



*Setting Innovative  
Standards*

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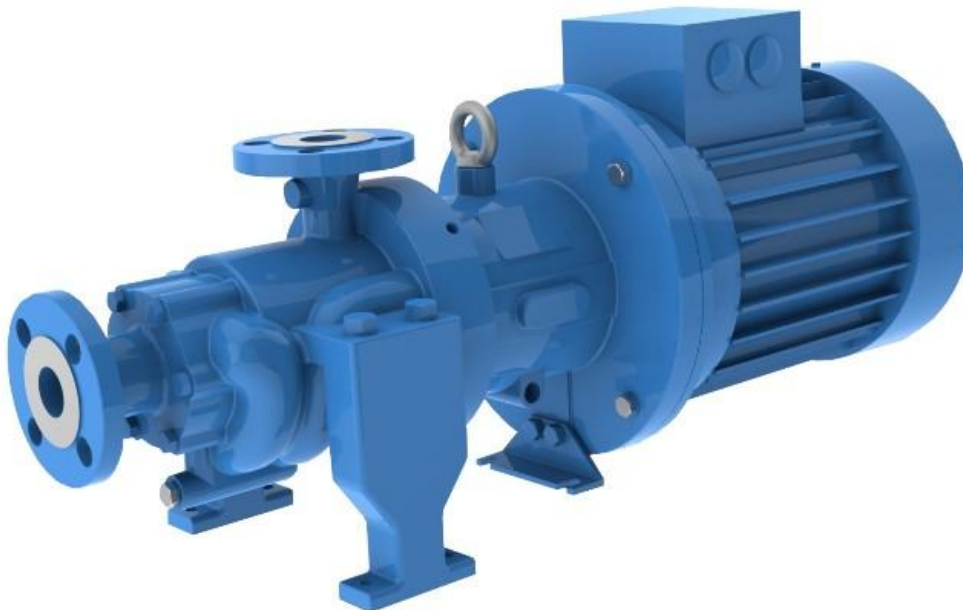
# **MAGNETIC DRIVE PUMPS**

## **Centrifugal, peripheral, mag-drive**

- **CT MAG-M series**

### *INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS*

*- The present instruction are a translation of the original manual;  
Keep it together to the original Italian manual.*



#### **CAUTION**

These instructions are intended to qualified personnel that will:

- install the pump;
- use the pump;
- carry out maintenance / repair of the pump.

Read carefully this instruction manual before using the pump.



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



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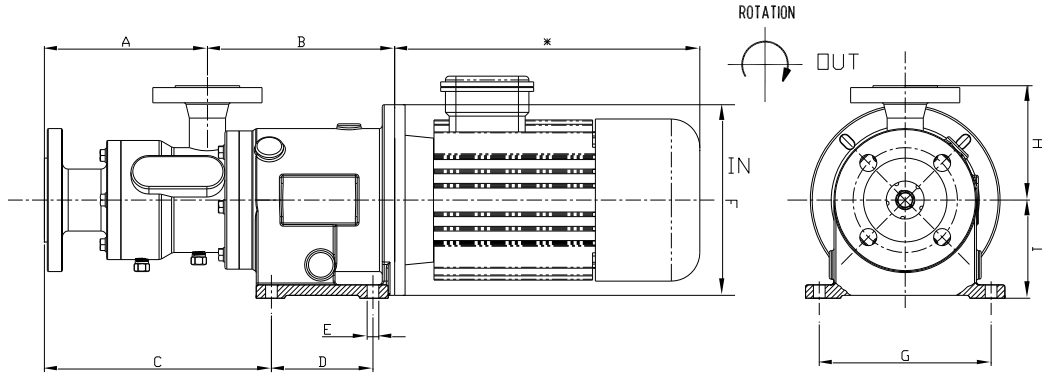
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# OUTLINE DRAWINGS

**INGOMBRI \_ OVERALL DIMENSIONS**  
 SERIE/PUMP SERIES: CT MAG-M

DOC.100001-08 REV.00



Conessioni flangiate DIN PN40 UNI 2284-67 Port connection flanged DIN PN40 UNI 2284-67

Nome Pompa Pump Name	IN/OUT	p	q	r	s
CT MAG-M 3/4	IN	40	110	150	18
CT MAG-M 3/4	OUT	25	85	115	14
CT MAG-M 5/6	IN	40	110	150	13
CT MAG-M 5/6	OUT	40	110	150	18

The detail drawing shows a top view of the flange connection with dimensions p (inner diameter), q (flange diameter), r (outer diameter), and s (flange thickness).

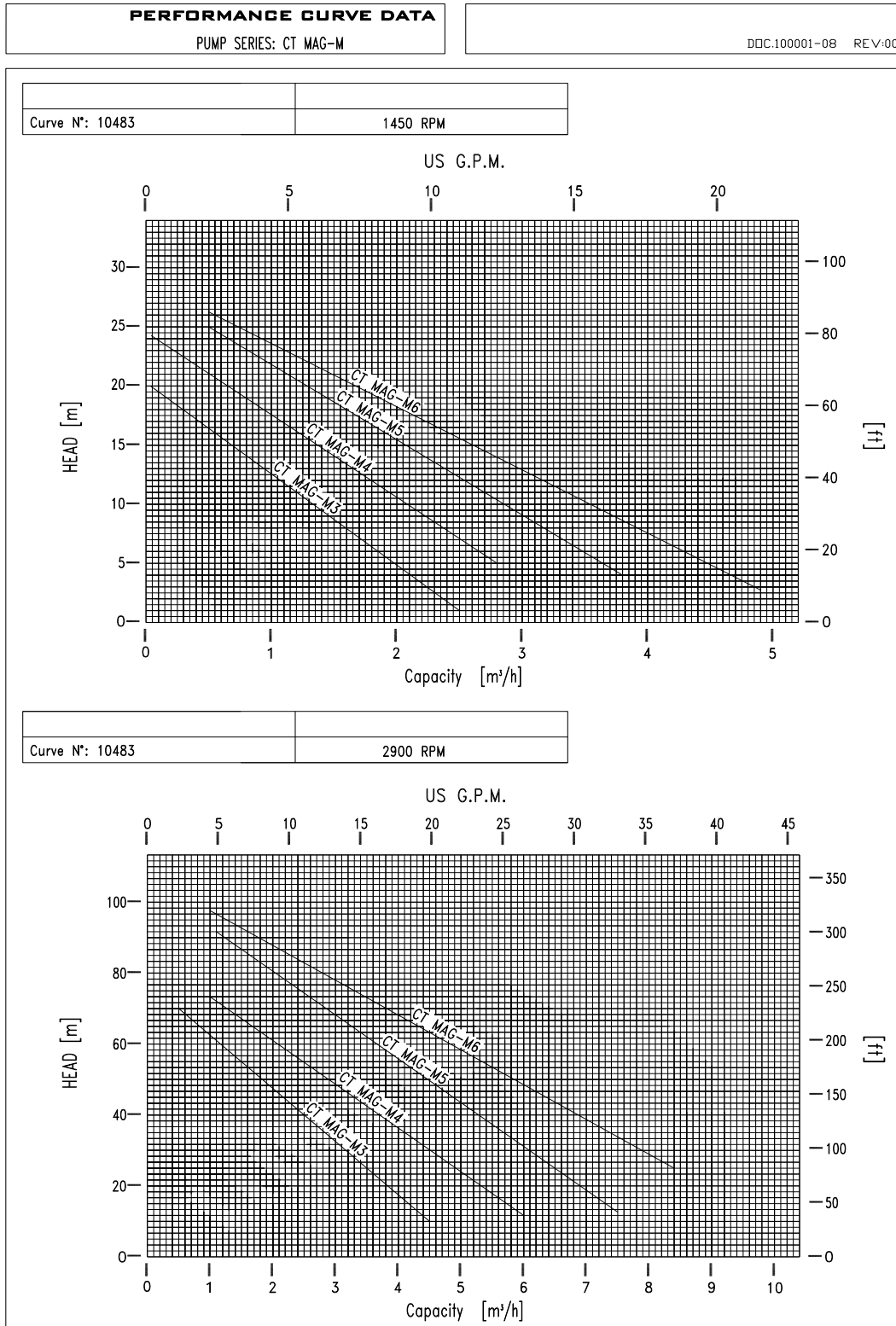
Conessioni flangiate ANSI B.16.5 Class 300 Port connection flanged ANSI B.16.5 Class 300

Nome Pompa Pump Name	IN/OUT	p	q	r	s
CT MAG-M 3/4	IN	40.9	114.3	155.6	22
CT MAG-M 3/4	OUT	26.7	88.9	123.8	19
CT MAG-M 5/6	IN	40.9	114.3	155.6	22
CT MAG-M 5/6	OUT	40.9	114.3	155.6	22

The detail drawing shows a top view of the flange connection with dimensions p (inner diameter), q (flange diameter), r (outer diameter), and s (flange thickness).

Nome Pompa Pump Name	Gr. motore Motor Size	A	B	C	D	E	F	G	H	I		
CT MAG-M 3	90	171.7	197.2	238.1	109	11	200	180	120	103		
CT MAG-M 3	100/112	171.7	207.2	238.1	109	11	250	180	120	129.5		
CT MAG-M 4	90	171.7	197.2	238.1	109	11	200	180	120	103		
CT MAG-M 4	100/112	171.7	207.2	238.1	109	11	250	180	120	129.5		
CT MAG-M 5	100/112	192.7	222	272.7	120	11	250	190	140	135		
CT MAG-M 5	132	192.7	242	277.7	119	11	300	190	140	155		
CT MAG-M 6	100/112	192.7	222	272.7	120	11	250	190	140	135		
CT MAG-M 6	132	192.7	242	277.7	119	11	300	190	140	155		

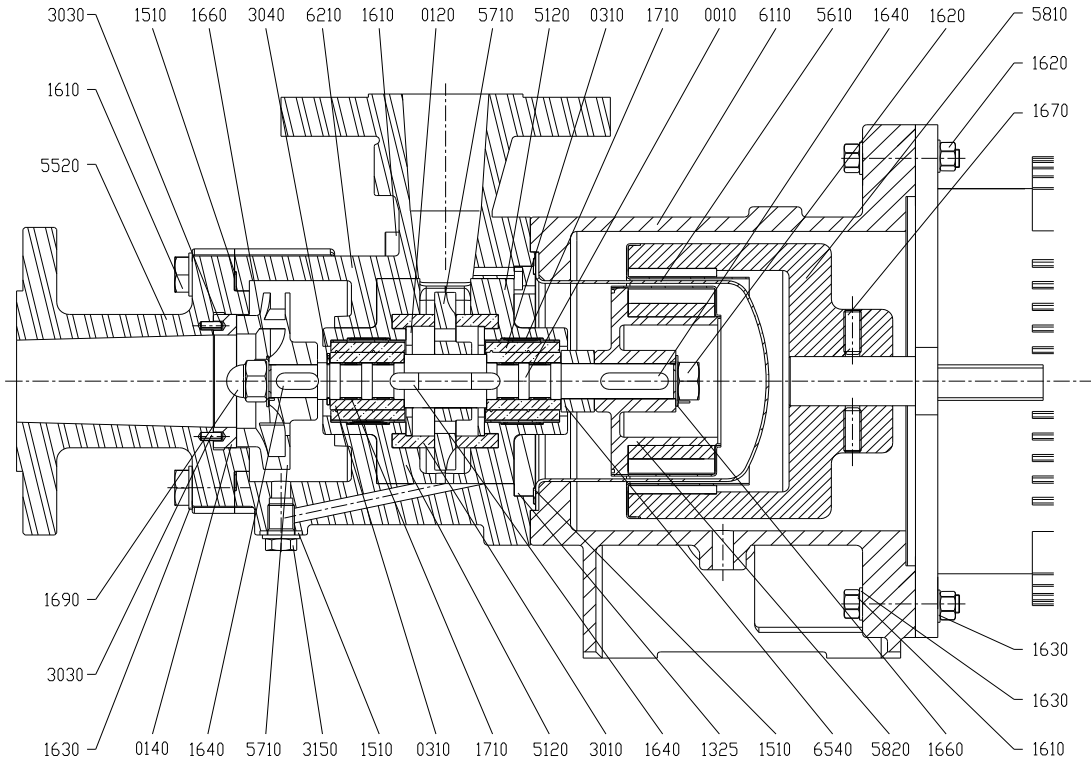
# 1. CURVE



## 2. CROSS SECTION

**SEZIONE E LISTA PARTI / CROSS SECTION AND PART LIST**  
 SERIE/PUMP SERIES: CT MAG-M3÷6

S10013 REV:00



N°	DESCRIZIONE	DESCRIPTION
0010	Albero	Shaft
0120	Anello d'Arresto Pattini	Lock Washer
0140	Reggispinta	Trust Bearing
0310	Boccola	Bushing
1325	Ghiera Bloccaggio Anello Voluta	Volute Ring Locknuts
1510	Guarnizione	Gasket
1610	Vite/Prigioniero	Screw
1620	Dado	Nut
1630	Rondella	Washer
1640	Linguetta	Key
1660	Rosetta di Sicurezza	Lock Washer
1670	Grano	Exagon Socket Set Srew
1690	Dgiva	Impeller Nut
1710	Tollerance Ring	Tollerance Ring
3010	Pattino Usura	Volute Ring Wear Ring
3030	Spina Elastica	Spring Pin
3040	Sege	Sege
3150	Tappo	Plug
5120	Anello Voluta	Volute Ring
5520	Coperchio	Pump Casing Cover
5610	Corpo Posteriore	Rear Casing
5710	Girante	Impeller
5810	Magnete Esterno	External Magnet
5820	Magnete Interno	Internal Magnet
6110	Supporto Motore	Bracket
6210	Corpo Pompa	Pump Casing
6540	Distanziale Magnete Interno	Spacer Ring

## 2. SAFETY

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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

CT MAG-M series 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.

## 4. INSPECTION

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

Upon receipt of CT 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.

## 5. STORAGE

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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.

## 6. INSTALLATION

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1. The foundation should be substantial in order to reduce vibrations, and rigid enough to prevent flexing which can result in misalignment. Foundation bolts of the correct size should be located by reference to certified drawings if the baseplate is supplied with the pump.
2. The pump must be mounted horizontally on a level foundation, with the discharge port vertically upwards.

3. Close-coupled motor-pump units without baseplates level the pump base accurately, using shims under the pump feet. The pump must sit firmly and evenly on its foundation. It must not be distorted by bolting to an uneven surface.
4. Bare frame motor-pump unit on baseplate, level the baseplate accurately, using shims under the baseplate next to the foundation bolts. The baseplate must sit firmly and evenly on its foundation: it must not be distorted by bolting to an uneven surface, which will throw the pump and motor out of alignment.

## 7. OPERATION SAFETY BASICS

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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.

## 8. PUMP IDENTIFICATION

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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.

The serial number is built in this way:

Pump Nr / production year / ord\_conf.

EX.: 001 / 09 / 125



Standard nameplate

## 9. SUCTION AND DISCHARGE PIPING

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- 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.

## 10. ELECTRICAL



**DANGER**



**WARNING**

▲ 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 pro-



**CAUTION**

**tection 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.

## 11. PUMP SPEED

CT MAG-M pumps are designed to rotate at speed up to 4000 RPM.

Standard speeds are:

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

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

## 12. STARTING

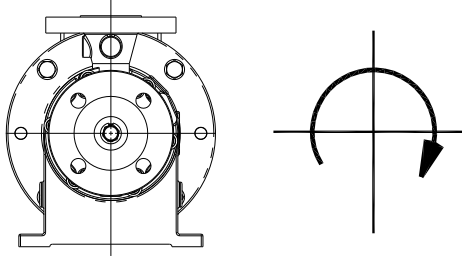
Fully open the suction valve. Pump requires a flooded suction.

▲ 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.



▲ **CT MAG-M pump sense of rotation is not reversible. Check driver for proper rotation. Correct rotation is counter clockwise when viewed from the pump casing.**

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



**⚠ CAUTION**

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

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

**13. 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 of 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.

## 14. MAINTENANCE AND DIS-ASSEMBLY

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

*M PUMPS* CT MAG-M series contains a 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

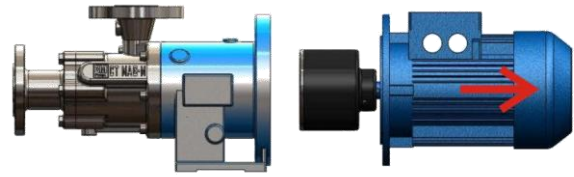


## MAGNETIC

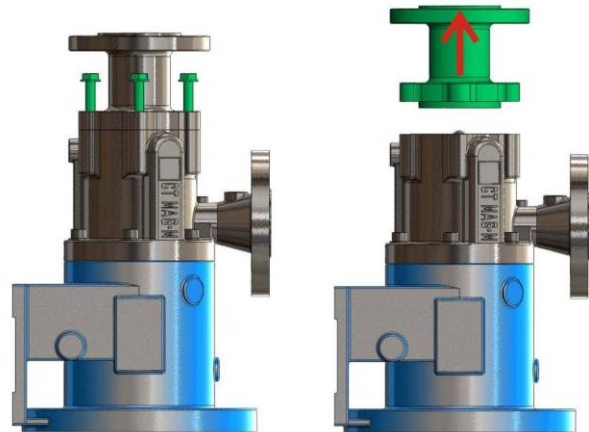
▲ *M PUMPS* units contain extremely strong magnets. The use of non magnetic tools and work surface is highly recommended.

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

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



- 4) Place the pump with the suction upward, remove hex screws connecting the cover from the pump casing. Then pull out the cover assembly.



- 5) Remove the cover gasket and replace it every disassembling.



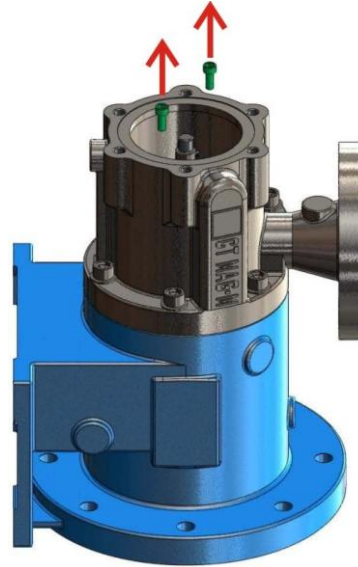


# CAUTION

6) Unlock impeller nut and lock washer

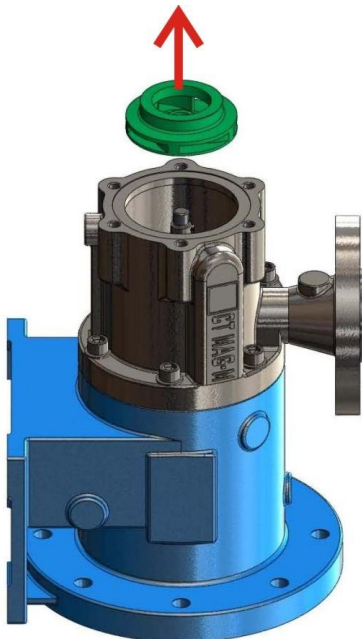


8) Unscrew the two screws that locks volute ring, in the back of centrifugal stage

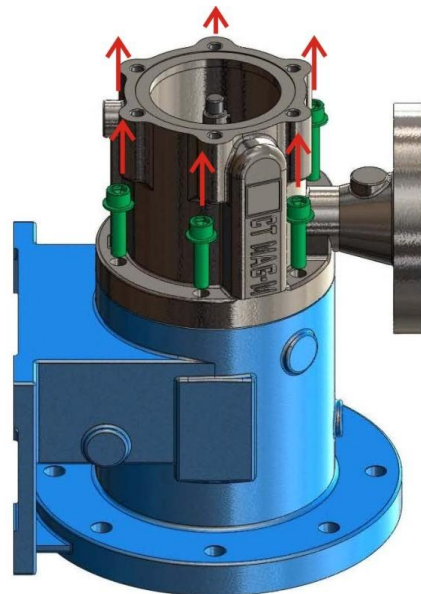


# CAUTION

7) Remove the impeller

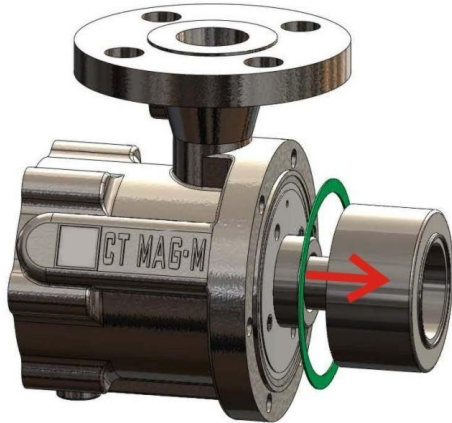


9) Remove pump casing screws

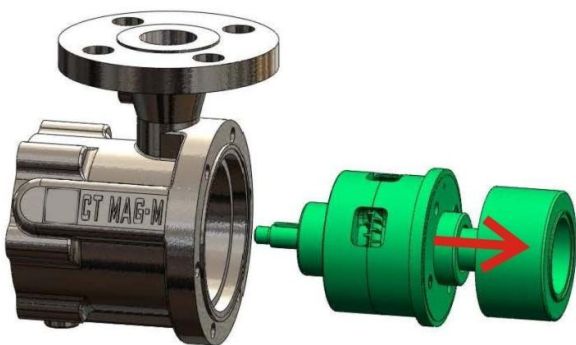


▲ **Reminder: Keep all metal tools away from magnetic field of the inner magnet.**

10) Remove rear casing gasket, remember that gaskets should be replaced every time you disassemble the pump.



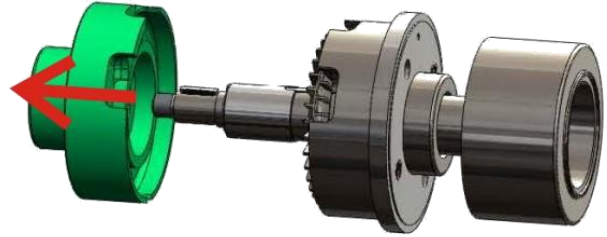
11) Extract internal assembly, bringing with the hand the internal magnet and pulling.



12) Extract front volute ring



**MAGNETIC**

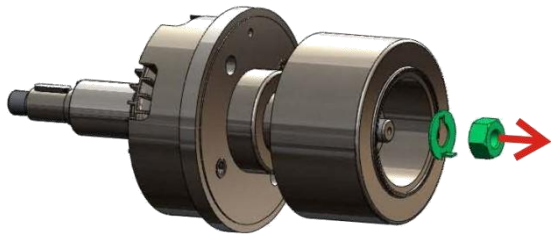


13) To disassemble the volute ring:

- a) Remove lock washer screw
- b) Pull out lock washer and wear ring, replace it in case of worn or damage
- c) To extract the bushing, push from the back, check status and replace it if necessary
- d) Every time you disassemble the bushing, replace tolerance rings and bushing elastic rings



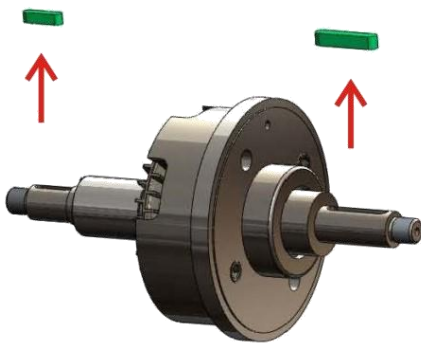
14) Flatten the magnet lock washer and remove the internal magnet bolts



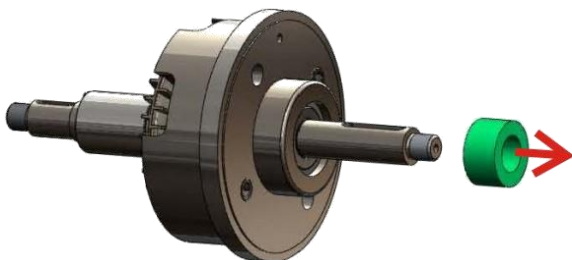
15) Pull out internal magnet



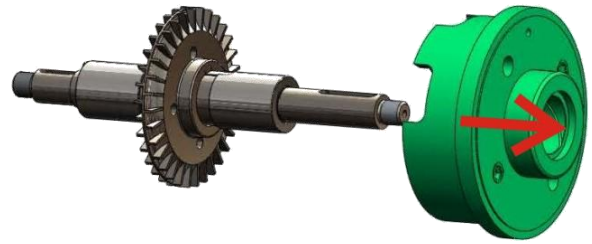
16) Pull out the keys from the shaft



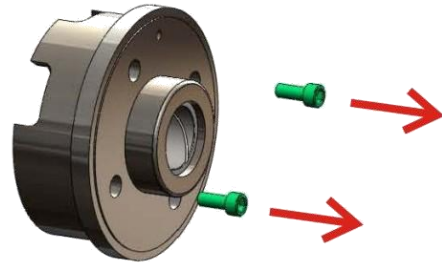
17) Extract shaft spacer



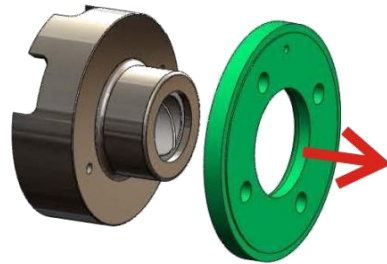
18) Pull out rear volute ring assembly



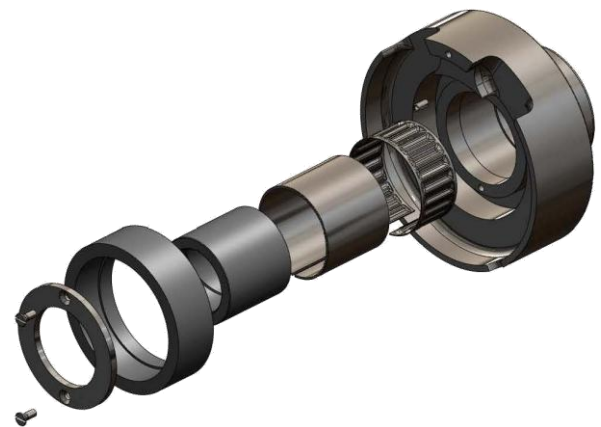
19) Remove rear volute ring backplate screws



20) Remove rear volute ring backplate



21) Follow the instruction shown at point 13



22) In case of wearing or damage of sleeve bushings remove shaft seger



23) Pull out shaft sleeve bearings and replace it in case of worn or damage. Replace the tolerance rings every time you replace sleeve bushing



24) Remove the impeller and replace it, in case of wearing or damage



25) To remove the external magnet,

26) unlock the hub screw



27) Pull out the magnet from motor shaft using an extractor



**CAUTION**

▲ Replace all damaged or worn parts.

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

B) To re-assembly the pump following the above instruction on the contrary.





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