IWAKI PUMPS

IWAKI Magnetic Drive Pump

Model MDF-L

Instruction Manual

⚠ Read this manual before use of product

Thank you for selecting the IWAKI Magnetic Drive Pump type MDF-L. This instruction manual has been prepared to ensure correct and safe handling of the pump. Please read this manual carefully and thoroughly prior to operating the pump.

Pay special attention to the "Safety Instruction to Prevent Personal Injuries," "Warning," and "Caution" messages included in this manual.

This instruction manual should be kept by each end user and within reach of the actual operator, for quick reference when needed.

Contents

IMPORTANT INSTRUCTIONS ····· ~5· 1

Safety Instructions to Prevent Personal Injuries

OUTLINE OF PRODUCT ····· ~14· 6

1. Before Using Pump ····· 7
2. Operating Principle ····· 7
3. Identification Codes ····· 8
4. Specifications and Outer Dimensions ····· 9
5. Names of Parts ····· 11

PUMP OPERATION ····· ~30 15

1. Handling Instructions ····· 16
2. Installation ····· 21
3. Piping ····· 22
4. Wiring ····· 26
5. Operation Step ····· 27

MAINTENANCE ····· ~43· 31

1. Causes of Trouble and Troubleshooting ····· 32
2. Maintenance and Inspection ····· 35
3. Spare Parts ····· 39
4. Disassembly and Assembly ····· 40

Please contact the IWAKI sales office or IWAKI dealer for any inquiries or questions regarding this product.

IMPORTANT INSTRUCTIONS

Important notes and statements for safe operation, preventing physical injury, and property damage, are included on the body of the product and in the attached instruction manual.

Always Observe These Safety Instructions!

Safety Instruction to Prevent Personal Injuries

 **Warning**	Ignoring this message can lead to improper handling resulting in death or serious injury to the operator.
 **Caution**	Ignoring this message can lead to improper handling resulting in injury to the operator or damage to the product.

Safety Section

⚠ WARNING

- **Damaged or deteriorated tools are very dangerous.** Use qualified and suitable tools only.


Caution

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


Wear protective gear

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


Caution

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


Prohibited

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


Power off

- **To ensure greater safety, check and make sure that there is no one near the pump when switching on the power supply.** The pump is not equipped with an ON/OFF switch. Connecting the power cable supplies the power to the pump and starts the operation.


Caution

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


Prohibited

- **If the pump operation is stopped due to a power failure or closure of discharge wire,** turn off the power switch at once. After normal conditions return, turn the switch on again.


Caution

- **Do not use the pump for anything that it is not designed to do.** User's failure to observe this instruction exempts IWAKI from any responsibility for personal injury or damage to the equipment or facility caused by the pump's misuse.


Prohibited

- **When handling a toxic or odorant liquid,** ventilate the working area well. In addition, the operator must wear protector gear (such as a safety mask, safety goggles, and protective gloves).


Wear protective gear

Safety Section

⚠ WARNING

- **Do not allow toxic substances such as lubricants, solvents, or similar substances to flow into the local sewage system or river systems.** Do not drain hazardous liquids such as chemical solutions discharged out of the pump directly onto the ground. Instead, drain such liquids into some kind of container. Observe the laws and regulations related to the application, handling, and processing of hazardous substances.


Prohibited

- **Do not pass under a raised pump.**
  Never pass under a raised pump. A serious injury could occur if the pump is accidentally dropped.



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


No Remodeling

- **Cautions when dangerous liquids are transferred.**
  When the pumps are used to transfer the dangerous liquids mentioned as below, the pumps always must be checked and watched so that the liquids can not be leaked. The operation of the pumps leaking the liquids may result in personal injury and/or explosion, fire accidents.
  - Explosive, fire-spreading and inflammable liquids
  - Corrosive and stimulus toxic liquids
  - Liquids detrimental to health



⚠ CAUTION

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



- **For specified application only**
  The pump is designed and manufactured to the specifications agreed upon by the user and IWAKI. The use of a pump in any application other than those clearly specified may result in injury or damage to the pump. Use the pump strictly in accordance with the pump specifications and application range. If you change any specification, contact IWAKI or your dealer.


Prohibited

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


Caution

Safety Section

⚠ CAUTION

- **Spill-out prevention measures**
  Appropriate protective measures should be taken against any spill-out accidents involving the operating liquid as a result of unexpected damage to the pump or the piping. Never discharge hazardous liquid, including, but not limited to, chemical liquid, over the ground or floor on the pump operating site. Follow local rules and regulations in disposing of hazardous substances.


Caution

- **Do not operate the pump dry.**
  Do not run the pump dry (without liquid inside the pump). Heat generated as a result of abrasion between elements inside the pump during operation without liquid may damage the inside of the pump. Operating the pump with the suction valve fully closed will result in dry operation.


Prohibited

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


Prohibited

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


Prohibited

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


Caution

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


Grounding

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


Electrical Shock

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


Prohibited

Safety Section

⚠ CAUTION

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



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



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



- **Handling of magnet coupling**
  The magnet used in the pump has a very high magnetic power. Be careful not to allow your fingers to be seized by the magnet or to allow the magnet near any electronic device which may be affected by the magnet's power.



- **Suspending pump operation for a prolonged period**
  When suspending pump operation for a prolonged period, drain the pump and clean inside the pump. Take appropriate measures to prevent the entrance of foreign matter into the pump. If the pump is not operated for a period longer than one year, replace the O ring and inspect inside the pump.



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



OUTLINE OF PRODUCT

1. Before Using Pump 7

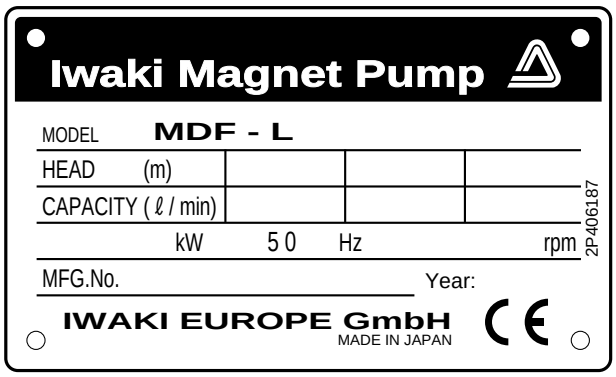
2. Operating Principle 7

3. Identification Codes 8

4. Specifications and Outer Dimensions 9

5. Names of Parts 11

1. Before Using Pump



After unpacking, check the following points to confirm that the delivered product and its accompanying parts and elements are exactly what you ordered.

When lifting the pump please follow the procedure mentioned "2. Installation" of "Pump operation".

[1] Do the model and frequency indicated on the nameplate conform to your order?

[2] Prior to the installation of the MDF-L□KK pump (using SiC liner ring and mouth ring), remove the cardboard pad inserted inside the suction port.

[3] Has the pump unit or any part of it been damaged or bolts and nuts been loosened during delivery?

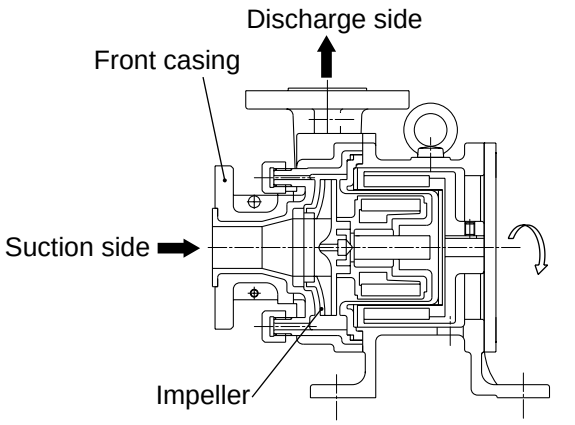
[4] The fourth numeral of the MFG. No. shows the year the product was manufactured.

(e.g.) ×××5×××

"5" shows the product was manufactured in the year 1995.

If you find anything wrong, please refer to the dealer you placed your order with.

2. Operating Principle



➡ : Flow of liquid
⇨ : Direction of impeller rotation

The MDF-L pump is a magnet-driven centrifugal type pump developed for various applications.
The impeller inside the pump chamber (front casing) is rotated by magnetic force to transfer liquid from the suction side to the discharge side.
The MDF-L type pump features excellent corrosion resistance, durability, and safety, and serves as a chemical pump for various processes. Most chemicals can be handled by the pump.

3. Identification Codes

Example:

MDF-L ①	42 ②	5 ③	CF ④	V ⑤	T ⑥	-	D ⑦

①	Series	MDF-L Type Series
②	Size of pump:	Shows discharge port diameter (42 shows 40)
③	Motor output	0: 0.37 kW 1: 0.75 kW 2: 1.5 kW 3: 2.2 kW 5: 4 kW 7: 5.5 kW 10: 7.5 kW 15: 11 kW
④	Material of bearing/spindle	CF: High density carbon/Alumina ceramics 99.5% AA: Alumina ceramics 99.5%/Alumina ceramics 99.5% * SiC/SiC is used in the model 6515. KK: SiC/SiC
⑤	Material of O ring and gasket	V: FKM E: EPDM A: AFLAS® FKM, AFLAS®: Fluoro rubber EPDM: Ethylene propylene rubber
⑥	Code of impeller	T, V, W: Standard K, L: For high head applications
⑦	Construction code	No mark: Standard D, E: Pin-point contacting bearing system (Standard models for 250, 401, 422, 423 and 425) H, DH, EH: For up to 100 ˚C model (call it "H" type)

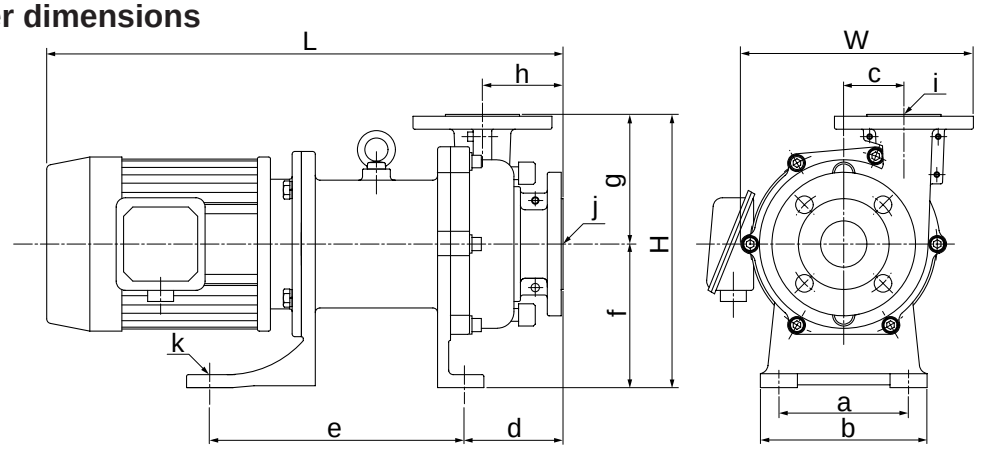
4. Specifications and Outer Dimensions

■ Standard specifications

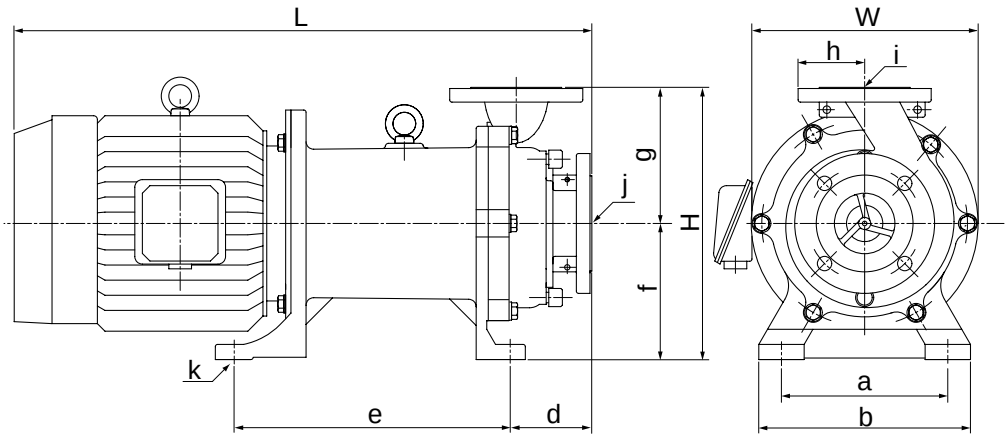
50Hz

Model	Port Diameter Suction Port × Discharge Port	Impeller Code	Standard Performance m- ℓ / min. 50Hz	Rated speed (min^{-1})	Motor Output kW
MDF-L250	25×25	K	12.2 - 50	2900	0.37
		T	7.3 - 150		
		V	5.6 - 150		
		W	3.0 - 150		
MDF-L401	40×40	K	16.8 - 100		0.75
		T	4.5 - 200		
		V	8.3 - 200		
		W	4.8 - 200		
MDF-L422	50×40	K	20 - 200		1.5
		T	18 - 200		
		V	14 - 200		
		W	10.5 - 200		
MDF-L423	50×40	K	28.5 - 150		2.2
		L	21.5 - 300		
		T	19.5 - 300		
		V	15 - 300		
		W	11.5 - 300		
MDF-L425	50×40	T	25.5 - 400		4
		V	21 - 400		
		W	12 - 400		
MDF-L505	65×50	T	17 - 600		
		V	12.5 - 600		
		W	8.5 - 600		
MDF-L507		K	32.5 - 500		5.5
		T	29 - 600		
		V	19.5 - 600		
		W	12.0 - 600		
MDF-L657	80×65	T	18.5 - 1000		
		V	10.5 - 1000		
		W	6.5 - 1000		
MDF-L6510		K	30.5 - 800		7.5
		T	26 - 1000		
		V	14.8 - 1000		
		W	9.5 - 1000		
MDF-L6515		T	33 - 1000		11
		V	24.8 - 1000		
		W	15 - 1000		

Outer dimensions



Model	W	H	L	a	b	c	d	e	f	g	h	i	j	k
MDF-L250	205	237		110	150	51	95	143	115	122	88	25	25	4-ø12
MDF-L401	233	275		130	170	58	111	250	135		102		40	
MDF-L422														
MDF-L423	251	295		140	180	65	106	275	155	140	87	40	50	4-ø14
MDF-L425														



Model	W	H	L	a	b	d	e	f	g	h	i	j	k
MDF-L505		340				90	285		160	80	50	65	
MDF-L507							365	180					
MDF-L657	298	360		220	280	108.5			180	100	65	80	4-ø14
MDF-L6510													
MDF-L6515		410				108	450	230					

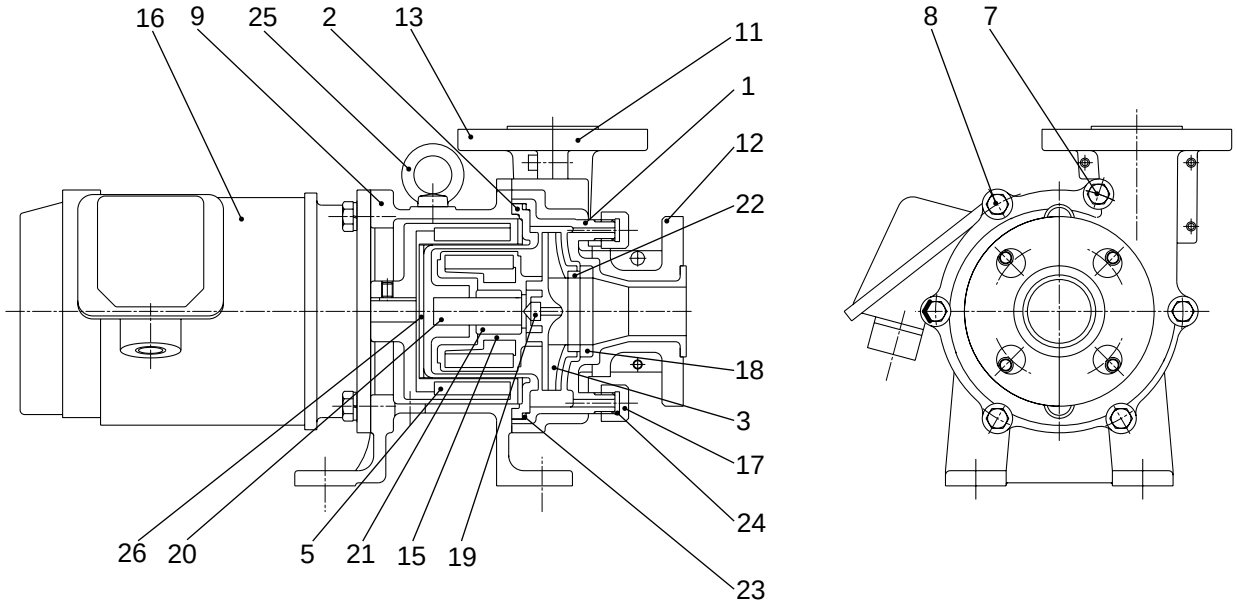
Mass

Model	250	401	422	423	425	505	507	657	6510	6515
Mass (kg)										

5. Names of Parts

■ Names of Parts

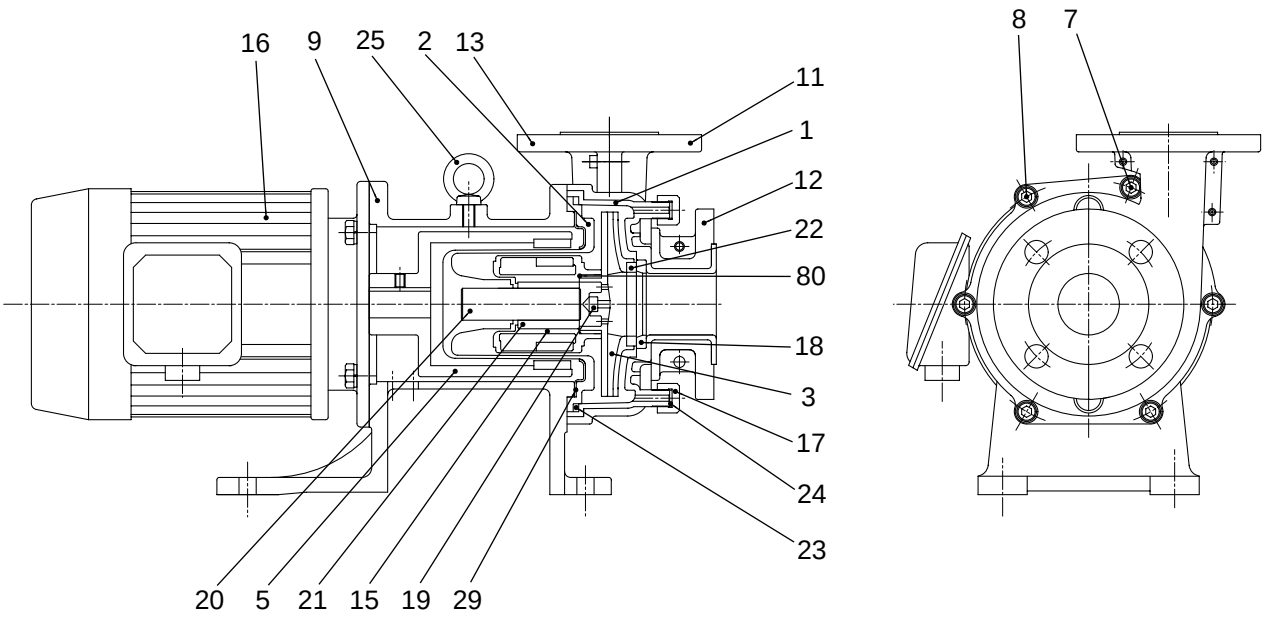
• MDF-L250 and 401



No.	Parts name	Q'ty	Material	Remarks	
				Model 250	Model 401
1	Front casing	1	CFRETFE		
2	Rear casing	1			
3	Impeller	1			
5	Drive magnet unit	1	FERRITE MAGNET+ALUMINUM ALLOY		
7	Hex. head bolt		STNLS STL	M8×65, WITH SW, Q'TY5	M8×70, WITH SW, Q'TY5
8	Hex. head bolt			M8×35, WITH SW, Q'TY1	M8×40, WITH SW, Q'TY3
9	Foot support	1	FC200		
11	Cover A	1			
12	Cover C	2			
13	Cover B	1			
15	Magnet capsule	1	CFRETFE		
16	Motor	1			
17	Cap	2	PTFE		

No.	Parts name	Q'ty	Material			Remarks	
			CF-D	AA-E	KK-E	Model 250	Model 401
18	Liner ring	1	Alumina ceramics 99.5%		SiC		
19	Impeller thrust	1					
20	Spindle	1					
21	Bearing	1	High density carbon				
22	Mouth ring	1	PTFE				
23	Oring	1	V: FKM E: EPDM A: AFLAS ®			JIS B 2401 G 135	JIS B 2401 G 160
24	Gasket	2					
25	Eye bolt	1	Steel			Only model 401	
26	Rear casing cover	1	STNLS STL			Only "H" type	

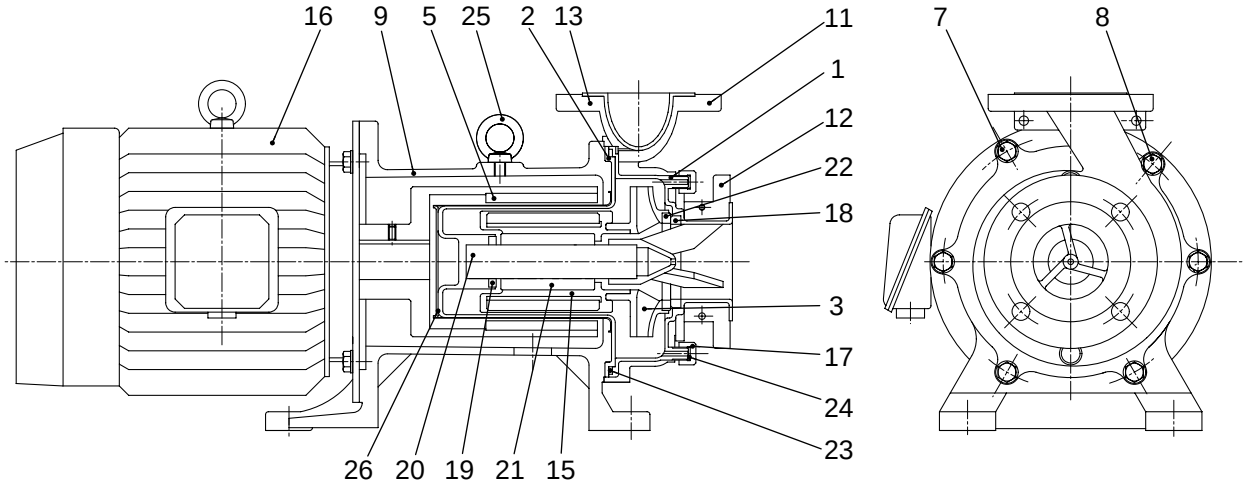
• MDF-L422, 423 and 425



No.	Parts name	Q'ty	Material	Remarks
1	Front casing	1	CFRETFE	
2	Rear casing	1		
3	Impeller	1		
5	Drive magnet unit	1	RARE EARTH MAGNET+FCD450	
7	Hex. socket head bolt	5	STNLS STL	M10×40 WITH SW
8	Hex. socket head bolt	1		M10×75 WITH SW
9	Foot support	1	FC200	
11	Cover A	1		
12	Cover C	2		
13	Cover B	1		
15	Magnet capsule	1	CFRETFE	
16	Motor	1		
17	Cap	2	PTFE	

No.	Parts name	Q'ty	Material			Remarks
			CF-D	AA-E	KK-E	
18	Liner ring	1	Alumina ceramics 99.5%		SiC	
19	Impeller thrust	1				
20	Spindle	1				
21	Bearing	1	High density carbon			
22	Mouth ring	1	PTFE			
23	O ring	1	V: FKM E: EPDM A: AFLAS®			JIS B 2401 G 165
24	Gasket	2				
25	Eye bolt	1	Steel			
29	Retainer ring	1	STNLS STL			
80	O ring	1	V, A: FKM E: EPDM			AS568-129

• MDF-L505, 507, 657, 6510 and 6515

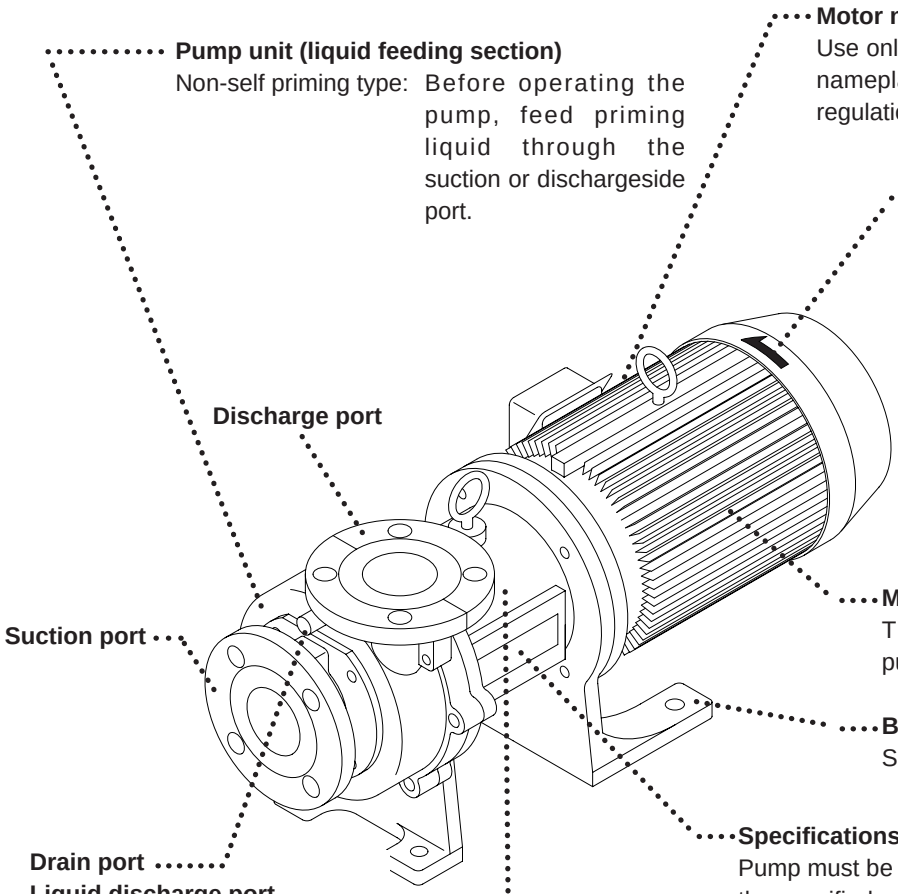


No.	Parts name	Q'ty	Material	Remarks		
				Model 505 and 507	Model 657 and 6510	Model 6515
1	Front casing	1	CFRETFE			
2	Rear casing	1				
3	Impeller	1				
5	Drive magnet unit	1	FERRITE+SS400			
7	Hex. head bolt		STNLS STL	M12×50, WITH SW, Q'TY 5	M12×50, WITH SW, Q'TY 5	M12×90, WITH SW, Q'TY 6
8	Hex. head bolt			M12×90, WITH SW, Q'TY 1	M12×100, WITH SW, Q'TY 1	————
9	Foot support	1	FC200			
11	Cover A	1				
12	Cover C	2				
13	Cover B	1				
15	Magnet capsule	1	CFRETFE			
16	Motor	1				
17	Cap	2	PTFE			

No.	Parts name	Q'ty	Material			Remarks
			CF	AA	KK	
18	Liner ring	1	Alumina ceramics 99.5%		SiC	
19	Rear thrust ring	1				
20	Spindle	1				
21	Bearing	1	High density carbon			
22	Mouth ring	1	PTFE			
23	O ring	1	V: FKM E: EPDM A: AFLAS®			JIS B 2401 G 230
24	Gasket	2				
25	Eye bolt	1	Steel			
26	Rear casing cover	1	STNLS STL			

* Note: In model 6515 AA, Spindle and Bearing made of SiC are used.
In model 6515, Drive magnet made of rare earth magnet is used.
Model 505 has a rear casing cover only "H" type.
The larger models above model 507 have a rear casing cover as standard equipment.

■ Description on Main Unit Body and Label



Pump unit (liquid feeding section)
Non-self priming type: Before operating the pump, feed priming liquid through the suction or dischargeside port.

Motor nameplate
Use only the power voltage specified on the nameplate. (Follow applicable local power regulations when used outside of Japan.)

"Arrow" indicator label
The arrow indicates the rotating direction of the motor.
Always make sure that the motor runs in the direction the arrow indicates. (Refer to Preparation for start-up [6] in the Pump operation chapter.)

Discharge port

Suction port

Motor (Driving section)
This motor provides power to the pump unit.

Base
Setting should be fixed.

Specifications nameplate
Pump must be operated only under the specified conditions.

Drain port
Liquid discharge port
Drain the discharged liquid into a suitable container and follow the applicable local regulations in disposing of the liquid. Never allow the discharged liquid to run directly onto the ground.

"Never Operate Dry" indicator label
Operating the pump without liquid will cause damage inside the pump. Never operate the pump without liquid.

⚠CAUTION

When cleaning the pump, be careful not to wipe the labels or the pump body with solvent.

PUMP OPERATION

1. Handling Instructions 16

2. Installation 21

3. Piping 22

4. Wiring 26

5. Operation Step 27

1. Handling Instructions

(Observe all the following instructions to prevent injuries and accidents.)

⚠ Caution

- **Read the following information prior to installing the pump.**
- **Protective wear:**
  When operating the pump or working near it, with the pump system loaded with chemical liquid, always wear protective clothing, face guard, goggles, and gloves. Further precautionary measures must be taken depending upon the type of liquid used.
- **Operating the pump dry (without supplying liquid to it) may cause seizure on wear of the inside of the pump section.**
- **Do not repair the pump beyond the range specified in this instruction manual.**
  The pump must be repaired by trained and qualified operators only.

[1] Handle the pump carefully.

Strong impacts caused by dropping the pump on the floor or striking it may result in damage or faulty performance.

[2] Priming water

Be sure to fill the pump unit with feeding liquid as priming water before pump operation.

[3] Do not operate the pump in the following places.

- Places where the temperature falls below 0 ˚C
- Places where corrosive gas or explosive gas is generated
- Places exposed to splashing water
- Places where the ambient temperature is 40 ˚C or above
- Places where the humidity is excessively high. (Permissible humidity: 35~85%RH)
- Places filled with or likely to be filled with explosive or corrosive atmosphere.
- Danger due to dust, fire, earthquake and/or any externally imposed shock.

[4] Keep the pump away from fire.

To prevent fire and explosions, do not place dangerous or inflammable substances near the pump.

[5] If pump is damaged

Do not operate a damaged pump, otherwise there may be electricity leakage or electric shocks.

[6] No remodeling

Never try to remodel the pump. This may cause a serious accident or damage.

[7] Limitation to disassembly or repair

Users are allowed to disassemble and repair the pump to the degree of the given description in "Disassembly and Assembly" in this manual.

[8] No dry running operation

Dry operation of the pump (pump operation without liquid inside) may cause damage to the pump internally. Never operate the pump dry. In the case of MDF-L type, the sliding parts are self-lubricated and self-cooled. If the pump is operated dry or with the suction-side valve closed, damage may result.

* Countermeasures to be taken in case of dry operation
  1. Turn off the power switch of the pump immediately and leave the pump as it is for more than 1 hour.
  2. Prime the pump and fill the pump with liquid.
     (Note that the pump should be supplied with liquid after leaving the pump empty for more than 1 hour. Sudden supply of liquid may cause a crack in a part due to quenching effects.)

[9] Dry operation compatible type pump

The dry running operation compatible type pump (with D at the end of the model identification) can endure continuous dry running operation of not longer than 1 hour. Longer dry running operations, if repeated frequently, may result in wear of the sliding parts which rapidly affects the normal functioning of the inner part of the pump. The pump is designed so as not to develop cracks as a result of sudden cooling down with liquid immediately after dry operation. However, it is recommended that the pump be left as it is for about 20 minutes before running it with liquid.

* Pumps with E at the end of the model identification or without any symbol cannot endure dry running operation.

[10] Points to be noted when starting and stopping pump

Pay close attention to the following points to avoid water hammer action when starting and stopping pump operation. When the discharge-side piping is very long, extra attention is required.

(1) When starting the pump, first prime it. Then, close the discharge valve completely and turn on the power switch. After starting up the pump, open the discharge valve gradually and set it to the desired operation level.

(2) When stopping the pump, first close the discharge valve slowly. Turn off the power switch only after completely closing the discharge valve.

⚠ Caution

In this procedure, never try to stop the pump quickly using a solenoid valve, etc. Quick closure may cause water hammer action, and the excessive pressure will destroy the pump.

[11] Allowable pressure limit

See the table 1~5 for allowable pressure limits of each model.

See that the discharge pressure does not exceed the allowable pressure limit.

NOTE

Table 1

MDF-L250

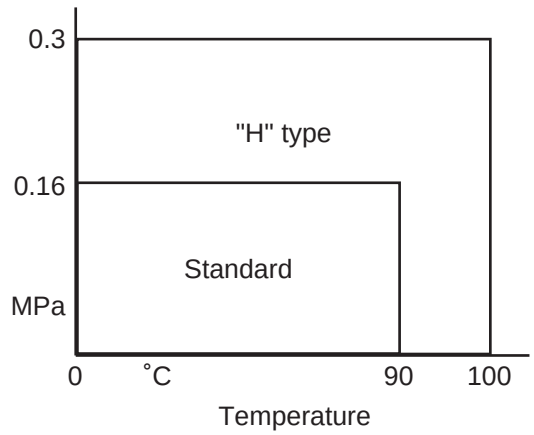


Table 2

MDF-L401

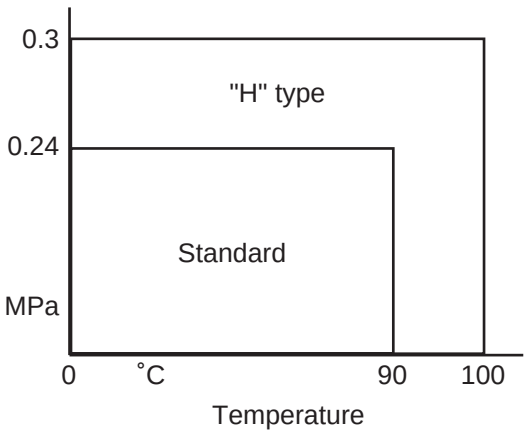


Table 3

MDF-L422/423/425

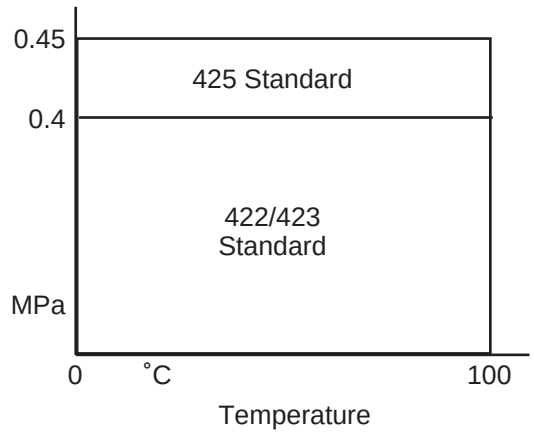


Table 4

MDF-L505/507/657/6510

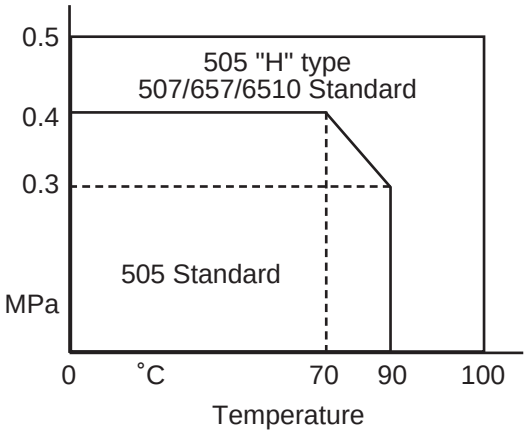
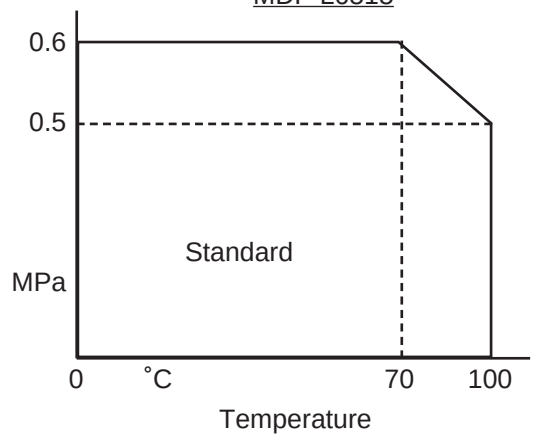


Table 5

MDF-L6515



NOTE

*AFLAS® O ring

Above 10 ˚C

[12] Use of slurry liquid

In principle, slurry liquid pumping is not possible. However, pumps with ceramic bearings (AA, and KK types only) can handle the pumping of slurry liquid with a density of 5wt% or less, grain size of 50 μm or less, and hardness of 80Hs or less. Prior to pumping such slurry liquid, be sure to confirm the operation feasibility with the supplier.

[13] Influence of specific gravity and viscosity of liquid on pump performance

If the specific gravity or viscosity of the liquid is higher than that of pure water, the shaft power, discharge volume, and pump head may vary somewhat. The delivered pump has been prepared to meet the specifications ordered by the user. To change the operating conditions after delivery, be sure to contact the supplier.

[14] Intermittent operation

Frequent start/stop switching considerably shortens the service life of the pump. Try to limit the switching frequency to six times or less per hour.

[15] Temperature humidity fluctuation

Temperature fluctuation may not change the performance of the pump itself. However, the liquid may change in terms of its viscosity, pressure, or corrosion resistance. Pay special attention to changes in liquid characteristics as a result of temperature fluctuation.

► Liquid temperature range: 0~100 ˚C (pure water) < 90~100 ˚C for the model MDF-L 250, 401 and 505 with code symbol "-H", "-EH", or "-DH" >
► Ambient temperature range: 0~40 ˚C
► Humidity range: 35~85%RH

* The liquid temperature range for the pump using the O ring supplied by AFLAS® is 10~90 ˚C.
* Refer to the corrosion resistance table for the temperature ranges recommended for various types of liquid. For inquiries or consultation, contact the dealer you placed your order with.
* Some types of pumps can be operated in the temperature range of 90~100 ˚C. For details, contact your dealer.

[16] Disengagement of magnet coupling

Though the motor is running, the liquid is not circulated. (The pressure gauge on the discharge side points to "0" point approximately.)

When the magnet coupling disconnects, stop the pump within 1 minute. If operation is continued with the coupling in the disconnected mode, the power of the coupling will decrease considerably.

[17] Removal of grease (For AA type only)

Fluorocarbon grease is applied over the bearing in the AA type pump. The grease may, depending on the type of liquid, melt into the liquid. Contact your dealer if you do not want the application liquid to be mixed with the grease.

[18] Operation within range of drooping head capacity curve

In the case of a pump which generates a drooping head capacity curve in a low-capacity range, do not operate the pump in the section where the line droops to the left. (Refer to the standard performance curve to verify the head capacity.) If the drooping section (left side) of the head capacity curve is part of the pump operation specifications, design the piping with the following points in mind.

① The discharge piping should have no water tank or air trap.
② The discharge amount should be adjusted with the valve installed near the discharge port.

2. Installation

[1] Installation position

- Install the pump as close to the suction tank as possible and in the lowest position available (for flooded suction).
- If the suction port of the pump is to be positioned higher than the suction tank (for suction lift), be sure to arrange for a foot valve in the priming pipe and suction pipe.

* The lift head depends upon the liquid properties, temperature, and length of the suction piping. For details of the setup, consult IWAKI or your dealer.

[2] Indoor and outdoor use

The pump can be operated either indoors or outdoors. However, safety measures should be taken so as not to expose the motor and power distribution unit to flooding or other natural hazards.

[3] Installation site

Select an installation site that is flat and free of vibrations caused by nearby machines. Space sufficient for maintenance work should be provided.

■ Lifting

When lifting the pump, please pay attention to the following points.

- Pump must be lifted horizontally using two bolts located at pump and motor.
- In the case that there is no lifting bolt at the motor, rope or such kind materials should be tightenly winded to the motor to lift the pump horizontally.
- Please use lifting chain or rope which has enough strength enduring pump weight.
- To prevent any human body accident caused by the pump drop, please do not enter under the lifted pump.

■ Foundation preparation (before pump installation)

[1] The area for anchoring the pump must be greater than the area of the base. If the anchoring area is not enough, the base may be destroyed due to a concentrated load on it.

[2] If pump operation is to be subject to vibration (resonation with the piping, for example), provide an expansion joint between the pump and the piping. Otherwise, the piping, gauge, etc., may be damaged.

[3] Installation advice

- Use anchor bolts to fasten the pump base firmly.
- Install the pump horizontally.
- Sufficient space is required to allow cool air from the motor fan to circulate.
- Allow ample space around the pump for easy and efficient maintenance work.

3. Piping

Tightening torque for piping flange of pump. (In the cace of steel flange with rubber gasket.)

Recomended bolt size and tightening torque for piping flange are as follows.
MDF-L250 : Bolt size is M12 and tightening torque is 42 N·m.
MDF-L401, 422, 423, 425, 505, 507, 657, 6510 and 6515 : Bolt size is M16 and tightening torque is 78.4 N·m.

Load of piping and momentum of piping for MDF-L.

The permissible stress and moment applicable to pump connection arrangement are as shown below.
The piping should be designed and worked so that stress and moment, higher than those values indicated in the table, should not be applied to the pump.

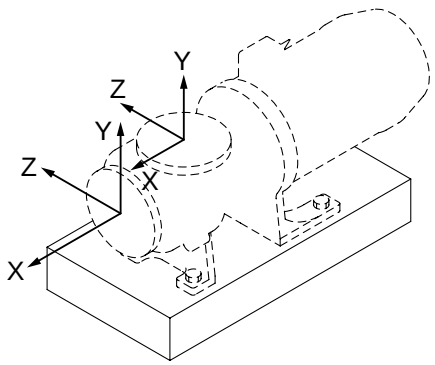


Table 9 : Piping loadings

Forces of discharge piping

	Dia. of pipe	
	25, 40, 50	65
	Load	
Direction of load	kN	kN
Fx	0.71	1.07
Fy: compression	0.89	1.33
Fy: tension	0.44	0.67
Fz	0.58	0.89

Forces of suction piping

	Dia. of pipe	
	25, 40, 50	65, 80
	Load	
Direction of load	kN	kN
Fx	0.89	1.33
Fy	0.58	0.89
Fz	0.71	1.07

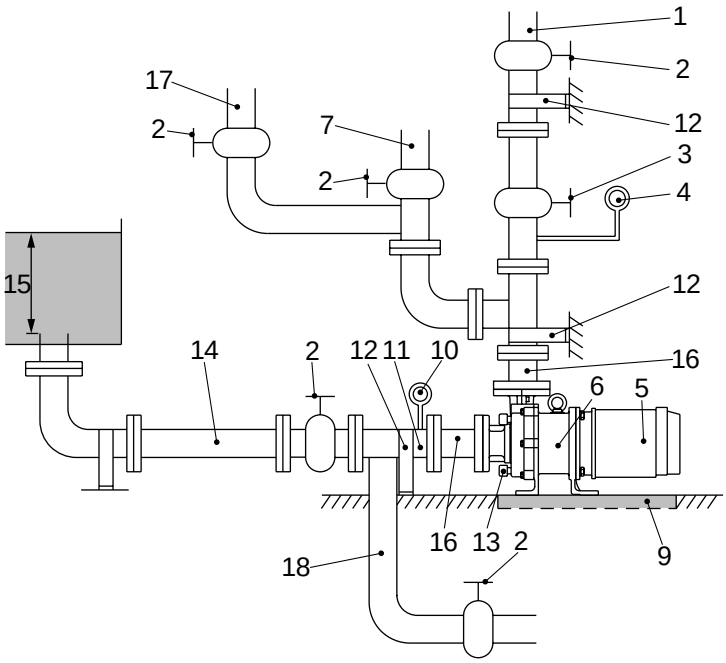
Moments of discharge piping

	Dia. of pipe	
	25, 40, 50	65
	Load	
Direction of load	kN·m	kN·m
Mx	0.35	0.72
My	0.46	0.95
Mz	0.23	0.47

Moments of suction piping

	Dia. of pipe	
	25, 40, 50	65, 80
	Load	
Direction of load	kN·m	kN·m
Mx	0.46	0.95
My	0.35	0.72
Mz	0.23	0.47

Example of piping



(1) Discharge pipe (Support the pipe to keep the pump free of piping load.)
(2) Valve
(3) Check valve
(4) Pressure gauge
(5) Motor
(6) Pump
(7) Air vent pipe
(9) Drain ditch
(10) Vacuum gauge
(11) Suction pipe (pipe diameter: D)
(The horizontal section should be as short as possible and there should be an ascending gradient of 1/100 toward the pump.)
(12) Pipe support
(13) Pump drain
(14) Suction pipe (pipe diameter: D)
(15) 2D, 500 mm or above
(16) Expansion joint
(17) Piping for flushing (Discharge side)
(18) Piping for flushing (Suction side)

■ Suction piping

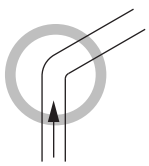
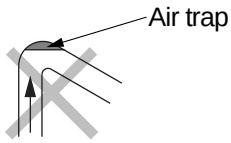
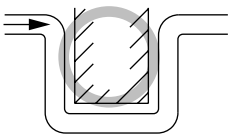
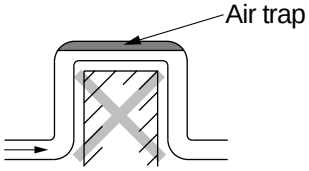
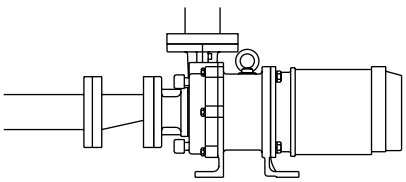
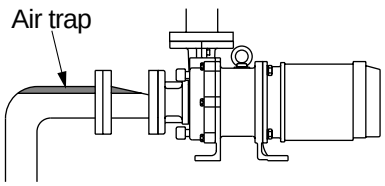
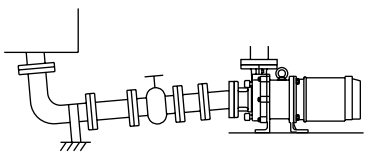
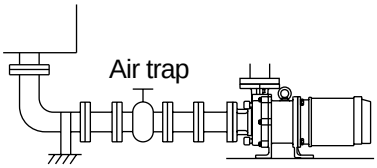
[1] The suction pipe should employ the flooded suction method if possible. The shortest pipe possible, with the minimum number of bends, should be used. Arrange a proper support under the suction pipe such as an expansion joint or the like so that the weight and thermal stress of the pipe are not applied to the pump.

[2] Attach the coupling on the suction pipe carefully so as not to allow air inside the line. Air in the suction pipe may damage the system.

[3] If suction is not good (e.g., the suction tank is a vacuum, the suction head is large, or the suction pipe is long), the condition NPSHa > NPSHr + 0.5 m should be established. For the NPSHr level, refer to the standard performance curve.

[4] When using an elbow pipe on the suction side, install a straight pipe with a length of at least 500 mm or 8 times the suction port diameter before the pump suction port. Provide the largest radius possible for the R of the bend.

[5] Do not allow any projection where air may be trapped along the suction pipe. The suction pipe should have an ascending gradient of 1/100 toward the pump.

Good conditions	Unacceptable conditions
Good 	No good 
Good 	No good 
Good 	No good 
Good 	No good 

[6] If the diameters of the pump suction port and the suction pipe are different, use an eccentric reducer pipe. Connect the eccentric reducer pipe so that the upper surface is level. In any case, never use a suction pipe with a diameter smaller than that of the suction port.

[7] It is also recommended, in the case of flooded suction, that a gate valve be installed on the suction pipe for easier overhaul inspection of the pump. Keep the gate valve fully open during ordinary pump operation; it is required to be closed only during an overhaul inspection.

[8] When circulating a dangerous liquid, arrange the flushing pipes so that internal cleaning is possible when disassembling the pump.

[9] The diameter of the suction pipe must be larger than that of the pump suction port.

[10] The end of the suction pipe should be located 500 mm or more below the surface of the liquid.

[11] A screen should be provided at the inlet in the suction tank to prevent the entry of foreign matter into the suction pipe. The end of the suction pipe should be 1~1.5 D (D: diameter of suction pipe) or more away from the bottom of the suction tank. Note that the entry of foreign matter may cause the pump to malfunction.

[12] In the case of the suction lift method, install a foot valve on the suction pipe.

Note: The items [10], [11], and [12] above are applied to the suction lift method.

■ Discharge piping

[1] Use a support so that the weight of the pipe is not applied to the pump as load.

[2] If a method other than flooded suction is employed, install a priming pipe.

[3] If the pipe is too long the piping resistance may increase, hampering the pump's performance. The diameter of the pipe should be determined by calculating the piping resistance.

[4] A check valve should be installed if any one of the following conditions is present. When selecting the check valve, consider the check valve pressure limit (including the influence of water hammer or back flow onto the pump).

① The discharge piping is very long
② The discharge lift exceeds 15 m
③ The end of the discharge pipe is 9 m higher than the surface of the suction tank
④ Several pumps are connected parallel to one another on the same piping

[5] It is recommended that a valve be installed on the discharge pipe for the adjustment of discharge volume and for the prevention of overload onto the motor. When installing both a check valve and a valve, the check valve should be positioned between the pump and the valve.

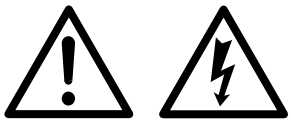
[6] Do not fail to install a pressure gauge on the discharge piping.

[7] Install an air bleeding valve if the discharge pipe is very long horizontally.

[8] Install a drain valve for the drainage of liquid if there is a chance that the liquid in the discharge pipe might freeze.

4. Wiring

Electrical connections



ATTENTION

The electrical connection should be carried out by an authorized electrician in accordance with local regulations. Please make sure that the electrical data on the nameplate of the motor correspond to the electricity supply on which it will be used. Motors must be connected to a motor protection switch.

[1] Use an electromagnetic switch that conforms with the specifications (voltage, capacity, etc.) of the pump motor.

[2] If using the pump outdoors, waterproof the wiring to protect the switches from rainwater.

[3] Electromagnetic switches and push buttons should be installed reasonably distant from the pump.

[4] For starting up a pump with a motor of 5.5 kW or higher, be sure to use a Star Delta starter, soft starter or invertor.
*Refer to the instruction manual of the motor issued by the motor maker for detailed handling instructions.

5. Operation Step

■ Operation instructions

[1] Never operate the pump dry or with the suction-side valve closed. Otherwise, the inside of the pump will be damaged.

[2] In the event of cavitation, stop the pump within a minute.
In addition, do not continue pump operation with the air mixed into the suction side.

[3] If the magnet coupling disconnects, stop the pump within a minute. The power of the magnet coupling is reduced if operation is continued with the coupling disconnected.

[4] The temperature fluctuation should not exceed 80 ˚C through the operation modes of starting, stopping, and operating the pump.

[5] Before starting operation, close the discharge valve fully to prevent water hammer action upon start-up.

[6] Note that pump operation with the discharge valve closed fully over a long time will raise the temperature of the liquid inside the pump and finally damage the pump.

[7] In the event of a service power failure, turn off the power switch immediately and close the discharge valve.

[8] Make sure that intolerable pressure levels are not applied to the pump. Refer to "page 18 [11] Allowable pressure limit" in "1. Handling Instruction."

[9] Maximum pump surface temperature
The max. pump surface temperature of each model is shown in the table. Arrange protective measures in accordance with the temperature levels.

Model	Liquid temp (˚C)	Maximum surface temperature when ambient temperature is at 40 ˚C. (˚C)	Rated speed (min^{-1})
MDF-L250	100	90	2900
401		90	
422, 423, 425		90	
505, 507		90	
657, 6510		90	
6515		95	

[10] Sound generated by pump

The level of sound generated by each type of pump is shown in the table. Arrange a muffling measures in accordance with the sound level. The procedure for sound measurement conforms to the EN 31201 (ISO11201).

Model	MDF-L250	401	422, 423, 425	505, 507	657, 6510	6515
Sound Level	75	80	80	80	85	85

(dB)

■ Preparation for start-up

Preparations should be made, as described below, in the case of initial operation after installation and in the case of restarting of operation after a long period of inactivity.

[1] Thoroughly clean the inside of the pump and pipe. Then, supply liquid.

[2] Tighten the flange connecting bolts and the installation bolts on the base.

[3] After priming the pump, close the discharge valve fully.
Also, make sure the air-vent valve and flushing piping valve are closed.

[4] In the case of the flooded suction method, measure the pressure in the flood pipe to confirm that the pump is filled with liquid.

[5] In the case of the suction lift method, prime the pump.

[6] Run the motor instantaneously to check for correct direction of motor rotation. The motor should run in the direction indicated with the arrow on the pump. If the direction is reversed, exchange any two wires of the three-phase power wires.

■ Operation

Operate the pump by following the steps given below.

<table>
<tr><th>No</th><th>Operation Step</th><th>Remarks</th></tr>
<tr><td>1</td><td>• Close or open the valve.</td><td>• Suction valve-Fully opened
• Discharge valve-Fully opened</td></tr>
<tr><td>2</td><td>• Prime the pump</td><td>• Confirm pump is filled with liquid. If pump is not filled with liquid, fill it in accordance with steps [4] and [5] of 'Preparation for start-up'. After priming completely, close the discharge valve fully.</td></tr>
<tr><td>3</td><td>• Check the motor for correct rotating direction. Switch on the power and then immediately switch off the power.</td><td>• Supply power immediately to run the pump only when checking the rotating direction of the pump. (Correct direction of pump operation is indicated with arrow on the pump. Check the direction of motor fan by looking at the fan through the fan cover.)
• Observe carefully to see if the motor fan slowly and smoothly stops rotating when the power switch is turned off.
Note: If the motor fan does not stop smoothly, it is possible that the pump is locked inside. In this case, contact your IWAKI dealer.</td></tr>
<tr><td>4</td><td>• Turn on the power and start the pump. Then, adjust the discharge pressure and discharge volume.
Following discharge volumes should be noted during pump operation.
▶ MDF-L250 and 401: 10 ℓ /min. or above
▶ MDF-L422 and 423: 20 ℓ /min. or above
▶ MDF-L425, 505, 507, 657, 6510, and 6515: 50 ℓ /min. or above
• In case of automatic drive, too, close discharge valve before start-up and open valve slowly after start-up.
⚠ Caution
Do not run pump longer than 1 minute against a fully closed discharge valve.</td><td>• Open valve carefully while paying attention to amperemeter, to prevent motor from being overloaded from excessive opening of valve.
* Within 1 minute, open the discharge valve gradually and adjust the discharge pressure while checking the reading of the pressure gauge on the discharge side. (Otherwise, adjust the flow rate while checking the reading of the flowrate meter.)
⚠ Caution
Total discharge pressure is increased to shut-off pressure after start of normal pump operation, open discharge valve gradually to set.</td></tr>
<tr><td>5</td><td>Points to be observed during operation.
If pump enters continuous operation mode, check flow meter and confirm that pump operation is as per specifications.</td><td>• If flow meter is not available, check the values of discharge pressure, suction pressure, and electric current with reference to piping resistance.</td></tr>
</table>

■ Stoppage

	Check/Operation Step	Remarks
1	• Close discharge valve gradually.	• Do not cause sudden closure with solenoid valve, etc., otherwise pump may be destroyed by water hammer action which is likely in case of long discharge piping.
2	• Turn off the power and stop pump operation.	• Observe carefully whether the motor fan slowly and smoothly stops rotating. ⚠ **Caution** **If not, check inside of pump.**
3	Points to be observed when stopping pump • If the pump operation is stopped during cold weather, liquid in pump may freeze and damage pump. When circulating a dangerous liquid, carry out internal cleaning by using flushing piping. Then drain the liquid fully. • Be sure to remove all liquid after stopping pump. In case of short-term suspension of operation, which does not allow for removal of liquid, use band heater, etc., to prevent liquid inside from freezing. • In event of power failure, turn off power switch and close discharge valve.	

MAINTENANCE

1. Causes of Trouble and Troubleshooting 32

2. Maintenance and Inspection 35

3. Spare Parts 39

4. Disassembly and Assembly 40

1. Causes of Trouble and Troubleshooting

Refer to "1. Causes of Trouble and Troubleshooting". Consult supplier for more information.
If you find any troubles, turn off the power supply immediately.

Problem	Symptom on pump		Cause	Inspection and Measures
	When Discharge Valve is Closed	When Discharge Valve is Opened		
Liquid is not lifted.		Pressure gauge and vacuum gauge indicate 'zero'.	● Not enough priming water ● Dry operation.	○ Stop pump, feed sufficient priming water, and restart pump.
	Water goes down at once when priming is carried out.		● Foreign matter is clogging foot valve.	○ Clean foot valve. ○ Check whether seat is clogged with foreign matter.
	Pressure is reduced if discharge valve is opened after start-up step.	Points of pressure gauge and vacuum gauge swing but return to zero at once.	● Air enters through suction pipe or gasket section.	○ Check again whether connecting flange in suction piping is sealed airtight. ○ Check whether suction liquid level is abnormally lowered.
			● Magnet coupling has disconnected.	○ Measure electric current level to check for overload condition. ○ Check whether the voltage level is normal. ○ Check for foreign matter between impeller and casing.
	Pointer of pressure gauge never rises.		● Speed of pump is too low. ● Pump rotates in reverse direction.	○ Check wiring and motor and make necessary repairs. ○ Exchange wires.
Discharge volume is small.		Pointer of vacuum gauge indicates a high value.	● Strainer is clogged with foreign matter and liquid passage is blocked.	○ Eliminate the foreign matter in strainer.

Problem	Symptom		Cause	Inspection and Countermeasures
	When Discharge Valve is Closed	When Discharge Valve is Opened		
Discharge volume is small.	Pointers of pressure gauge and vacuum gauge indicate normal values.	Pointer of vacuum gauge indicates extraordinarily high value.	● Air is trapped in suction pipe.	○Inspect setup condition of suction pipe and modify it if necessary.
			● Inlet section of impeller unit is clogged with foreign matter.	○Disassemble unit partially and eliminate foreign matter.
		Pointers of pressure gauge and vacuum gauge swing.	● Air enters through suction pipe or gasket section.	○Check connecting section of suction pipe and tighten it if necessary.
			● Discharge side of pump is clogged with foreign matter.	○Eliminate foreign matter in the pump. ○Eliminate foreign matter or scale inside pipe.
		Pointer of vacuum gauge indicates a high value while that of pressure gauge indicates normal value.	● There is an air trap or resistance in suction pipe.	○Check whether there is protruding section in suction pipe and take necessary measures.
		Pointer of pressure gauge indicates high value while that of vacuum gauge indicates normal value.	● There is portion in discharge pipe that causes resistance, or actual head and loss of head are too high.	○Check actual head and piping loss of discharge pipe and take necessary measures.
	Pointer of pressure gauge indicates low value and that of vacuum gauge indicates extraordinarily low value.	Pointers of pressure gauge and vacuum gauge indicate low values.	● Rotation direction is reversed.	○Exchange wires.

Problem	Symptom		Cause	Inspection and Countermeasures
	When Discharge Valve is Closed	When Discharge Valve is Opened		
Motor is overheated.			● Voltage is lowered. ● Overload. ● Ambient temperature is high.	○ Check whether the voltage and frequency levels are adequate. ○ Check whether the specific gravity and viscosity of liquid are adequate. ○ Improve air ventilation.
Discharge volume is suddenly lowered.		Pointer of vacuum gauge indicates high value.	● Strainer is clogged with foreign matter.	○ Eliminate foreign matter.
Pump vibrates.			● Foundation is defective. ● Anchor bolt is loose. ● Suction pipe is closed. Cavitation is caused. ● Wear or melting of pump bearing. ● Magnet capsule or spindle is damaged. ● Dynamic balance of drive magnet assembly fluctuates. ● Impeller and/or magnet capsule is in contact with fixing section. ● Wear of motor bearing.	○ Reinstall. ○ Retighten bolts. ○ Clean, and eliminate cause of cavitation. ○ Replace. ○ Replace. ○ Eliminate cause or replace. ○ Replace. ○ Replace bearing or motor.

2. Maintenance and Inspection

■ Daily inspection

[1] Check whether the pump operates smoothly, without generating any abnormal noise or vibration.

[2] Check the level of the liquid in the suction tank and the suction pressure.

[3] Compare the discharge pressure and electric current measured during operation with the values indicated on the motor nameplate for the verification of normal pump load.

* Note that the values indicated on the pressure gauge vary in proportion to the specific gravity of the liquid. The cock of the pressure gauge or vacuum gauge must be opened only when measurement is carried out. It must be closed upon the completion of each measurement. If the cock remains open during pump operation, the meter mechanism may be affected by abnormal pressure caused by water hammer action.

[4] If a spare pump is available, activate it from time to time to keep it ready for use any time.

[5] Check to be sure there is no liquid leakage in the pump before operating it. If leakage is detected, never try to operate the pump.

[6] Check to be sure the discharge pressure, discharge flow rate, and motor power supply voltage do not fluctuate during pump operation. If considerable fluctuation of the respective values occurs, refer to "1. Causes of Trouble and Troubleshooting" for correct measures.

■ Periodic inspection

To ensure efficient and smooth operation of the pump, carry out periodic inspections by the following procedures described below.

The overhauling and repair work for IWAKI pumps must be performed by qualified and trained personnel. User’s failure to observe this instruction exempts IWAKI from the responsibility for personal injury or damage to the equipment or facility which result from its misuse.

Inspection Timing	Part Name	Check Points
Every 6 months * Inspection record should be kept.	Drive magnet unit	● Are there slide-scratches? ● Is housing fixed normally? Is hex. socket set screw loose? ● Are inner perimeter of magnet and motor shaft coaxial? (Max. eccentricity: 1/10 mm)
	Rear casing	● Are there slide-scratches in bore? ● Are there cracks on liquid end part? ● Wear of thrust ring. ● Wear of spindle tip. (MDF-L 250, 401, 422, 423 and 425) ● Stains in rear casing.
	Magnet capsule	● Are there a slide-scratches in the rear section or in the cylindrical body? ● Are there cracks in resin of rear section or in cylindrical body? ● Wear of bearing. (Measure dimensions.) ● Condition of fixed with impeller.
	Impeller	● Wear of mouth ring. (Measure dimensions.) ● Wear of impeller thrust. (MDF-L 250, 401, 422, 423 and 425) ● Are there cracks? ● Are there cavitation marks (such as mouth ring condition, wear, seizure)? ● Stains or clogging inside impeller. ● Dimensional change in impeller.
	Front casing	● Stains in liquid contacting part. ● Are there cracks? ● Are there wear, slide-scratches, or cracks in thrust ring? ● Is drain clogged? ● Are there expansion or cracks on O ring? ● Slide-scratches in unlikely position.
	Spindle	● Are there cracks? ● Wear of abrasive section.

■ Wear limits of bearing and spindle

Unit: mm

Part \ Model	MDF-L 250		MDF-L 401, 422 423, 425		MDF-L 505		MDF-L 507, 657, 6510		MDF-L 6515	
	Upon Ship-ment	Upon Replace-ment	Upon Ship-ment	Upon Replace-ment	Upon Ship-ment	Upon Replace-ment	Upon Ship-ment	Upon Replace-ment	Upon Ship-ment	Upon Replace-ment
Inner diameter of bearing	18	19	26	27	28	29	36	37	34	35
Outer diameter of spindle	18	17	26	25	28	27	36	35	34	33

* If the difference between the inner diameter of the bearing and the outer diameter of the spindle exceeds 1 mm, either the bearing or the spindle whichever has the greater wear, should be replaced regardless of the values in the above table. In the case of a ceramic bearing type pump, the spindle and the bearing should be replaced simultaneously.

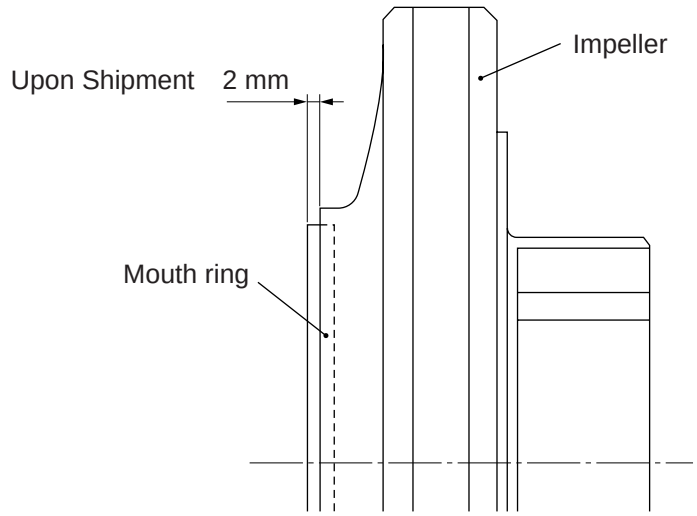
* Initial wear may appear in the sliding parts in the first stages of operation. This should not be mistaken for an abnormal condition.

■ Wear limit of mouth ring

Unit: mm

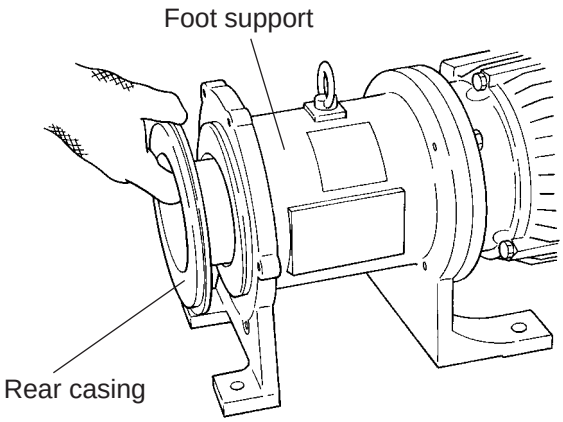
Model	MDF-L250, 401, 422, 423, 425	MDF-L505, 507, 657, 6510, 6515
Thickness upon shipment	8	9
Thickness upon replacement	6	7

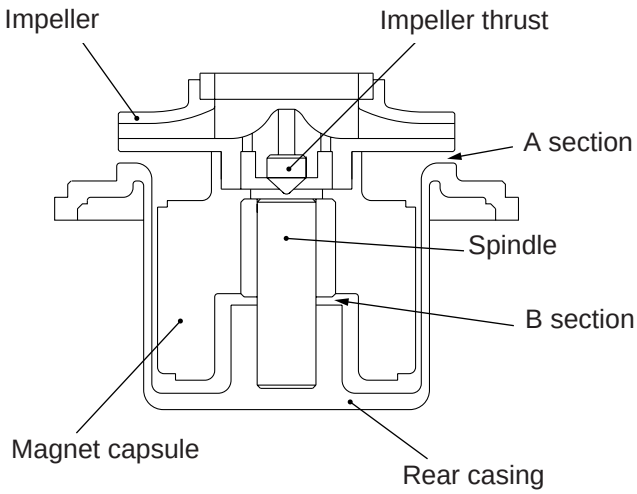
* The step between the surfaces of the mouth ring and the impeller upon shipment is 2 mm. The wear limit of the mouth ring is reached when this step is reduced to 0 mm. Replace the mouth ring then.



■ Wear limits of tips of impeller thrust and spindle (only for pumps with D or E at the end of model identification)

Pumps whose model identification codes have D or E at the end are designed to result in contact between the impeller thrust tip and the spindle tip in the event of an abnormal operating condition (cavitation, dry operation, etc.). If the tips are worn out beyond the wear limit level, the pump is subject to serious damage. The condition of the tips in contact must be checked if an abnormal profile such as dry operation or cavitation lasts a total of over 3 hours.





■ Wear checking steps

[1] Remove the rear casing from the foot support and insert the magnet capsule attached to impeller can into the rear casing.

[2] Rotate the impeller slowly by hand, with it positioned on the rear casing.

- Tips are not worn out beyond wear limit

  The impeller and magnet capsule will continue to rotate smoothly.

- Tips are worn out beyond wear limit

  The impeller and magnet capsule will not continue to rotate smoothly. The contact at the A section or B section, as shown in the figure of the left, does not allow for the continuous smooth rotation of the impeller and the magnet capsule because the tips of the two elements are excessively worn. In this case, replace the impeller and rear casing with new ones.

3. Spare Parts

Appropriate spare parts are necessary to ensure long, continuous operation of the pump. It is recommended that consumable parts be kept at hand constantly. When placing an order, supply the following information.

① Name of part and part number (in accordance with the drawings in this instruction manual)
② Pump model number and manufacturing number (as indicated on the pump nameplate)
③ Drawing number if you have received the IWAKI-approved drawing

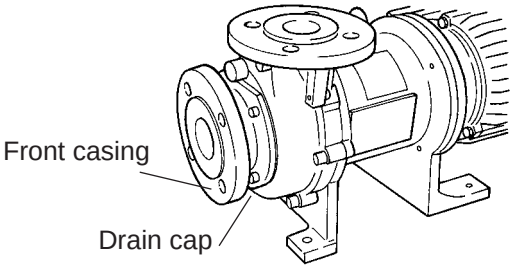
No.	Part Name		Material	MDF-L 250	MDF-L 401	MDF-L 422	MDF-L 423	MDF-L 425	MDF-L 505	MDF-L 507	MDF-L 657	MDF-L 6510	MDF-L 6515
2	Rear casing	CF AA	CFRETFE	MFL 1393	MFL 1437	MFL1502			MFL 0254	MFL0298			MFL 0428
		KK	CFRETFE	MFL 1394	MFL 1438	MFL1503			MFL 0255	MFL0299			MFL 0429
15 + 21	Magnet capsule	CF	CFRETFE	MFL 1430	MFL 0071	MFL 1515	MFL 1550	MFL 1564	MFL 0227	MFL0316		MFL 0404	MFL 0445
		AA	CFRETFE	MFL 1432	MFL 0073	MFL 1516	MFL 1551	MFL 1565	MFL 0229	MFL0317		MFL 0405	MFL 0447
		KK	CFRETFE	MFL 1433	MFL 0074	MFL 1517	MFL 1552	MFL 1566	MFL 0230	MFL0318		MFL 0406	
㉔	Gasket		FKM	MFL0031									
			EPDM	MFL0032									
			Aflas ®	MFL0033									
㉓	O ring		FKM	MFL 0034	MFL 0080	MFL0130			MFL0280				
			EPDM	MFL 0035	MFL 0081	MFL0131			MFL0281				
			Aflas ®	MFL 0036	MFL 0082	MFL0132			MFL0282				
⑳	Spindle	AA	*1 Alumina ceramics 99.5%	———		———			MFL 0134	MFL0327			MFL 0457
		CF	Alumina ceramics 99.5%										MFL 0456
		KK	SiC	———		———			MFL 0135	MFL0328			MFL 0457
3	Impeller	AA CF	CFRETFE										
		KK	CFRETFE										

► Circle around a number indicated the part is consumable.

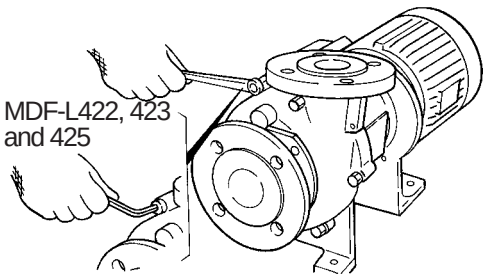
4. Disassembly and Assembly

⚠ Caution

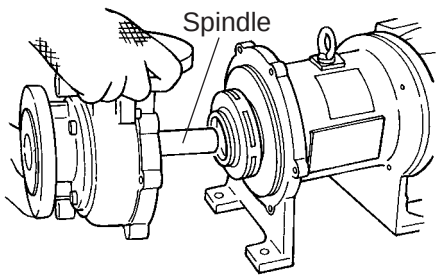
- **When disassembling the pump, put a mark on each lead in order to prevent the pump from reversing rotation after rewiring, if you disconnect leads from the motor.**
- **Since the magnet used in the pump is very powerful, be careful not to get your fingers caught between the elements during the disassembly and assembly processes. Also, pay attention to prevent metal pieces or metal powder from adhering onto the pump.**
- **Do not bring any electronic device that may be impacted by strong magnetic power into the pump magnetic field.**
- **Prior to disassembly or assembly, close the suction valve and discharge valve fully.**
- **The piping and the pump often retain liquid. When a dangerous liquid is handled, wear protectors (goggles, rubber gloves, etc.) when disconnecting the pipes.**



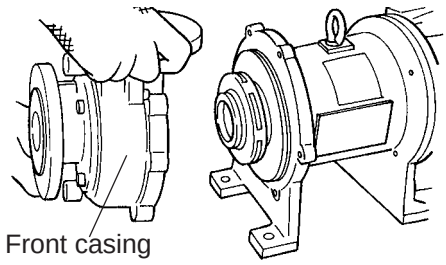
MDF-L250, 401, 505, 507, 657, 6510 and 6515



MDF-L505, 507, 657, 6510 and 6515



MDF-L250, 401, 422, 423 and 425



■ Disassembly

[1] Disassemble only after thoroughly washing out the liquid inside the pump by use of flushing piping, remove the cap to discharge the liquid from the pump. Then, clean the inside of the pump.

⚠ Warning
Wear protectors (goggles, rubber gloves, etc.). Certain liquids are dangerous. They may hurt your eyes and skin.

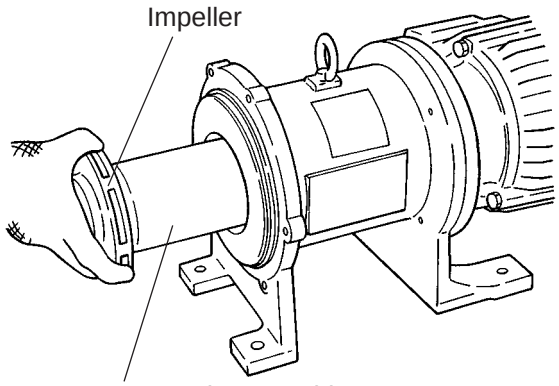
[2] Remove the front casing from the foot support.
Remove the hex socket bolts (or hex bolts) and take out the front casing from the foot support.
Be careful with the spindle which remains pressed-fit in the front casing.

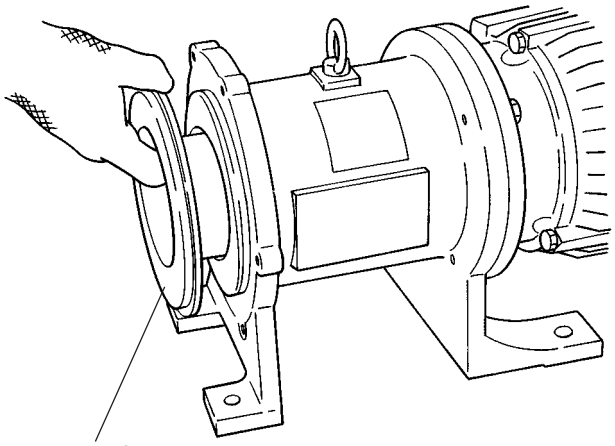
⚠ Caution
Strong impacts may crack the spindle or casing. Do not hit them with a tool.

* Note on MDF-L250, 401, 422, 423 and 425

The spindle is integrated with the rear casing, not pressed into the front casing.

* During disassembly, discharge the liquid from the casing and clean the inside of the pump.





Do not hit them with a tool.

* Note on MDF-L250, 401, 422, 423 and 425

The spindle is integrated with the casing, not pressed into the front casing.

* During disassembly, discharge the liquid from the casing and clean the inside of the pump.

[3] Pull out the impeller and magnet capsule assembly toward yourself.

Be careful not to scratch the surface of each part. Since the magnet capsule is strongly magnetized, store it in a place free of metal pieces or metal powder. Handle the front casing, magnet capsule, and impeller with extra care so as not to scratch the sliding surface and sealing surface.

* Note on MDF-L250, 401, 505, 507, 657, 6510 and 6515

Then disconnecting the impeller from the magnet capsule, hold the magnet capsule by hand and strike the rear of the impeller gently with a resin hammer. When the impeller is tightly pressed in and disconnection is difficult, warm the impeller and magnet capsule in hot water (about 90 ˚C) for 5 minutes prior to striking the impeller with the hammer.

* Note on MDF-L 422, 423 and 425

The impeller is fixed to the magnet capsule by screwing. When removing the impeller from the magnet capsule, hold the magnet capsule by hand and rotate the impeller counterclockwise (from the impeller side). If thread part is too tight and the impeller is not disconnected from the magnet capsule, put the magnet capsule with the impeller on hot water (about 90 ºC) for 5 minutes. And then rotate the impeller counterclockwise. Beware of scald while this procedure.

⚠Caution

When disassembling and reassembling MDF-L 422, 423 and 425 magnet capsule and impeller, pay attention to followings.

- **The O ring is inserted between the impeller and thread part of the magnet capsule. This O ring prevents that the impeller comes loose from thread part of the magnet capsule, even if the pump rotates reverse direction. When replacing the impeller and/or the magnet capsule, confirm the pump rotating direction is correct before reassembling the impeller and the magnet capsule without O ring.**
- **If the impeller and the magnet capsule are reassembled with O ring, there is possibility that the impeller is not screwed into thread part of the magnet capsule completely. This may cause pump damage.**

[4] Remove the rear casing.

Insert a flat-head screwdriver into the perimeter of the rear casing and pull the rear casing forward while lifting it slightly up.

* Pay extra attention not to scratch the sealing surface.

[5] Replacement of spindle

The spindle is pressed into the front casing. Pay attention to the following points when replacing the spindle.

a. Hold the worn spindle in one hand and hit the perimeter of the front casing (cast part) lightly and evenly with a resin hammer to remove the spindle from the casing. In this step, never strike the seal surface of the front casing or the spindle.

b. Wipe off the stains on the front casing. Then, insert a new spindle into the casing by hand and strike it gently with the resin hammer to press it in.

* Do not disassemble the spindle section unless it is seriously worn and needs to be replaced.
* If the spindle does not come off easily, warm the front casing in hot water (about 90 ˚C) before pulling it out for replacement.
* In the case of the MDF-L250, 401, 422, 423 and 425, the casing and the spindle are integrated. It is not possible to replace only the spindle.

■ Assembly

The pump should be assembled by carrying out the steps of disassembly in reverse. Pay attention to the following points.

- **Replacement of O ring and gasket**

  When replacing the O ring or gasket, be sure to install a new one. In addition, see that the O ring or gasket is not twisted or pressed by another part.

* The sealing section should be cleaned free of dust or scratches before installation.

- **Fastening Bolts**

  Fasten the bolts in diagonal order by applying the fastening torque shown in the following table. Apply an equal torque to each bolt.

Model	Type	Fastening torque N·m	Size of bolts
MDF-L 250	Hex. head bolt	12.5	M8×35L, M8×65L
MDF-L 401			M8×40L, M8×70L
MDF-L 422, 423, 425	Hex. socket head bolt	24.5	M10×40L, M10×75L
MDF-L 505, 507	Hex. head bolt	42.0	M12×50L, M12×90L
MDF-L 657, 6510			M12×50L, M12×100L
MDF-L 6515			M12×90L

- **Ceramics bearing (AA type)**

Apply fluorocarbon grease inside the bearing and the perimeter of the spindle. Otherwise, it will wear out in a short time.

* Note on MDF-L 250, 401, 505, 507, 657, 6510 and 6515

[1] Install the rear casing onto the foot support.

[2] Attach the impeller onto the magnet capsule. If this is difficult, warm the magnet capsule in hot water (about 90 ˚C) for 5 minutes before attaching it.

[3] Check that there is no metal piece or other matter adhering onto the magnet capsule. Then, insert the magnet capsule and impeller slowly into the rear casing.

* Note that the magnetic force of the magnet capsule is very strong.

[4] Confirm there is no dust or scratches on the seal surface of the front casing. Then, attach the O ring onto the front casing.

[5] Insert the spindle attached on the front casing into the through hole of the magnet capsule and rear casing so that the front casing and rear casing will be assembled.

[6] Fasten the hex. head bolts in diagonal order, applying an equal torque to each.

* Note on MDF-L 422, 423 and 425

[1] Attach the impeller to the magnet capsule.

⚠ Rotate the impeller clockwise, and screw the impeller on the magnet capsule.

Caution

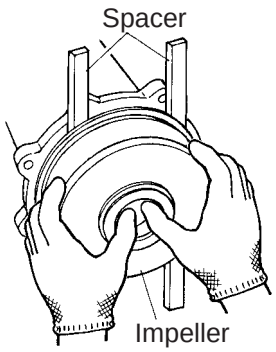
- **When replacing the impeller and /or the magnet capsule, confirm the pump rotating direction is correct before reassembling the impeller and the magnet capsule without O ring.**
- **If the impeller and the magnet capsule are reassembled with O ring, there is possibilitiy that the impeller is not screwed into thread part of the magnet capsule completely. This may cause pump damage.**

[2] Insert the impeller and the magnet capsule unit to the rear casing. Then, the rear casing, the impeller and the magnet capsule set is installed onto the foot support.

⚠

Caution

- **Since the magnet used in the pump is very powerful, be careful not to get your fingers caught between elements by inserting wood pieces or plastic pieces between the rear casing and the foot support.**



[3] Confirm there is no dust or scratches on the seal surface of the front casing. Then, attach the O ring onto the front casing.

[4] Attach the front casing onto the foot support.

[5] Fasten the hex. socket head bolts in diagonal order, applying an equal torque to each.

IWAKI PUMPS

( )Country codes

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