AFFETTI PUMPS

YOUR SOLUTIONS

CORROSIVE APPLICATIONS

User manual

Installation
Operation
Maintenance

ISO 9001:2015
Certified company

CE

2006/42/EC
Machinery Directive

EN

Translation of the original instructions

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

Volumetric self-priming pumps

VGA / VMA

INDEX

GENERAL INFORMATION

EXECUTION

The pumps of this series have been developed for the pumping of corrosive liquids and special attention has been dedicated to a sturdy construction, an easy access for maintenance and hydraulic efficiency.
Each machine is combined with a series of motors of different powers and rotation speeds 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 low energy consumptions.
The installed motors are in compliance with the UNEL-MEC standards, mount a protection according to IPSS, are built in insulation class F and in the VMA series they are connected with the pump body through an intermediate adaptor of techno polymeric material. In the VGA version an elastic coupling performs the coupling of the hydraulic part and operates in a way that the shaft is supported by the motor.

PUMP BODY

The pump body is composed of a cylindrical chamber with an eccentric sector interposed as a centre line between the suction and delivery points positioned at 90° one from another.
The series connections have got a cylindrical threading or a hose nozzle (excluded ASS and AQS, which exclusively mount free flanges). On request can be delivered the flange connections (UN 2223 or another type) or the connections with hose nozzle and pipe union.

IMPELLER

It is composed of different elements:
- the rotor
- the two counter-faces
- the eight blades.

The above-mentioned pieces have got the special property that they can be replaced alone and independently of the state of the other parts that compose the impeller. In this way the maintenance costs are reduced.

ROTOR

On the machines of the VMA series the rotor is rigidly connected with the motor shaft, while on the machines of the VGA series the rotor is connected with the electric motor by means of an elastic coupling and is kept in place by an aluminium support, which houses two ball bearings.

FRONT AND REAR BLOCK

The front block fulfils the function of closing the body after the installation of the impeller.
The rear block on the one hand completes the closure of the pumping chamber and on the other hand it houses the seal.
Into the front and in the rear block have been introduced discs of pure PTFE and aluminium rings to assure a low friction coefficient between the parts that come into contact with each other.

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 or the aluminium support in a distance from the rest of the pump to guarantee the integrity of its external structure and above all of its internal parts like bearings, rotor and copper winding, if the machine belongs to the VMA monobloc version.

SEALS

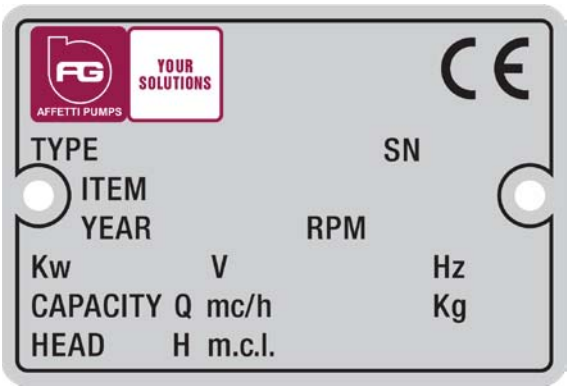
The applied seals are edge seals of elastomer (EPDM-FPM-NBR) and are mounted in pairs. For very special applications and provided that the operating conditions allow it, can be mounted mechanical seals with flux systems, which guarantee the lubrication of the contacted parts.
The choice is made in every case with the order and according to the operating conditions of the pump.

BASE

On the VMA monobloc series the base that holds the motor is of bent lamination (stainless steel AISI 304) and it is put onto support legs.
As far as the range of machines that belong to the version with an elastic coupling is concerned, the base is entirely constructed of Fe 37, electrowelded and 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/EC** and which facilitate the identification of the machine.
For an eventual spare part order 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 need an external covering;
- wooden box for long and very heavy pumps.

TRANSPORT

A good transport is very important for the fine functioning of a 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 every 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 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 the delivery tubes. The machine should be positioned in immediate neighbourhood of the suction column, tank or vat. Please try to avoid in the collectors the 90° elbows (if possible use curves with a large radius or flexible tubes reinforced by metallic spirals), sudden tube interruptions or contractions of any kind. By no means you should install foot valves on the suction side. The pump does not need them.
- An easy access for inspection during normal duty or for the 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 the pump in spaces together with inflammable or explosive materials.
To assure the safety of the operator or of any other 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 machine from the power 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 laid on solid ground are highly recommendable. The base has to be placed in a horizontal position. It should be checked with a water level and fixed in the anchoring holes applied on the base itself or on the feet of the motor by screws of stainless steel AISI 316.
In case of misalignment between the pump and the tubes we recommend the use of metal shims (AISI 316) to equal the differences, which occur 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 excessive charges or disproportions.
High forces and excessive movements transmitted by 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 or the mouthpieces of the tubes and the electric pump. A faulty positioning of these parts could cause forced unnatural alignments of the various connected collectors and subsequently this could cause leakages on the gaskets or even cracks on some tracts of the tube.
The suction tube has to be controlled and flushed before connection to guarantee that there are no solid or foreign bodies inside, which could damage the delicate parts of the machine.

ALIGNMENT OF THE GROUP (Only VGA)

Normally the alignment of the pump group and the motor is performed in our machine shop. After the installation another check-up with a comparator or a checking bar and shims is necessary:
fig. A -B.
For the control with a checking bar and shims please proceed as follows, fig. A:

a) Check with a gauge, a ruler or a calibrated shim, if the distance between the two semi-couplings is equal in the four points measured on the circumference with a maximum tolerance of 0,5 mm.
b) Control by means of a ruler applied on the two parts of the coupling that the distance between these parts and the shaft is equal in every point.

For the control with a comparator please proceed as follows, fig. B:

c) Manually turn the two semi-couplings together while keeping the instrument firm in the same point (on the edge of the coupling).
d) Repeat the operation after having turned the coupling by 90°.

If in the first or the second case you find differences in the level between the two semi-couplings, please apply on the misaligned parts of the motor or the support shims of metal lamination.

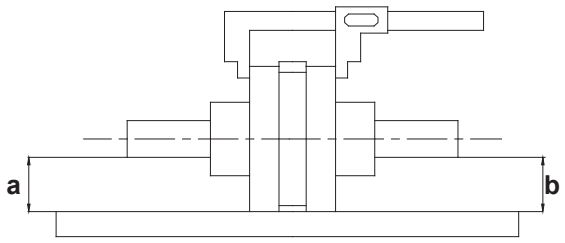


Fig. a

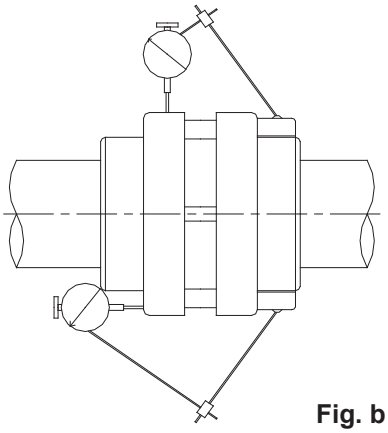


Fig. b

CONNECTION UNDER HEAD (Fig. 1)

The installation under head of the volumetric, self-priming pump is the most frequent and suitable one. This is due to the fact that the design of the machine clearly favours a use of this type.
The tracts of the suction and delivery tubes have to be predisposed in a way that tortuous courses, constrictions and various obstacles, which may cause difficulties in the free flow of the liquid through the section of the tube passage, are avoided.
As already mentioned before **please absolutely avoid the application of 90° elbows** (mounting instead curves with a wide radius or flexible tubes with a metallic spiral core).
We recommend to keep the pump in the immediate neighbourhood of the vat or the tank from which the liquid is taken and you should **not surpass** the maximum priming depth (**4 m**) between the water mark of the liquid and the axis of the machine.
If the pumped liquid is dirty, should be mounted on the rear side of the suction connection a filter (3 to 5 times the tube diameter) to exclude the introduction of foreign bodies into the pump body.
(This solution has to be taken into consideration only, if it is impossible to filter the liquid when it enters into the collection vat).
On the delivery has to be applied first a regulation valve and in an immediate sequence a check valve.

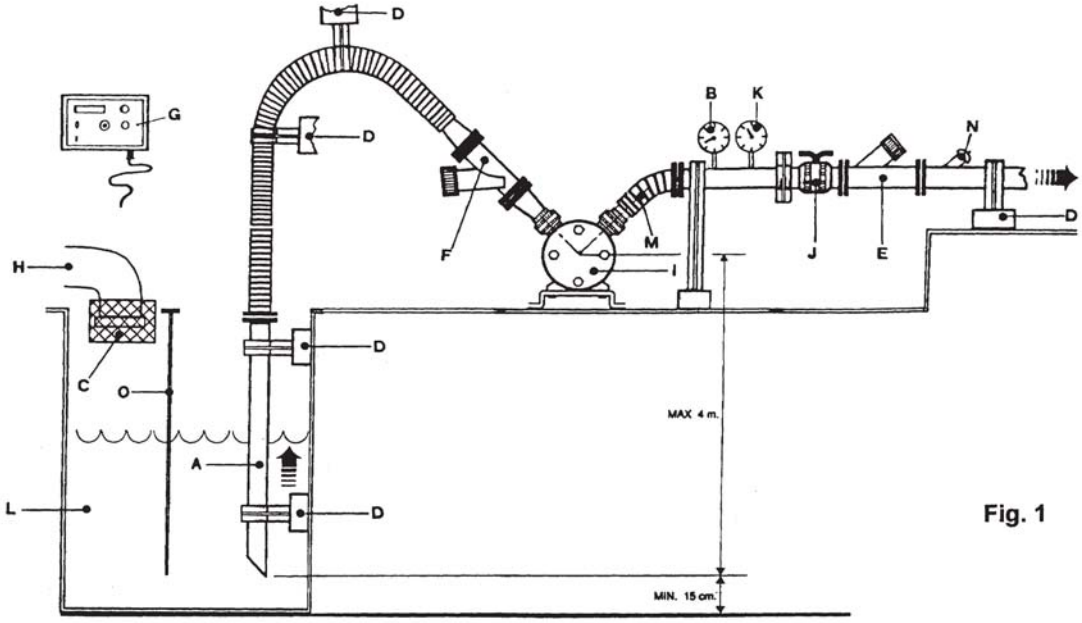


Fig. 1

(A) Suction tube
(B) Manometer
(C) Filter
(D) Bracket
(E) Check valve
(F) Filter
(G) Electric control board
(H) Charge tube
(I) Pump
(J) Delivery valve
(K) Pressure gauge
(L) Collection vat
(M) Delivery tube
(N) Thermometer
(O) Level probe

CONNECTION OVER HEAD

The design properties of this type of installation result very similar to the installation under head. The only difference consists in the application of a check valve on the rear side of the collection vat or tank. This valve has to be tightened when the machine is out of function. The other components are identical.

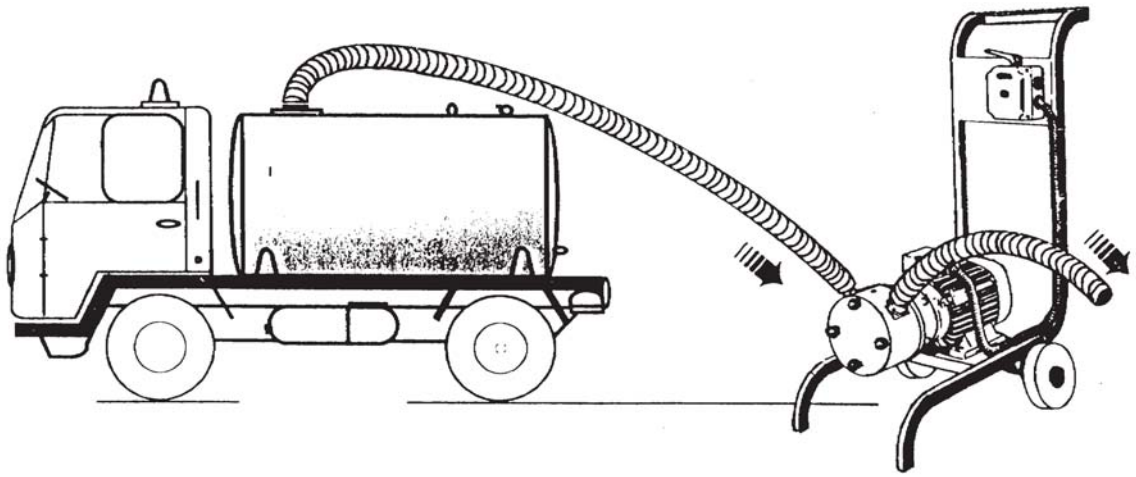


Fig. 2

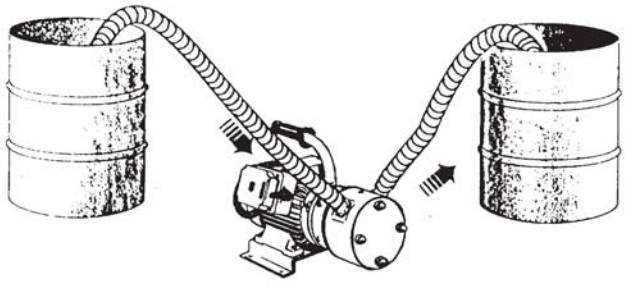


Fig. 3

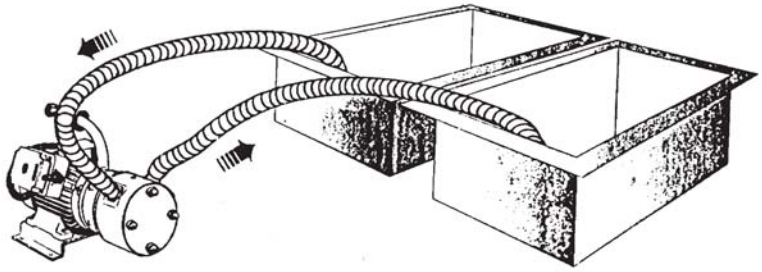


Fig. 4

MOVABLE CONNECTION ON CARRIAGE AND WITH HANDLE (Fig. 2 3 4)

The use of the volumetric pump on a carriage and with a handle certainly is one of the most frequently adopted solutions.
The tract of the suction tube must be as short as possible and adequately designed to avoid a tortuous course, constrictions and various obstacles, which might cause difficulties to the free flow of the liquid through the tube passage. It is very important to cut the ends of the suction collector obliquely to avoid that during operation it touches the walls or the ground of the vat.
Please use a reinforced tube of anti-acid material and use metal clamps to fix it 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 should be contained crystals or foreign bodies, which might damage the machine, we recommend to install a filter (3 to 5 times the tube diameter) on the collection vat or tank.
Please keep in mind that the machine is reversible and that for this reason the flow may change direction according to the rotation sense of the electric motor (This becomes possible by the installation of a reversing gear). If the operator wants to profit from this special feature, he has to remember that the orifices of the body may serve for the delivery as well as for the aspiration. We recommend to apply on both sides a filter (if the liquid is dirty and has not been filtered before the entry into the collection vat) and a sluice valve.

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 extremely dangerous to put the pump into motion before having completed the installation. The assembly operations have to be performed by specialized workers.

CONTROL INSTRUMENTS

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

- 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 damage the materials of which it is composed (see paragraph “TEMPERATURES", page 10).
- A pressure gauge or an automatic safety device, which blocks the pump in case of functioning without liquid or a minimum level probe, which must be applied to the collection tank or vat.
  In any case you should carefully follow the instructions for installation and use 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 suction tubes are correctly connected and that all the bolts are well tightened.
b) The sluice valves of the suction and delivery tubes have to be completely opened.
c) After having completed the phases (a) and (b) please make sure that the sense of rotation of the motor is correct (see arrow on the cap or on the covering coupling) by actuating the switch with a rapid sequence of start and stop.
   To change the sense of rotation you only have to invert two of the three terminal wires of the motor or, if the machine mounts a knob for the reversing gear, put it into the position 1 or 2 (while the a position indicates the standstill of the machine).
d) Start the motor.
e) Make sure that the liquid reaches the pump in the following times **(please do not flood the body or the tube)**. If the times are longer, check if the suction collector is clogged or under no ideal conditions find out why the suction of the product takes place from the machine side:
   for the pumps with a 1450 RPM motor: 6 seconds
   for the pumps with a 900 RPM motor: 9 seconds
   for the pumps with a 700 RPM motor: 12 seconds
   Please strictly respect the a. m. priming times.
   The lacking observation of these rules may cause serious damages on the pump.
f) With the exclusion valve positioned on the delivery side regulate the flow until you reach the requested capacity. (Please do not leave the sluice valve of the pressure tube closed for more than 5 seconds !).
g) 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 particular precautions.
In the negative case the delivery valve has to be slowly closed before stopping the motor in order to avoid water hammers in the pressure system and the liquid flowing out through the pump.
We recommend short periodical operating controls of the pump.

EMPTYING OF THE TUBES AND THE BODY

One of the main features of the present machine consists in the fact that the suction and delivery tubes of the body-pump can be emptied.
To reach a satisfying result we should like to stress that it is extremely important to mount a reversing gear on the motor.
After having stopped the pump please check if the suction valve is completely closed and if the delivery valve is open.

a) If the pump is installed under head, set the machine into motion by actuating the reversing gear or the switch while maintaining the sense of rotation of the motor used for operation (position 1 or 2).
b) If the pump is mounted onto a carriage and the applied tubes do not have any valves, it is sufficient to take the collectors out of the containers in which they are immersed or positioned and put the pump into motion by making it turn first in one sense and then in the other sense.
c) If the installation is over head, open the valve on the delivery side and invert the sense of rotation of the motor by actuating the knob of the reversing gear (position 1 or 2).

Anyway for a complete emptying please slightly knock on the pump in intervals of about 2 seconds.
(Repeat this step for 3 or 5 times in sequence.)
At this stage the emptying of the liquid from the tubes and the pump should be completed.

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 gloves and 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 a correct operation of the machine should be observed the 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, and the delivery bill and on the invoice.

CAPACITY RANGE

The choice of the type of pump, of its impeller and its motor takes place at the moment of ordering on the basis of the customer's requests regarding the capacity and head data.
The user should carefully observe the operating conditions mentioned on the data sheet and especially the data regarding capacity and heat at the operating point for which the machine has been constructed.
Please do not force the pump to work too far on the left hand of the characteristic line, since serious problems might arise.

ACOUSTIC PRESSURE

If the present product is used in an appropriate and permanent way, the noise exposure, which depends on the type of environment, may reach a maximum level 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 materials used for construction and 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, the shaft, the impeller, the sealing and the motor bearings (for the VGA series also the support) and if necessary replace them.
- On the machines of the VGA version the vibrations or the abnormal noise might be caused by the misalignment of the pump group with the motor or simply by cracks on the rubber or plastic parts of the elastic coupling. In this case please observe the instructions given in the paragraph “ALIGNMENT OF THE GROUP" on page 5.
- We recommend to inject by means of the greasers mounted on the support (only for the VGA series) once a week a small quantity of grease. The lubricant should be replaced after every 2000 hours of operation (Please use special grease for bearings 1).
- 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 the changes in the pumped solution are compatible with the characteristics of the machine by taking into account the temperature indications given in the present manual in the paragraph on "TEMPERATURES", page 10, while for the other parameters you should contact your local reseller or our company.
- Please make sure that the capacity and the 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 cause a reduction of the hydraulic performances. In this case please replace the faulty parts.
- 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 receives the right signals.
- Please check the support base and make sure that the gaskets on the machine do not lose any liquid at all.
  In any case we recommend to intervene before a symptom of this kind occurs by replacing the O-rings or the sealing organs, which might be the cause of a similar problem.

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

LUBRICATION

VGA 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 2000 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 on the minimum value at which the liquid starts the crystallization process.

CHANGE OF THE PUMPED LIQUID

To change the pumped liquid please take the following steps:

- Completely empty the tubes and the machine following the instructions in the paragraph "EMPTYING OF THE TUBES AND THE BODY" on page 9.
- Clean the body internally with water or a suitable liquid and avoid eventual chemical reactions, which might cause irreparable damages to the machine and the operator.

Recommended Safety Measures

To operate in conditions of extreme safety during the control of the running machine the operator should be adequately equipped.
Rubber gloves and boots, anti-acid overalls and helmet with a 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 has to be observed at any instant, says that for a machine of this type you must avoid in every possible way that it functions without liquid to exclude damages on the sealing (see paragraph "START OF THE PUMP", page 9).
There are many situations in which this drawback might occur and some of them are listed below:

- Most frequently it occurs during the charge and discharge operations of the tank truck or during the mobile use. In this case you should equip the machine with suitable instruments, which may stop the operation in case of a lacking flow of pumped liquid (see paragraph "CONTROL INSTRUMENTS" on page 8).
- The malfunction of the control instruments due to the encrusting and corrosive action of the pumped liquid, which attacks the most exposed organs.
- A poor or inefficient maintenance of the filter.
- The lacking opening of the suction valve.
- The total or partial absence of liquid in the vat or in the tank.
- The formation of air pockets and cavitation due to a wrong dimensioning and an inadequate structure of the suction collector.
- The contact of the suction tube with the walls or the ground of the collection vat or tank.
- The squashing of the suction tube section due to the depression caused by the machine itself (if the tube is not reinforced by a metallic spiral).

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 with solid, abrasive or filamentary particles.
We recommend, if possible, to avoid the pumping of such liquids or to install a filter on the suction tube. In any case you should take into consideration that the maximum allowable impurity concentration is 3 %. With higher values could be caused serious problems to the sealing organs, the impeller, the body and in general the internal parts of the pump.

TROUBLES AND EVENTUAL CAUSES

THE PUMP DOES NOT DELIVER ANY LIQUID OR DOES NOT PRIME

1) The suction tube is obstructed by rubbish.
2) The impeller is blocked by solid bodies or incrustations contained in the liquid.
3) The end of the suction tube touches the ground or the walls of the vat.
4) The impeller blades are completely broken.
5) The total head required by the plant is higher than the projected head of the pump.
6) The seal is leaking and does not let the pump establish a vacuum in the suction tube.
7) The eccentric sector fixed inside the body is worn out our even broken.
8) The friction between impeller, front and rear block has increased to an intolerable measure.
9) The suction tube results squashed with a considerable reduction of its passage section.
10) On the tract of the suction tube have been applied elbows of 90°, an under dimensioned filter or other contractions.
11) The valves on the delivery or on the suction side are closed.
12) The impeller blades are worn out or assumed an excessive bending inside the body.
13) The motor has got a wrong sense of rotation.

THE PUMP DOES NOT WORK WITH A SUFFICIENT CAPACITY

14) Through the seal enters air into the suction tube.
15) The passages of the impeller are partially obstructed by foreign bodies.
16) The rotation speed of the motor is too low.
17) The position of the suction duct is not exact.
18) The filter on the suction side is partially obstructed.
19) The suction tube has got an under dimensioned passage section or an excessively tortuous course.
20) Some of the impeller blades are broken.
21) Vortex formation inside the vat or the tank.

THE PUMP WORKS UNDER INSUFFICIENT PRESSURE

22) The viscosity of the liquid is higher than foreseen. See also points 5-8-12-15-16-18-20.

THE PUMP ABSORBS AN EXCESSIVE POWER

23) The specific weight or the viscosity of the pumped solution is higher than the projected values.
24) The pump performances are higher than foreseen.
25) The rotation speed is too high.
26) Damages or mechanical defects on the machine: distorted shaft, rubbing of the rotating organs, locked bearings of the motor or the support (only for VGA), etc...
27) Excessive compression of the tightening nuts on the body.

THE PUMP CAUSES VIBRATION AND NOISE

28) The tubes or the foundations are not rigid enough.
29) The bearings of the motor or of the support (only for the VGA pumps) are worn out or damaged. See also points 20-26.
30) The pump and the motor are not aligned.
31) The impeller blades have become stiff due to a chemical reaction caused by the incompatible pumped liquid and a consequent overheating due to an operation of the pump without liquid.

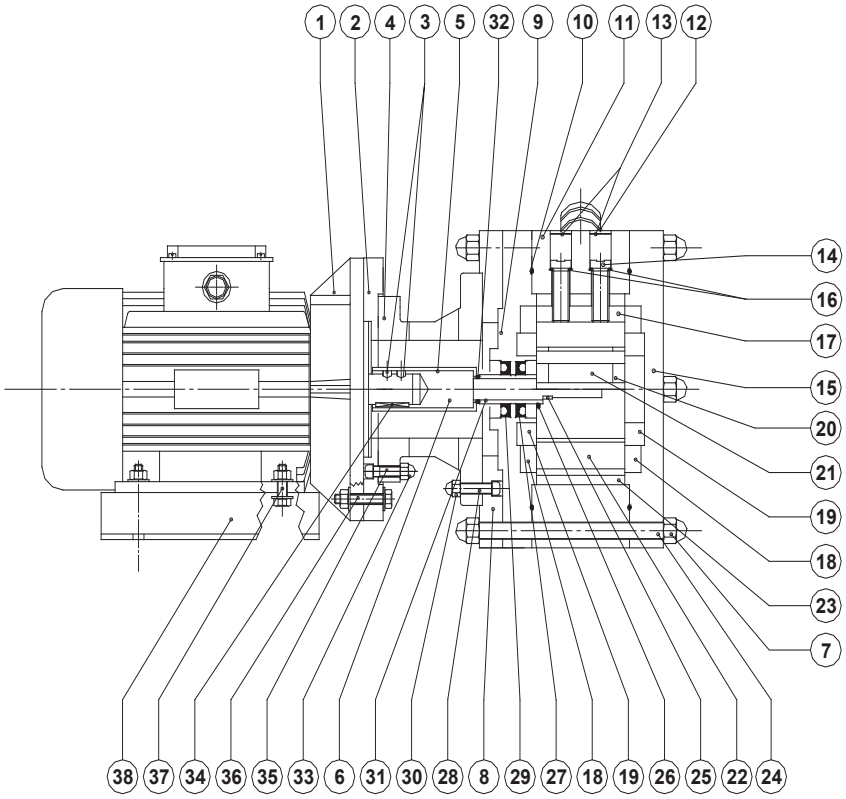
THE TIGHTNESS SYSTEM AND THE IMPELLER BLADES GET RAPIDLY WORN OUT

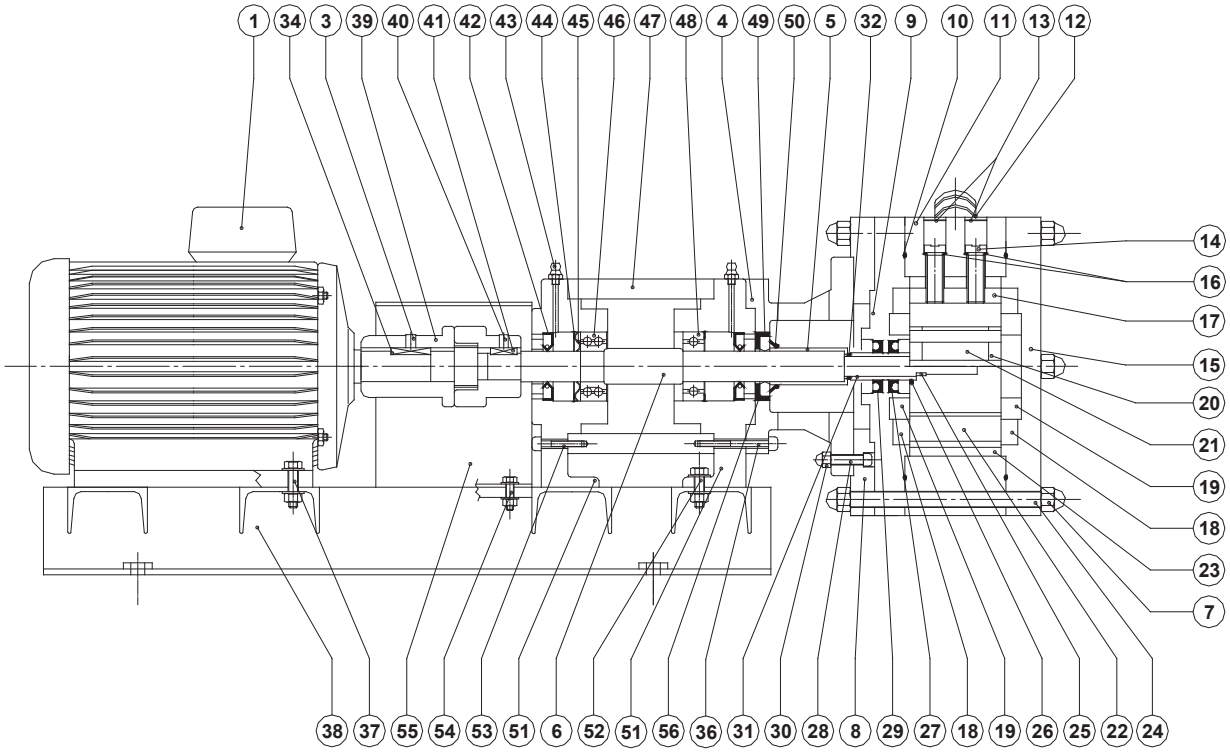
32) The flowing liquid or the pumped liquid contains foreign bodies or abrasive substances.
33) The gaskets or other employed materials are not suitable in relation to the characteristics of the pumped liquid.
34) The pumped liquid causes the formation of air or gas.
35) At the machine arrives only a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

SHORT LIFE OF THE MOTOR OR THE SUPPORT BEARINGS

36) Lacking lubricant in the support.
37) Presence of foreign bodies in the lubricant.
38) Presence of water or condense in the support or the motor.
39) Excessive thrust on the bearings caused by mechanical defects. See also point 26.

CROSS SECTIONS





PUMP PART LIST

1	Motor	21	Rotor	41	Key
2	Motor Flange	22	Impeller Shover	42	Snap Ring
3	Screw	23	Body Covering	43	Greaser
4	Intermediate Adaptor	24	Tirant	44	Seeger
5	Shaft Protection	25	Key	45	Compensation Spring
6	Shaft	26	O-Ring	46	Posterior Ball Bearing
7	Covered Nut	27	Edge Seal	47	Spacer
8	Intermediate adaptor flange	28	Screw	48	Anterior Ball Bearing
9	Rear Block	29	Snap Ring	49	Steam Tight Cap
10	O-Ring	30	Covered Nut	50	V-Ring
11	Body	31	Rotating Bushing	51	Support
12	Hose Nozzle	32	O-Ring	52	Screw
13	Stopper	33	Covered Nut	53	Screw
14	Screw	34	Key	54	Screw
15	Front Block	35	Screw	55	Coupling Covering
16	O-Ring	36	Screw	56	Steam Tight Ring
17	Eccentric Sector	37	Screw		
18	Double Face Body	38	Base		
19	Thrust Bearing Ring	39	Elastic Coupling		
20	Double Face Body	40	Screw		

MAINTENANCE AND REPAIR OPERATIONS

REMOVAL FROM THE PLANT

Before disconnecting the pump from the plant please take the following steps:
a) Empty the body and the tubes (see EMPTYING OF THE TUBES AND THE BODY" on page 9)
b) Please make sure that the pump is not running.
c) Detach the plug from the electric switchboard.
d) Detach the electric cables from the terminal board and carefully isolate the ends.
e) Tighten the suction and the delivery valves.
After having concluded these operations you may remove the machine from the plant.
Before disassembling the machine for maintenance the body has to be cleaned inside with water or an appropriate liquid. Please try to avoid chemical reactions, which might cause irreparable damages to the machine and the operator.
Please do not discharge the solution left after 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 gloves and 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 PROCEDURE

The disassembly should be carried out with the utmost care to avoid eventual damages on the internal parts of the machine caused by the 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 surface on which the pump is kept for disassembly please proceed as follows:

1) Unscrew (clockwise thread) by means of a pipe wrench of 18 or 22 mm (if possible do not use another type of key) the tightening nuts of the body (pos. 7).
2) Remove the front block (pos. 15).
3) Remove the medium block (11).
4) For the replacement of the eccentric sector (pos. 17) you have to remove the rubber stoppers (pos. 13) from their sites and unscrew with a screw-driver the screws (pos. 14) (clockwise thread) that connect it with the medium block (pos. 11).
5) Take pincers and remove the rotor blades (pos. 22) of the impeller (pos. 21).

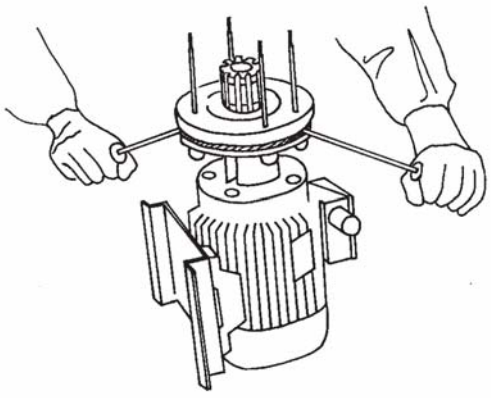


Fig.5

6) Introduce two screw-drivers into the relative openings on the posterior side of the rear block (pos. 9) and remove it by using the lever effect on the flange of the intermediate adaptor (pos. 8). With the same procedure the rotor is removed from the impeller (pos. 21), fig. 5. It is possible to separate the two double faces of the impeller (pos. 20) from the rotor (pos. 21) with the hands and a small lever.
7) If the surfaces of the double faces of the body (pos. 18) appear very scratched or grooved and if the thrust bearing rings (pos. 19) show radial cracks and ruptures, the pieces have to be replaced. To separate the parts you only have to slightly knock on the front or the rear block positioned on a table. In this way the double faces (pos. 18) leave their sites.
8) The extraction of the edge seal (pos. 27) and of the rear rubber ring (pos. 29) is necessary only if these parts show signs of abrasion or rupture. In this case use pincers for the edge seal (pos. 27) and a screw-driver for the rear ring (29) that acts as a lever between the site and the ring.
Please perform the operations described in the present point with extreme caution. Take care that the housings of the gaskets are not damaged.
9) Disassemble the intermediate adaptor (pos. 4) by unscrewing (clockwise thread) the bolts (pos. 36).
10) Remove the rotating bushing (pos. 31) from the shaft after having eliminated with a pair of pincers the tongue (pos. 25).
11) To extract the shaft from the VMA pumps (pos. 6) please use two levers after having loosened the fixing screws (pos. 3), fig. 6.
12) For the VGA pumps the disassembly operations are more demanding in terms of work.
After having performed the operations described under points 1-2-3-4-5-6-7-8-9-10 you have to remove the intermediate adaptor (pos. 4) from the support (pos. 51) by using an extended hexagonal wrench and introducing it into the relative holes, see fig. 7.
As far as the pumps AQ4 and AQ5 are concerned, this operation can only be performed after having removed the flange (pos. 8) fixed with four screws of stainless steel (pos. 28). In this working phase we recommend to use of a pipe wrench of 18 or 22 mm to seize the covered nut and a hexagonal wrench to loosen the screws (clockwise thread).
13) Remove the cover from the coupling (pos. 55).
14) Remove the shaft support group (pos. 47 51) from the base (pos. 38). This group must be completely disassembled, if ball bearings (pos. 46 -48) or snap

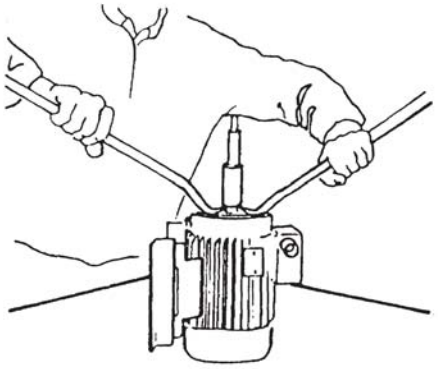


Fig.6

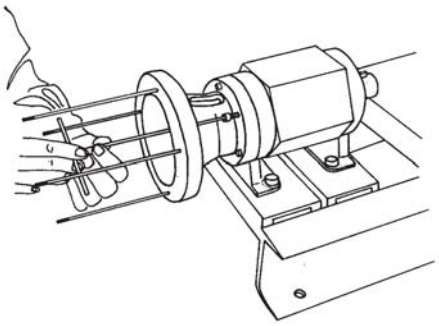


Fig.7

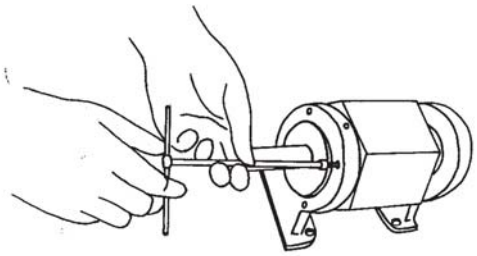


Fig.8

rings (pos. 42) have to be replaced, see fig. 8-9-10. To perform all the disassembly phases of the parts it is indispensable to remove one of the two halves of the elastic joint (pos. 39) from the shaft (pos. 6). First remove the hexagonal screw (pos. 40) and then take an extractor to separate the a. m. parts after having removed the elastic ring mounted on the rotor to lock the rear bearing.
If the shaft is equipped with a covering (pos. 5) you have to remove this covering before taking the above-mentioned steps.

15) If the snap rings are replaced, you first have to remove the elastic rings (pos. 44) by means of pincers, see fig. 11.
16) Introduce a metal centre-punch into the two support holes and knock with a hammer until the rubber snap ring (pos. 42) is ejected, see fig.12.

Every time when the pump is disassembled you should check the state of conservation of all the O-rings (pos. 10 - 16 - 26 - 32), the snap rings (pos. 27 - 29 - 49 - 50) and of the impeller blades (pos. 22).
The shaft has to be replaced only, if it presents parts, which have been corroded by the liquid, or if there are bent portions.

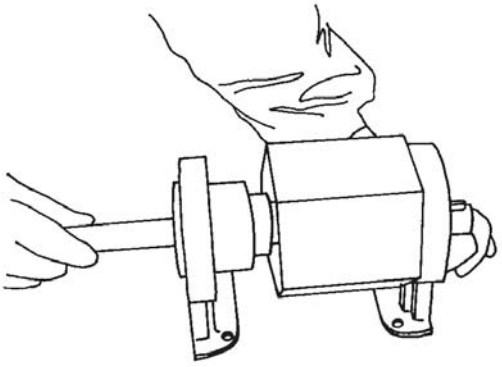


Fig.9

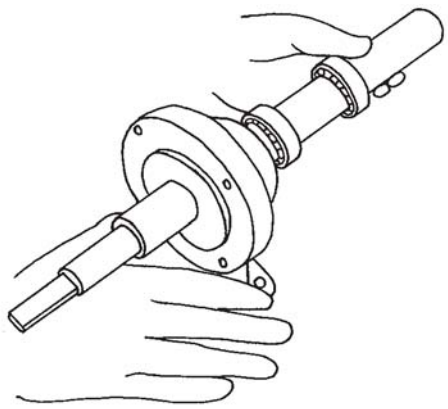


Fig.10

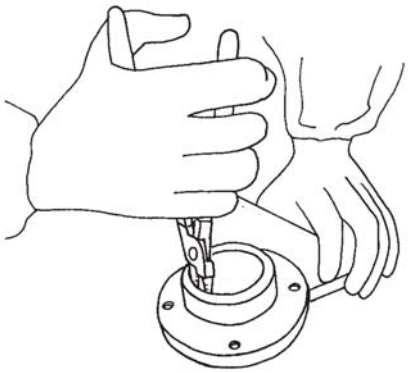


Fig.11

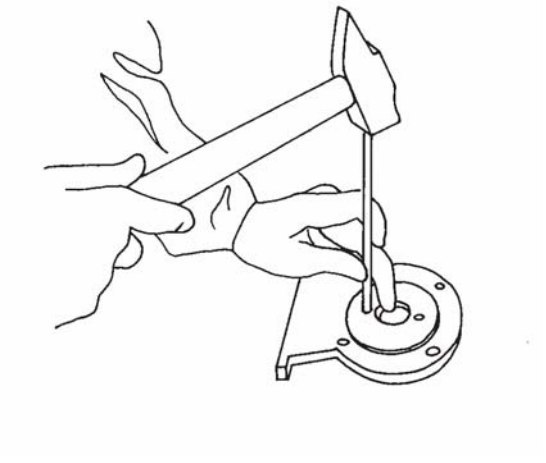


Fig.12

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 parts have to be replaced, please use only original spare parts.
As the phase of disassembly also the assembly phase requires that all the operations are carried out with particular precision.

For the pumps of the VMA series:

17) Even if the shaft is in a good condition, you should anyway check, if it is well balanced, by proceeding in the following way:
    a) Put the comparator onto the end of the part.
    b) Make the shaft turn until you find out the highest point of unbalance.
    c) If the measured value is higher than 0,03 mm, slightly knock with a rubber or plastic hammer to obtain a centering, which remains within the above-mentioned value, fig. 13.
18) If the shaft is in a bad state and has to be substituted, put the spare part onto 1he motor nozzle, which has to be greased beforehand. Tighten (clockwise thread) the two hexagonal screws (pos. 3) and perform the balancing (see point 17).

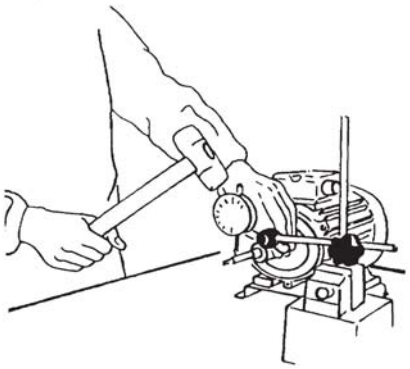


Fig.13

19) Fix the intermediate adaptor (pos. 4) on the motor and tighten the relative screws (pos. 36).
20) Put the rotating bushing (pos. 31) onto the shaft (pos. 6) and lock it with a tongue (pos. 25). Please proceed with extreme care when you insert the key into its site and use pincers.
21) To insert the two double faces and the thrust bearing rings (19) into the rear and front blocks you have to use devices, which fix together the single elements by means of pressure. Please do not use hammers or percussion tools.
22) Introduce the edge seal (pos. 27) into its site inside the rear block (pos. 9) and the snap ring (29) into the outer shoulder positioning it with the spring oriented towards the motor after having completely eliminated eventual burrs and sharp edges.
    It is very important that the introduced parts are clean and have been rinsed with water to facilitate their introduction inside the holding shoulders.
    The same precautions have to be taken also for a mechanical seal during the insertion of the fixed ring (57) into its site on the rear block.
    Please put bearing grease between the front (pos. 27) and the rear (pos.29) seals and try to keep the edge seal (pos. 27) clean.
23) Put the rear block (pos. 9) onto the shaft and into the flange of the intermediate adaptor.
24) If an external mechanical seal (B6E) is mounted, the covering (pos. 58) has to be applied after having firmly fixed the spacer ring (pos. 59). Successively install everything on the shaft.
25) Mount the rear block (pos.9) keeping the part with the double face of PTFE (Teflon) inside the body.
26) Introduce the impeller rotor (pos. 21) after having mounted the rubber blades (pos. 22) and the double faces (pos. 20) on the rotor and position it on the coupling of the shaft. Please do not forget the O-rings (pos. 26).
27) Mount the gasket of the rear block (pos. 10).

28) On the rest of the pump apply the medium block (pos. 11) by positioning the machine vertically with the impeller in an upward direction, fig. 14. During the introduction of the part please take care that the rubber blades do not get trapped in the teeth of the eccentric sector (pos. 17).
29) Close the pump body with the front block (pos. 15) after having applied the O-ring (pos. 10) and tighten the covered nuts by means of a pipe wrench of 18 or 22 mm.

The tightening has to be performed moderately on the running pump.
After having definitively tightened the closing nuts of the body you should check if the machine has got trouble during the start. If this is the case, please slightly loosen the four nuts until you reach the desired result. Please also keep in mind that an excessive loosening of the nuts may cause liquid leakage or prevent the priming of the machine.

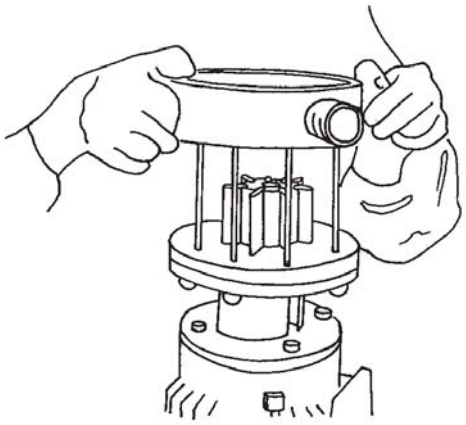


Fig.14

For the pumps of the VGA series :

30) The shaft (pos. 6) has to be replaced only in the cases listed under point 18.
Contrary to the monobloc pumps in this case the transmission device is mounted beginning with the introduction of the ball bearings (pos. 46 48) on the shaft, see fig. 15.
Fix the rear ball bearing with an elastic steel ring.
After having moderately greased the bearings put the rotor onto a clean surface and make sure that no foreign bodies stick to the bearings.

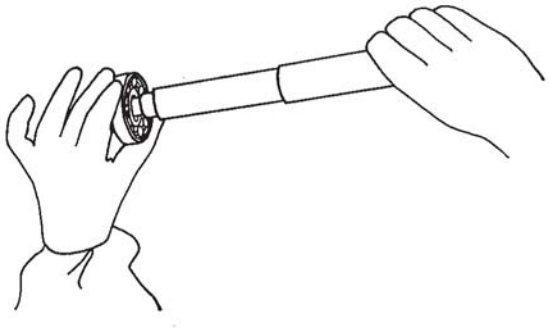


Fig.15

31) Introduce the rubber rings (42) into the relative sites on the supports and position the gaskets with the spring oriented outside for the rear site and inside for the front site.
Then put the elastic rings into the two supports, fig. 11.
32) Before the introduction of the rotor into its rear support you have to position the compensation spring (pos. 45) between the seeger and the bearing. Then assemble the support group on the base (fig. 8 - 9 -10) and at last mount the intermediate adaptor, fig. 7.
33) Fix the two halves of the elastic joint: the first one on the pump and the second one on the motor. Firmly tighten the two parts with screws (pos. 3 - 40) and use adhesive tape on the threads.
34) Fix the motor on the base and couple the two halves of the elastic joint. Then perform the alignment (see paragraph "ALIGNMENT OF THE GROUP" on page 5).
35) As far as the other assembly operations are concerned, please read points 20 to 29.

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, please take into consideration the operating conditions (that may be more or less heavy) and the number of interchangeable units installed on the plant.
For each pump we normally advise to keep the following parts on store:

a) One impeller rotor (pos. 21), two double faces (pos. 20) and eight rubber blades (pos. 22).
b) A rotating bushing (pos. 31) with its edge seals (pos. 27 - 29) or a mechanical seal, complete with covering (pos. 58).
c) A complete series of gaskets (pos. 10 - 13 - 16 - 26 - 32).
d) A shaft (pos. 6).
e) For the VGA series a couple of bearings (pos. 46 - 48). If a steam tight device is mounted, keep in reserve a rubber cap (pos. 49), a stationary ring (pos. 56) and a V-ring (pos. 50).

In your spare part orders please always cite:

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

DISPOSAL

The replaced parts or the pumps, which reached the end of their operative life, have to be submitted to a careful selection 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.

NOTES

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NOTES

AFFETTI PUMPS

YOUR SOLUTIONS

CORROSIVE APPLICATIONS

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