(32) in diagonal order.

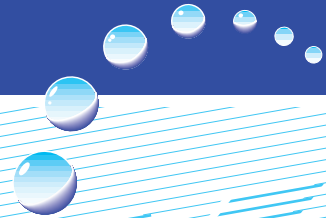
- Attach the assembled pump unit on the motor (1) and fasten the three screws (33).



()Country codes

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China : IWAKI Pumps (Guandong) Co., Ltd.	TEL : (86)750 380 9018	FAX : 750 380 9078	Switzerland : IWAKI (Schweiz) AG	TEL : (41)26 674 9300	FAX : 26 674 9302
China : GFTZ IWAKI Engineering & Trading (Guangzhou)	TEL : (86)20 8435 0603	FAX : 20 8435 9181	Austria : IWAKI (Austria) GmbH	TEL : (43)2236 33469	FAX : 2236 33469
China : IWAKI Pumps Co., Ltd. (Beijing)	TEL : (86)10 6442 7713	FAX : 10 6442 7712	Holland : IWAKI Holland B.V.	TEL : (31)297 241121	FAX : 297 273902
China : IWAKI Pumps (Shanghai) Co., Ltd.	TEL : (86)21 6272 7502	FAX : 21 6272 6929	Spain : IWAKI Iberica Pumps, S.A.	TEL : (34)943 630030	FAX : 943 628799
Philippines : IWAKI Chemical Pumps Philippines, Inc.	TEL : (63)2 888 0245	FAX : 2 843 3096	Belgium : IWAKI Belgium n.v.	TEL : (32)1367 0200	FAX : 1367 2030
Korea : IWAKI Korea Co.,Ltd.	TEL : (82)2 3474 0523	FAX : 2 3474 0221			



IWAKI
Magnetic Drive Gear Pump

Model MDG-R15

Instruction Manual

 Read this manual before use of product

Thank you for having selected IWAKI's magnetic drive gear pump model MDG-R15. This instruction manual deals with the correct handling and operation of the pump. You are requested to read this manual prior to installing and using the pump to ensure safe and long life of the pump. The content of this manual may be changed without notice.



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Important Instruction

For the Safe and Correct Handling of the Pump

- Read the “Safety Instructions” sections carefully to prevent accidents involving your customers or other personnel and to avoid damage or loss of other assets. Always follow the instructions and advice found in these sections.
- Observe and abide by the instructions described in this manual. These instructions are very important for protecting pump users from dangerous conditions and situations related with the use of the pump system.
- The symbols relate to the following meanings described below:

 Warning	Nonobservance or misapplication of the contents of the “Warning” section could lead to a serious accident, including death or injury.
 Caution	Nonobservance or misapplication of the contents of the “Caution” section could lead to serious physical injury to the user or serious damage to the product.

Types of Symbols



Indicates that “Warning” or “Caution” must be exercised. Inside this triangle, a concrete and practical image provided as a warning or caution message is depicted.



Indicates a prohibited action or procedure. Inside or near this circle, a concrete and practical image of the activity to be avoided is depicted.



Indicates an important action or procedure which must be performed or carried out without fail. Failure to follow the instructions herein can lead to malfunction or damage to the pump.

Safety Instruction

Warning

- **Turn off the power supply.**

Working without disconnecting the power supply may cause an electrical shock. Before engaging upon any working procedures involving the pump, make sure to turn the power supply switch off and to stop the pump and other related devices.



- **Terminate operation.**

When you detect or become aware of a dangerous sign or abnormal condition during operation, terminate the operation immediately and start it from the beginning again.



- **For specified application only.**

The use of a pump in an 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.



- **No remodeling.**

Never remodel a pump. Otherwise, a serious accident may result. Iwaki will not be responsible for any accident or damage of any kind which is caused by the user remodeling the pump without first obtaining permission or instructions from Iwaki.



- **Wear protectors.**

If you touch or come in contact with any type of hazardous chemical liquid, you may be harmed. Wear protective gear (protective mask, gloves, etc.) during the works for the pump.



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 or operate the pump. Pump operators must have enough knowledge of the pump and its operation.



- **Specified power only.**

Do not operate the pump on voltage which is not specified on the nameplate. Failure to do so may result in damage or fire. Only the specified power level is to be applied.



- **Do not wet or dampen.**

If the motor or wiring cable becomes wet or dampened with the operating liquid by mistake, this may result in a fire or cause an electrical shock. Install the motor and wiring cable in positions which are not likely to become wet or dampened with any liquid.



- **Ventilate.**

Poisoning may result during an operation which involves toxic or odorous liquid. Ventilate the operating site sufficiently.



- **Spill-out accident.**

Protective measures should be taken against any accidental spill-out or leakage of the operating liquid as a result of unexpected damage on the pump or the related piping.



- **Operating site must be free of water and humidity.**

The pump is not designed to be water-proof or dust-proof. The use of the pump in places where water splashes or humidity is high may result in an electrical shock or short circuit.



Safety Instruction

Caution

- **Do not damage power cable.**

Do not scratch, damage, process, or pull the power cable forcibly. An extra load onto the cable, such as heating the cable or placing something heavy on the cable, may damage the cable and finally cause a fire or an electrical shock.



Caution

- **Do not cover the motor.**

Running a covered motor may accumulate heat inside the motor and cause a fire or a mechanical failure. Ventilate the motor sufficiently.



- **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 a leakage breaker.



Electrical Shock

- **Power cable cannot be replaced.**

Never use a damaged or affected power cable. Otherwise, a fire or an electrical shock may result. Handle the power cable carefully, as it cannot be replaced by a new cable. (The complete motor must be replaced in that circumstance.)



Caution

- **Do not use damaged pump.**

Use of damaged pump may cause short-circuit and electrical shock. Never use damaged pump.



Prohibited

Caution

- **Limited operating site and storage.**

Do not install or store the pump in the following places:

* Places where a flammable gas or material is used or stored.

* Places where the ambient temperature is extremely high (40°C or higher) or extremely low (0°C or lower).



Prohibited

- **Do not drain the liquid in the site.**

The liquid discharged out of the pump, including a hazardous chemical liquid, must be drained into a special container. Never drain such liquid directly onto the floor in or near the operation site.



Prohibited

- **Disposal of used pump.**

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



- **Replacement of parts.**

Replacement of parts must be done according to this instruction manual. Do not disassemble pump exceeding the extent shown on this manual.



- **Countermeasure for static electricity.**

When low electric conductivity liquid such as ultra-pure water and flour inactive liquid (e.g. Fluorinert™) are handled, the static electricity may be generated in pump, which may cause static discharge and break down of pump. Take countermeasure to avoid and remove static electricity.



Outline of Product

1. Unpacking and inspection

After unpacking the product, check to see:

- 1) If model name, discharge capacity, discharge pressure, voltage etc. shown on the nameplate are those that you order.
- 2) If the product is not damaged or its bolts and nuts are not loosened during transportation.

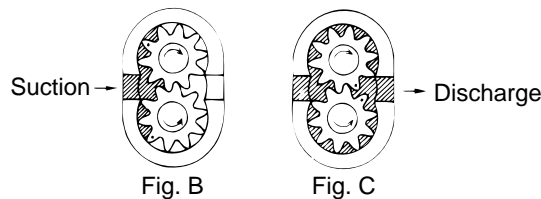
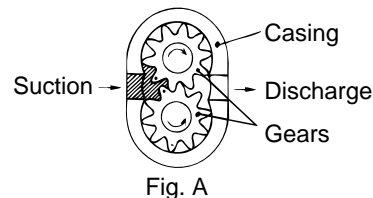
Iwaki Magnet Gear Pump		
MODEL		
MAX. CAPACITY	ℓ / min	
MAX. PRESSURE	MPa	
SINGLE PHASE INDUCTION MOTOR CAPACITOR-RUN		
POLES	SPEED	rpm
VOLTAGE	V RATING	CONT.
CURRENT	A CAPACITOR	μF
OUTPUT	W	INSULATION CLASS E
POWER CONSUMPTION	W	
FREQUENCY	Hz	INDOOR
DO NOT RUN PUMP DRY		
MFG.No.		
IWAKI CO.,LTD. TOKYO JAPAN		

If you find any abnormality, please contact your dealer.

2. Operating principle

IWAKI magnetic drive gear pump MDG-R15 consists of a pair of gears driven by magnetic coupling and the casing which contains the gears. (Fig. A)

The liquid which gets into from suction side enters into gear grooves and is transferred to discharge side by the rotation of gears. (Fig. B and C)



→ : Direction of liquid flow

Outline of Product

3. Model identification

MDG - R 15 T 220

(1) (2) (3) (4)

- (1) Pump type
- (2) Pump size
15 : 5.5 ml/revolution
- (3) Allowable liquid temperature and material of gear/bearing
 T : 0 – 45 deg. C PTFE gear, GFRPTFE bearing
 P : 0 – 45 deg. C PEEK gear, (CF +PTFE) PPS bearing
 K : 0 – 95 deg. C PTFE gear, GFRPTFE bearing
 C : 0 – 95 deg. C PEEK gear, (CF + PTFE) PPS bearing
- (4) Motor voltage
 115 : 115V single phase
 220 : 220 – 240V single phase

4. Specification

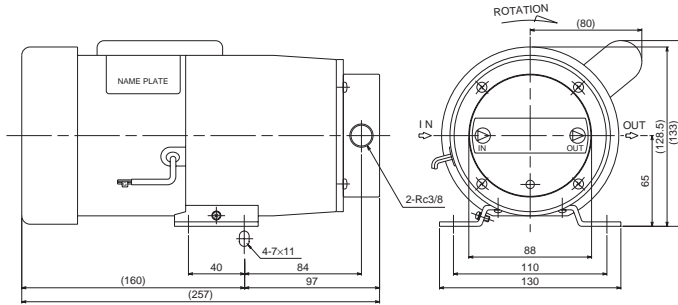
50/60Hz

Model	Pump bore	Max. flow L/min.	Max. disch. press. MPa	Max. vacuum KPa (abs)	Rated speed rpm	Motor specification			Mass kg
						Rated voltage	Rated ampere	Type	
MDG-R15T115	Rc3/8	14/17	0.3	5.33	2800/ 3300	AC 115	2.3/2.8	Single phase induction motor capacitor run	7.8
MDG-R15K115		12.5/15		8.00					
MDG-R15P115		14/17		5.33					
MDG-R15C115		12.5/15		8.00					
MDG-R15T220		14/17		5.33		AC 220-240	1.4/1.5		
MDG-R15K220		12.5/15		8.00					
MDG-R15P220		14/17		5.33					
MDG-R15C220		12.5/15		8.00					

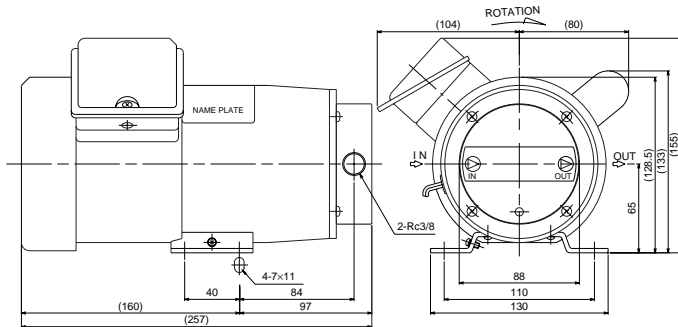
- Note 1. Performance shown above is based on pumping clear water at 25 deg. C. (discharge capacity changes according to the pumped liquid temperature. Ask IWAKI for details.
- 2. Allowable ambient temperature is 0 – 40 deg. C.
- 3. Allowable viscosity of pumped liquid is up to 30 mPa.s.

Outline of Product

5. Dimension

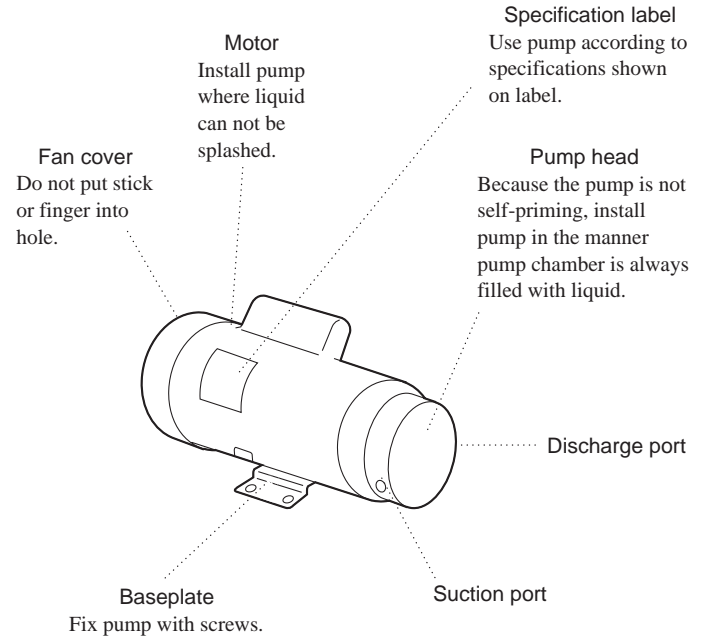


MDG-R15 () 115



MDG-R15 () 220

6. Main parts and label

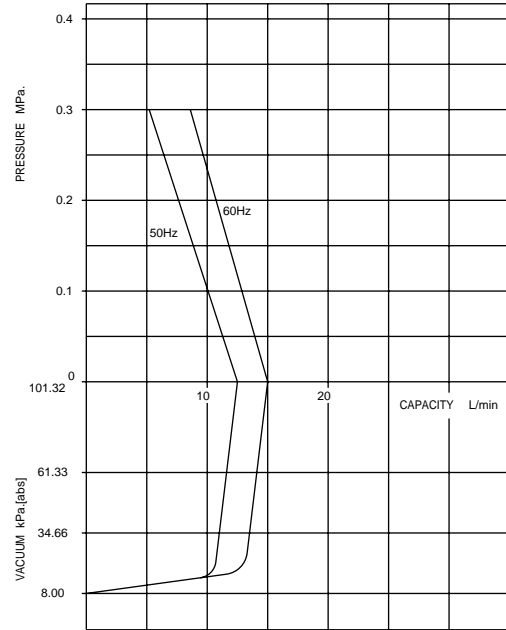
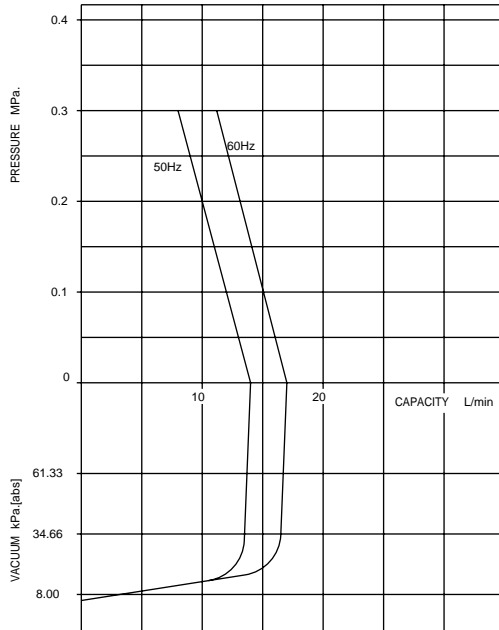


Outline of Product

7. Performance curves

MDG-R15T115
MDG-R15T220
MDG-R15P115
MDG-R15P220

MDG-R15K115
MDG-R15K220
MDG-R15C115
MDG-R15C220



Installation

1. Before use of product



Caution

Do not run pump dry

Dry running of pump causes quick wearing of gear and bearing.

Do not close discharge and suction valves

If pump is operated with suction and discharge valves closed, temperature inside pump excessively increases in a short time resulting in pump failure or burning. Operate pump with valves opened.

Do not install pump outdoor

Motor is not water-proof construction. If liquid is splashed on motor, it may cause fire or damage of motor. Do not install pump outdoor.

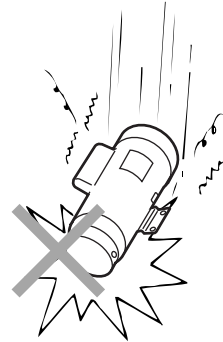
Keep fire away from pump

Do not put dangerous or flammable substance around pump.

Damaged pump

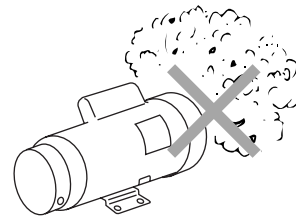
Do not use damaged pump to avoid short-circuit or electrical shock.

2. Precautions on operation



- (1) **Handle pump carefully**
Strong impacts on pump caused by dropping it on floor or so may result in damage or faulty performance of pump.

- (2) **Do not touch pump**
Pump/motor is very hot during operation or just after it is stopped. Do not touch it with bare hand.



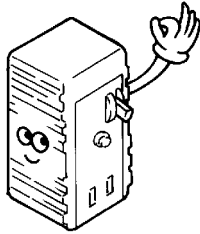
- (3) **Prime pump**
Pump is not self-priming. Prime pump with liquid before starting pump.

- (4) **Keep pump away from dusty atmosphere**
Do not use pump at dusty atmosphere and take measures for dust not to adhere to motor.

Installation

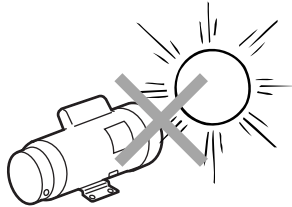
(5) Install earth leakage breaker

Install earth leakage breaker to avoid accident such as electrical shock etc.



(6) Do not splash liquid on motor.

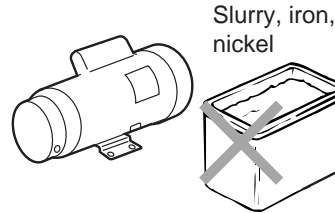
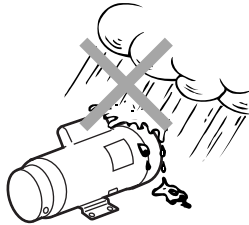
If motor or wires are wetted by splashed liquid, it may cause fire or electrical shock. Install pump at place where liquid can not be splashed on pump/motor.



(7) Place to be installed

Do not install or store pump at following places.

- where exposed to direct sunlight
- where ambient temperature increases to 40 deg. C or more
- where humid and dusty atmosphere
- where ambient temperature becomes 0 deg. C or below.
- where exposed to rain and wind



(8) Ground

Connect ground from ground wire (green) for MDG-115R () 115 and from ground terminal of terminal box for MDG-R15 () 220.

(9) Prohibited liquids

Following liquids can not be pumped.

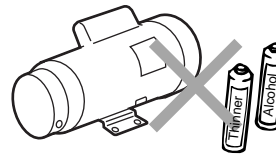
- liquids which contain iron or nickel powder
- liquids which contain slurry
- liquids which are crystallized when stopping
- flammable liquids such as gasoline or kerosene

(10) Power cord can not be replaced.

Do not use pump of which the power cord is damaged.

(11) Maintenance and cleaning

Do not use solvents such as benzene, alcohol or thinner to clean pump. Otherwise, paint gets discolored or peeled.



Installation

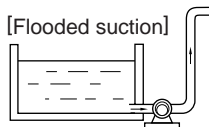
3. Installation, piping and wiring

3-1. Installation

1) Place to be installed

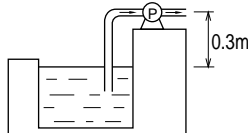
Install the pump at the place where ambient temperature is 40 deg. C or below, relative humidity is 85% or below and where the maintenance and inspection works can be done easily. Do not install pump outdoor.

- #### 2) Install the pump the lower position than liquid level of suction tank (Flooded suction piping). When it is unavoidable that the pump is installed at the place where its suction port is higher than the liquid level of suction tank (Suction lift piping), install the pump referring to the pictures on right. In this case, the pump can not suck up the liquid if the pump chamber is not wet. (MDG-R15K and C types can not be used for suction lift piping.)

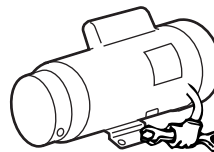
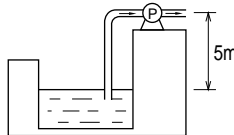


[Suction lift] In case pump chamber is wet.

- ① In case of no liquid in suction piping. (Only T and P types are possibly used.)



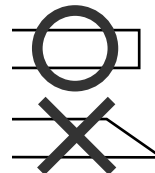
- ② In case liquid is filled in suction piping.



3) Fix baseplate

Fix the baseplate with screws M6. If the noise is large because of resonance of mounting floor, mount the pump via rubber cushion. Mount the pump in horizontal position.

Side view of hose



4) Preparation of hose

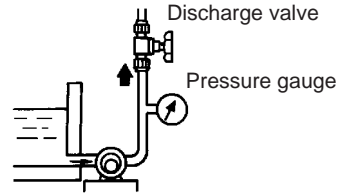
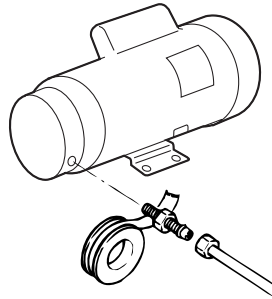
Before installation works, prepare the hose of which the end is cut as shown on left.

3-2. Piping

- #### 1) To minimize the pipe resistance of liquid, use the piping as short and as less bends as possible.

Installation

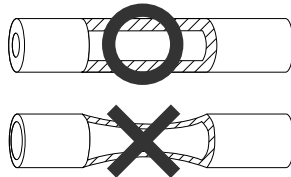
- 2) Connect joints to the suction and discharge ports of pump. Apply seal tape so that the air can not be sucked in. Above all improper connection of suction side joint will cause air being sucked resulting in fallen pump performance.
- 3) Use correct size of hose to ensure firm connection. Use the hose of which the material can chemically resist to the pumped liquid. When PVC hose used, use one which can endure the pressure made by the pump.



- 4) When you screw the joints in suction and discharge ports, hold the pump head with hand but do not hold the motor. Tightening torque is 15N·m or less.
- 5) If a pressure gauge is installed at discharge piping, you can find the abnormal operation of pump when it happens.
- 6) Periodically check the piping if it is not loosened and tighten it if loosened.

Caution

Suction side hose may be collapsed due to vacuum made by pump operation. When hose is used, employ the durable one such as blade hose. Special attention must be paid when pumping high temperature liquid.



Installation

3-3. Wiring



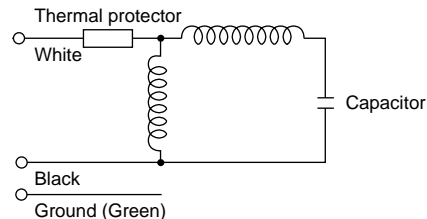
Caution

Electrical and wiring works must be done by qualified electrician. Otherwise accident of injury or damage may happen.

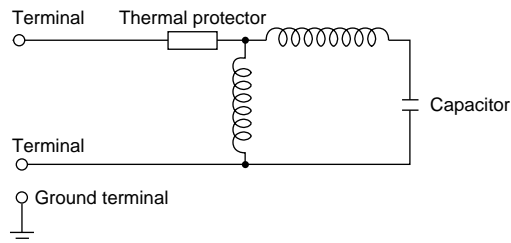
- 1) Before wiring is done, check if the main power source is switched off.
- 2) Use the power of pump which is indicated on the nameplate of pump.
- 3) The pump has no ON/OFF switch. The pump starts running as soon as the power cord is connected to the power source.
- 4) Take the ground.
- 5) In case the earth leakage breaker is installed and when it is operated, reset it after the reason is settled. Switch off the power when you check the reason.

■ Rated current, starting current

115V type



220V type



50/60Hz

Model	Voltage (V)	Rated current (A)	Starting current (A)
MDG-R15 () 115	115	2.3/2.8	6.1/5.7
MDG-R15 () 220	220 - 240	1.4/1.5	3.55/3.2

Operation

1. Operation

Operate the pump according to following procedure.



Caution

Never run pump dry (without liquid) or run pump with suction and/or discharge valve closed. Otherwise, pump is damaged.

No.	Procedure	Description
1	Check piping, wiring and power voltage.	<ul style="list-style-type: none"> • Check piping, wiring according to items “Piping” and “Wiring” in Installation section. • Check power voltage according to description on nameplate.
2	Open valves	<ul style="list-style-type: none"> • Fully open the valves on suction and discharge pipings.
3	Check if liquid is filled in pump chamber.	<ul style="list-style-type: none"> • In case of suction lift application, prime liquid sufficiently.
4	Switch on power to start	<ul style="list-style-type: none"> • After above procedures, switch on power and check if pump runs normally. If pump does not discharge liquid, stop it immediately and eliminate the cause referring to item “Troubleshooting”.
5	Operation	<ul style="list-style-type: none"> • Adjust valves gradually to get required flow rate, pressure or vacuum. • Rapid open and close of valves will cause disconnection of magnetic coupling. If this happened, switch off power to stop motor. Magnetic coupling will recover once the motor stops its rotation. • Do not operate pump with discharge and suction side valves fully or almost fully closed.
6	Precaution during pump operation	<ul style="list-style-type: none"> • Do not get foreign matters into pump. Foreign matter in pump will cause locked gears or abnormal wear of gears. • If earth leakage breaker operates, reset it after the cause is eliminated. Switch off the power and check the reason referring to item “Troubleshooting”.

2. Stopping

No.	Stopping procedure	Description
1	Switch off power. (Check stopping condition)	<ul style="list-style-type: none"> • When power is switched off, check if motor stops smoothly. If motor does not stop smoothly, you should inspect pump.
2	Close discharge side valve.	<ul style="list-style-type: none"> • Close discharge side valve gradually. Do not close it rapidly.

Precautions when pump is not used for a long period

When pump is not used for a long time, remove the liquid inside pump. Run the pump for five minutes once three months to circulate water to prevent rust from motor bearing.

Maintenance

1. Troubleshooting

Trouble	Cause	Countermeasures
Motor stops during operation.	<ul style="list-style-type: none"> • Wrong wiring • Thermal protector operates due to over loaded motor. • Earth leakage breaker operates due to short circuit. 	<ul style="list-style-type: none"> • Check and correct wiring. • Reduce viscosity of liquid or discharge pressure. • Check and repair or replace.
Pump does not discharge liquid or capacity is low.	<ul style="list-style-type: none"> • No liquid at suction side and pump runs dry. • Air is sucked in from suction side. • Suction side hose is collapsed. • Pressure at suction port is below saturated vapor pressure of pumped liquid. • Viscosity of liquid is too high. • Valve is closed. • Too large pipe resistance. • Worn gear 	<ul style="list-style-type: none"> • Fill liquid in suction tank or open suction side valve. • Check suction side piping and correct it. • Replace hose by stronger one. • Decrease liquid temperature or pipe resistance of suction piping. • Decrease liquid viscosity. • Open valve. • Correct piping. • Replace gear.
Magnet coupling is disconnected.	<ul style="list-style-type: none"> • No liquid at suction side and pump runs dry. • Gears are locked by their swelling. • Gears are locked by their expansion by heat. • Foreign matters adhere to gears. • Damaged gears. • Magnet capsule touches rear casing. • Valve is fully closed. • Too large pipe resistance. • Wrong pump is used in view of chemical resistibility. 	<ul style="list-style-type: none"> • Fill liquid in suction tank or open suction side valve. • Check chemical resistibility of gears. • Bring down liquid temperature. • Disassemble pump and remove foreign matters. • Replace gears. • Disassemble pump and repair or replace parts. • Open valve. • Correct piping. • Select suitable pump.

Trouble	Cause	Countermeasures
Motor does not start.	<ul style="list-style-type: none"> • Power is not switched on. • Wrong or disconnected wiring. • Failed motor or its winding is disconnected. • Earth leakage breaker operates due to short circuit. • Earth leakage breaker operates due to lack of power capacity. 	<ul style="list-style-type: none"> • Switch on power. • Check and correct wiring. • Repair or replace motor. • Check and repair or replace. • Employ larger power capacity.
Abnormal noise or vibration	<ul style="list-style-type: none"> • No liquid at suction side and pump runs dry. • Foreign matters on gears. • Damaged gear. • Magnet capsule touches rear casing. • Worn gear. 	<ul style="list-style-type: none"> • Fill liquid or open valve of suction side. • Disassemble pump and remove foreign matters. • Replace gear. • Disassemble pump and repair or replace parts. • Replace gear.
Liquid leaks.	<ul style="list-style-type: none"> • Damaged O ring. • Loosened bolts. • Wrong pump is selected in view of chemical resistibility. 	<ul style="list-style-type: none"> • Replace O ring. • Tighten bolts. • Use suitable pump.
Pump does not self-prime.	<ul style="list-style-type: none"> • No liquid at suction side and pump runs dry. • Air is sucked in from suction side. • Collapsed suction side hose. • Pump inside is dry. • Pressure at suction port is below saturated vapor pressure of pumped liquid. • Worn gear. • Too high suction lift. 	<ul style="list-style-type: none"> • Fill liquid in suction tank or open valve at suction side. • Check suction side piping and correct. • Replace by stronger hose. • Fill liquid from suction or discharge port. • Bring down liquid temperature or pipe resistance. • Replace gear. • Lower suction lift height.

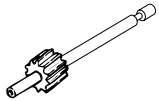
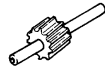


Maintenance

2. Maintenance and inspection

No.	Check item	Description	Method
1	If pump discharge liquid normally.	<ul style="list-style-type: none"> If liquid is normally transferred. If suction and discharge pressure is normal. 	<ul style="list-style-type: none"> Flow meter or by eye. Refer to figures shown on name plate.
2	If sound and vibration are normal.	<ul style="list-style-type: none"> Abnormal sound or vibration may be generated when pump does not operate normally. Resonance of base to which pump is mounted may enlarge vibration. In this case, take countermeasure such as rubber cushion etc. 	<ul style="list-style-type: none"> By eye and year. By eye and year.
3	If liquid does not leaks or air does not sucked from pump or piping.	<ul style="list-style-type: none"> Tighten bolts of the parts from which liquid leaks. When you see bubbles in discharged liquid, air is sucked in. Check piping and tighten relating bolts. 	<ul style="list-style-type: none"> By eye.
4	If pump or motor surface is not extremely hot.	<ul style="list-style-type: none"> Surface temperature of pump body is same as that of pumped liquid. Surface temperature of motor is within ambient temperature plus approx. 40 deg. C. You may not touch motor but it is not abnormal if it is within this temperature. 	<ul style="list-style-type: none"> By touching or thermometer.

3. Spare parts

If the pump is continuously operated for a long time, it is needed that the consumable parts are replaced at proper time. It is recommended you always keep the consumable parts shown as bellow.

No. (Note 1)	Parts		Q'ty	Time to be replaced (Note 2)
13	Drive gear		1	MDG-R15T&K types ... 3,000 hours MDG-R15P&C types ... 5,000 hours
11	Driven gear		1	
10	Bearing		6	
3	O ring		1	To be replaced at the time of maintenance works are done.

Note 1: Number corresponds to that of exploded view and drawing.

2: Time to be replaced is the time that the flow rate goes down by 20% compared to original flow rate when pumping clear water at ambient temperature at pressure of 0.2MPa.

Maintenance

4. Disassembly and assembly

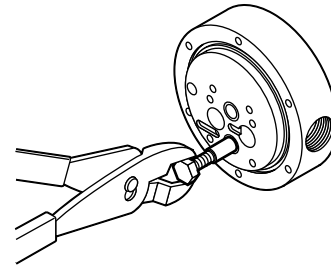
4-1. Disassembly (Parts No. relates to the construction drawing and exploded view.)

- 1) Remove four pan-head screws (15) to remove pump head from motor (1).
- 2) Remove six pan-head screws (16) to remove mounting plate (4), rear casing (6) and O ring (3).
- 3) Loosen hex. socket head screw (5) with hex. wrench (Nominal 2.5) and pull out a magnet capsule (7) from the shaft of drive gear (13). Take care iron powder can not be attracted to the magnet capsule.
- 4) Remove four pan-head screws (17) and disassemble the pump in order of bearing holder (9), gear case (12), two parallel pins (19), drive gear (13) and driven gear (11). Pay attention not to harm the parts when the pump is disassembled.

4-2. Replacement of bearings

4-2a For models MDG-R15T and K (equipped with GFRPTFE bearings)

- 1) Pull out six bearings(10) which are inserted in pump body (14) and bearing holder (9). Screw M8 bolt by approx. 5mm into worn bearing to pull it out together with bolt.

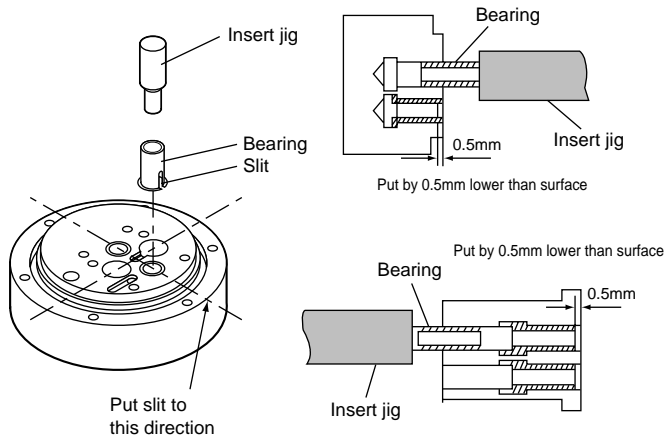


Pull out bearing from pump body

- 2) Put the slits of bearing (10) to the direction of line which connects the centers of two bearing holes, and insert it into the bearing hole of pump body (14) and bearing holder (9). End of bearing is located by 0.5mm lower than end surface of pump body (14) and bearing holder (9). Put the bearing carefully into the bearing hole so that it comes in straight along with the bearing hole. Total six bearings are inserted.
- 3) Insert the bearings to both sides of bearing holder (9).

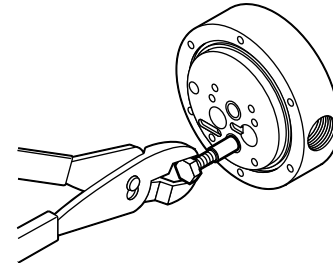
Maintenance

- 4) After the six new bearings (10) are inserted, adjust their inner diameter by putting the hand reamer of 7.15mm diameter into the bearings. Prepare two types of hand reamer, that is, the one is standard and another is that of which end is not tapered. First put the standard reamer by turning it by fingers, and then put not tapered one to finish. (If you wish jigs, ask our dealer.)

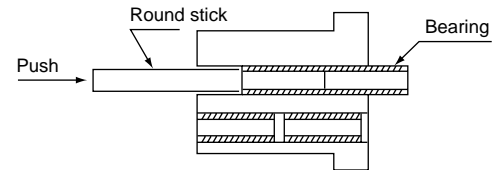


4-2b For models of models MDG-R15P and C (equipped with PPS bearings)

- 1) Pull out two bearings (10) which are inserted into pump body (14). Screw in by 15mm depth a screw (Nominal 8mm dia. x 25mm length) into worn bearing and pull it out together with the screw.



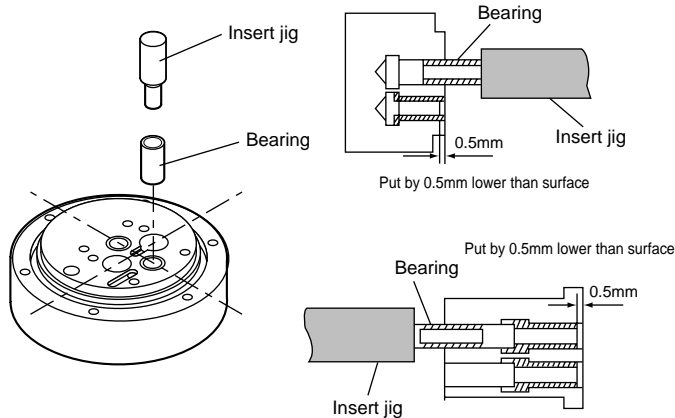
Pull out bearing from pump body



Pull out bearing from bearing holder

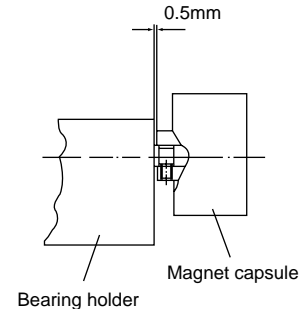
Maintenance

- 2) Pull out four bearings (10) which are inserted in bearing holder (9).
Fixing the bearing holder (9), push the bearing with a round stick of 9.5mm dia. to push out the worn bearing.
- 3) Insert the bearings(10) into the bearing holes of bearing holder (9) and pump body (14). Put the bearing end by 0.5mm lower than the end of bearing holder (9) and pump body (14). Put the bearing carefully into the bearing hole so that it comes in straight along with the bearing hole. Total six bearings are inserted. (If you wish insert jig, ask your dealer.)



4-3. Assembly

- 1) Mount drive gear (13) and driven gear (11) on pump body (14).
- 2) Put two parallel pins (19) on pump body (14). Put the gear case (12) and bearing holder (9) on it and tighten and fix it with four pan-head screws (17) and four spring washers (18). (Tightening torque is 1.76N·m.)
- 3) Insert magnet capsule (7) into shaft of drive gear (13) and fix it with hex. socket head screw (5). Keep 0.5mm distance between magnet capsule (7) and bearing holder (9). (Tightening torque is 3.43N·m.)



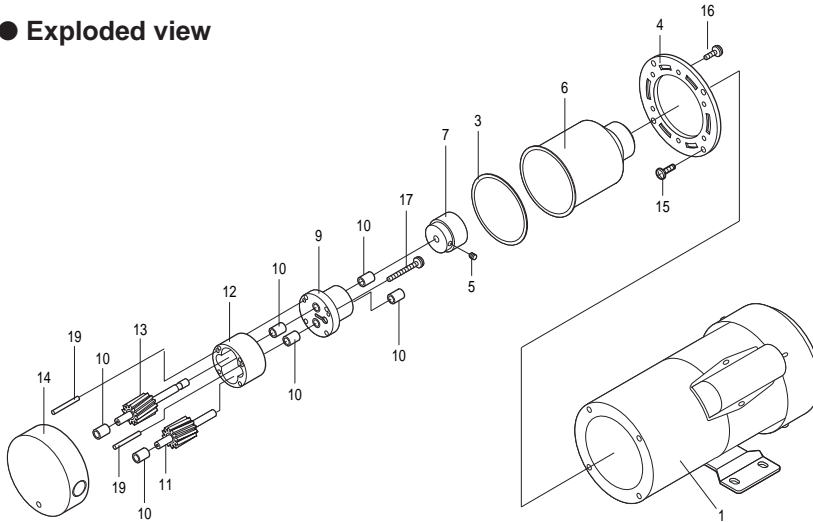
- 4) Insert O ring (3) into pump body (14).

Maintenance

5) Mount rear casing (6) and mounting plate (4) on the pump body so far assembled and fix them with six pan head screw and spring washer (16). Face the chamfered side of mounting plate to the pump body. (Tightening torque is 1.76N·m.)

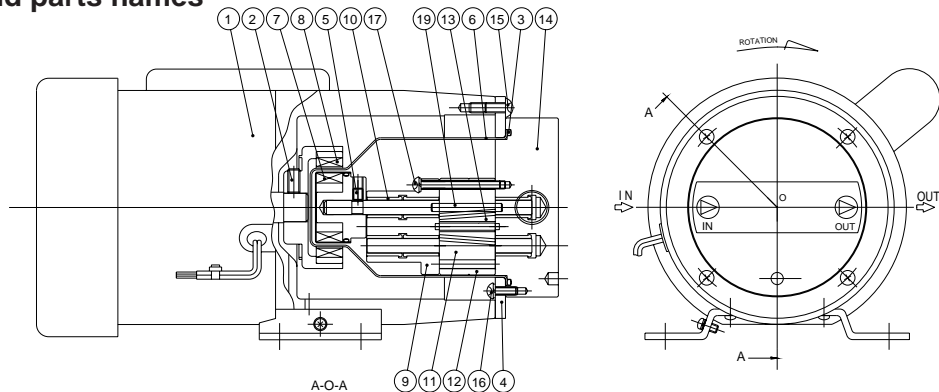
Mount the assembled pump body to motor (1) with four pan-head screws (15). Pay attention for your fingers not to be pinched by strong magnets used. (Tightening torque is 2.95N·m.)

● Exploded view



Maintenance

5. Construction and parts names



No	Parts name	Mat'l	Q'ty	Remarks	No	Parts name	Mat'l	Q'ty	Remarks
1	Motor		1		11	Driven gear	PTFE, SUS316	1	R15T/K
2	Hex. socket head screw	SNCM	1	M6 × 12	11	Driven gear	PEEK, SUS316	1	R15P/C
3	O ring	FKM	1		12	Gear case	SUS316	1	
4	Mounting plate	Iron	1		13	Drive gear	PTFE, SUS316	1	R15T/K
5	Hex. socket head screw	s.s.	1	M5 × 6	13	Drive gear	PEEK, SUS316	1	R15P/C
6	Rear casing	SUS316	1		14	Pump body	SUS316	1	
7	Magnet capsule	SUS316, FKM, Nd magnet	1		15	Cross rec. head screw	s.s.	4	M5 × 10
8	Drive magnet unit	ADC, Nd magnet	1		16	Cross rec. head screw	s.s.	6	M4 × 12 with s.w.
9	Bearing holder	SUS316	1		17	Cross rec. head screw	s.s.	4	M4 × 45 with S.W.
10	Bearing	GFRPTFE	6	R15T/K	19	Parallel pin	SUS316	2	
10	Bearing	(CF+PTFE) PPS	6	R15P/C					



()Country codes

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Australia : IWAKI Pumps Australia Pty. Ltd.	TEL : (61)2 9899 2411 FAX : 2 9899 2421	Italy : IWAKI Italia S.R.L.	TEL : (39)02 990 3931 FAX : 02 990 42888
Singapore : IWAKI Singapore Pte. Ltd.	TEL : (65)763 2744 FAX : 763 2372	Denmark : IWAKI Pumper A/S	TEL : (45)48 24 2345 FAX : 48 24 2346
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