



**YOUR  
SOLUTIONS**

C O R R O S I V E   A P P L I C A T I O N S

# User manual

## Installation

## Operation

## Maintenance



User manual in the original or in different languages should be requested to the manufacturer.

ISO 9001:2015  
Certified company



2006/42/EC  
Machinery Directive



Translation of the  
original instructions

Horizontal centrifugal pumps  
with mechanical seal

# CGO / CMO-N

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## GENERAL INFORMATION

### EXECUTION

The pumps of these series have been developed for the pumping of corrosive liquids and special attention has been dedicated to a rugged construction, an easy access for maintenance and hydraulic efficiency. The design of the volute and at the same time of a bladed channel guarantees a high output with minimum overall dimensions and excellent performances.

Each machine is combined with a series of motors of different power and satisfies the most diversified needs by means of an optimum ratio between capacity and head in function of the specific weight of the pumped liquid assuring a low energy consumption.

The installed motors are in compliance with the UNEL-MEC standards, mount a protection according to IP55 and are built in insulation class F.

### PUMP BODY

The pump body is equipped with a volute and the suction point is located in an axial position whilst the delivery point is in a tangential position and this is corresponding to the normal requirements of this type of plant.

On some machines the connections can be equipped with free flanges (UNI 2223 or a similar product) and on other machines with cylindrical gas threads (see overall dimensions).

In the area under the body has been reserved a space for an eventual draining hole for the complete flowing out of the liquid from the pump.

### IMPELLER

In series is installed an open impeller and on request or if needed can be mounted a closed impeller. The blades on the rear side provide for a reduction of the axial thrust caused by the flux of the liquid during suction.

### ROTOR

On the machines, which make part of the CMO series, the rotor is rigidly connected with the motor shaft while for the machines of the CGO version it is connected with the electric motor by means of an elastic joint and is held up by an aluminium support with two ball bearings.

### REAR BLOCK

The rear block is deep and may also be adapted to the insertion of single or double mechanical seals and edge seals.

### INTERMEDIATE ADAPTOR

The intermediate adaptor has got a very sturdy construction and is entirely composed of a technopolymer. It has been specially designed to keep the electric motor and the aluminium support in a distance from the rest of the pump and to guarantee the integrity of its external structure and above all of its internal parts like bearings, rotor and copper winding, if the machine makes part of the CMO version.

## SEALS

The applied seals can be of different types and different trade marks.  
The choice is made with the order and according to the operating conditions of the machine.

## BASE

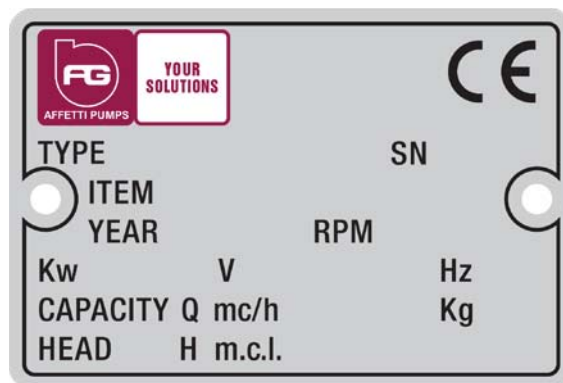
In the CMO monobloc series the base, which supports the motor, is of bent lamination of stainless steel according to AISI 304 and is installed on support legs.

As far as the range of machines is concerned, which make part of the CGO version and are equipped with an elastic joint, the base is entirely constructed of electro-welded steel Fe 37 and is equipped with a butt strap of the same material.

## MARKING

Each machine is equipped with a label on which you find all the data requested by the Machine Decree 2006/42/CE and which facilitate the identification of the machine.

For an eventual spare part request please cite the machine number of the pump.



## GUARANTEE AND CERTIFICATION

Automatically and without a special request of the customer our company emits a guarantee and test certificate.

Moreover we are ready to supply all possible types of certificates according to the requirements of our customers.

## **PRE - INSTALLATION**

### **PACKING**

The structure of the packing and the employed materials are chosen according to shape, dimensions and weight of the machine, which has to be shipped.

We may adopt solutions of the following type:

- cardboard box with filling material for machines of small dimensions;
- cardboard box and wooden pallet with filling material for bigger pumps;
- wooden pallets exclusively for machines, which due to their structure do not need any external covering;
- wooden box for long and very heavy pumps.

### **TRANSPORT**

A good transport is very important for the fine functioning of the machine and for this reason this operation merits our full attention.

The charge and the discharge of the delivered items have to be performed in dependence on the shape, the weight and the type of packing.

The lifting should be done without soliciting the fragile parts (body and connections) of the pump. The packed machine should be set down gently and without a blow and has to be fixed and supported so that during transport it does not leave its original position and is not exposed to strong vibrations.

The discharge in the customer's store has to be performed with the same precautions as the charge.

### **INSPECTION**

At the arrival of the machine has to be carried out an accurate inspection to make sure that during transport did not occur any damage. If this should be the case, please contact the responsible agent.

Sometimes -for safety reasons- components and accessories are separately packed inside the main packing.

After the removal of the pump please accurately check the contents of the packing.

Our company is free from any obligation to reply on a request of compensation for damages advanced by the customer or third persons.

### **STORING**

Normally the pump is delivered with the objective of a short-term installation.

If a long storing period is foreseen, please make sure that the storing site is dry and clean in order to avoid damages before installation.

In the cited case we advise that before its installation on the plant the pump should be carefully cleaned by eliminating eventual foreign bodies, which could compromise the correct functioning. At last have to be removed the protection taps from the delivery and suction orifices.

## INSTALLATION

### POSITIONING OF THE MACHINE

The pump has to be mounted in the best possible position to assure:

- An easy installation of the suction and delivery tubes. The machine should be positioned in immediate neighbourhood of the suction column or tank. Elbows and contractions should be excluded as far as possible.
- An easy access for inspection during normal duty or for maintenance operations.



#### Recommended Safety Measures

**Above all you have to keep a sufficient safety distance between the machine and an eventual passage for persons. Do not store in spaces together with inflammable or explosive materials. To assure the safety of the operator or any other interested person the positioning of the pump should be performed by taking into consideration eventual ruptures of the body or overflows of highly corrosive liquid during operation under pressure.**

**Before the installation of the machine you should make sure that the interruptor is in the "zero" position (OFF) and disconnect the appliance from the supply to avoid the accidental actuation of the moving parts.**

**These operations should be performed only by specialized and trained staff.**

### SUPPORT BASE AND FOUNDATIONS

These parts have to be realized with suitable materials and guarantee the stability of the support and its surrounding area.

Foundations in reinforced concrete layer on solid ground are highly recommendable. The base has to be placed in a horizontal position. It should be checked by a water level and is fixed by anchoring holes applied on the base itself or on the feet of the motor with screws of stainless steel according to AIS1316.

In case of misalignment between the pump and the tubes we recommend the use of metal shims (AISI 316) to equal the differences, which occurred during the connection.

### CONNECTION WITH THE TUBES

The suction and the delivery tubes, which are connected with the mouthpieces of the machine, should not produce any excessive charges or disproportions.

Elevated forces and excessive movements transmitted to the tubes may cause damages on the pump. For this reason we recommend to use brackets and rigid fixations for the delivery and suction collectors. This operation is essential and indispensable, if you want to obtain a correct operation of the machine.

Another special requirement, which should be strictly observed, is the parallelism between the flanges of the tubes and of the electric pump. A faulty positioning of these tubes could cause forced unnatural alignments of the various connected collectors and subsequently this could cause leaks on the gaskets or even cracks on some tracts of the tube.

The suction tube has to be controlled and flushed before the connection to guarantee that there are no solid or foreign bodies inside, which could damage the delicate parts of the machine.

## CONNECTION UNDER HEAD (Fig. 1 )

The installation of the centrifugal pump under head is the most frequent and suitable one. It follows a very simple rule: the water mark of the liquid level always has to be higher than the axe of the suction orifice of the machine and this is an essential condition for avoiding serious damages on the sealing organs and on other parts.

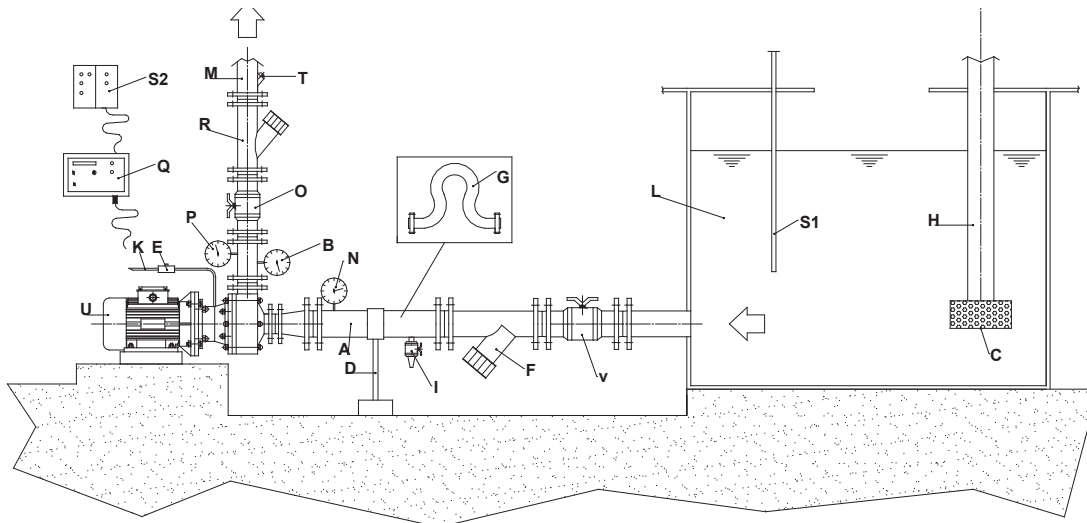
The tract of the suction tube has to be prepared in the way that a tortuous course, constrictions and various obstacles, which may cause difficulties in the free flow of the liquid through the passage of the tube, are avoided.

We recommend to keep the pump in the immediate neighbourhood of the vat or the tank from which the liquid is taken. If this is impossible, you should increase the section of the passage in relation to the diameter of the suction orifice to avoid the formation of air pockets.

On the rear side of the vat you should immediately mount an exclusion valve and successively, if the liquid is dirty, it is recommendable to install a filter (3 to 5 times the tube diameter) on the suction collector to exclude the introduction of foreign bodies into the pump body.

If the tracts results too long or the pumped liquid is too hot, you should introduce a dilatation joint at a distance from the machine, which corresponds to 5 times the diameter of the suction tube. For the complete emptying of the collector and the machine has to be introduced between the joint and the filter a small discharge valve (3/8") during the disassembly of the plant.

On the delivery has to be applied at first a regulation valve at a distance, which corresponds to 5 times the diameter of the tube passage. In immediate sequence has to be mounted a check valve and herewith the installation is completed.



**FIG.1**

- |                      |                         |                            |
|----------------------|-------------------------|----------------------------|
| (A) Suction tube     | (I) Discharge valve     | (Q) Electric control board |
| (B) Manometer        | (J) Filling tap         | (R) Check valve            |
| (C) Filter           | (K) External flow line  | (S1) Level Probe           |
| (D) Bracket          | (L) Supply vat          | (S2) Dry run switch        |
| (E) Electric-valve   | (M) Delivery tube       | (T) Thermometer            |
| (F) Filter           | (N) Manual vacuum gauge | (U) Pump                   |
| (G) Dilatation joint | (O) Delivery valve      | (V) Suction valve          |
| (H) Charge tube      | (P) Pressure gauge      | (W) Foot valve             |

## CONNECTION OVER HEAD (Fig. 2)

This method cannot be considered the most suitable one for the installation of a centrifugal pump, which due to its design is not really fit for a use of this kind.

In fact we feel obliged to illustrate the problems, which could arise from a similar application, which above all refer to the gradual emptying of the suction tube and probably to a light leakage at the foot valve.

This problem may be caused by an insufficient sealing of the gaskets of the valve or by a movement of the tightening piston.

For the above-mentioned motive we do not recommend this type of installation, if the pumped product is encrusting, sticky or so hot that it is almost unsupportable for the construction material of the pump.

On the other hand there should not be any particular problems with unencrusting liquids, which have room temperature.

The connection of the suction tube always requires an extremely short tract and a maximum difference of 3 m between the over head connection of the pump and the free water mark.

If the liquid contains impurities, on the end of the suction collector should be applied a foot valve, which guarantees the flow into the column. A wide-radius bend takes the tube from a vertical into a horizontal position and reaches up to the dilatation joint (applied only in case of a long course 'of the tube or of hot liquid).

As for the installation under head also in this case should be mounted a valve (3/8") for the emptying of the suction tube and the pump body.

The installation of the delivery has to performed according to the same principles as described in the "CONNECTION UNDER HEAD" (see the relative paragraph).

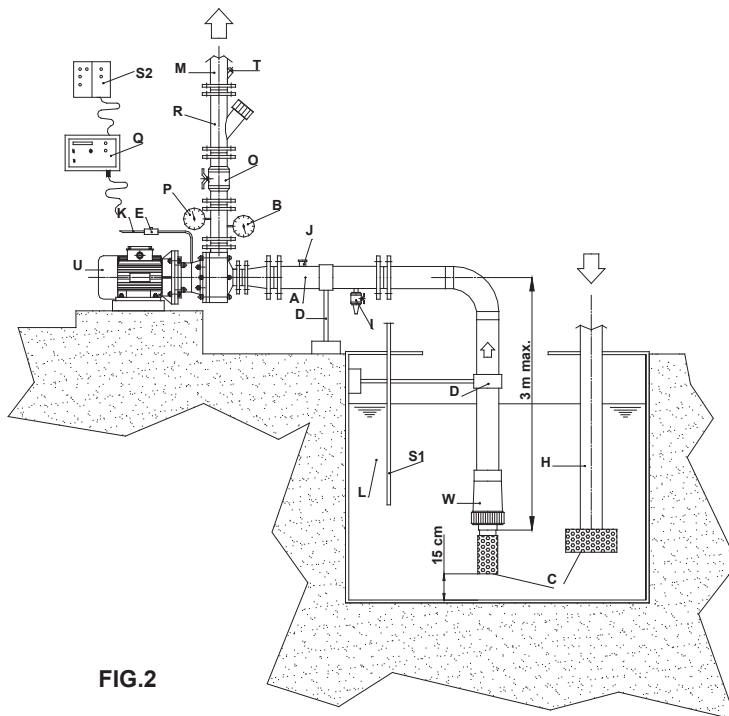


FIG.2



## MOVABLE CONNECTION ON CARRIAGE

As far as the safety of the operator reliability, performances and life are concerned the use of the centrifugal pump mounted on a carriage certainly is the less suitable operating solution.

The customer should be familiar with the limits of operation, which should be carefully observed during this kind of use.

Please use machines, which do not exceed the following operational values:

- maximum capacity 35 mc/h
- maximum head 2.5 Bar

The tract of the suction tube has to be adequately designed so that a tortuous course, constrictions and various obstacles, which may cause difficulties in the free flow of the liquid through the passage of the tube, are avoided.

Please use a tube of anti-acid material, if possible a reinforced type, and metal clamps to fix this tube firmly to the hose adaptors of the suction and delivery orifices.

On the rear side of the pressing pipe should be mounted an exclusion valve.

If in the pumped liquid might be contained crystals or foreign bodies, you should install a filter (with 3 to 5 times the diameter of the tube) on the supply vat or tank.

If there are different pumped products, check that the materials of the pump are compatible and apply a draining valve (to be requested in the order), which allows the emptying of the suction tube and the successive cleaning with clear water.

## CONNECTION OF THE ELECTRIC MOTOR

We advise to follow with care the schemes, which the producer of the motor illustrates in the terminal box or in the instruction manual.



### Recommended Safety Measures

**It is highly dangerous to start the pump before having completed the installation. The assembly operations have to be performed by specialized workers.**

## ALIGNMENT OF THE GROUP

Normally the alignment of the pumping group and the motor is performed in our workshop.

After the installation will be necessary another control, which can be performed by means of a gauge or a rule with shims, fig. A -B.

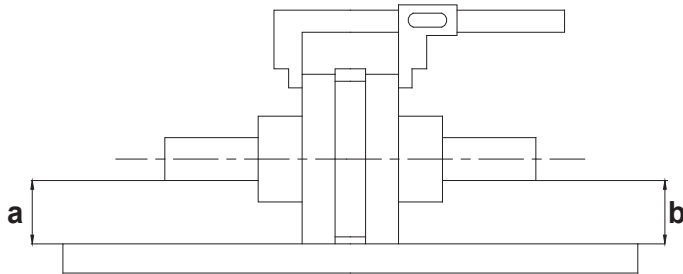
The control with rule and shims is performed in the following way, fig. A:

- Please check with a caliper, a rule or a calibrated gauge that the distance between the two semi-joints is equal at the four points measured on the circumference with a maximum tolerance of 0,5 mm.
- Apply a rule on the two parts out the joint and check if the distance between the parts and the shaft is equal at every point.

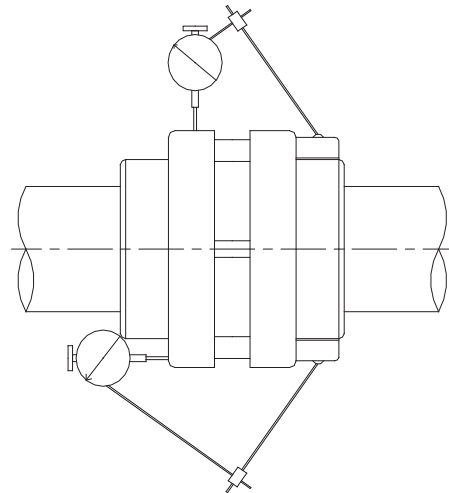
The gauge control is performed according to fig. B.

- Manually make the two semi-joints turn together and keep the instrument stable in the same point (on the rim of the joint).
- Repeat the operation turning the joint by 90°.

If in one or the other case you should note differences in level between the two semi-joints, you have to insert laminated shims to align the unaligned parts of the motor or the support.



**FIG. a**



**FIG. b**

## CONTROL INSTRUMENTS

To guarantee a correct functioning the machine should be equipped with instruments, which control every instant of its operation, i.e.

- A manual vacuum gauge installed on the rectilinear tract of the suction tube in the immediate neighbourhood of the pump allows to check and to calculate the N.P.S.H. value.
- A manometer installed near the exit orifice for the measurement of the operating pressure.
- A wattmeter or an ammeter for the examination of the input power and the comparison of the values indicated on the motor label with the effectively absorbed energy.
- A thermometer for measuring the temperature of the liquid. This parameter is very important and has to be kept under control to avoid the exposure of the machine to excessive temperatures, which could damage the materials of the pump (see paragraph "TEMPERATURES",).
- A pressure gauge or an automatic safety device, which blocks the pump in case of functioning without liquid or a minimum level probe, which is applied to the supply vat or tank.

In any case you should carefully follow the instructions for installation put at your disposal by the producer of the appliance.

## OPERATION

### START OF THE PUMP

Before starting the pump you should take the following steps:

- a) Please make sure that the delivery and the suction tubes are correctly connected and that all the bolts are well tightened.
- b) The sluice valve of the suction section has to be completely opened for the filling of the pump and the tube. Please eliminate eventual air or gas pockets and then close the discharge valve.  
If the machine is functioning under head, you should flood the suction tube and the pump and make sure that the foot valve is correctly functioning and that above all the sealing of the gaskets is perfect.
- c) Close the exclusion valve on the delivery tube; in case of external flushing system, open the valve in order to guarantee the liquid's arrival at the seal before the start of the pump (flow 5 lt/min, pressure 1 bar more than working value).
- d) After having completed the phases (a), (b) and (c) please make sure that the sense of rotation of the motor is correct (see arrow on the cap) by actuating the switch with a rapid sequence of start and stop.  
Please do not insist on making the pump turn in the inverse sense, since this operation could cause serious damages on the machine.  
To change the sense of rotation you only have to invert two of the three terminal wires of the motor.
- e) Start the motor and slowly open the exclusion valve on the delivery until you reach the required capacity for operating the pump (Please do not leave the sluice valve of the pressure tube closed for a long time).
- f) Check the input values of the pump by taking into consideration the values marked on the motor label and make sure that these values (input power in kw or intensity in ampere) are not exceeded.

### STOP OF THE PUMP

If the delivery tube is equipped with a check valve, the stop of the machine may take place without any particular precaution.

In the negative case the check valve has to be slowly closed before stopping the motor so that water hammers in the pressure system are avoided and the liquid can flow out through the pump.

Only at this point you may close the eventual auxiliary flowing from an external source, provided that the machine is equipped with such a device.

We recommend short periodical operating controls of the pump.



#### Recommended Safety Measures

**In the start as well as in the stop phase of the pump the operator should be adequately equipped for reasons of health preservation.**

**This means rubber boots, anti-acid overalls, helmet with protective visor for the face and the indispensable equipment for each operator, which excludes the risk of physical damages.**

**It is absolutely forbidden to introduce the fingers or other parts of the body into the orifices and the various openings. The pump is equipped with movable parts.**

**The mentioned operations have to be performed by skilled staff.**



## TEMPERATURES

For the correct operation of the machine should be observed the following temperature values, which are listed on the data sheet. Moreover we indicate the maximum and minimum operating temperatures, which have to be strictly observed for a continuous working cycle of eight hours.

PP                   =    -10° C +75° C  
PVDF               =    -40° C +90° C

The relative material is specified on the data sheet, on the delivery bill and on the invoice.

## CAPACITY RANGE

The choice of the type of pump, impeller and motor takes place at the moment of ordering by taking into consideration the capacity and head data requested by the customer.

The user should carefully observe the operating conditions mentioned on the data sheet and especially the data regarding capacity and head at the installation site to which the machine is destined.

Please do not force the pump to work in the two extreme positions, i. e. too far on the right hand or too far on the left hand of the characteristic line, since serious problems might arise. For this reason we recommend to work with the intermediate point of the curve.

## ACOUSTIC PRESSURE

If the present product is used in an appropriate and a permanent way, the noise exposure, which depends on the relative environment, may reach maximum values of no more than 80 dB (A).

## HINTS ON CORRECT OPERATION

### PREVENTIVE MAINTENANCE

The functionality of the pump depends on the number of working hours, the service conditions, the used construction materials and on the care with which the pump is treated during its operative life. A daily check during operation helps to avoid complications and assures an immediate intervention in case of damages.

- The pump has to function without vibrations or abnormal noise. If similar events should occur, please intervene and check the status of the rotating organs like shaft, impeller, sealing and motor bearings (also of the support for the CGO series) and if necessary replace them.

In the machines of the CGO version the cause of vibrations and abnormal noise might be the lacking alignment of the pumping group and the motor or simply the rupture of the rubber of plastic parts of the elastic joint. In this case please find a remedy by observing the instructions given in the paragraph "ALIGNMENT OF THE GROUP" .

- We recommend to inject once a week a small quantity of grease by means of the lubricators mounted on the support (only for the CGO series).

The lubricant has to be replaced after 2000 hours of operation (Please use special grease for bearings).

- Please control the characteristics of the pumped liquid (temperature, specific weight and chemical composition).

If these characteristics change, the operating conditions and the performances of the machine may change too.

- Please accurately check that changes in the pumped solution are compatible with the characteristics of the machine by taking into account the indications on temperature given in the present manual in the paragraph on "TEMPERATURES", while for the other parameters we advise to contact your local reseller or our company.
- Please make sure that capacity and pressure are according to the projected values and that they have not been subject to changes, which may negatively influence the internal parts of the pump.
- The partial rupture of the impeller blades may be caused by a reduction of the hydraulic performances. In this case you have to replace the faulty part.
- The filter housing has to be checked in periodical intervals and cleaned, if necessary.
- Please make sure that the control instruments are completely efficient and that the machine always gets the right signals.
- Please check the support base and make sure that the gaskets of the machine do not lose a small quantity of liquid. In any case we recommend to intervene before any symptom of this kind occurs and to replace the O-rings or the sealing organ, which may be the cause of a similar problem.

The replacement of the damaged parts has to take place in a dry and clean environment.

### LUBRICATION

CGO pumps are delivered with the bearings filled with grease.

It is recommended to inject a small quantity of grease by means of the greaser every week.

Grease should be changed after 3000 hours of operation. The suggested types of grease is SHELL ALVANIA 3 or ESSO BEACON 3 or equivalent.

### CRYSTALLIZATION OF THE PUMPED LIQUID

The crystallization of liquids is a problem, which should not be underestimated. For this reason we invite the user to ask the producer for information on the pumped product and for information on the minimum value at which the liquid starts the crystallization process.

## CHANGE OF THE PUMPED LIQUID

If you want to change pumped liquid, you have to take the following measures:

- Close the delivery and the suction taps.
- The tube and the machine have to be completely emptied by opening the discharge valve on the suction duct or in case of a mobile installation under the body of the pump.
- Clean the pump internally with water or a suitable liquid by avoiding eventual chemical reactions, which might cause irreparable damages to the machine and the operator.
- Do not discharge the solution obtained from the cleaning of the internal parts of the pump into the environment.



### Recommended Safety Measures

**To operate in conditions of extreme safety during the control of the running machine the operator should be adequately equipped.**

**Rubber boots, anti-acid overalls and helmet with protective visor for the face are the indispensable equipment for the persons who have to operate without running the risk of physical damages.**

**The described operations have to be carried out by skilled staff.**

## EVENTUAL DRY FUNCTIONING OF THE PUMP

The principal rule, which you should observe at any instant, says that for a machine of this type you must avoid in every possible way that it functions without liquid in order to exclude damages on the sealing.

There are many situations, in which this drawback might occur and some of them are listed below. Very frequently this occurs during the charge and discharge operations of the tank trucks. In this case you should equip the machine with suitable instruments, which block operation in case of a lacking flow of pumped liquid (see paragraph entitled "CONTROL INSTRUMENTS' ). Other causes are:

- The malfunction of the control instruments due to the encrusting and corrosive action of the pumped liquids, which attacks the most exposed organs;
- A poor or inefficient maintenance of the filter or the foot valve;
- The missed opening of the suction valve;
- The total or partial absence of liquid in the vat or the tank;
- The formation of air pockets and cavitation due to a wrong dimensioning and an inadequate structure of the suction collector.

## IMPURITIES CONTAINED IN THE PUMPED LIQUID

Due to their nature and design the pumps of this series have got low endurance levels in case of liquids, which contain solid, abrasive or filamentary particles.

We recommend to avoid, if possible, the pumping of such fluids or to install a filter on the suction tube. In any case you should take into consideration that the maximum allowable concentration of impurities is 3 %. With higher values could be caused serious problems on the sealing organs, the impeller, the body and the internal parts of the machine.

## **TROUBLES AND EVENTUAL CAUSES**

### **THE PUMP DOES NOT EROGATE ANY LIQUID**

- 1) The pump and the suction tube are not completely filled with liquid. There are air pockets, which have to be purged.
- 2) The foot valve is clogged due to solid residues contained in the liquid.
- 3) The non-return valve on the suction tube is blocked and totally closed.
- 4) The foot valve is faulty and causes the partial or total emptying of the suction duct.
- 5) The impeller is blocked by rubbish or incrustations present in the liquid.
- 6) The foot valve is not sufficiently immersed in the liquid.
- 7) The total head required by the plant is superior to the projected head of the pump.

### **THE PUMP DOES NOT GIVE SUFFICIENT PERFORMANCES**

- 8) Air is penetrating into the suction tube through the sealing.
- 9) The passages of the impeller are partially or totally obstructed by foreign bodies.
- 10) The rotation speed of the motor is too low.
- 11) The impeller is worn out or damaged and the distance to the pump body is too big.
- 12) The sense of rotation is wrong.
- 13) The course of the suction duct is not exact.
- 14) The filter on the suction portion is obstructed.
- 15) The suction tube has got an underdimensioned passage section or an excessively tortuous course.
- 16) The liquid level is too low.
- 17) The foot valve is underdimensioned.

### **THE PUMP WORKS UNDER AN INSUFFICIENT PRESSURE**

- 18) The viscosity of the liquid is higher than foreseen. See also points 7-9-10-11-12.

### **THE PUMP IS DISCONNECTED AND STOPS EROGATION**

- 19) The transported liquid contains an excessive quantity of air or gas. See also points 4-8-14-16.
- 20) Temperature rise of the pumped liquid.
- 21) The capacity increased by more than the fixed value.

### **THE PUMP ABSORBS AN EXCESSIVE POWER**

- 22) The specific weight or the viscosity of the pumped solution is higher than the projected values.
- 23) The pump performances are higher than foreseen.
- 24) The rotation speed is too high.
- 25) Defects or mechanical damages on the machine: non-linear shaft, scrubbing of the rotating parts, locked bearings of the motor or the support (only CGO), etc.
- 26) Excessive compression of the elastic element on the mechanical sealing (if mounted).

### **THE PUMP CAUSES VIBRATION AND NOISE**

- 27) Operation at a capacity I which is too low for the application.
- 28) The tubes or the foundations are not sufficiently rigid.
- 29) The bearings of the motor or the support (only on CGO pumps) are worn out or damaged. See also points 9-25.
- 30) The pump is subject to cavitation. Please check the reasons for this abnormal functioning by taking into consideration points 1-9-12-14-15-16.
- 31) Lacking alignment between the pump and the motor.

### **THE SEALING DEVICE IS SUBJECT TO RAPID WEAR**

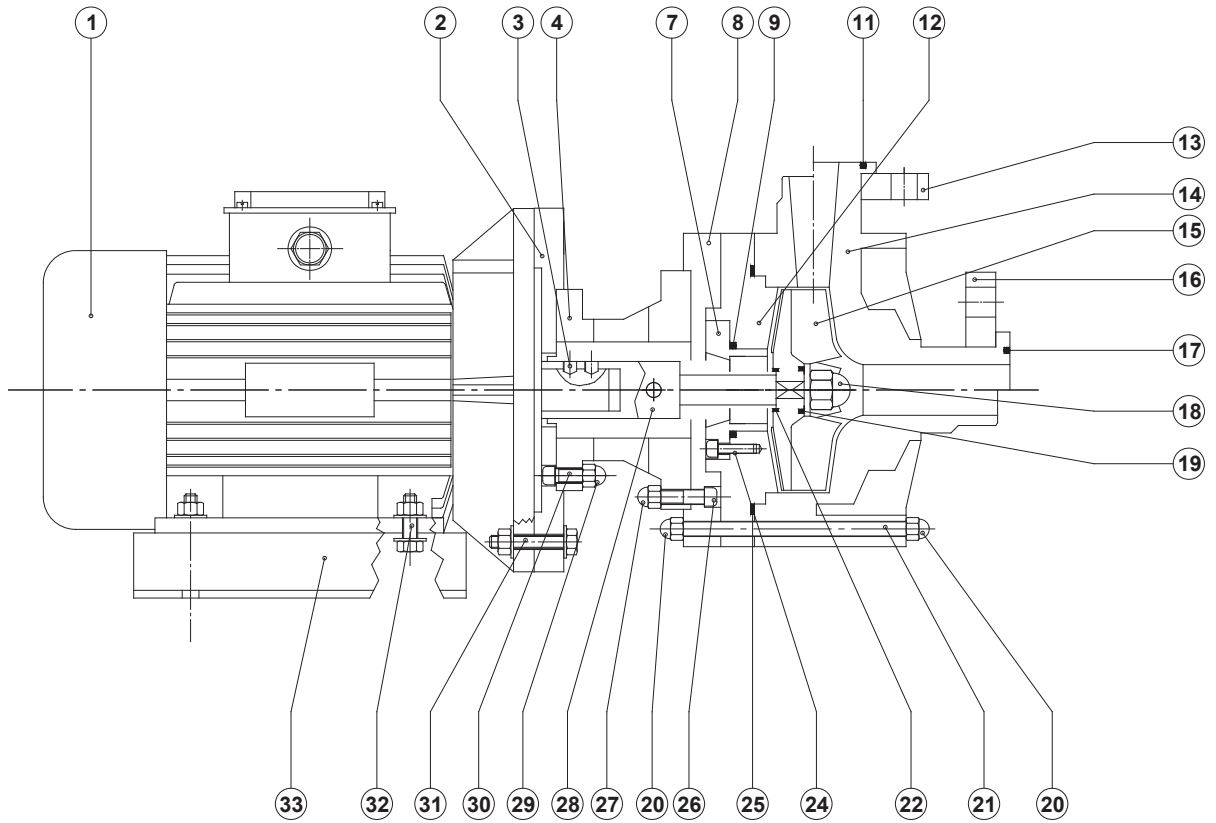
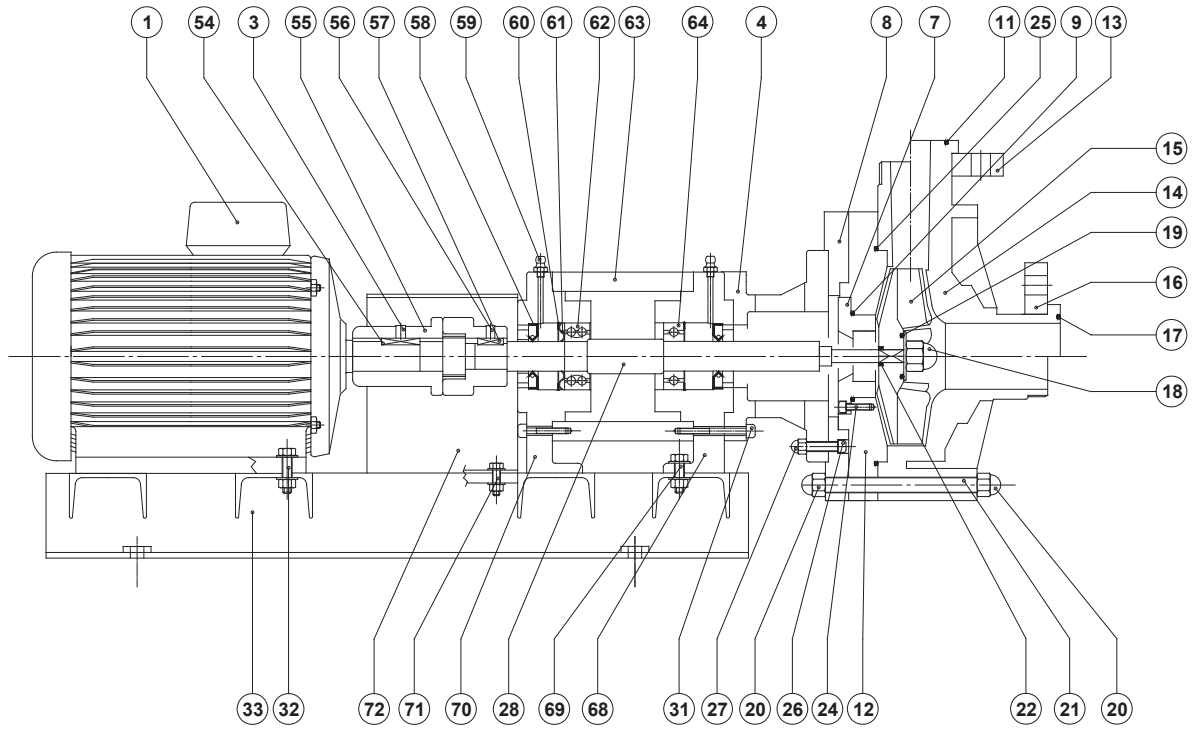
- 32) The flowing liquid or the pumped liquid contains foreign bodies or abrasive substances.
- 33) The gaskets or other employed materials are not suitable for the characteristics of the pumped liquid.
- 34) The pumped liquid causes the formation of air or gas.
- 35) At the machine arrives only a small quantity of liquid or no liquid at all.

### **THE BEARINGS OF THE MOTOR OR OF THE SUPPORT ARE SUBJECT TO RAPID WEAR**

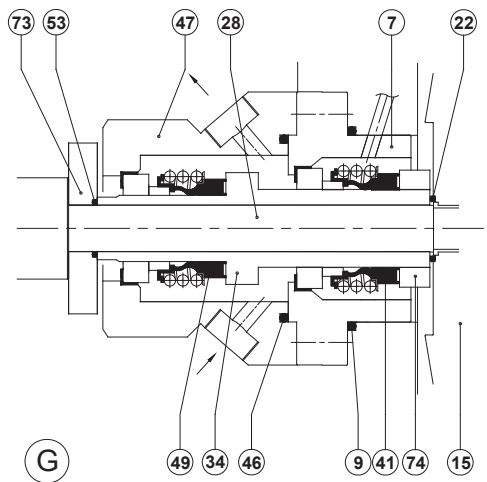
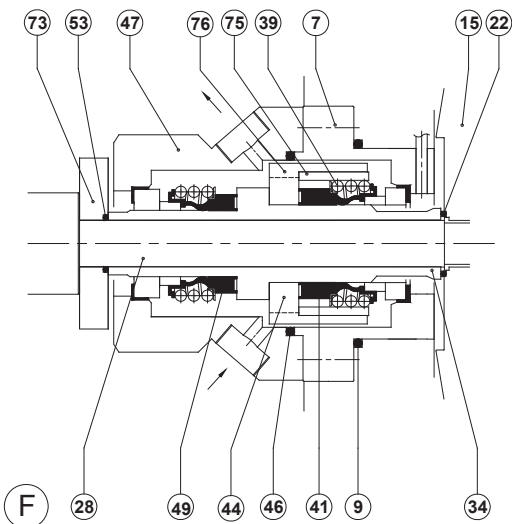
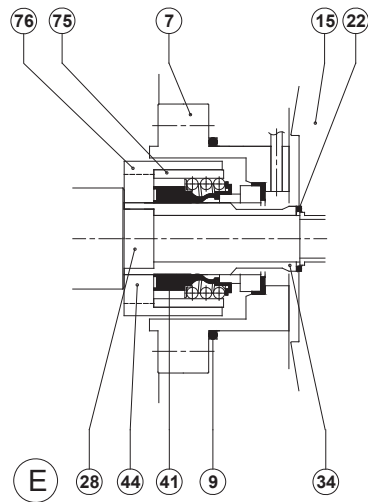
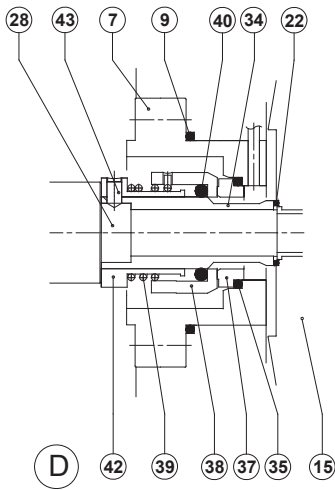
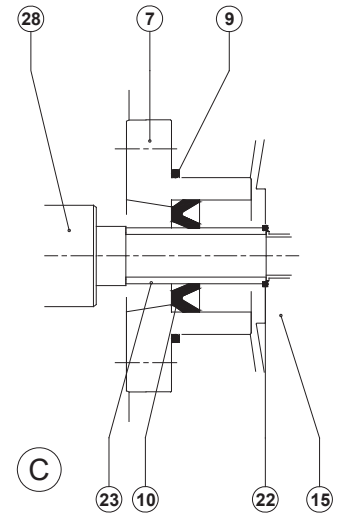
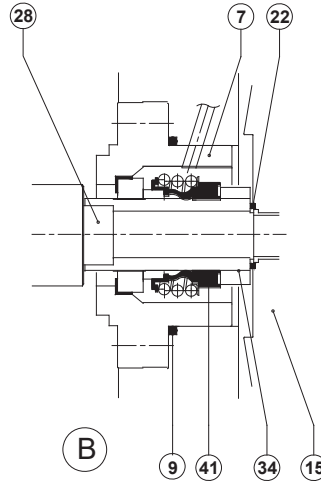
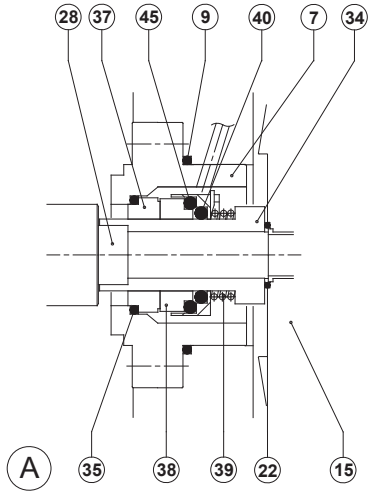
- 36) Lacking lubricant in the support.
- 37) Presence of foreign bodies in the lubricant.
- 38) Presence of water or condensate in the support or in the motor.
- 39) Excessive thrust on the bearings caused mechanical defects. See also point 25.



## CROSS SECTIONS



## MECHANICAL SEAL SECTIONS



## MECHANICAL SEAL TYPES

- |  |  |
|--|--|
| (A) Internal single seal <b>U58</b>                                  | (E) External single seal <b>B6E</b> -External flux seal <b>B6EFL</b> |
| (B) Internal single seal <b>B6I</b> -Internal flux seal <b>B6IFL</b> | (F) Double external flux seal <b>B6EDF</b>                           |
| (C) Edge seal <b>TL</b>  | (G) Double internal flux seal <b>B6IDF</b>                           |
| (D) External single seal <b>U71</b>                                  |  |

## PUMP PART LIST

POS.	DESCRIPTION	POS.	DESCRIPTION
1	Motor	40	O-ring
2	Motor flange	41	Mechanical seal
3	Screw	42	Sleeve
4	Intermediate adaptor	43	Grub screw
7	Sealing flange	44	Spacer
8	Intermediate adaptor	45	O-ring
9	O-ring	46	O-ring
10	Edge seal	47	Double sealing flange
11	O-ring	48	Mechanical seal
12	Back piece of casing	53	O-ring
13	Flange	54	Key
14	Body	55	Elastic coupling
15	Impeller	56	Screw
16	Flange	57	Key
17	O-ring	58	Snap ring
18	Impeller lock nut	59	Greaser
19	O-ring	60	Seeger
20	Covered nut	61	Compensation spring
21	Tie rod	62	Posterior ball bearing
22	O-ring	63	Spacer
23	Rotating bushing	64	Anterior ball bearing
24	Screw	68	Support
25	O-ring	69	Screw
26	Screw	70	Support
27	Covered nut	71	Screw
28	Shaft	72	Covering coupling
29	Covered nut	73	Back-up ring
30	Screw	74	Spacer
31	Screw	75	Internal frame
32	Screw	76	External frame
33	Base		
34	Shaft protection		
35	O-ring		
37	Stationary seal ring		
38	Rotating seal ring		
39	Self-driving spring		

## MAINTENANCE AND REPAIR OPERATIONS

### REMOVAL FROM THE PLANT

Before disconnecting the pump from the plant please take the following steps.

- a) Make sure that the pump is not under power.
- b) Detach the plug from the electric switchboard.
- c) Detach the electric cables from the terminal board and carefully isolate the ends.
- d) Tighten the suction and the delivery valves and gradually open the discharge valve so that the liquid, which remained in the tube and in the pump, can flow out.

After these steps you may begin with the removal of the machine from the plant.

Before disassembly you have to clean the entire body with water or an appropriate liquid. Please try to avoid chemical reactions, which might cause unrepairable damages to the machine and the operator.

Please do not discharge the solution obtained from the cleaning of the pump into the environment.



#### Recommended Safety Measures

To operate in conditions of extreme safety during the removal of the pump from the plant the operator should be adequately equipped.

Rubber boots, anti-acid overalls and helmet with protective visor for the face are the indispensable requisites for the persons who have to operate without running the risk of physical damages.

The described operations have to be carried out by skilled staff.

### DISASSEMBLY OPERATION OF THE PLANT

The disassembly should be carried out with the utmost care to avoid eventual damages on the internal parts of the machine caused by a wrong use of pincers and screw-drivers.

The various components should be kept on a bench in the order of disassembly and be protected against crash and dust.

After having prepared the table on which the pump is assembled and disassembled please proceed as follows:

- 1) Unscrew (clockwise thread) by means of a wrench of 18 or 22 mm (if possible don't use another type of key) the tightening nuts of the body (pos. 20) (see fig. 3).
- 2) Unscrew (clockwise thread) the locking nut of the impeller (pos. 18) with a wrench of 22 mm by introducing into the hole on the shaft (pos. 28) a pin, which impedes the rotation of the impeller (pos. 15) during operation (see fig. 4). Remove the O-ring (pos. 19).
- 3) Remove the impeller (pos. 15) with an extractor (see fig. 5).
- 4) Remove the rear block (pos. 12) from the intermediate adaptor.

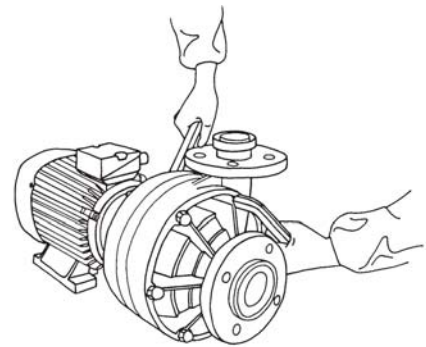


FIG.3

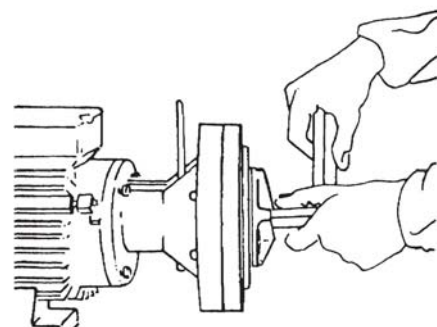
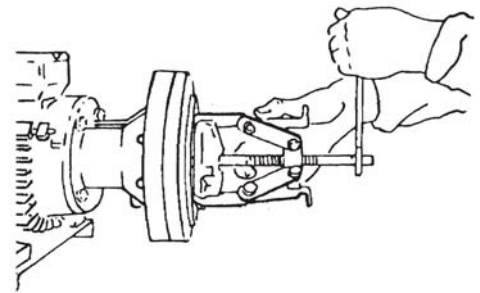
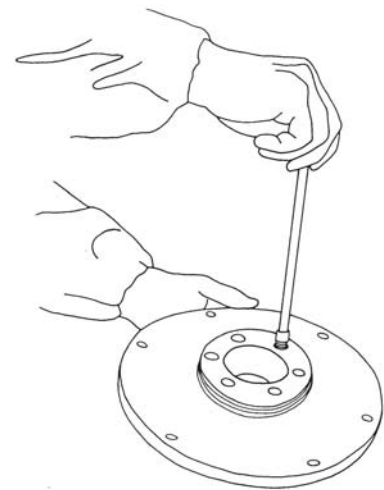


FIG.4

- 5) Unscrew (clockwise thread) the screws (pos. 24) from the sealing flange (pos. 7) (see fig. 6).
- 6) Extract the sealing ring (pos. 10 with an edge seal and pos. 37 with a mechanical seal) from its site. Control and check it (see fig. 7) by avoiding scratches on the housing shoulders.
- 7) With every disassembly of the pump you should check the state of conservation of all the O-rings.  
In addition to the already mentioned O rings you should control the O ring on the body (pos. 25), the O-ring of the sealing flange (pos. 9-46), the packings of the mechanical sealing (if applied) (pos. 35-36-40-45), the O-rings of the impeller (positions 19 and 22), the O-rings of the delivery and suction orifices (positions 11 and 17) and eventually (if mounted) the O-ring on the shaft coating (pos. 6-53).
- 8) Remove the rotating bushing (pos. 23 on the version with edge seal) or the shaft protection (pos. 34 on the version with a mechanical seal). If the mounted seal is an external mechanical seal, type U7, you have to take care to remove the shaft protection before unscrewing (clockwise thread) the screw (pos. 43).
- 9) Remove the intermediate adaptor (pos. 4) by unscrewing (clockwise thread) the motor connection screws (pos. 31) (CMO pumps).
- 10) Before the extraction of the shaft (pos. 28) you have to remove the protection (pos. 5). Afterwards have to be untightened the screws (pos. 3), which fix the shaft of the pump to the shaft of the motor.
- 11) The replacement of the shaft should be performed only in the case that it presents corroded portions caused by the liquid or if portions of the stem are bent. For the removal of the shaft on the machines of the CMO series you should use an extractor or more simply two levers, see fig. 8.
- 12) For the CGO pumps the disassembly operations require more work. After having performed steps 1 -2 -3 -4 -5 -6 -7 -8 -9 -10 remove the intermediate adaptor (pos. 4) from the support (pos. 68) by means of an extended hexagonal wrench, which has to be inserted into the relative holes, fig. 9. As far as the pumps 25-125, 32-125, 40-130, 25-160, 40-160, 50-160 and 65-125 are concerned, before this operation has to be removed the flange (pos. 8) fixed with four steel screws of stainless steel (pos. 26). For this disassembly phase we recommend to use a pipe wrench of 18 or 22 mm (to lock the covered nut (pos.



**FIG.5**

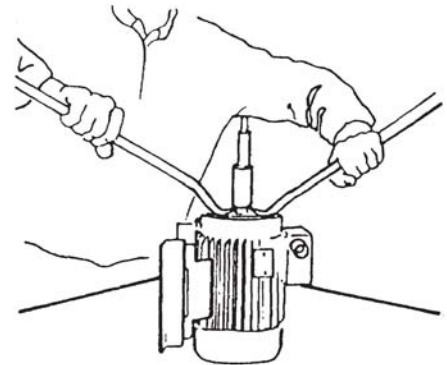


**FIG.6**

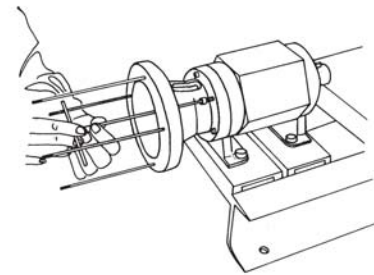


**FIG.7**

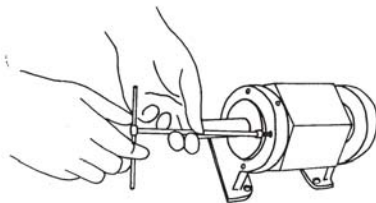
- 27) and to proceed the untightening operation with a hexagonal wrench (clockwise thread).
- 13) Remove the butt strap (pos. 72).
  - 14) Remove the shaft support group (pos. 63 -68 - 70) from the base. This group has to be completely disassembled, if you replace the ball bearings (pos. 62 -64) or the sealing rings (pos. 58) fig. 10 11 12. For a correct execution of all the disassembly phases one of the two halves of the elastic joint (pos. 55) has to be removed from the shaft (pos. 28). At first remove the hexagonal screw (pos. 56), then use an extractor to separate the a.m. pieces and remove the elastic ring mounted on the rotor to lock the rear bearing. If the shaft is provided with a jacket (pos. 5) you first have to remove this piece before performing the indicated steps.
  - 15) To replace the sealing rings you first have to remove the elastic rings (pos. 60) with pincers, fig. 13.
  - 16) Introduce a metallic center-punch into the two holes on the support and knock with a hammer until the rubber sealing ring (pos. 58) is driven out, fig. 14.



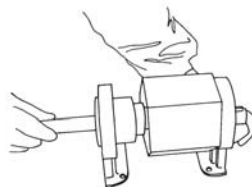
**FIG.8**



**FIG.9**



**FIG.10**



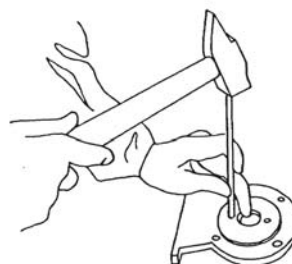
**FIG.11**



**FIG.12**



**FIG.13**



**FIG.14**

## ASSEMBLY PROCEDURE OF THE PUMP

After having disassembled the pump and found out the parts, which have to be replaced, all the properly functioning parts have to be carefully cleaned with water or an appropriate solvent. If you have to replace parts, you must use original spare parts.

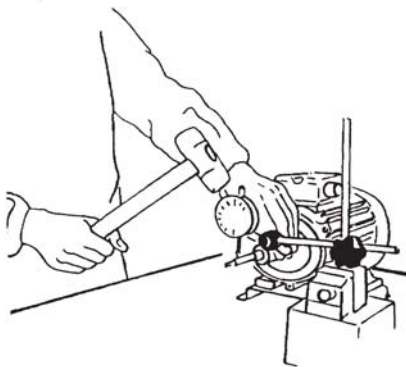
As the phase of disassembly also the assembly phase demands that all the operations have to be carried out with extreme care.

### For pumps of the CMO series:

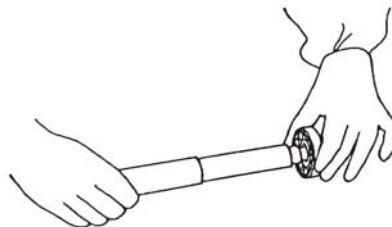
- 17) If the shaft is in a good shape, you should anyway make sure that it is well balanced by proceeding in the following way (see fig. 15):
  - a) Fix the comparator on the end of the piece.
  - b) Make the shaft turn until it reaches the highest point of unbalance.
  - c) If the measured value is bigger than 0.03 mm, knock with a rubber or plastic hammer to obtain a centering, which remains within the a.m. value, see fig. 15.
- 18) If the shaft seems to be in a bad shape and must be replaced, introduce the spare piece onto the hub of the motor after having greased the hub.  
Tighten (clockwise thread) the two hexagonal screws (pos. 3) and carry out the balancing (see point 17).
- 19) Fix the intermediate adaptor (pos. 4) to the motor and tighten the relative screws (pos. 31).
- 20) Introduce the sealing ring (pos. 10 in case of an edge seal and pos. 37 in case of a mechanical seal) into its site in the housing of the flange (pos.7) after having completely eliminated burrs and sharp edges (if present).  
It is extremely important that parts are cleaned before their introduction and then wetted with water to favour the fitting in their sites.
- 21) Insert the sealing flange (pos. 7) into the rear block (pos. 12) and fix it (clockwise thread) with the screws. Do not forget to introduce the O-ring (pos. 9) into its site.  
Tighten with care and make sure to obtain an equal distribution of traction on the bolts, see fig. 6.
- 22) If the seal you mount is an external mechanical one (type 86E-86EFL), put it onto the protection (pos. 34) after having positioned the spacer (pos. 44). Afterwards the whole group is installed on the stem of the shaft (pos. 28). If you mount a seal type U7, please proceed according to above description and lock the seal with the hexagonal screw (pos. 43).  
If you apply the edge seal (type TL) before mounting the rear block (pos. 12) onto the flange of the intermediate adaptor (pos. 8), you have to introduce a rotating bush (pos. 23) on the shaft.  
The procedure is different for the internal mechanical seals (type 861-861FL-U5) where the rear block (pos. 12) has to be applied on the flange of the intermediate adaptor before putting the protection (pos. 34) and the rotating portion of the seal onto the shaft.
- 23) Mount the rear block (pos. 12) according to the indications given under point 22 and do not forget to position below at the right side the discharge hole, which is foreseen only in the version with a mechanical seal.
- 24) Introduce the impeller (pos. 15) on the grip side of the shaft and do not forget the a rings (pos. 19-22). Carefully tighten (clockwise thread) with a pipe wrench of 22 mm the locking nut (pos. 18) by introducing a pin into the hole on the shaft to impede shaft rotation, see fig. 4.
- 25) Mount the gasket of the body (pos. 25) onto the rear block (pas. 12).
- 26) Connect the body (pos. 14) with the rest of the pump and fix it with nuts (pos. 20) by using a pipe wrench of 18 or 22 mm. See fig. 3.
- 27) At last introduce the O-rings (pos. 11-17) into the relative delivery and suction orifices.

**For the pumps of the CGO series:**

- 28) The shaft (pos. 28) has to be replaced only in the case described under point 18. Contrary to the monobloc pumps the transmission device is mounted beginning with the keying of the ball bearings (pos. 62 -64) on the shaft. See fig. 16. Fix the rear ball bearing with the special steel ring.
- After having applied a small quantity of grease on the bearings the rotor is laid down on a clean surface. Please make sure that no foreign bodies stick at the bearings.
- 29) Introduce the rubber sealing rings (pos. 58) into the support sites and position the gaskets with the spring turned towards the outside on the rear ring and turned towards the inside on the front ring. Then introduce the elastic rings into the two supports, fig.13.
- 30) Before introducing the rotor into the rear support put the compensation spring (pos. 61) between the seeger and the bearing. Proceed with the mounting of the support group onto the base, fig. 10-11-12 and at last mount the intermediate adaptor, fig. 9.
- 31) Fix the two halves of the elastic joint, one on the shaft of the pump and one on the motor. Rigidly tighten the two halves of the elastic joint and perform the alignment (see paragraph "ALIGNMENT OF THE GROUP" ).
- 32) As far as the other assembly operations are concerned. please study points 20 to 27.



**FIG.15**



**FIG.16**



**Useful indications**

**The assembly and disassembly operations of the pump can be performed exclusively by persons who have got basic mechanical knowledge and skills.**

**For a better understanding of the characteristic features sufficient notions on the materials, which are used for the construction of the machine, are indispensable.**



## RECOMMENDED SPARE PARTS

To determine the minimum quantity of spare parts, which should be available for eventual replacements, you should take into consideration the operating conditions (more or less heavy) and the number of interchangeable units installed on the plant.

For each pump we normally advise to keep the following pieces on store:

- a) One impeller (pos. 15) with its locking nut (pos. 18).
- b) One rotating bush (pos. 23) with edge gasket (pos. 10) or one mechanical seal, complete with protection (pos. 34).
- c) A complete series of gaskets (pos. 6-9-11-17-19-22-25-35-40-45-46-53).
- d) One shaft (pos. 28).
- e) One sealing flange (pos. 7).
- f) For the CGO series a couple of bearings (pos. 62 64).

In your spare part orders please always cite:

- Machine number of the pump.
- Series and type.
- Number and position of the component on the sectional drawing attached to the present manual.
- Quantity of requested pieces.

## DISPOSAL

The replaced spare parts or the pumps, which reached the end of their operative life, have to be submitted to a careful selection in order to separate the various parts according to the materials.

They should be stored and if possible recycled. If this is impossible, please charge specialized and authorized companies with the disposal.







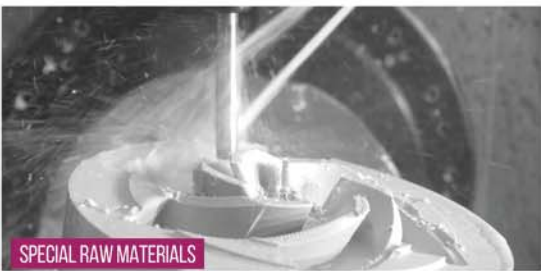
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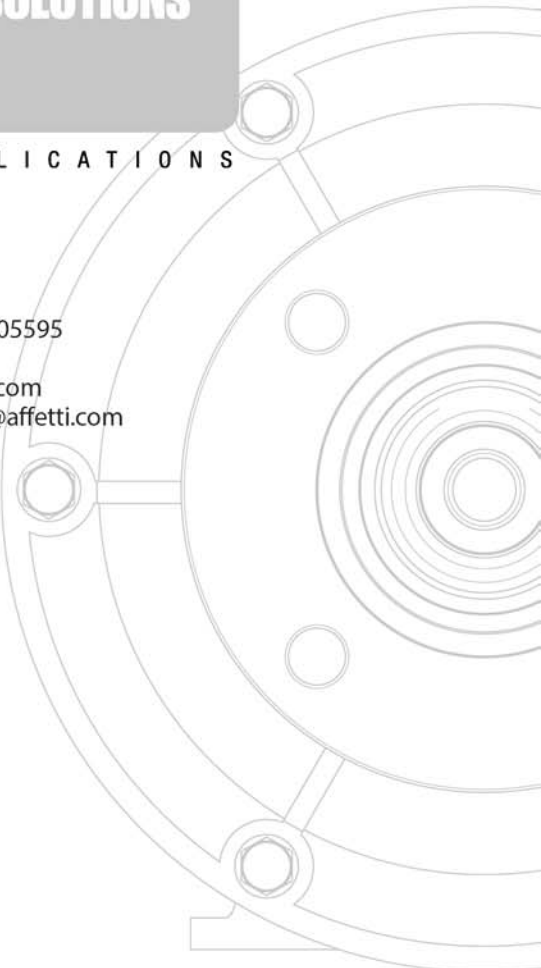


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