

Installation, Operating, Maintenance & Safety Instruction

for

M PUMPS CM MAG-M SERIES Centrifugal light Mag-Drive pumps (CM MAG-M06/1/2/3/4)



This manual presents installation, servicing, troubleshooting, and maintenance for M PUMPS CM MAG-M SERIES. Information that may be required regarding performance, alterations or detailed technical data which is not included here may be obtained from your M PUMPS representative.

THIS INSTRUCTION MANUAL is intended to guide those responsible for the installation, operation and maintenance of *M PUMPS* CM MAG-M series seal-less magnetic drive pumps. Please read it carefully, before you install and operate your *M PUMPS* pump. Useful information can also be obtained from: - Hydraulic Institute Standards (USA) regarding pump installation. – *M PUMPS* inspection standards ISP 01.9001 regarding performance and test.



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1 SAFETY

INSTALLATION, OPERATION AND MAINTENANCE MUST BE DONE BY THOROUGHLY QUALIFIED PERSONNEL IN STRICT ACCORDANCE WITH THIS MANUAL AND MUST COMPLY WITH ALL LOCAL, STATE AND FEDERAL CODES.

For your protection and the protection of others, learn and always follow the safety rules outlined in this booklet.

Observe warning signs on machines and act accordingly. Form safe working habits by reading the rules and abiding by them. Keep this booklet handy and review it from time to time to refresh your understanding of the rules.

DANGER

The use of the word “DANGER” always signifies an immediate hazard with a high likelihood of severe personal injury or death if instructions, including recommended precautions, are not followed.

WARNING

The use of the word “WARNING” signifies the presence of hazard or unsafe practices which could result in severe personal injury or death if instructions, including recommended precautions, are not followed.

CAUTION

The use of the word “CAUTION” signifies possible hazards or unsafe practices

which could not result in minor injury, product or property damage if instructions and recommended precautions are not followed.

MAGNETIC

CM MAG-M are magnetic driven pumps. The use of the word “Magnetic” indicates the persistent presence of a magnetic field.

Such fields present immediate danger to individuals having electronic medical devices, metallic heart valves, metallic prosthetics or metallic surgical clips.

2 INSPECTION

All *M PUMPS* products unit are inspected prior to shipping and prepared for safe transportation.

Upon receipt of CM MAG-M pump, check usually for any damage which may have occurred during shipment.

Notify the courier and *M PUMPS* promptly if damage has occurred.

3 STORAGE

If the pump is not installed immediately, it should be protected from exposure to moisture and dust.

Shipping protections of the ports installed at the factory, must be kept securely in place.

Storage instruction provided by the driver manufacturer should be observed.



4 INSTALLATION

- 1) Locate the pump on a firm base close to the liquid source, preferably below liquid level in such a way to be easily accessible for maintenance and inspection.
- 2) Mount the pump horizontally .If mounted vertically, the unit must be downwards, not motor upwards.

5 OPERATION SAFETY BASICS

Listed below are some of basics you should keep during mind in addition to your own company rules regarding installation, operation and maintenance:

NEVER: start this pump without proper prime (casing must be full of liquid)

NEVER: operate these pumps with the suction or the discharge valve closed.

NEVER: run this pump dry over a few minutes.

NEVER: operate pump if there are question signs of leakage.

NEVER: change pump condition of service without approval of your *M PUMPS* representative.

NEVER: loosen port connection while system is under pressure.

NEVER: attempt to clean the pump while it is operating.

NEVER: operate pump above rated temperature and pressure.

NEVER: Pump liquids containing ferromagnetic particles of any size, or substances which will erode or chemically attack the internal parts of the pump. If in doubt, please contact your pump supplier for advice.

NEVER: Restrict both the inlet and the discharge lines while the pumps are running.

Restriction of the inlet may cause the pump to cavitate, leading to loss of efficiency and rapid wear.

Reduced flow can be obtained if required by a valved branch from the discharge side of the pump back to the liquid source.

If the pump is to be shutdown for an extended period, circulate clean water (or other suitable solvent compatible with pump materials) for several minutes, to avoid the risk of internal precipitation or encrustation.



6 PUMP IDENTIFICATION

Every *M PUMPS* pump unit has a nameplate located on the side of the casing. It is recommended that the purchaser record the serial number and reference it when requesting information or service parts from *M PUMPS*. The serial number must be used for all correspondence and spare parts order.



Nameplate

7 SUCTION AND DISCHARGE PIPING

- Piping should be supported independently of the pump and the line up naturally to pump ports.

Suction piping should be installed with as few restrictions as possible to provide no less than minimum NPSH as listed on the specification sheet.

- The length of the suction pipe should be kept to a minimum.

- Suction line should be clean and/or a strainer should be installed to protect the impeller from damage by welding slag, mill scale, or other foreign particles during initial start-up.

- In suction use only a full flow valve.

- Pressure gauge should be installed in both the suction and discharge piping. The gauges will enable the operator to easily observe the operation of the pump, and to control if the pump is operating in conformance with the duty point required. If cavitations or other instable operation should occur, widely fluctuating pressure will be noted.

8 ELECTRICAL

DANGER

- ▲ Only a qualified electrician should make the electrical connections to the pump drive motor.

- ▲ Thoroughly read motor manufacturers instructions before making installation.

- ▲ Check motor nameplate data to be certain that all wiring, switches, starter, and overload protection are correctly sized.

Install the motor according local electrical codes. Check all connections to motor and starting device with wiring diagram. Check voltage, phase, and frequency on motor nameplate with line circuit.

NOTE: Install a flexible electrical coupling on the motor. Allow for movement of at least 12 inches. This is necessary to service and inspect the pump.

9 PUMP SPEED

CM MAG-M pumps are designed to rotate at speed up to 4000 rpm. Standard speeds are:

ELECTRIC MOTOR	50Hz	60Hz
2 POLES	2900 rpm	3500 rpm
4 POLES	1450 rpm	1750 rpm

If the pump is driven at variable speed via an a.c. frequency inverter, keep within the recommended limit of speed.

10 STARTING

Fully open the suction valve. Pump requires a flooded suction.

WARNING

- ▲ Do not operate pump with suction or discharge valve closed. Operating pump more than a few minutes with the suction valve closed can cause bearing failure.

CAUTION

- ▲ Check driver for proper rotation. Correct rotation is clockwise when viewed from the pump casing.

CAUTION

- ▲ At start-up immediately check pressure gauges. If discharge pressure is not quickly reached stop the driver, relieve and attempt to restart.

- Check the pump and piping to assure that there are no leaks.

11 TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	INVESTIGATIVE/CORRECTIVE ACTION
No flow, no pressure at start up.	Pump not completely filled with liquid.	Bleed all vapour or air from port 6. Allow more cool down time if pumping low temperature fluid. Check suction line for air leak if suction pressure is lower than atmospheric.
	NPSH actually lower than NPSH requirement listed on specification sheet.	Suction line blocked – check suction screen and valve. Excessive pressure drop through suction piping. Flow restricted by vapour pockets in high points of suction line. Suction tank level or pressure too low. Entrained air or vapour in pumped fluid. NPSH reduced by presence of more volatile fluid in process fluid.
	Failure of drive component, such as interconnecting shaft or impeller key, or item missing from assembly.	Disassemble and inspect.
	Reverse direction of rotation.	Note: impeller and driver rotate in the same direction.
Insufficient flow or head-rise.	NPSH actually lower than NPSH requirement listed on specification sheet.	Refer to solutions listed under “No flow, no pressure at start-up”.
	Flow too low, causing overheating of fluid resulting in internal boiling or unstable pump operation.	Increase through-flow rate. By pass part of pump discharge to supply tank. Use seal cavity bypass and vent the high point of the pump to continuously increase inlet flow rate.
	Diffuser discharge partially plugged or impeller damaged by passage of a solid particle.	Clean these areas of all obstructions and restore surfaces to a smooth polished finish (use emery cloth or machine), free of all corrosion pitting.
Driven overloaded.	Process fluid specific gravity or viscosity different from values shown on specification sheet.	Check actual viscosity and specific gravity at operating temperature. Viscosity higher than ten centipoises will cause reduced head and flow and increased power consumption.
	Drive speed too low.	Check speed against value listed on specification sheet.
	Pressure gauges or flow meters in error.	Calibrate instrumentation.
	Fluid specific gravity or viscosity higher than values listed on specification sheet.	Check actual viscosity and specific gravity against value listed on specification sheet.
	Electrical failure in electric driver.	Check circuit breaker heater size and setting. Check voltage. Current for each phase should be balanced within three percent.
	Mechanical failure in driver, or pump.	Remove driver and check for freedom of rotation of pump shaft assemblies. Remove fluid end and search for any mechanical failure.
Excessive discharge pressure pulsations.	Insufficient NPSH.	Refer to solution for insufficient NPSH under “No flow, no pressure at start-up”, above.



12 MAINTENANCE AND DISASSEMBLY

The maintenance and disassembly procedure are intended for use during standard field inspection or service.

CM MAG-M pumps contain very strong magnets.

The use of non metallic work surface is highly recommended.

A) Disassembly

In case the pump has handled hot liquids, make sure that it cools down before disassembling it. The pump could have handled dangerous or toxic liquids: it is therefore necessary to wear protections for the skin and the eyes.

The liquid must be recovered and eliminated according the existing environmental laws.

In case the pump has to be sent back to the manufacturer to be reconditioned, in case it pumped aggressive or toxic liquids, the same has to be thoroughly drained and cleaned by the customer.

1) Remove bolts connecting pump and motor to foundation or base plate.

2) Remove hex bolts connecting pump to motor.

3) Separate the pump from the motor end pull the driver away from the pump.



⚠ WARNING ⚠ MAGNETIC

▲ *M PUMPS* units contain extremely strong magnets. The use of non magnetic tools and work surface is highly recommended.

▲ Strong magnetic attraction when disassembling / assembling drive end to liquid end.

⚠ CAUTION

▲ The shop area must be clean and free of any ferrous particles.

4) Remove pump casing hex nut.



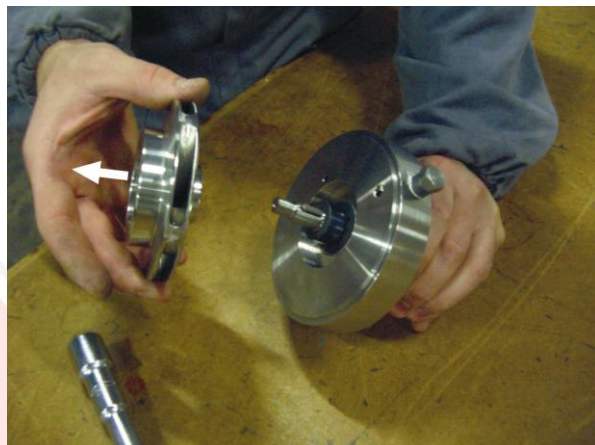
5) Pull out the pump casing.



6) Pull out the internal assembly from the pump rear casing.



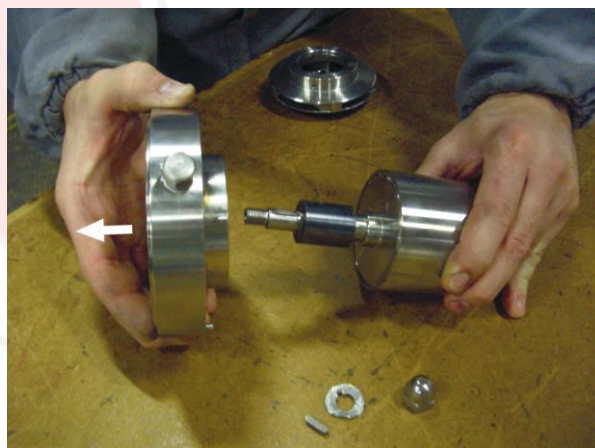
13) Remove shaft hex nut and pull out the impeller.



10) Remove the impeller wear ring retaining screw.



12) Remove the bushing's support.



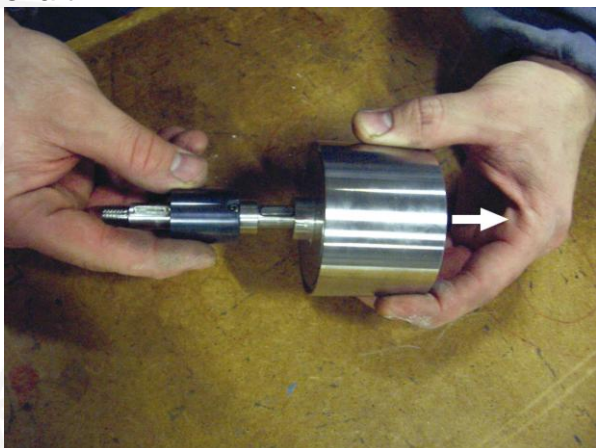
14) Remove the impeller wear ring.



7) Remove inner magnet hex nut.



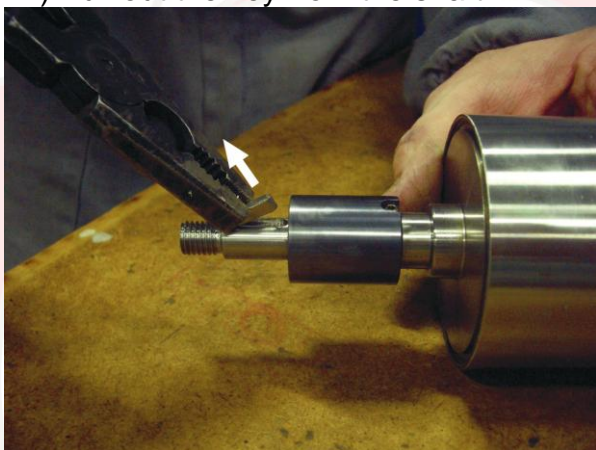
8) Pull out the internal magnet from the shaft.



MAGNETIC

▲ **Reminder: Keep all metal tools away from magnetic field of the inner magnet.**

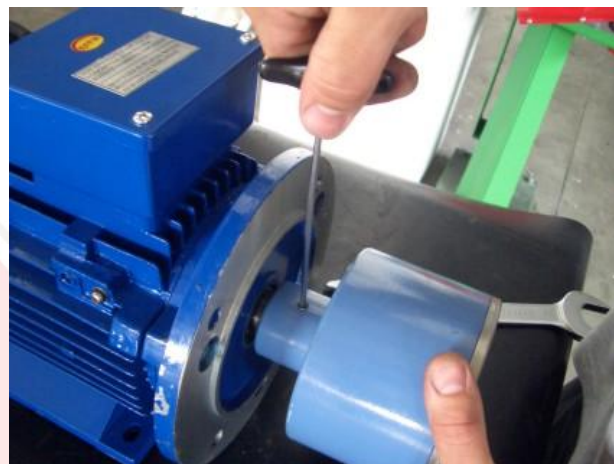
11) Pull out the key from the shaft



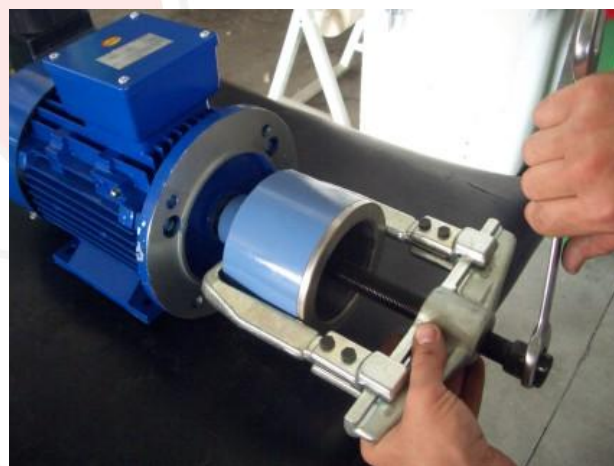
12) Pull out the sleeve bushing from the shaft.



17) Remove the screw from external magnet hub.



18) Using an extractor pull-out the external magnet from motor shaft.



To re-assembly the pump, please follow the above instruction on the contrary.

CAUTION

▲ **Thoroughly clean all parts before assembly. Make sure all parts are free of dirt, metallic particles, etc.**

13 PUMP ITEM LIST

<i>Pos.</i>	<i>Description</i>	<i>Material</i>
1,2	Flushing Kit	SS 316
3	Pump casing	SS 316
4	Screw	SS 316
5,12	Bushing elastic rings	SS 316
6,11	Sleeve bushings	SiC
7,17,31,8	Seger, washer, nut, shaft key	SS 316
9	Impeller	SS 316
10	Shaft	SS 316
13,14,22,23	Lock washer & screws	SS 316
15	Volute ring	SS 316
16	Internal magnet <1>	SS 316
18	Rear casing <2>	SS 316
19	External magnet <1>	Carbon steel
20	Set screws	SS 316
21	Pump casing wear ring	Special carbon
24,28	Bushings tolerance rings	SS 316
25,27	Bushings	Special carbon
26	Sleeve bushings tolerance rings	SS 316
29	Volute ring wear ring	Special carbon
30	Body gasket	Asbestos free
32	Bracket	Carbon steel

<1> With rare earth magnet sectors

<2> Minimum thickness 1,5 mm



M PUMPS s.r.l. Via dell'Artigianato, 120
45015 - Corbola (RO) – Italy
info@mpumps.it
www.mpumps.it
Tel. +39 0426 34 63 04
Fax. +39 0426 34 91 26

