



***IWAKI WALCHEM
MAGNETIC DRIVE PUMP
MDF-M SERIES
INSTRUCTION MANUAL***



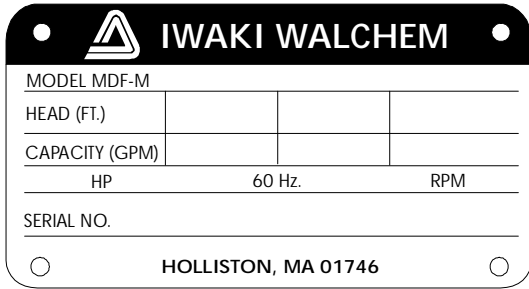
IWAKI WALCHEM Corporation

Thank you for having selected an Iwaki Walchem MDF-M Series magnetic drive pump. This instruction manual deals with the correct handling, maintenance, inspection, and troubleshooting procedures for the MDF-M magnetic drive pump. Please read through it carefully to ensure the optimum performance, safety and long service of your pump.

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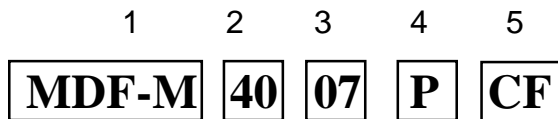
1 Unpacking and Inspection



Open the package and check that the product conforms to your order. Also, check each of the following points. For any problem or inconsistency, contact your distributor at once.

1. Check that the model number and the voltage indicated on the nameplate conform to the specifications of your order.
2. Check that all the accessories you ordered are included.
3. Check that the pump body and parts have not been accidentally damaged or that any bolts or nuts have not been loosened in transit.

2 Identification



1. Series name
2. Pump bore symbol
Suction × discharge
25: 1½ × 1
40: 2 × 1½
3. Magnet Coupling Rating (@ 3600 rpm)
02: 2 HP
03: 3 HP
05: 5 HP
07: 7.5 HP
4. Material of Wetted Parts (portions made of resin)
P: PFA
E: ETFE
5. Material of Bearing Surfaces

Shaft	CF	KK
Thrust Collar	High purity Ceramic	SiC
Bushing	High density Carbon	SiC

3

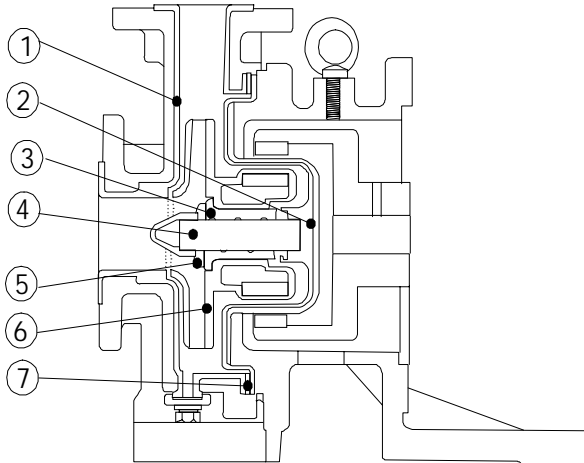
SPECIFICATIONS

Model	Connections Inlet × Outlet	Head (ft)	Rated Capacity (gpm)	Motor RPM	Motor Output (HP)
			60 Hz		
MDF-M2502	1½ × 1	116	53	3440	2
MDF-M2503				3440	3
MDF-M4005	2 × 1½	116	132	3450	5
MDF-M4007				3470	7.5

Notes:

1. Rated performance (head/capacity) represents the maximum discharge/head/capacity measured with pure water at 68°F.
2. Liquid temperature range:
PFA type: 32 - 248° F
ETFE type: 32 - 212° F
3. Slurry: Hardness 80Hs or below, grain size maximum 2 mil, density maximum 5% wt. Contact Iwaki Walchem or your distributor for details.
4. Specific gravity limit: contact Iwaki Walchem or your distributor for details.

■ Materials of Main Components



Parts	Type	
	CF	KK
1 Casing Liner	ETFE or PFA	
2 Containment Shell	ETFE or PFA	
3 Bushing, Bearing	High density Carbon	SiC
4 Shaft	High purity Alumina Ceramic	SiC
5 Thrust Collar	High purity Alumina Ceramic	SiC
6 Impeller Asm.	ETFE or PFA	
7 Gasket	PTFE	

4 HANDLING INSTRUCTIONS

1. Do not operate the pump dry.

The sliding parts used in the MDF-M series pump are lubricated and cooled by the fluid being pumped. Never operate the pump dry or with the valves on the suction side closed. Otherwise, the inside of the pump will be damaged. If the pump is unavoidably or accidentally operated dry, with no obvious damage, allow the pump to cool down for a minimum of one hour before attempting to restart. Do not allow fluid to enter the pump cavity until the pump has cooled down. Sudden or rapid cooling of the pump may cause damage to the ceramic bearing system. A dry run operation device is recommended for the prevention of dry pump operation.

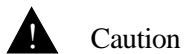
2. Points to be observed in starting and stopping pump operation.

Pay close attention to the following points to avoid water hammer upon starting and stopping pump operation. Extra attention is required when the discharge piping is very long.

Starting

Prior to starting the pump, make sure that the power is turned off. Then carry out priming to fill the pump cavity with liquid.

Next, close the valves on the discharge side. Now you can turn the power on and start up the pump. When the pump has reached full speed and line pressure is stable, the discharge valving can be opened to the desired settings.



Caution

If the pump is operated with air remaining in the pump cavity, biting, cracking, or breakage of the bushing and/or thrust collar may occur, causing damage to the pump.

Stopping

When stopping the pump, first close the discharge valve gradually. When it is completely closed, turn off the power switch so that the pump stops. Never stop the pump suddenly by quickly closing a valve (i.e., solenoid or hydraulic valves).



Caution

Quick valve closure may cause water hammer which can cause severe damage to the pump.

3. Maximum system pressure rating

The table on the right shows the maximum pressure rating of each model. Take care that the system pressure does not exceed the maximum pressure rating.

Model	Max. Pressure Rating PSI
MDF-M2502	71
MDF-M2503	
MDF-M4005	85
MDF-M4007	

4. Handling of slurry liquid.

In general, slurries should not be handled. However, a pump with SiC bearings (KK type) can handle slurries if the density is 5% or less and the grain size is 2 mil or less. Prior to pumping such slurry liquid, you should call Iwaki Walchem or your distributor to verify if the operation is feasible.

5. Influence of specific gravity pump performance.

The performance of the pump does not change even for liquids of higher specific gravity. However, a magnet assembly and motor selected for the specific gravity should be used.

6. Influence of liquid viscosity on pump performance.

When pumping a high viscosity liquid, the discharge head and capacity of the pump may be lower than in the case of pure water. The required driving power may also vary and should be checked.

7. Intermittent operation.

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

8. Influence of temperature.

The pump itself may not suffer a change in performance due to temperature fluctuation. However, the liquid may change in terms of viscosity, vapor pressure, and corrosive resistance. Pay special attention to changes in liquid characteristics as a result of temperature fluctuation.

Liquid temperature range:	PFA type: 32 - 248° F
	ETFE type: 32 - 212° F
Ambient temperature range:	32 - 104°F

* Refer to the corrosion resistance table for the recommended temperature ranges for various types of liquids. In case of any questions, contact Iwaki Walchem or your distributor to determine if operation is feasible.

9. Separation of magnet coupling.

If the magnet coupling should disconnect, stop the pump within 1 minute. If operation is continued, the torque rating of the coupling will be permanently reduced.

10. Operation within range of bell-shaped head capacity curve.

In the case of a pump which generates a bell-shaped head capacity curve in a low-quantity range, do not operate the pump in the section where the line ascends rightward. (Refer to the standard performance curve to verify the head capacity.) If the rightward ascending section of the head capacity curve is part of the pump operation specifications, design the piping by observing the following points.

1. The discharge piping should have no water tank or air trap.
2. The discharge quantity must be adjusted by a valve which is installed close to the discharge port of the pump.

■ Installation Position

1. Install the pump as close to the suction tank as possible (flooded suction). If the suction port of the pump is positioned higher than the suction tank (suction lift), be sure to arrange a foot valve in the priming pipe and the suction pipe. The lifting capability depends upon the liquid properties, temperature, and length of suction piping. For details, consult Iwaki Walchem or your distributor.
2. The pump can be installed indoors or outdoors. However, there should be sufficient space around the pump to enable efficient and easy maintenance.

■ Installation

1. The pump anchoring area must be greater than the area of the base. If the anchoring area is not large enough, the base may be damaged due to the concentration of loads placed on it.
2. Set the pump base on a concrete foundation and fasten the anchor bolts tightly to prevent the pump from vibrating during operation.
3. Insert a spacer between the concrete surface and the bottom of the base to level the pump horizontally. Next, put a level on the discharge flange surface to adjust the pump horizontally in the direction of the pump shaft. Also adjust the direction vertical to the pump shaft at the same time by placing a level on the suction flange surface. Pour cement mortar into the anchor bolt holes after leveling has been completed. When the cement mortar is hardened, fasten the anchor bolt nuts firmly. (See figure below.)
4. Prior to the installation of the MDF-M KK series pump (with SiC type shaft and bushing), remove the cardboard pad inserted in the suction port.
5. In case there is influence of motor vibration during operation (e.g., sympathetic vibration with piping), an expansion joint should be provided between the pump and the piping before the installation. Otherwise, pipes and gauges may be damaged.

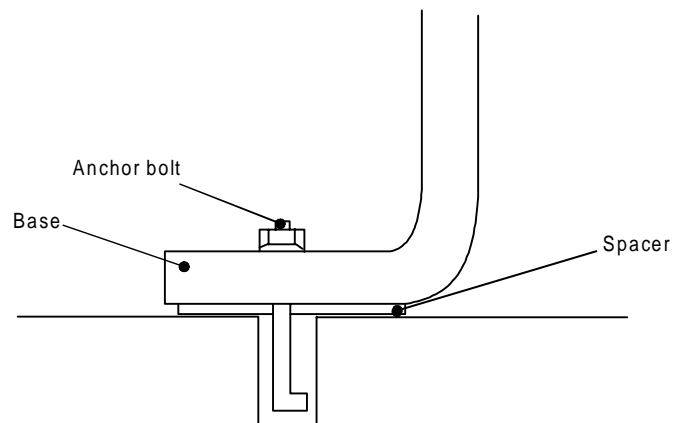
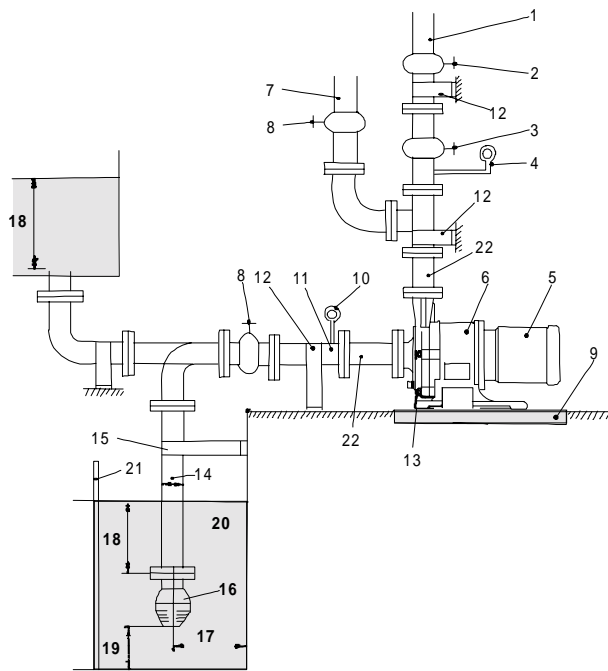


Fig. 1

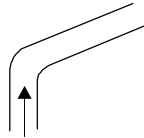
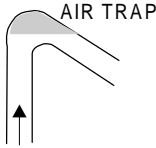
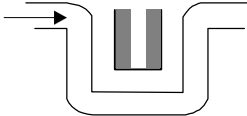
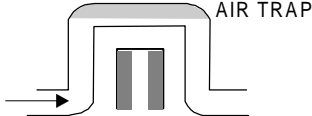
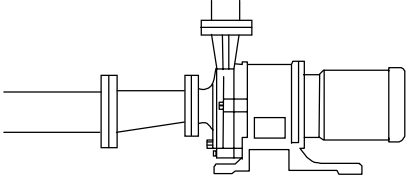
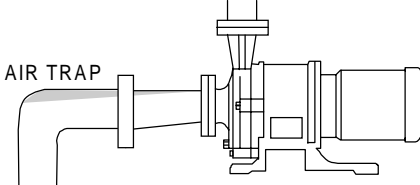
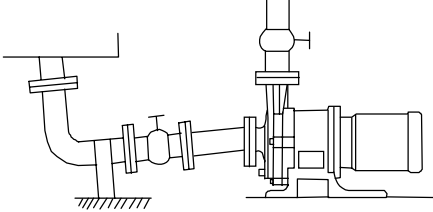
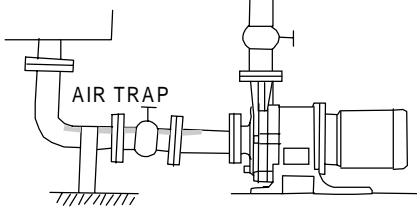
■ Piping



1. Discharge pipe (Use a support to keep the pump free from the load of the pipe.)
2. Gate valve
3. Check valve
4. Pressure gauge
5. Motor
6. Pump
7. Priming pipe
8. Gate valve
9. Drain ditch
10. Compound gauge
11. Suction pipe (D=Diameter of pipe) (Shortest horizontal section with an ascending gradient toward the pump)
12. Pipe support
13. Pump drain
14. Suction pipe (D=Diameter of pipe)
15. Suction pipe stabilizer brace (Used if the suction pipe is particularly long.)
16. Foot valve
17. 1.5D or more
18. 18 inches or more
19. 1- 1.5D or more (if sediment accumulates easily)
20. Suction tank
21. Screen
22. Short pipe

1. The suction pipe should employ the flooded suction method if possible. The shortest pipe possible, with the minimum number of bends, should be designed. ■ **Suction Piping** Arrange a proper support on the suction pipe so that the load and the thermal stress of the pipe itself are not applied to the pump.
2. Attach the coupling on the suction pipe carefully, so that no air enters the line. The presence of air in the suction pipe may prevent priming of the pump.
3. If the suction process condition is not good (e.g., the suction tank is a vacuum, the suction head is large, or the suction pipe is long), NPSHa should always be at least 2 feet greater than NPSHr. For the NPSHr, refer to the standard performance curve.
4. When using a bend on the suction side, install a straight pipe which is more than 20 inches long or 10 times as long as the suction port diameter before the suction port of the pump. Use the largest possible radius of curvature for 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 toward the pump.

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 such that the upper part of it is level. Never use a suction pipe with a diameter smaller than that of the suction port.
7. When using the flooded suction method, the suction pipe should be given a slight ascending gradient toward the pump so that no air pocket is created on the suction side.
8. The end of the suction pipe should be located 18 inches or more below the surface of the liquid.
9. A screen should be provided at the inlet of the suction tank to prevent the entrance of foreign matter into the suction pipe. Foreign matter may cause malfunctioning of the pump. The end of the suction pipe should be a least 1- 1.5D from the bottom of the suction tank. (D=Diameter of suction pipe).
10. When employing the suction lift method, install a foot valve on the suction pipe.
11. When using the flooded suction method, it is recommended that a gate valve be installed on the suction pipe for easier overhaul inspection of the pump. Since this valve is used only in the overhaul inspection of the pump, keep it fully opened during normal pump operation.

GOOD CONDITIONS	UNACCEPTABLE CONDITIONS
	
	
	
	

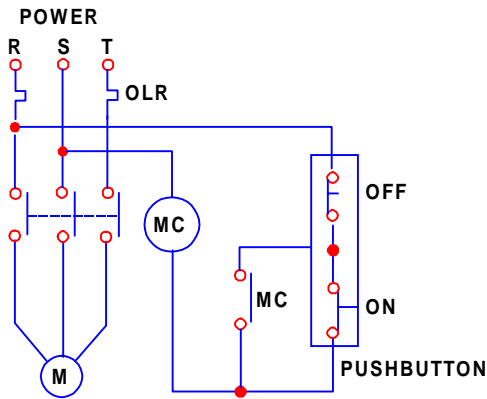
12. Pay close attention to the lowest level of the liquid in the suction tank so that air entrainment to the suction piping will not occur.

The inflow pipe into the suction tank should be distanced from the suction pipe and positioned below the liquid surface as a means of preventing air entrainment to the suction pipe. If air bubbles are generated in the suction tank, install a baffle.

13. It is recommended that a vacuum/pressure gauge be installed on the suction piping approximately 6 D from the pump suction flange.

■ Discharge Piping

1. Use proper pipe supports so that the weight of the piping does not load the pump nozzle.
2. If a method other than flooded suction is used, install a special pipe for priming.
3. If the piping is very long, its diameter should be determined by calculating the piping resistance. Otherwise, the specified performance may not be obtained due to increased piping resistance.
4. A check valve should be installed if any of the following conditions exists in the piping:
 - The discharge piping is very long.
 - The discharge head is 50 feet or more.
 - The end of the discharge pipe is located 30 feet higher than the surface of the suction tank.
 - Several pumps are connected in parallel with the same piping.
5. The installation of a gate valve on the discharge pipe is recommended for the adjustment of discharge quantity and for the prevention of motor overload. When installing both a check valve and a gate valve, the check valve should be positioned between the pump and the gate valve.
6. A pressure gauge must be installed on the discharge piping.
7. An air bleeding valve should be installed if the discharge pipe is very long in the horizontal direction.
8. A drain valve should be installed for the drainage of liquid if there is a chance that the liquid in the discharge pipe will freeze.



M MOTOR
 MC ELECTROMAGNETIC SWITCH
 ON } PUSH BUTTON
 OFF }
 OLR OVERLOAD RELAY

■ Wiring

Use appropriate wiring materials, follow the instruction manual for the motor and abide by the local and national standards for electrical codes. In addition, follow the instructions given below:

1. Use an electromagnetic switch that conforms to the specifications (voltage, capacity, etc.) of the pump motor.
2. If the pump is installed outdoors, use waterproof wiring to protect the switches from rainwater and moisture.
3. The electromagnetic switch and push button should be installed a reasonable distance from the pump.
4. Refer to the wiring example shown on the left. (This example does not include the installation of a dry-operation prevention device. Follow the instruction manual of the dry-operation prevention device when installing it.)

6

Operation

■ Notes on Operation

1. Never operate the pump dry or with the suction-side valve (gate valve) closed. Otherwise, the inside of the pump will be damaged.
2. In the event of cavitation, stop the pump within a minute.
3. If the magnet coupling disconnects, stop the pump within a minute. The torque rating of the magnet coupling will be reduced if operation is continued with the coupling disconnected.
4. Temperature fluctuation should not exceed 176°F when starting, stopping, and operating the pump.
5. Be sure to close the discharge valve completely before starting operation in order to prevent water hammer upon start-up.
6. The pump should never be operated for a lengthy period with the discharge valve closed. A resulting rise in temperature of liquid in the pump may cause damage to the pump.
7. In the event of a service power failure, turn off the power switch immediately and close the discharge valve.

■ Start-Up Preparation

When operating the pump for the first time after installation, and when restarting operation after a long interval, prepare for operation as described below.

1. Thoroughly clean the inside of the piping and pump. Supply water.
2. Tighten the flange connecting bolts and base installation bolts. Check the torque of the bolts which couple the front casing and the frame together. Proper torque is 32.5 ft-lbs.
3. Use a screwdriver to rotate the motor fan and check that the fan rotates smoothly.
4. After priming the pump, fully close the discharge valve.
5. If using flooded suction, measure the pressure in the suction pipe to check that the pump is filled with liquid.
6. Run the motor momentarily to check the direction of motor rotation. The motor should run in the direction indicated by the arrow sealed on the pump. If the direction is reversed, exchange two wires of the three-phase power wires.


■ Operation

Pump operation is detailed below.

Check/Operation Step		Remarks
1.	Verify valve position.	Suction valve fully open. Discharge valve fully closed.
2.	Check that the pump is filled with liquid.	If pump is not filled with liquid, fill it in accordance with step 5 of 'Start-up Preparation'.
3.	Turn ON motor switch momentarily and check for correct direction of pump operation.	See the arrow on the casing to confirm the direction of rotation (clockwise when viewed from the motor fan side).

	Check/Operation Step	Remarks
4.	<p>Flow rate adjustment.</p> <p>If total discharge pressure is increased to shut off pressure after achieving normal pump operation, open discharge valve gradually to set discharge pressure as specified.</p> <p>Pump should be operated at a minimum discharge quantity of: 5.3 gpm (20 L/m) or more.</p> <p>In case of automatic control, close discharge valve when starting pump and gradually open the discharge valve thereafter.</p> <p>Don't operate the pump with the discharge valve closed for more than one minute.</p>	<p>Open valve carefully, paying attention to ammeter to prevent motor from being overloaded through excessive opening of the valve.</p>
5.	<p>Points to be observed during operation.</p> <p>If pump enters continuous operation condition, check flow meter and confirm in relation to piping resistance that pump operation meets specifications.</p>	<p>If flowmeter is unavailable, check values of discharge pressure, suction pressure and current</p>

■ Stopping Operation

	Check/Operation Step	Remarks
1.	<p>Close discharge valve gradually.</p>	<p>Caution  Do not cause sudden closure by using solenoid valve, etc. Otherwise, pump may be damaged by water hammer.</p>
2.	<p>Stop motor.</p>	<p>Observe that the motor stops rotating slowly and smoothly. If not, check inside of pump.</p>
3.	<p>Points to be observed when stopping pump.</p> <p>If pump operation is stopped in cold weather, liquid inside the pump cavity may freeze and damage the pump. Be sure to drain liquid completely. In case of short-term shut down, which does not allow removal of liquid, use band heater, etc., to prevent liquid from freezing.</p> <p>In case of service power failure turn OFF power switch and close discharge valve.</p>	

■ Daily Inspection

1. Check that the pump operates smoothly, without generating abnormal sounds or vibration.
2. Check the level of the liquid in the suction tank, and the suction pressure.
3. Compare the discharge pressure and current measured during operation with the specifications indicated on the motor and pump nameplates to verify normal pump load.

* Note that the indicated value of the pressure gauge varies in proportion to the specific gravity of the liquid.



Note: The valve of the pressure gauge or vacuum gauge should be opened only when measurements are recorded. It must be closed after completion of each measurement. If the valve remains open during operation, the gauge mechanism may be affected by abnormal pressure caused by water hammer.

4. If a spare pump is included in the installation, keep it ready for use by operating it from time to time.

■ Periodic Inspection

To ensure efficient, smooth operation of the pump, carry out periodic inspection by following the procedure described below. When carrying out an overhaul inspection, handle the sliding and resin parts most carefully. Since the outer magnet and impeller unit magnet are very powerful, be careful not to position them near any electronic device that could be affected by a strong magnetic field.

Inspection Interval	Part		Inspection Points	Operator Action
Every 6 months * Inspection record should be maintained.	Outer magnet assembly		<ul style="list-style-type: none"> ● Is there scoring? ● Is housing mounted normally? Is hexagonal socket setscrew loose? ● Are inner perimeter of magnet and motor shaft concentric? 	<ul style="list-style-type: none"> ○ Contact your distributor if any abnormality is observed. ○ Reinstall housing on motor shaft and fasten hexagonal socket setscrews. ○ Retighten or replace hexagonal socket setscrews.
Every 3 months * Inspection record should be maintained.	Containment shell & cover		<ul style="list-style-type: none"> ● Is there scoring on inner diameter? ● Are there any cracks in liquid-containing section? ● Wear of rear thrust collar? ● Stain in rear casing? 	<ul style="list-style-type: none"> ○ Contact your distributor if abnormality is observed. ○ Replace if abnormality is observed. ○ Replace if abnormality is observed. ○ Clean.
	Impeller unit	Inner magnet	<ul style="list-style-type: none"> ● Is there scoring in rear face or cylindrical body? ● Are there any cracks in resin of rear section or cylindrical body? ● Bearing wear. 	<ul style="list-style-type: none"> ○ Contact your distributor if any abnormality is observed. ○ Contact your distributor if abnormality is observed. ○ Replace if abnormality is observed. ○ See tolerance chart.
		Impeller	<ul style="list-style-type: none"> ● Are there any cracks? ● Are there any cavitation marks? ● Stain or clogging inside impeller. ● Dimensional change of impeller. 	<ul style="list-style-type: none"> ○ Replace if abnormality is observed. ○ Eliminate cause. ○ Clean. ○ Replace if abnormality is observed.

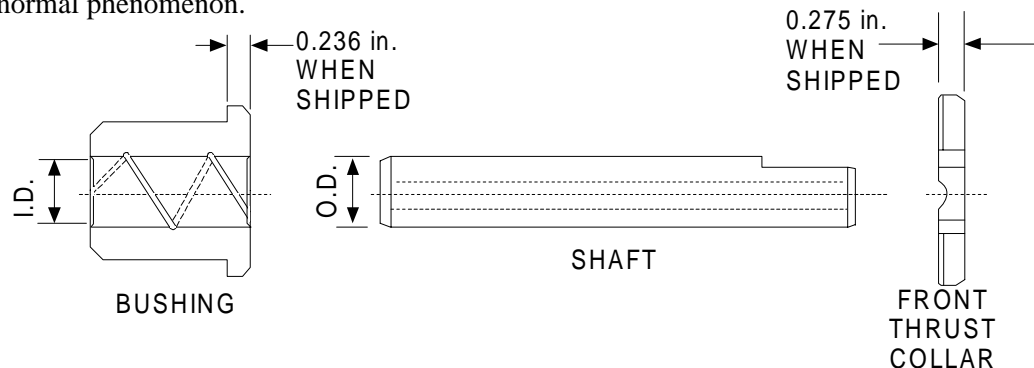
Inspection Interval	Part	Inspection Points	Operator Action
Every 3 months * Inspection record should be maintained.	Front casing	<ul style="list-style-type: none"> ● Stain in liquid-contacting section. ● Are there any cracks? ● Is drain clogged? ● Wear or crack of front thrust collar. ● Expansion or wear of gasket. ● Scoring in abnormal location. 	<ul style="list-style-type: none"> ○ Clean. ○ Replace if abnormality is observed. ○ Clean. ○ Contact your distributor if abnormality is observed. ○ Replace if part is damaged. ○ Contact your distributor if abnormality is observed.
	Shaft	<ul style="list-style-type: none"> ● Are there any cracks? ● Wear of abrasive section. 	<ul style="list-style-type: none"> ○ Replace if abnormality is observed. ○ Replace if wear limit is exceeded.

■ **Wear Limit of Bushing, Shaft, Front Thrust Collar**

Part	Model	MDF-M25		MDF-M40	
		New	Replacement	New	Replacement
Bushing	Flange thickness (in.)	.236	.196	.236	.196
	Inner diameter (in.)	.787	.826	.945	.984
Outer diameter of shaft (in.)		.787	.748	.945	.905
Front thrust collar thickness (in.)		.275	.236	.275	.236

* When the difference between the inner diameter of the bushing and the outer diameter of the shaft exceeds .040 inches, replace the worn bushing or shaft with a new one regardless of the above table.

* The sliding parts often suffer initial wear in a short period of time after the start of operation. This is not an abnormal phenomenon.



8 Troubleshooting Guide

Trouble	Symptom on Pump		Cause	Inspection and Countermeasures
	With Discharge Valve Closed	With Discharge Valve Open		
		Pressure gauge and vacuum gauge indicate 'zero'	<ul style="list-style-type: none"> ● Insufficient priming. ● Dry Operation 	<ul style="list-style-type: none"> ○ Stop pump, feed priming liquid and restart pump.
	Liquid Level drops immediately when priming is carried out		<ul style="list-style-type: none"> ● Foot valve is clogged with foreign matter. 	<ul style="list-style-type: none"> ○ Replace strainer. ○ Check whether seat is clogged with foreign matter.
Liquid is not pumped	Liquid level drops if discharge valve is opened after starting operation.	Needles of pressure and vacuum gauges swing but return to zero immediately.	<ul style="list-style-type: none"> ● Air enters through suction pipe or gasket section. 	<ul style="list-style-type: none"> ○ Check that the connection flange in suction piping is sealed airtight. ○ Check whether suction liquid level is abnormally low.
			<ul style="list-style-type: none"> ● Magnet coupling is disconnected. 	<ul style="list-style-type: none"> ○ Stop pump and use a screwdriver to check for easy and smooth rotation of motor fan. ○ Measure current level to check for low reading. ○ Check for foreign matter inside pump cavity. ○ Check whether voltage level is normal.
			<ul style="list-style-type: none"> ● RPM of pump is insufficient. ● Pump rotation is reversed. 	<ul style="list-style-type: none"> ○ Check wiring and motor, and fix as necessary. ○ Correct motor wiring.

Trouble	Symptom on Pump		Cause	Inspection and Countermeasures
	With Discharge Valve Closed	With Discharge Valve Open		
Discharge quantity is small.	Needles of pressure and vacuum gauges indicate normal values.	Needle of vacuum gauge indicates high value.	<ul style="list-style-type: none"> ● Strainer is clogged with foreign matter and liquid passage is blocked. 	<ul style="list-style-type: none"> ○ Remove foreign matter in strainer.
		Needle of vacuum gauge indicates abnormally high value.	<ul style="list-style-type: none"> ● Air is trapped in suction pipe. 	<ul style="list-style-type: none"> ○ Inspect installation of suction pipe and modify it as necessary.
			<ul style="list-style-type: none"> ● Inlet section of impeller unit is clogged with foreign matter. 	<ul style="list-style-type: none"> ○ Partially disassemble unit and remove foreign matter.
		Needles of pressure gauge and vacuum gauge fluctuate.	<ul style="list-style-type: none"> ● Air enters via suction pipe or gasket section. 	<ul style="list-style-type: none"> ○ Check flange gaskets of suction pipe and tighten it as necessary.
			<ul style="list-style-type: none"> ● Discharge side of pump is clogged with foreign matter. 	<ul style="list-style-type: none"> ○ Remove foreign matter in pump. ○ Remove foreign matter or scale inside of piping.
		Vacuum gauge needle indicates high value while pressure needle indicates normal value.	<ul style="list-style-type: none"> ● Air pocket or resistance in suction pipe. 	<ul style="list-style-type: none"> ○ Inspect suction piping installation and make corrective adjustments.
		Pressure gauge needle indicates high value while vacuum gauge needle indicates normal value.	<ul style="list-style-type: none"> ● There is a section in discharge pipe that causes high resistance or actual head and loss of head are too high. 	<ul style="list-style-type: none"> ○ Check actual head and piping loss of discharge pipe and take necessary measures.

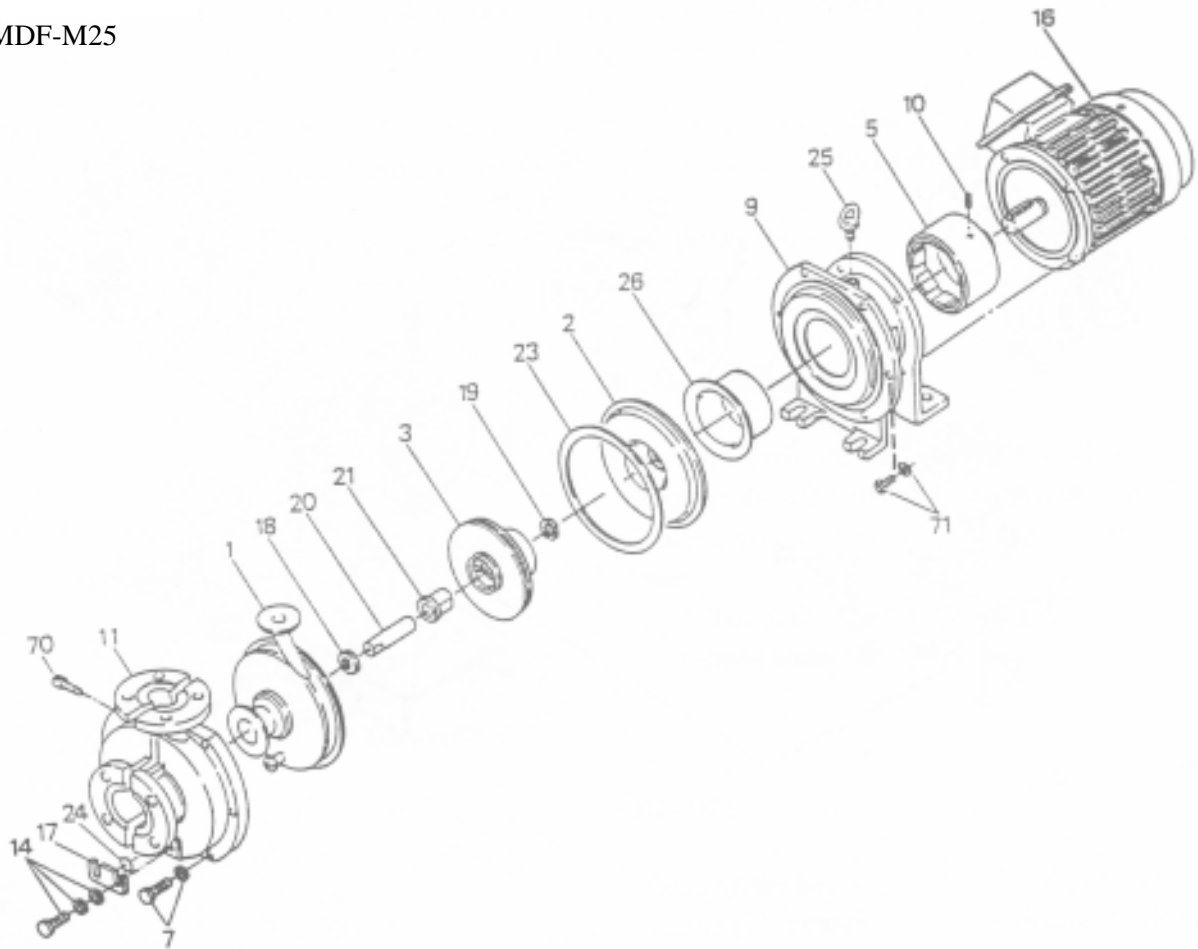
Trouble	Symptom on Pump		Cause	Inspection and Countermeasures
	With Discharge Valve Closed	With Discharge Valve Open		
Discharge quantity is low.	Needle of pressure gauge indicates low value and vacuum gauge indicates extraordinarily low value.	Needle of pressure gauge and vacuum gauge indicate low value.	<ul style="list-style-type: none"> ● Rotating direction of pump/motor is reversed. 	<ul style="list-style-type: none"> ○ Correct motor wiring to reverse rotation. (Clockwise when viewed from motor side.)
Motor overheats			<ul style="list-style-type: none"> ● Voltage is insufficient. ● Overload. ● Ambient temperature is high. 	<ul style="list-style-type: none"> ○ Check whether voltage and frequency levels are adequate. ○ Check whether specific gravity and viscosity of liquid are above specification. ○ Stop pump and use screwdriver, etc., to check whether motor fan rotates easily and smoothly. ○ Improve air ventilation.
Discharge quantity is suddenly lowered.		Needle of vacuum gauge indicates high value.	<ul style="list-style-type: none"> ● Strainer is clogged with foreign matter. 	<ul style="list-style-type: none"> ○ Remove foreign matter.

Trouble	Symptom on Pump		Cause	Inspection and Countermeasures
	With Discharge Valve Closed	With Discharge Valve Open		
Pump vibrates.			<ul style="list-style-type: none"> ● Foundation is inadequate. ● Anchor bolt is loose. ● Suction pipe is closed. Cavitation is caused. ● Wear or melting of pump bushing. ● Damaged inner magnet assembly or pump shaft. ● Fluctuating dynamic balance of outer magnet assembly ● Impeller is in contact with inner magnet assembly anchoring section. ● Wear of motor bearing. 	<ul style="list-style-type: none"> ○ Carry out installation process again. ○ Retighten bolt. ○ Clean, eliminate cause of cavitation. ○ Replace. ○ Replace. ○ Remove or replace. ○ Replace bearing or motor.

9

Parts Description and Exploded View

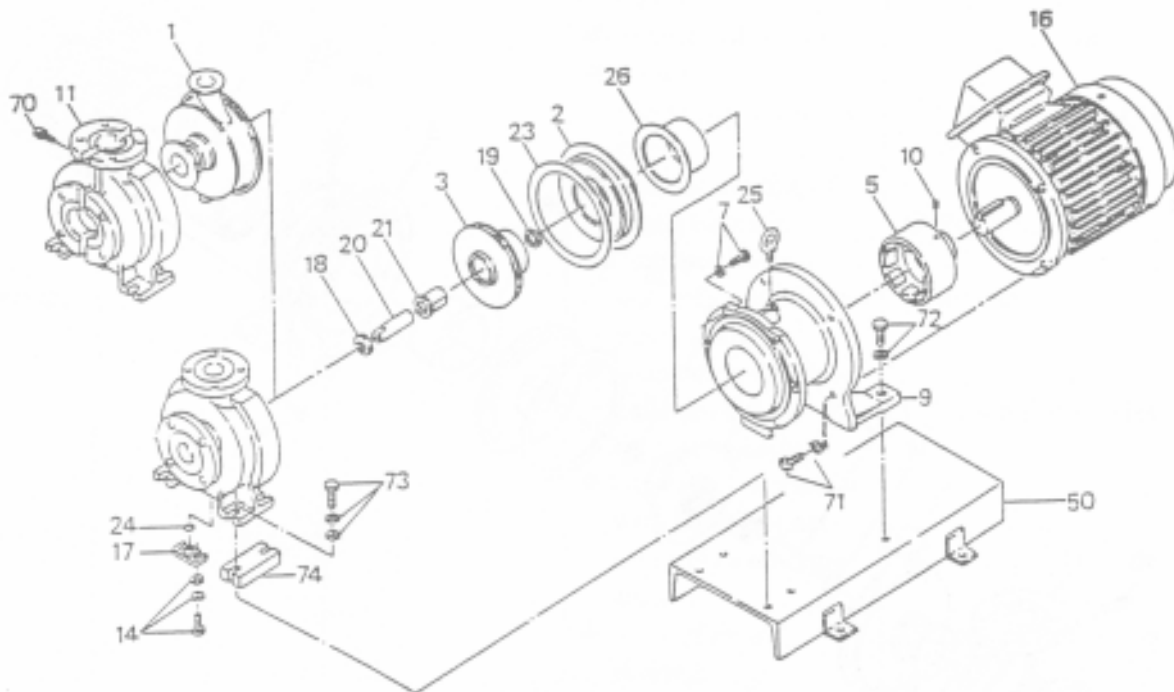
■ MDF-M25



No.	Description	Quantity
1	Front Casing Liner	1
2	Containment Shell	1
3	Impeller Unit & Inner Magnet Assembly	1
5	Outer Magnet Assy	1
7	Bolt	6
9	Frame	1
10	Setscrew	2
11	Casing, Front	1
14	Bolt	2
16	Motor	1
17	Drain Plate	1

No.	Description	Quantity
18	Front Thrust Collar	1
19	Rear Thrust Collar	1
20	Shaft	1
21	Bushing	1
23	Gasket	1
24	Drain Gasket	1
25	Eye Bolt	1
26	Containment Shell Cover	1
70	Setscrew	2
71	Bolt	4

■ MDF-M40



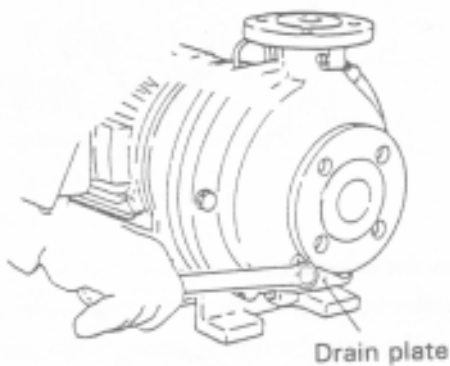
No.	Description	Quantity
1	Front Casing Liner	1
2	Containment Shell	1
3	Impeller & Inner Magnet Assembly	1
5	Outer Magnet Assy	1
7	Bolt	6
9	Frame	1
10	Setscrew	2
11	Casing, Front	1
14	Bolt	2
16	Motor	1
17	Drain Plate	1
18	Front Thrust Collar	1
19	Rear Thrust Collar	1

No.	Description	Quantity
20	Shaft	1
21	Bushing	1
23	Gasket	1
24	Drain Gasket	1
25	Eye Bolt	1
26	Containment Shell Cover	1
50	Base Plate (optional)	1
70	Setscrew	2
71	Bolt	4
72	Bolt	2
73	Bolt	4
74	Front Spacer	2

⚠ Caution Since the magnets used in the pump are powerful, be careful not to catch your fingers or hand between them during disassembly or assembly. Also, keep the magnet unit away from any electronic device that could be affected by a strong magnetic field.

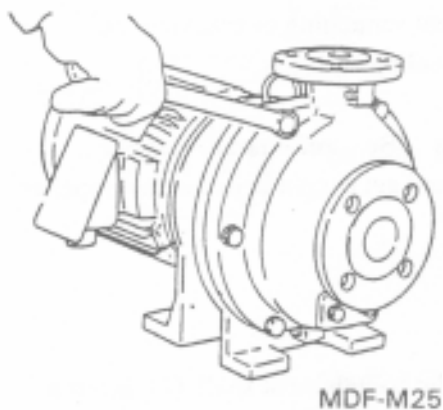
Prior to disassembly or assembly, the suction and discharge valves must be closed. The piping and the pump often retain some liquid it is recommended the piping and pump cavity be drained prior to servicing.

⚠ Caution If dangerous liquid is used, wear protection.



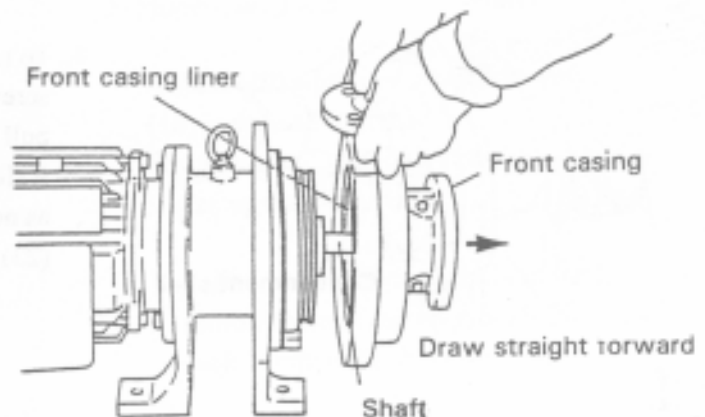
■ Disassembly

1. Loosen the hexagonal head bolts (14) and remove the drain plate (17) so that the liquid in the pump is drained out. Flush the inside of the pump.
 - * The drain plate of the MDF-M40 is located under the front casing.

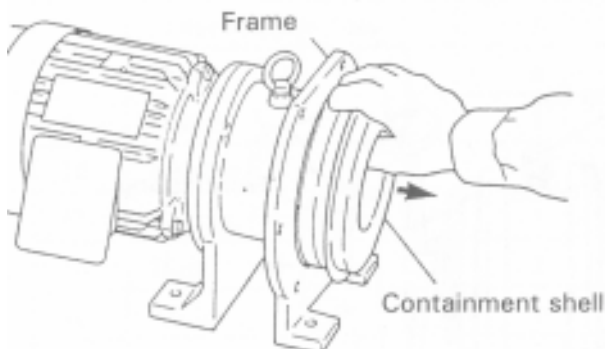
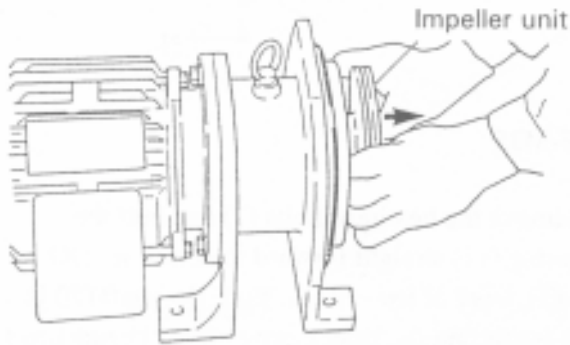
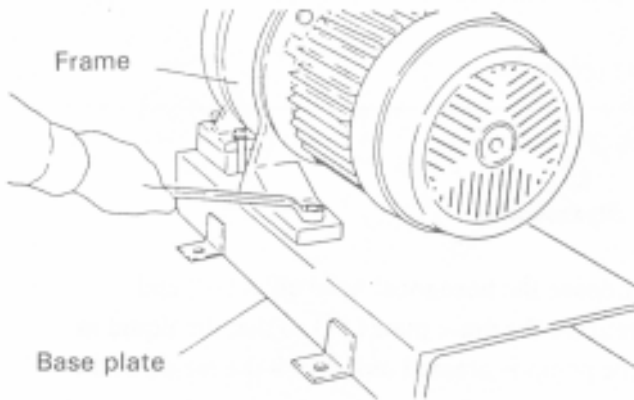
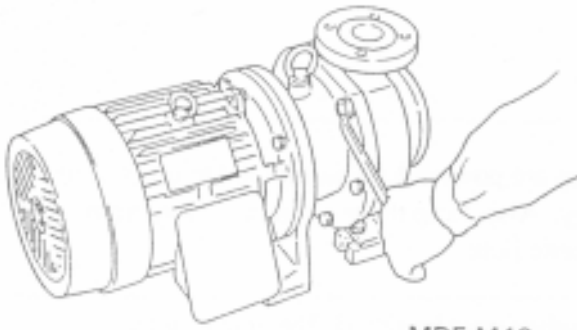


MDF-M25

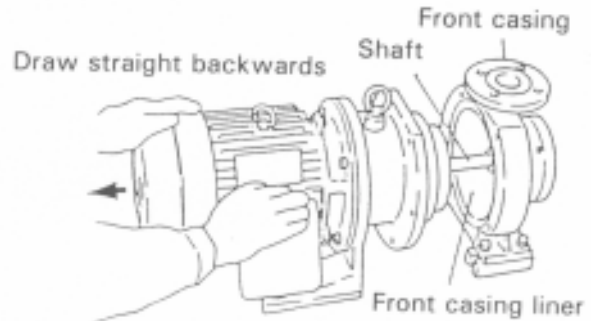
2. Remove the hex head bolts (7) and pull the casing (11) straight forward to detach it. DO NOT force or use impact, since the shaft (20) is press-fit into the front casing liner (1) attached to the cover. (The shaft may break or the casing may be cracked if too much force is applied.)



MDF-M40



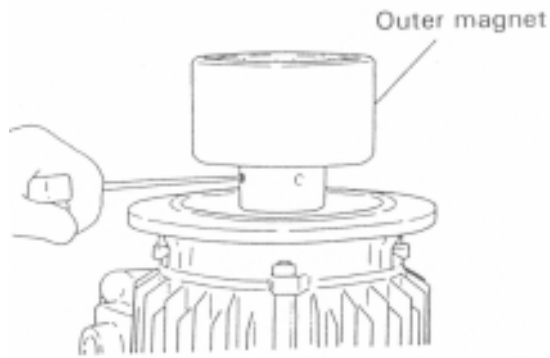
2. Remove the anchoring bolts (72) on the frame (9) and remove the casing bolts (7). Then, draw the frame backward on the base. Be careful not to strike the shaft, which is pressed into the casing liner, or subject it to other impact. (The shaft might break or the casing might crack if the shaft is struck.)



3. Draw the impeller unit (3) forward. Handle the impeller very carefully to avoid scratching it. Since the impeller unit is strongly magnetized, store it such that no metal pieces are attracted to it. In addition, pay close attention to the handling of the front casing (1) and the impeller unit to prevent scratching or cracking the bushing or sealing surfaces.

⚠ Caution Be careful not to let your fingers or hand get caught between the impeller and frame.

4. To remove the containment shell (2), insert a screwdriver into the recess on the perimeter and pull the containment shell forward while lifting it slightly upward. Do this with utmost care so as not to damage the seal surface of the gasket (23).

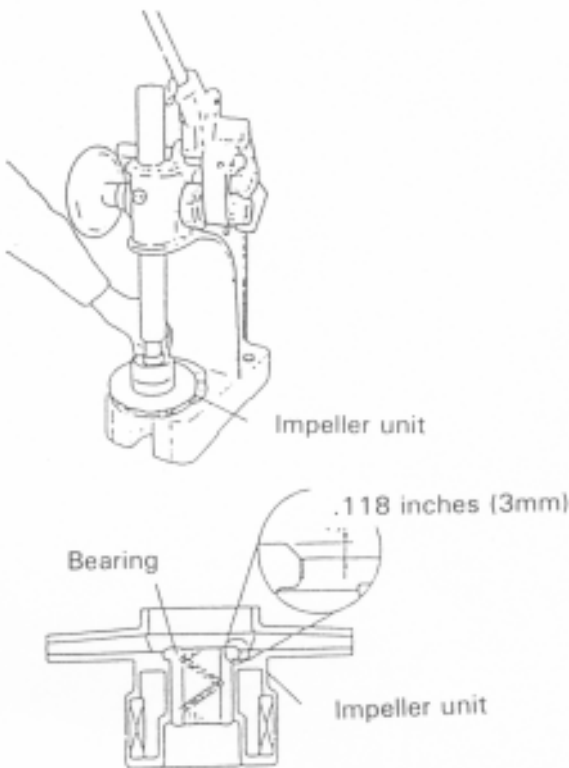


- To remove the outer magnet (5), first remove the motor (16) from the frame (9). Then, stand the motor upright and remove the two M8 hexagonal socket setscrews (10). Apply a pry bar to the boss on the outer magnet assembly and pull or lever the unit upward. Store the unit such that no metal particles are attracted to it.

* Clamping torque of drive magnet unit: 8.7 ft-lbs.

- The bushing (21), front thrust collar (18), and shaft (20) should be replaced as described below.

Disassembly and replacement of bearing.



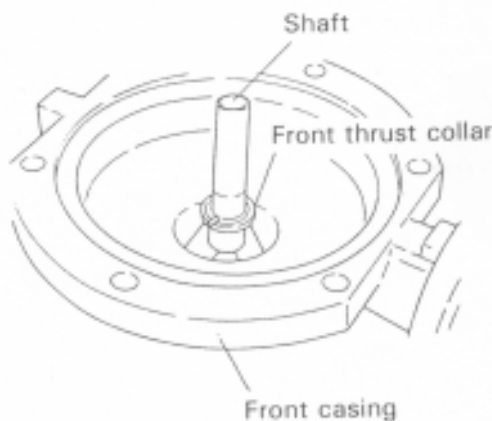
- Warm the impeller unit (3) with hot water (approximately 195°F) for about 5 minutes. Then, use a hand press and a replacement jig to remove the bearing. (Consult Iwaki Walchem for special jig specification.)

- Press a new bushing into the unit by means of an arbor press. (If the impeller unit is cold, warm it up as in step (a) before pressing the bushing into it.)

- After pressing in the bushing, check that it is correctly positioned inside the impeller unit. (See the figure on the left.)

Replacement of shaft.

A shaft (20) equipped with front thrust collar (18) is pressed into the front casing liner (1). Pay attention to the following points when replacing the shaft.



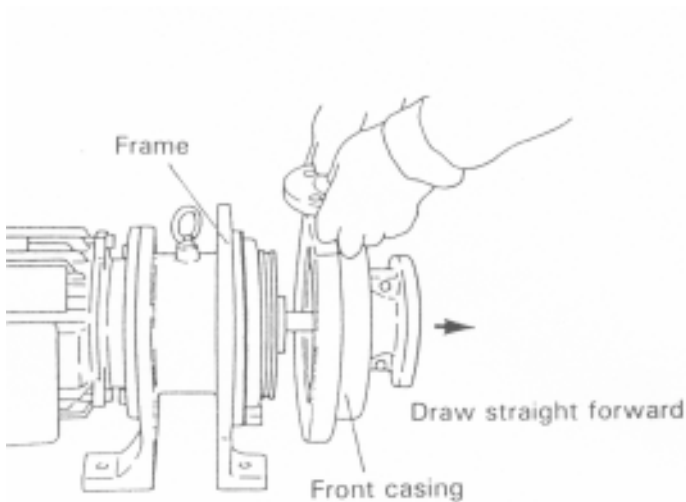
- * The shaft section should not be disassembled unless replacement is unavoidable, such as when the shaft is worn.

- Holding the worn shaft in one hand, tap

the perimeter section of the front casing lightly and evenly with a plastic hammer to remove the shaft from the casing liner. Never strike the seal surface of the front casing liner or the shaft.

* If the shaft does not come out easily, warm the front casing with warm water of about 195° F.

(b) Wipe off the stains on the front casing liner. Then, insert a new shaft into a new front thrust collar and press the shaft into the front casing with your hand, trapping the thrust collar between the shaft and liner. Next, tap the shaft lightly with a plastic hammer to drive it into position.



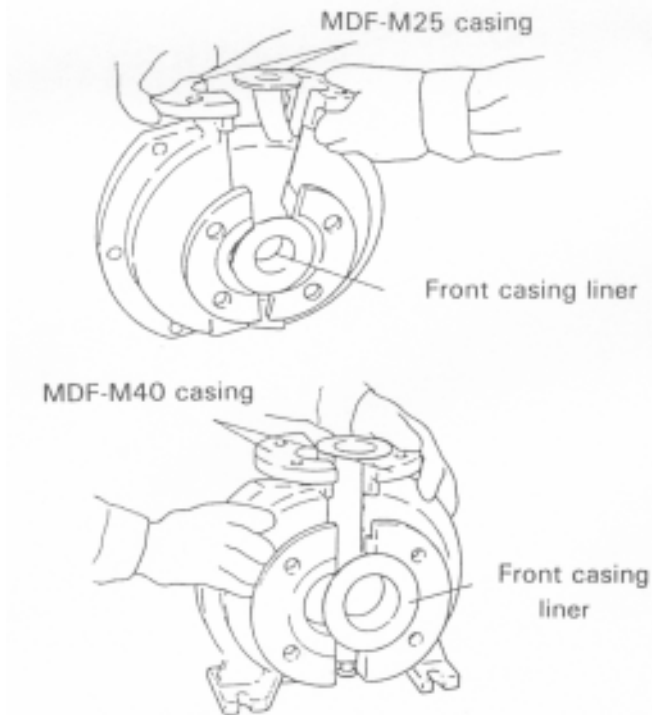
■ Disassembly and Replacement of Front Casing Liner

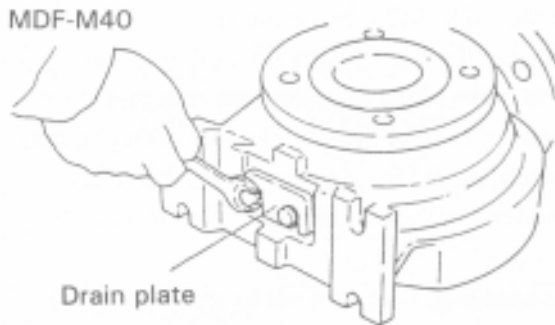
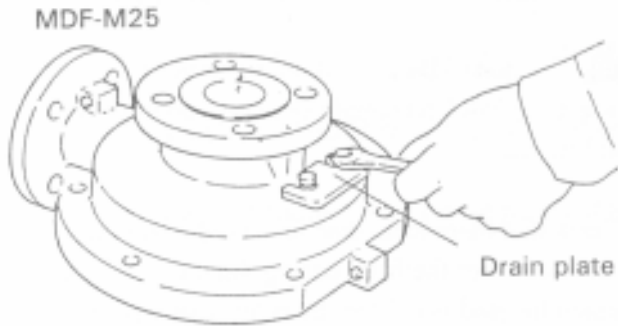
Disassembly

1. Remove the hexagonal head bolts (7) and front casing cover assembly.
2. Remove the hexagonal socket bolts (70) and split the casing (11) in two directions to remove the casing liner. If the casing does not come off easily due to stains or rust on it, tap it lightly with a plastic hammer. (This step concludes the disassembly process.)

* The casing is divided into a pair of right and left sections. A single set consists of a right and a left section.

Replacement





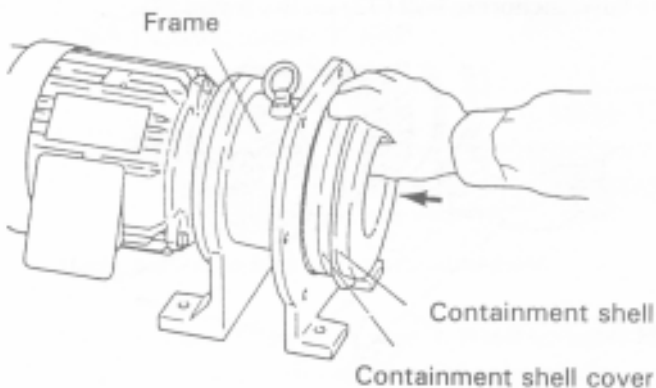
1. Attach the casing (11) to a new front casing liner (1), paying attention to the drain port. Then, loosely fasten the hexagonal socket bolts (70). If the casing is difficult to attach in place, tap it lightly so that the seal section of the front casing liner is not damaged.
 2. When attaching the casing onto the front casing liner, be careful not to misalign it in the vertical or horizontal directions. Fix the casing by firmly tightening the hexagonal socket bolt (70).
 - * Be sure not to damage the casing liner in this step.
 - * The casing is not to be disassembled unless casing liner replacement is required.
 3. Install the drain plate (17).
- * The PFA front casing liner used in the MDF-M40 type is integrated into a single assembly with the casing. The front casing and liner must be replaced as an assembly.

■ Assembly

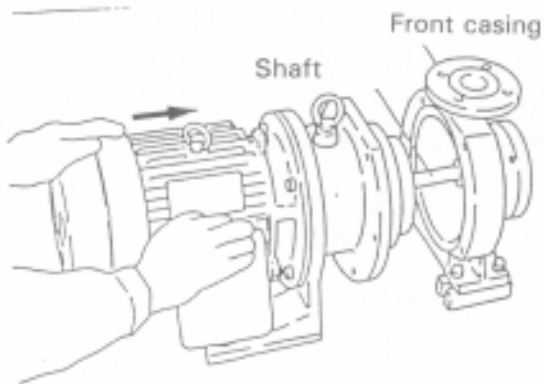
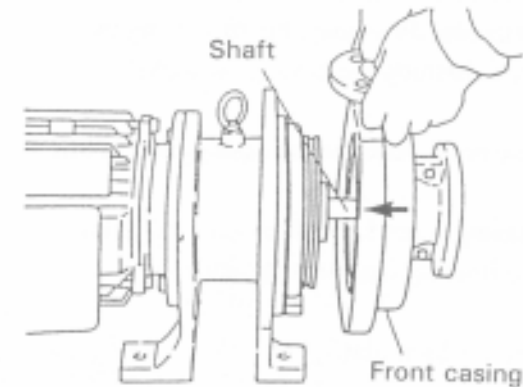
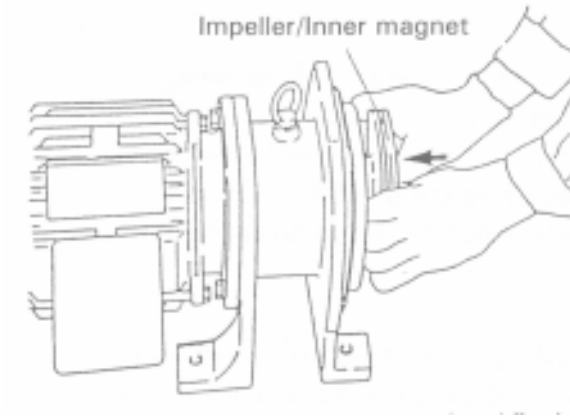
The pump should be assembled in the reverse order of disassembly, as described below. Refer to the exploded view diagrams on pages 21-22 for parts and locations.

Clean the gasket seating section thoroughly so that no dust or scratches are observed. Fasten the bolts evenly.

1. Install the containment shell cover (26) and containment shell (2) onto the frame (9).



2. Check that there are no metal pieces, etc., attracted to the impeller/inner magnet assembly (3). Then, slowly insert the unit into the contain-



ment shell. **Since its magnetic power is strong, the unit must be inserted carefully.**

⚠ Caution Be careful not to let your fingers or hand get caught between the impeller and frame.

3. Check that there is no dust or scratches on the seal surface of the front casing liner (1). Then, attach the gasket (23) to the front casing liner.
4. For the MDF-M25, insert the shaft (20) installed in the front casing liner (1) into the guide holes of the impeller/inner magnet assembly (3) and the containment shell (2), thus assembling the front casing to the frame and containment shell assembly.

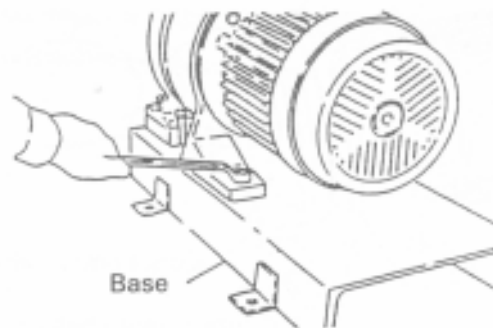
* In assembling, take care not to apply too much force to the shaft.

For the MDF-M40, slide the frame (9) on the base (50) forward to position it into the front casing.

5. Fasten the hexagonal head bolts (7) one after another diagonally, to apply even torque. Then, use a screwdriver to rotate the motor fan and check its ease and smoothness of rotation.

* Clamping torque: 32.5 ft-lbs.

6. For the MDF-M40, after the above step, fasten the base anchoring bolt (72) on the frame (9).



Appropriate spare parts must be used to ensure continued pump operation. Expendable parts, in particular, should always be kept on hand. When placing orders, supply the following information.

1. Description and part number (according to this instruction manual).
2. Pump model number and serial number (as shown on the nameplate of the pump).
3. Drawing number if you have received a certified drawing.

■ MDF-M Series Spare Parts List

No.	Description	Material	MDF-M2502	MDF-M2503	MDF-M40005	MDF-M4007
2* (19)	Containment shell (with rear thrust collar)	ETFE, ceramic	MFM1467		MFM1543	
		ETFE, SiC	MFM1488		MFM1566	
		PFA, ceramic	MFM1421		MFM1516	
		PFA, SiC	MFM1478		MFM1556	
2	Containment shell	ETFE	MFM1458		MFM1563	
		PFA	MFM1400		MFM1500	
18*	Front thrust collar	Ceramic	MFM1377		MFM1491	
		SiC	MFM1471		MFM1548	
19*	Rear thrust collar	Ceramic	MFM1398		MFM1498	
		SiC	MFM1476		MFM1551	
20*	Shaft	Ceramic	MFM1378		MFM1520	
		SiC	MFM1472		MFM1549	
21*	Bushing	High-density carbon	MFM1391		MFM1494	
		SiC	MFM1475		MFM1550	
23*	Gasket	PTFE	MFM1399		MFM1499	
24*	Drain gasket	PTFE	MFM1381			
26*	Containment shell cover	FRP	MFM1401		MFM1501	
3	Impeller/ Inner Magnet Assembly	PFA	MFM1395	MFM1413	MFM1517	
		ETFE	MFM1455	MFM1464	MFM1544	

Items with asterisks are expendable parts.

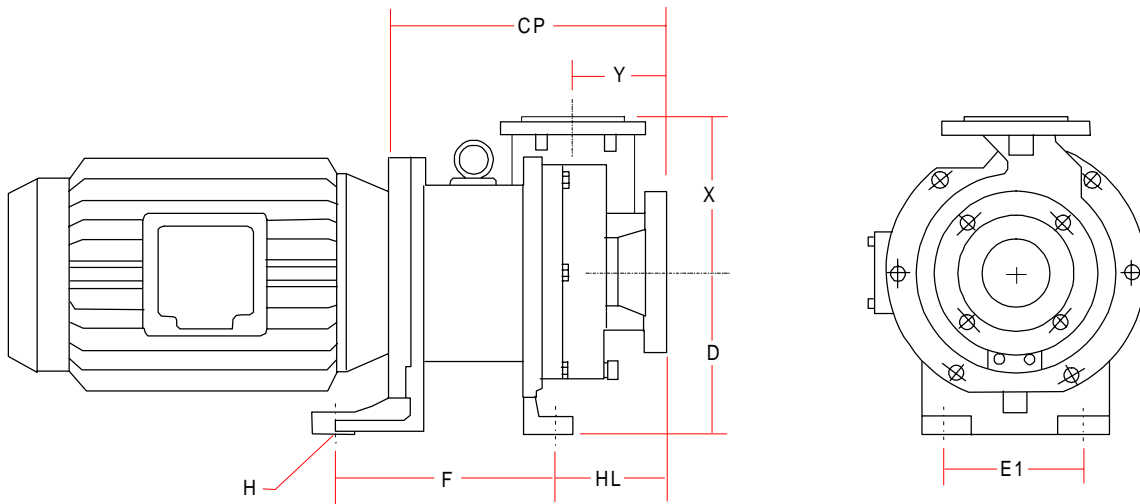
Note: For replacement of item 3, Impeller/Inner Magnet Assembly, specify existing impeller trim or pump serial number at the time of order placement.

■ **Dimensions and Weights**

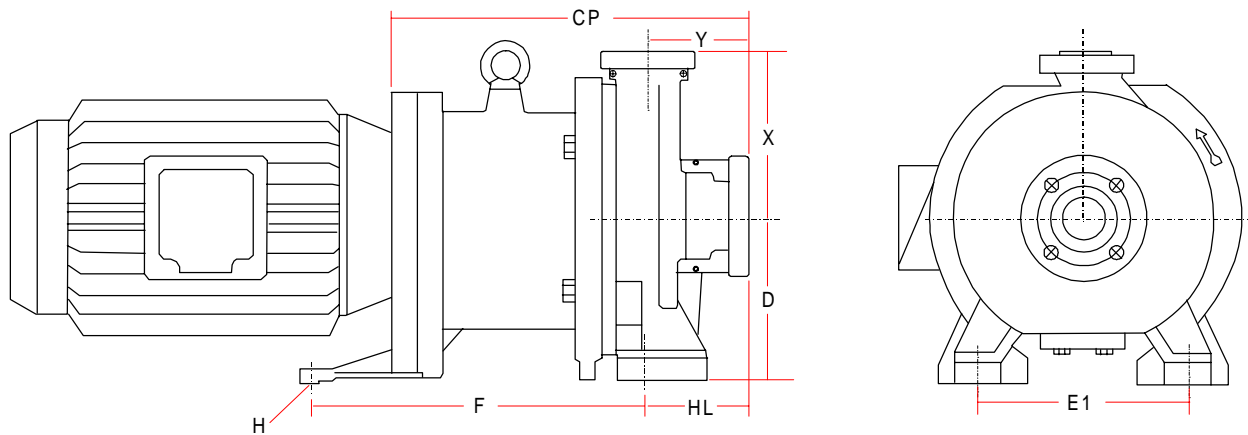
Pump Dimensions inches (mm)

Model	Size	X	D	E1	CP	F	H	HL	Y	Weight lbs (kg)
MDF-M2502	1.5 x 1.0 x 5.4	6.31 (160)	5.91	5.13	9.80	7.22	0.63 (16)	3.94	3.16 (80)	86 (39.1)
MDF-M2503			(150.0)	(130)	(249)	(184)		(100)		
MDF-M4005	2.0 X 1.5 X 5.4		6.31	7.48	10.48	9.84		4.52		130 (59.1)
MDF-M4007			(160)	(190)	(266)	(250)		(115)		145 (65.9)

■ **MDF-M25**



■ **MDF-M40**



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