

## Magnetic drive pumps MDF-L series



### Patent

JAPAN / U.S.A. / EU / TAIWAN / KOREA



Caution for safety use: Before use of pump, read instruction manual carefully to use the product correctly.  
Actual pumps may differ from the photos. Specifications and dimensions are subject to change without prior notice. For further details please contact us.



# MDF-L magnetic drive pumps for chemical processing

Already one of our best selling pump ranges they have proved their reliability over many years in many countries. Our continuous development ensures the highest possible efficiency in a chemical processing pump, whilst retaining high levels of corrosion resistance durability and safety.

## High corrosion resistance

Ethylene-Tetrafluoroethylene copolymer (ETFE) is used in the main material of the wet end parts. This material is known for its high resistance to corrosion among the fluororesins in injection molding and it almost equals PTFE in chemical resistance particularly against hot concentrated sulphuric acids, fuming sulphuric acid, concentrated nitric acid, hot chromic acid, and strong alkaline liquids. We use the latest anti-corrosion materials in the manufacture of the spindle, bearing and mouth ring, which combined with leak-free seal-less structures, ensure the safe transfer of strong acids and strong alkaline liquids.

## Dry running is not a problem with our pin-point contact system.

In conventional magnetic drive pumps, the inner parts of the pump are often melted due to heat and lubrication problems between the rear bearing surface and the rear casing, caused by dry running.

## Solid construction with excellent durability

ETFE, the main material, is filled with carbon fiber to increase its mechanical strength. The exterior of the pump is entirely covered by cast iron. Reliability is assured for continued operation under adverse conditions.

## High-efficiency/energy-saving design

The maximum pump efficiency reaches 50-55%, the highest level for resin pumps. In designing the pump, energy-saving was taken into full consideration.



MDF-L401-D

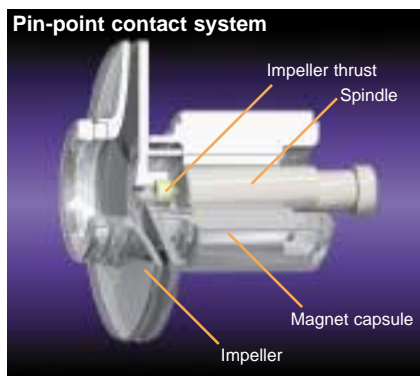
MDF-L250-D

### The patented pin-point contact system is making the magnetic drive pumps tough for dry running

Iwaki's pump technology has produced an innovative magnetic drive pump which incorporates an extremely high resistance to dry running. By employing the newly developed pin-point contact system, dry running which was unavailable with previous models is now a feature on the new magnetic drive pump series.

#### Pin-point contact system

In a no-thrust condition due to dry run, only the impeller thrust surface and spindle fore edge come in contact. The magnet capsule never touches the rear casing. This "pin-point" contact between impeller and spindle thrust surfaces significantly minimizes friction, and therefore heat generation.

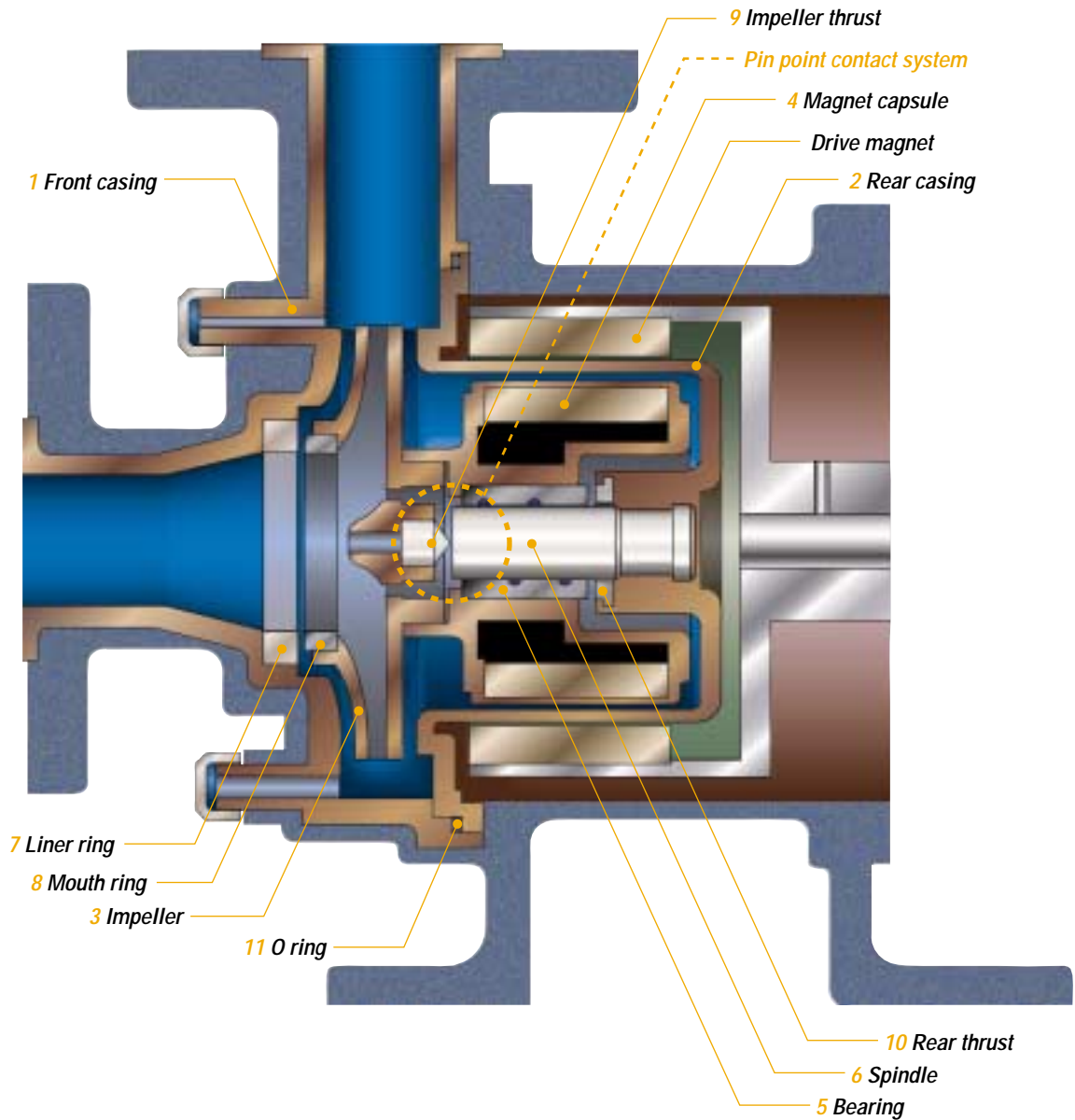


Patents  
Europe / Japan / Taiwan / U.S.A. / Korea





## Construction and materials



### Wet-end materials

| Part              | Material code | CA -D                                     | Note1 | CC -E                       | Note1 | CF -D               | AA -E                       | KK -E | Note2 |  |
|-------------------|---------------|---|-------|-----------------------------|-------|---------------------|-----------------------------|-------|-------|--|
| 1 Front casing    |               | CFRETPE<br>(Carbon fiber-reinforced ETFE) |       |                             |       |                     |                             |       |       |  |
| 2 Rear casing     |               |   |       |                             |       |                     |                             |       |       |  |
| 3 Impeller        |               |   |       |                             |       |                     |                             |       |       |  |
| 4 Magnet capsule  |               |   |       |                             |       |                     |                             |       |       |  |
| 5 Bearing         |               | High-density carbon                       |       | Alumina ceramic             |       | High-density carbon | High-purity alumina ceramic |       |       |  |
| 6 Spindle         |               | Alumina ceramic                           |       | High-purity alumina ceramic |       |                     |                             |       | SiC   |  |
| 7 Liner ring      |               |   |       |                             |       |                     |                             |       |       |  |
| 8 Mouth ring      |               | PTFE                                      |       |                             |       |                     |                             |       |       |  |
| 9 Impeller thrust |               | High-purity alumina ceramic               |       |                             |       |                     |                             |       |       |  |
| 10 Rear thrust    |               | High-purity alumina ceramic               |       |                             |       |                     |                             |       |       |  |
| 11 O ring         |               | FKM/EPDM/AFLAS®                           |       |                             |       |                     |                             |       |       |  |

Note1 : Available materials of "CA-D" and "CC-E" type for MDF-L250/MDF-L401 are only.

Note2 : MDF-L401"KK" type is not available.

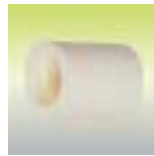
### Impeller thrust

When dry running happens, the impeller thrust and the spindle front part come into contact.



### Bearing

The bearing is a one-piece and press-fit type. Replacement is possible when required.



### Spindle

The spindle is integrally molded with the rear casing to form a cantilever structure. Without any supporting boss in the suction port, the pump efficiency is increased and the NPSHr is reduced.



### Impeller

The impeller is a closed type designed for maximum efficiency. Different impeller sizes are available as standard, which adds greater latitude in handling liquids of high specific gravity.



### Magnet capsule

High-power magnets are thoroughly molded in the resin to provide sufficient corrosion resistance and torque.

(Rare earth magnet is used in the 422,423 and 425 type.)



## Pump identification

**MDF-L 42 2 CF V K - D**

#### Pump size

Shows discharge port diameter (42 is 40)

#### Motor output

- 0: 0.4kW
- 1: 0.75kW
- 2: 1.5kW
- 3: 2.2kW
- 5: 3.7kW

#### Material of Bearing/Spindle

- CA: High-density carbon/Alumina ceramic
- CC: Alumina ceramic/Alumina ceramic
- CF: High-density carbon /High-purity alumina ceramic
- AA: High-purity alumina ceramic /High-purity alumina ceramic
- KK: SiC/SiC

#### Material of O ring

- V: FKM
- E: EPDM
- A: AFLAS®

#### Code of Impeller

- K,L,T,V,W: for 50Hz
- P,Q,X,Y,Z: for 60Hz
- S: Non-standard impeller

#### Special code

- D: Pin-point contact system (Dry run is available)
- E: Pin-point contact system (Dry run is not available)
- S: Special specifications
- H1: For high liquid temperature (Max. 100°C for MDF-L250,401)

## Specifications

| Model    | Nominal bore size<br>Suction X Discharge<br>mm | 50Hz             |           |                   | 60Hz             |           |                   | Motor<br>Output<br>kW | Mass <sup>Note1</sup><br>(Less motor)<br>kg |
|----------|--|------------------|-----------|-------------------|------------------|-----------|-------------------|-----------------------|---|
|          |  | Impeller<br>size | Head<br>m | Capacity<br>L/min | Impeller<br>size | Head<br>m | Capacity<br>L/min |                       |   |
| MDF-L250 | 25 X 25  | K                | 12.2      | 50                | P                | 12.2      | 50                | 0.4                   | 23(14)                                      |
|          |  | T                | 7.3       | 150               | X                | 6.4       | 150               |                       |   |
|          |  | V                | 5.6       |                   | Y                | 4.6       |                   |                       |   |
|          |  | W                | 3.0       |                   | Z                | 2.4       |                   |                       |   |
| MDF-L401 | 40 X 40  | K                | 16.8      | 100               | P                | 16.2      | 100               | 0.75                  | 38(22)                                      |
|          |  | T                | 9.6       | 200               | X                | 9.0       | 200               |                       |   |
|          |  | V                | 8.3       |                   | Y                | 6.6       |                   |                       |   |
|          |  | W                | 4.8       |                   | Z                | 4.8       |                   |                       |   |
| MDF-L422 | 50 X 40  | K                | 20        | 200               | P                | 26        | 100               | 1.5                   | 41(26)                                      |
|          |  | T                | 18        | 200               | X                | 17.5      | 200               |                       |   |
|          |  | V                | 14        |                   | Y                | 14        |                   |                       |   |
|          |  | W                | 10.4      |                   | Z                | 9.3       |                   |                       |   |
| MDF-L423 | 50 X 40  | K                | 28.5      | 150               | P                | 30        | 150               | 2.2                   | 43(26)                                      |
|          |  | L                | 21.5      | 300               | Q                | 26.5      | 300               |                       |   |
|          |  | T                | 19.5      |                   | X                | 19.5      |                   |                       |   |
|          |  | V                | 15        |                   | Y                | 14.5      |                   |                       |   |
|          |  | W                | 11.5      | Z                 | 10.5             |           |                   |                       |   |
| MDF-L425 | 50 X 40  | -                | -         | -                 | P                | 39.8      | 200               | 3.7                   | 54(28)                                      |
|          |  | T                | 25.5      | 400               | X                | 26.5      | 400               |                       |   |
|          |  | V                | 21        |                   | Y                | 18.5      |                   |                       |   |
|          |  | W                | 8.5       |                   | Z                | 13.0      |                   |                       |   |

Temperature range of liquid handled (MDF-L250/401) : 0 to 90°C. 10 to 90°C when AFLAS® O ring is used. (Up to 100°C possible on special order)

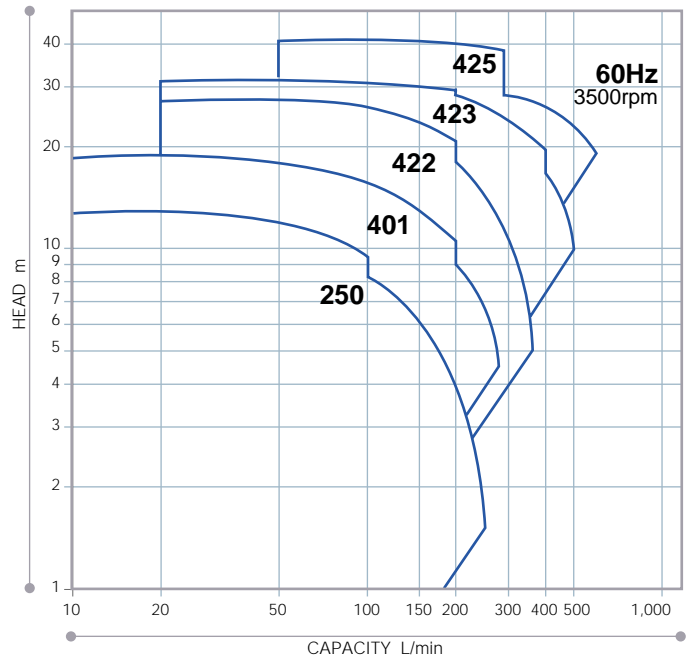
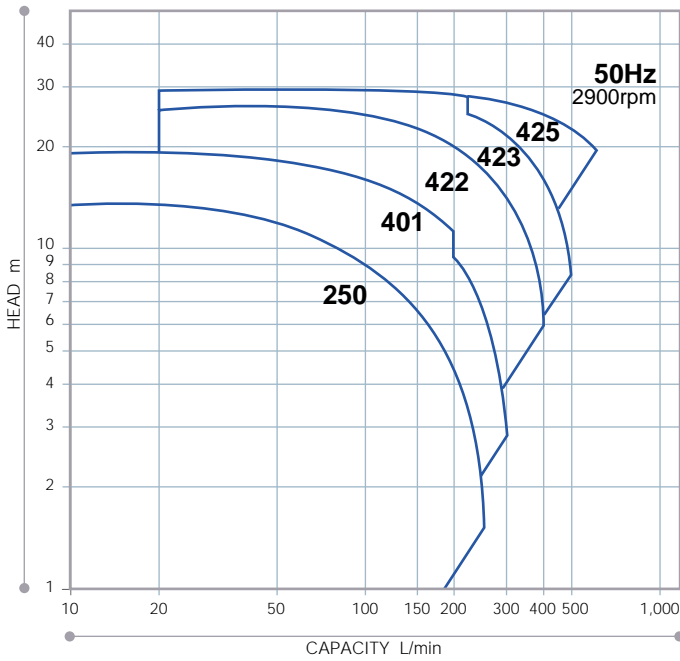
Temperature range of liquid handled (MDF-L422-425) : 0 to 100°C. 10 to 100°C when AFLAS® O ring is used.

Allowable slurry (AA and KK type) : Hardness: Below 80HS, Particle size: Below 50µm (Concentration up to 5wt%)

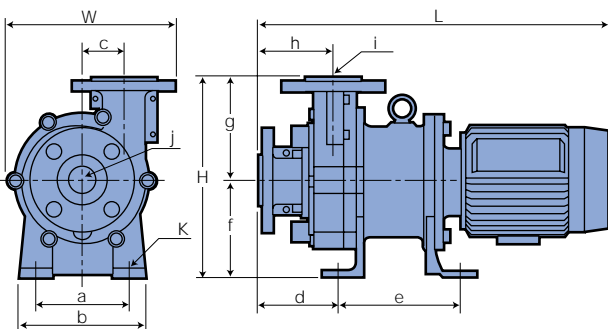
Casing cover : Cast iron FC200

Note1 : Mass (weight with motor) vary depending on motor installed.

## Performance curves



## Dimensions in mm



| Model    | W   | H   | L   | a   | b   | c  | d   | e   | f   | g   | h   | i  | j  | K     |
|----------|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|----|----|-------|
| MDF-L250 | 205 | 237 | 439 | 110 | 150 | 51 | 95  | 143 | 115 | 122 | 88  | 25 | 25 | 4-ø12 |
| MDF-L401 | 233 | 275 | 519 | 130 | 170 | 58 | 111 | 250 | 135 |     | 102 |    | 40 |       |
| MDF-L422 |     |     | 557 |     |     |    |     |     |     | 140 |     | 40 |    |       |
| MDF-L423 | 251 | 295 |     | 140 | 180 | 65 | 106 | 275 | 155 |     | 87  |    | 50 | 4-ø14 |
| MDF-L425 |     |     | 625 |     |     |    |     |     |     |     |     |    |    |       |

Note : Dimensions vary depending on motor installed.

### Care to be taken in selecting type of pump

- (1) The performance curves show when pumping clear water at room temperature.
- (2) An impeller size suitable for the specific gravity of the liquid to be handled should be selected. When selecting, add a 5-10% allowance to the motor output.  
Pump shaft power SP X Specific gravity of liquid X 1.05 to 1.1 as allowance  $\leq$  Motor output

(Note: Motor shaft power Sp rises in proportion to the specific gravity of liquid. Also if the liquid viscosity increases, required shaft power increases while pump discharge capacity and head decrease. Therefore the correction of pump performance must be done together with the correction of pump shaft power.)

- (3) Continuous operation with a closed discharge is not permissible with magnet drive pumps. A minimum flow rate must be maintained, as given below:

| Model             | 250•401 | 422•423 | 425     |
|-------------------|---------|---------|---------|
| Maximum flow rate | 10L/min | 20L/min | 50L/min |

- (4) How to determine suction conditions (NPSH)•••Prevention of cavitation

Select an NPSHa value so that  $NPSHa \geq \{0.5(m) / \text{Allowance}\}$

$$NPSHa = \frac{10^5(Pa - Pv)}{\rho g} \pm hs - hf$$

- Pa : Pressure applied to surface of supply liquid MPa
  - Pv : Vapor pressure of liquid MPa
  - $\rho$  : Liquid density kg/m<sup>3</sup>
  - hs : Height of suction m
  - hf : Suction pipe resistance m
  - g : Acceleration due to gravity 9.8m/s<sup>2</sup>
  - $\gamma$  : Specific gravity of liquid
  - NPSHa : Available NPSH m
  - NPSHr : Required NPSH m
- (Note : Refer to the performance curve for the selection of NPSHr.)

- (5) Pump casing pressure limit.  
The pumps have the following casing pressure limits:

| Model                       | 250  | 401  | 422<br>423 | 425  |
|-----------------------------|------|------|------------|------|
| Maximum pressure rating MPa | 0.16 | 0.24 | 0.4        | 0.45 |

$$P = \frac{\rho g(H_{max} \pm h_s)}{10^6} \dots \text{MPa}$$

- P : Internal pressure of pump MPa
- $\rho$  : Liquid density kg/m<sup>3</sup>
- g : Acceleration due to gravity 9.8m/s<sup>2</sup>
- Hmax : Pump maximum discharge head m
- hs : Suction head m

- (6) In case of pump performance curve where max. head does not occur at shut off point ( For example MDF-L423 with "W" impeller)

For the pump model of which the performance curve shows ascending line in the small flow range, it is recommended the pump is not used at ascending range of performance curve. If the pump is obliged to be used in this range, piping must be done paying attention to the following points.

- (1) No air trap should be in discharge piping.
- (2) Flow rate adjustment should be done by means of the valve located just after the pump.

### Iwaki dry running protector DR series (Option)

Model DR is electric current sensing type dry running protector. It detects the decreased load current (lower limit) to stop the pump when it runs dry or runs with air sucking in. It can detect over-load, too.

- Current figure to be set is indicated on LCD.
- Both top/bottom figures can be set.  
Top:Over-load  
Bottom:Dry running, air sucking-in operation, operation with suction side closed
- Built-in current transformer (DR-20)
- DIN rail mounting



DR-20

#### Specification

| Model                   | DR-20                                      | DR-21                               |
|-------------------------|--|-------------------------------------|
| Motor power             | 200 to 440V                                |                                     |
| Applied motor           | 0.4 to 7.5kW                               | 11 to 37kW                          |
| Power<br>45-65Hz        | V  | 200 to 240V $\pm$ 10% shingle phase |
|                         | Input                                      | 3.5W                                |
| Detective current       | 0.0 to 32.0A                               |                                     |
| Current transformer(CT) | Built-in                                   | External                            |
| Current range           | Auto : 4.4/17.6/32A                        | 0 to 200A                           |
|                         | Manual : 2.2/4.4/8.8/11/17.6/26.4/32A      |                                     |
| Ambient                 | Temperature:0 to 40°C Humidity:RH40 to 85% |                                     |
| Outer dimension         | D80 X W153 X H110                          |                                     |



Current transformer 200AT(For DR-21)

Iwaki process magnetic drive pump series

## MDM SERIES

Magnetic drive process pumps  
with dry running capability

**Specifications** (50/60Hz)

- Max. discharge capacity: 1.4m<sup>3</sup>/min
- Max. head: 72/102m
- Main materials: CFRETFE/PFA
- Liquid temp. range: 0 to 105°C(CFRETFE), 0 to 120°C(PFA)



## MDE SERIES

The world's largest-class  
non-metallic magnetic drive pumps

**Specifications** (50/60Hz)

- Max. discharge capacity: 4.0m<sup>3</sup>/min
- Max. head: 55/79m
- Main materials: ETFE/PFA/PVDF
- Liquid temp. range: 0 to 100°C(ETFE), 0 to 120°C(PFA), 0 to 90°C(PVDF)



## YMD SERIES

Stainless steel magnet pumps with  
compact size and simple structure

**Specifications** (50/60Hz)

- Max. discharge capacity: 330/320L/min
- Max. head: 20.5/22m
- Main materials: SUS316
- Liquid temp. range: 0 to 120°C

