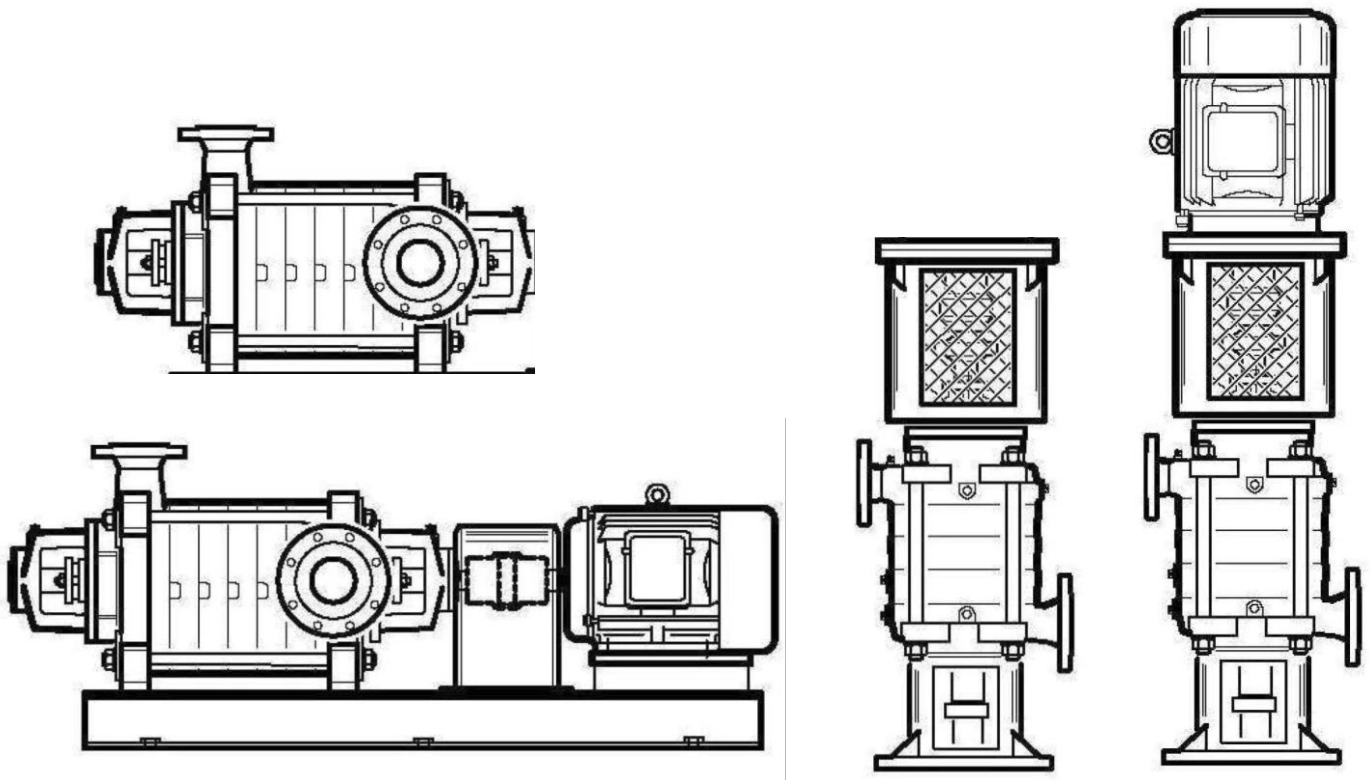




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MULTISTAGE CENTRIFUGAL PUMPS TM SERIES

**HP - HV - HPM - HVM - HPR**

**CA-ENG** OPERATING INSTRUCTIONS **CE**

Rev. 9

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## INTRODUCTION



### CAUTION



This Manual is specifically for the skilled pump users and for the normal maintenance technical personnel. It is therefore necessary to read carefully the whole handbook before undertaking the installation and operation of the pump, as it contains important information concerning the operation and maintenance personnel's safety.

#### MANUAL SAFEKEEPING

The Manual is an integral part of the pump and must always accompany the pump, even if sold. Keep this Manual in a safe place in the pump area, and made available for both Operation and Maintenance personnel for reference.

PLEASE READ CAREFULLY AND REPEATEDLY CHAPTER 3 CONTAINING IMPORTANT INFORMATIONS AND WARNINGS ON SAFETY INSTRUCTIONS

THE MACHINES OR PARTLY COMPLETED MACHINERY ARE NOT ATEX CERTIFIED.  
IF THEY ARE, THEN REFER TO THE ATTACHED "SUPPLEMENTARY MANUAL FOR EXPLOSIVE ATMOSPHERES (ATEX)"

These pumps are designed and manufactured in compliance with:

European directive: 2006/42/CE - 2006/95/CE - 2000/14/CE

#### SAFETY TECHNICAL REGULATIONS

European Standards: EN 809, EN ISO 12100-1, EN ISO 12100-2, EN ISO 14121-1, EN ISO 3344

#### ELECTRIC INSTALLATION

EN 60034/1, EN 60204-1, EN 61000

Assembly, installation, working, non-routine maintenance, repair, overhaul, handling and dismantling of the pumps must be carried out by skilled technicians authorized by the MANUFACTURER or AUTHORIZED DISTRIBUTOR. THE MANUFACTURER DOES NOT ACCEPT RESPONSIBILITY FOR ANY INJURY TO PERSONS OR DAMAGE TO OBJECTS CAUSED BY INCORRECT USE OF THE PUMP.

To fully understand the language of this Manual, the pump user must have necessary qualifications in servicing and maintenance; he must have the necessary knowledge to interpret figures and descriptions of the Manual, he must be educated and trained about the general and specific accident prevention steps as applicable in the country where the pump is installed.

The same criteria is valid for choosing the technical maintenance personnel who, additionally, must have necessary knowledge of specific and specialized regulations (mechanical and electrical) to safely carry out the operations described in the Manual.

FOR ANY SPECIFIC REQUIREMENTS OR INFORMATION, PLEASE CONTACT THE MANUFACTURER.

## 1. IDENTIFICATION, PACKING, SHIPMENT AND STORAGE

### 1.1 • IDENTIFICATION

Pump is provided with a metallic nameplate of identification (figure1) listing the manufacturer's name, address, CE mark and the following data:

- **Pump type**
- **Serial number**
- **Capacity**
- **Speed (RPM)**
- **Head**

For pump/motor assemblies the nameplate also shows: (figure 2):

- **Maximum pressure**
- **Motor power**
- **Voltage**
- **Frequency**

The serial number identifies uniquely each manufactured pump. Please provide this number as a reference for every correspondence to the manufacturer.

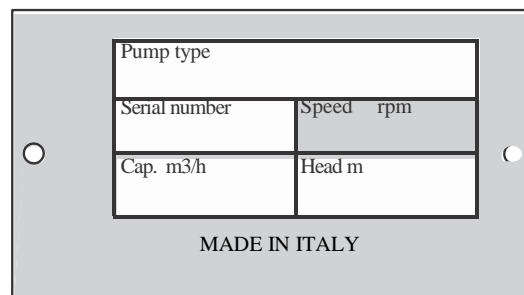
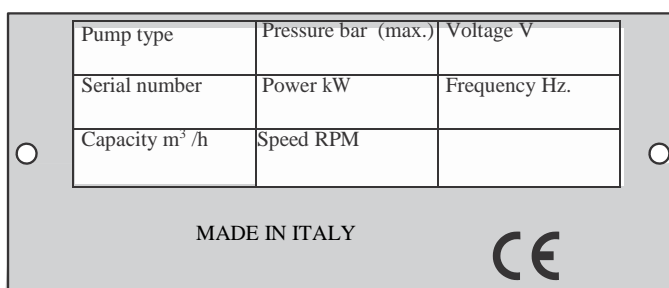


Fig.2



**CRATING, LIFTING, HANDLING, TRANSPORTING AND UNPACKING SHOULD BE HANDLED ONLY BY PERSONNEL FAMILIAR WITH BOTH PUMP AND MANUAL.**

### 1.2 • PACKING

Depending on dimensions, pumps may be shipped as follows:

- in wooden crates for some types of horizontal pumps and for the vertical pumps. (Fig. 3)
- in strapped wooden pallets. (Fig. 4)



#### **CAUTION!**

Dimensions, net and gross weights are printed on the packing. (see figure 1)

Fig.4

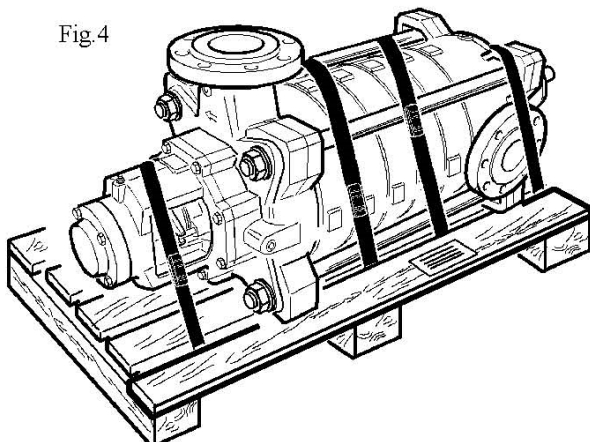
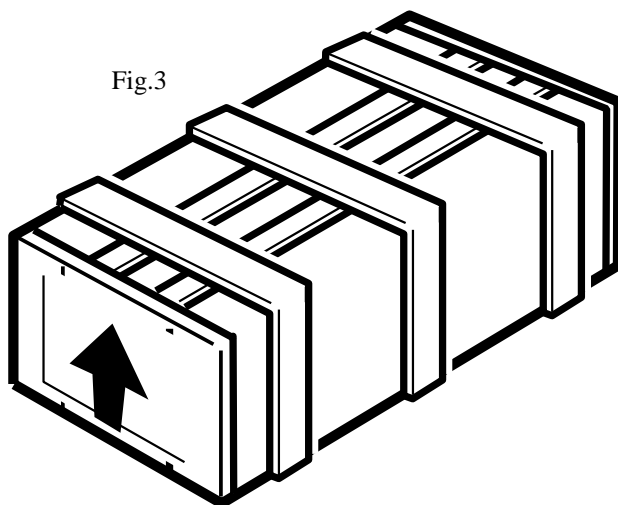


Fig.3



## 1. IDENTIFICATION, PACKING, SHIPMENT AND STORAGE

### 1.3 • LIFTING AND HANDLING

Packed pumps can be lifted and transported by fork lift trucks or by hoists (see figure 5). All pump units with steel base frame are equipped with lifting holes for crane hook.



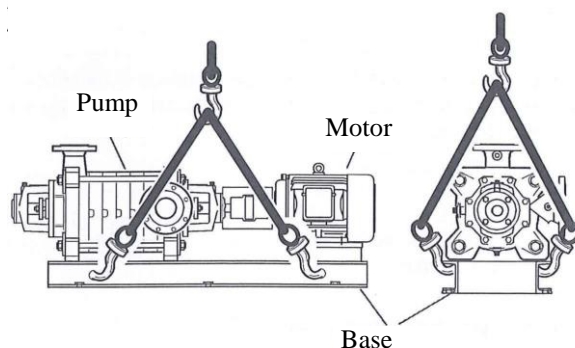
#### CAUTION!

The selected trucks must be suitable for a safe lifting and handling, considering the dimensions and weights indicated on the packing. (Fig 3).



#### CAUTION!

Pump units must be handled only by authorized and skilled personnel.



### 1.4 • STORAGE

Packed pumps and units must always be kept in a covered, dry and protected environment with temperatures between  $-10^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$  avoiding direct exposure to sunlight (Fig.6). Where pumps and units are to be stored for long time, rotors should be rotated at least twice each month using a suitable tool. In case of over 6-month storage, always contact the manufacturer for further instructions. As for the protection against corrosion, the external parts of the pump can be oiled and greased.

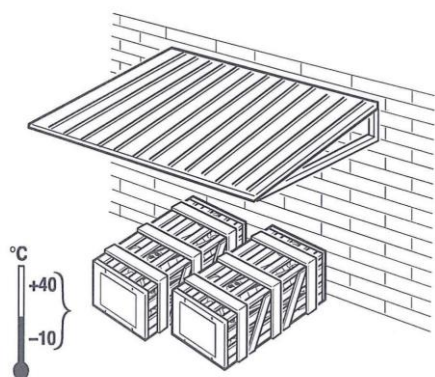


Fig. 6

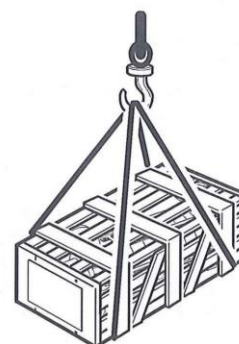
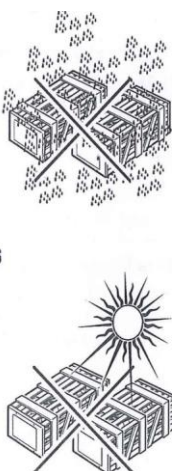
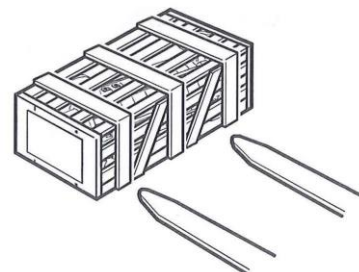


Fig. 5



### 1.5 • PACKING, STACKING

The type of packing being utilized permit the possibility of stacking up to 2 crates on top of each other inside the warehouse or into truck cabin, provided that they are properly stacked and secured against falling (Fig.7).

### 1.6 • UNPACKING

Upon receipt, please check parts against damage that may have occurred during transportation and verify every part listed on the packing list is received (please inform the manufacturer about possible problems or damages).

Unpack carefully taking all the necessary precautions in order to avoid any damage to persons or pump parts (during the unpacking, please do not let the parts fall from the crate).

### 1.7 • PACKING DISPOSAL

The wood form crate or pallet can be re-used or recycled in accordance with the local laws in the country where the pump is received. Other materials like straps and plastic must be disposed in accordance with local laws and regulations.

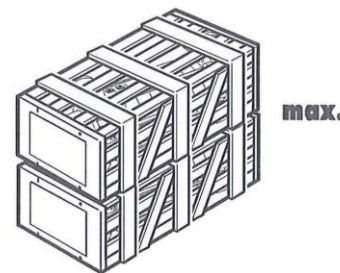


Fig. 7

## 2. TECHNICAL SPECIFICATIONS

Multistage centrifugal pumps can be of the following series:

- HP HPM and HV HVM for pressures up to 64 bar.
- HPR for pressures up to 100 bar.

Horizontal pumps series HP, HPM, HPR (Fig.8) are usually coupled to the motor through a flexible coupling and mounted on common baseplates.

Vertical pumps series HV, HVM are driven by flanged mounted motors (Fig.9)

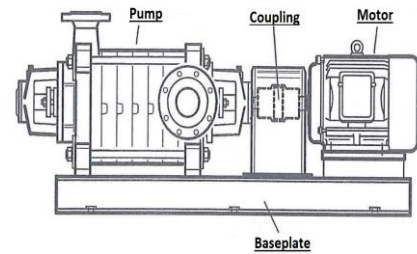


Fig. 8

These pumps have been designed and manufactured for the following use:

- industrial water works and water supply systems
- irrigation and reclamation
- in line pressure boost systems
- steam boiler feed
- condensate conveyors
- fire fighting systems
- water treatments plants

Pumped fluids: fresh water (standard design), seawater, condensate, chemical and petrochemical substances (special design on request).

The range of pumps can be divided in (fig.10):

- centrifugal pumps type HP, HPM for pressures up to 64 bar and capacity from 3-900 m<sup>3</sup>/h.
- centrifugal pumps type HPR for pressures up to 100 Bar and capacity from 3-900 m<sup>3</sup>/h.
- centrifugal vertical pumps type HV, HVM for pressures up to 64 bar and capacity from 3-900 m<sup>3</sup>/h.

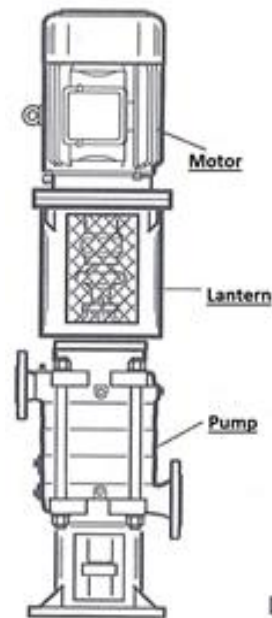
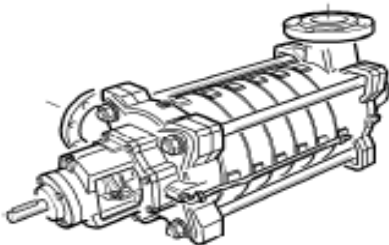
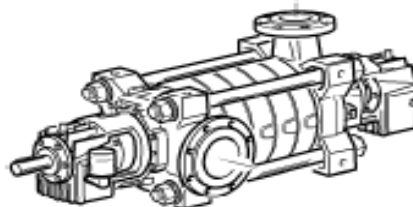


Fig. 9

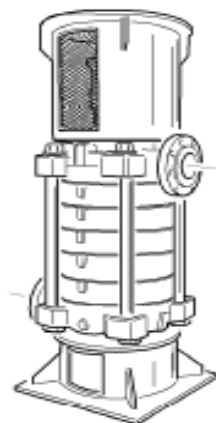
Fig. 10



HP



HPM



HV



## 2. TECHNICAL SPECIFICATIONS

### 2.1 • CONSTRUCTION

The multistage horizontal or vertical pumps are constructed with a suction casing, a discharge casing, multistage casings, diffusers and impellers, all mounted on a common drive shaft. The radial impellers are casting with double curvature form and diffusers are located inside each stage casing (fig.11).

Stage sealing is by means of O-ring, compressed by the axial load applied by external tie rods.

For horizontal pumps, the cast feet on the base frame are positioned under the delivery casing and under the suction casing.

For vertical pumps, the base frame is in the lower part of the suction casing.

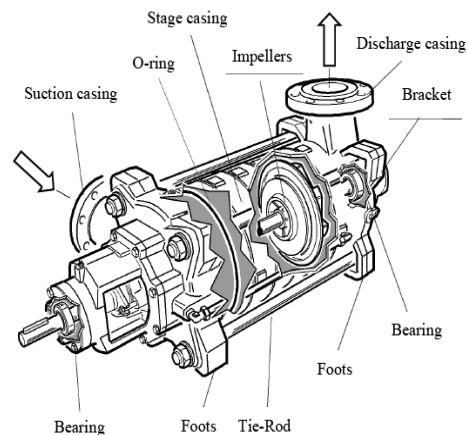


Fig.11

### MAIN BEARINGS AND HYDRAULIC BALANCING

The driveshaft is supported by outboard bearings lubricated either oil or grease, Bearings fitted in the flanged bearing housing on the pump ends are:

- 1 radial ball bearing and 2 angular ball bearing in the HP pumps
- 3 angular ball bearings and 1 roll bearing in the HPM pumps
- 2 angular ball bearing and a sliding sleeve in the HV pumps
- 2 angular ball bearing and 1 roll bearing in the HVM pumps

The axial thrust from the impellers is hydraulically balanced at each stage, additional hydraulic balance is achieved with a pressure discharge drum in the delivery casing. Any residual axial thrust is absorbed by the angular main bearings or by the ball bearing.

### SHAFT SEAL

The pumps are available with standard uncooled packed gland sealing for water temperatures up to 105°C or on request, with water cooled packed glands for temperatures between 105°C to 140°C (fig. 12).

The pumps can also be fitted with uncooled mechanical seals for special applications and fluid temperatures up to 140°C (fig. 13).

The pump shaft is protected in the sealing areas by replaceable sleeves.

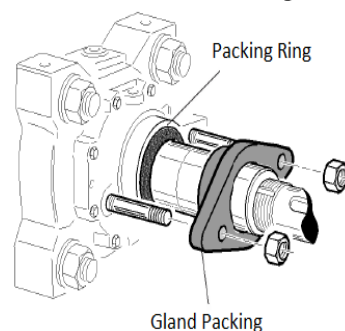


Fig.12

### SUCTION AND DELIVERY PORT ORIENTATION

For HP, HPM, HPR pumps standard build: suction port on left hand side of pump when viewed from end of drive shaft in standard position i.e., at suction end of pump. Delivery port is vertical. On special request, pumps can be supplied with the suction port either vertical or on right hand side of pump. (fig.14)

HV, HVM pumps standard execution: opposite ports; special execution: different positioning.

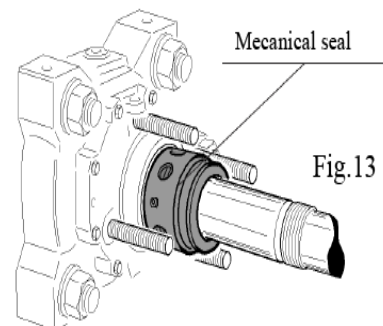


Fig.13

### STANDARD FLANGES

Suction flange for HP, HPM, HV, HVM series pumps are machined to UNI2237 PN16 and to UNI 2238 PN 25 for HPR pumps.

Delivery flange for HP, HPM, HV and HVM pumps are to UNI 2243 PN 64 and to UNI 2244 PN 100 for HPR pumps.

Flanges and adaptors machined to ANSI are available on request.

### MATERIALS OF CONSTRUCTION

Pumps can be supplied with suction and delivery casings, stage casings, impellers and diffusers in cast iron, stainless steel or bronze. Drive shafts and sleeves in stainless steel. For special material options, please refer to the technical catalogue.

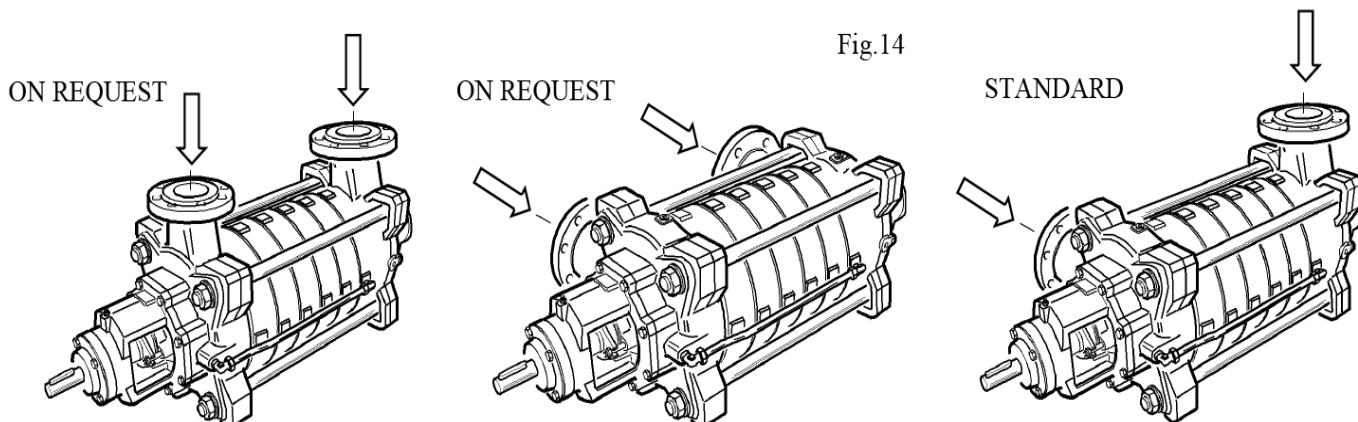


Fig.14

## 2. TECHNICAL SPECIFICATIONS

### 2.2 • SUPPLY TERMS

Pumps can be supplied as follows (fig.15):

- pump bare shaft
- Vertical pump with flanged electric motor (for HV, HVM series).
- Pump and motor (electric or diesel motor) mounted on common base frame in steel, coupled with flexible coupling and coupling guard.



#### CAUTION!

For each pump series data, details, parts list and performance range (performance curve capacity/head) please refer to the General Catalogue.

The main technical characteristics of the pump and motor are listed on the identification nameplate fixed on the pump and motor (see chapter 1.1 "IDENTIFICATION") Special applications on request. Please review in the technical specifications.

### LIMITS FOR PUMP SERIES

Max. Working pressure: see also identification nameplate attached to pump.

	HP	HPM	HPR	HV	HVM
Flow 1450 rpm	3-900 m <sup>3</sup> /h	3-900 m <sup>3</sup> /h	--	3-450 m <sup>3</sup> /h	3-450 m <sup>3</sup> /h
Flow 1750 rpm	4-1080 m <sup>3</sup> /h	4-1080 m <sup>3</sup> /h	--	4-540 m <sup>3</sup> /h	4-540 m <sup>3</sup> /h
Flow 2900 rpm	3-900 m <sup>3</sup> /h	3-900 m <sup>3</sup> /h	3-900 m <sup>3</sup> /h	3-900 m <sup>3</sup> /h	3-900 m <sup>3</sup> /h
Flow 3500 rpm	4-1080 m <sup>3</sup> /h	4-1080 m <sup>3</sup> /h	4-1080 m <sup>3</sup> /h	4-1080 m <sup>3</sup> /h	4-1080 m <sup>3</sup> /h
Max Suction Pressure	16 bar	16 bar	25 bar	16 bar	16 bar
Max Discharge Pressure	64 bar	64 bar	100 bar	64 bar	64 bar
Max liquid T.	100°C	140°C	180°C	100°C	100°C
Seal Cooling			Standard		



#### CAUTION! Pumps are not suitable for handling:

- fluids containing abrasives.
- fluids containing solid and fibrous substances.
- flammable and explosive fluids (only for special design).
- chemically aggressive fluids (only for special design).

The pump operating data must be specified at time of order. Max working time with closed port: 2 Minutes.

Pumps provided with standard motors are suitable for installation in covered areas due to IP55 motor enclosure.

For special or hazardous applications, please ask the Technical Dept. to provide the necessary information.

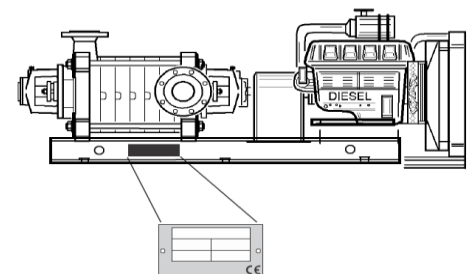
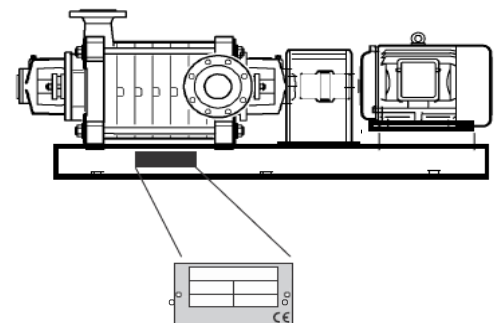
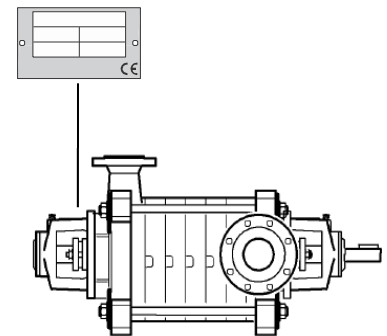
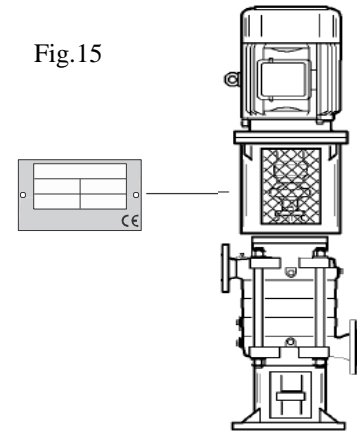
### 2.3 • NOISE LEVEL

Centrifugal pumps have different noise levels depending on the type of installation, operating point and on the type of motor.

#### CAUTION!

The noise level of the electric pumps varies depending on the installation: it is therefore, recommended to perform a noise test after completion of plant installation in compliance with the local rules and regulation.

Fig.15





### 3. SAFETY

Read this chapter and all its paragraphs very carefully as it contains important information about the hazards. Both the user and the maintenance personnel can refer to this in case of pump being misused or misapplied.



#### **CAUTION!**

In general, the pumps have been designed and built for water handling in civil, industrial and agricultural sectors.

Applications and limitations for pump usage are as listed under chapter 2

“TECHNICAL SPECIFICATIONS”. Any other usage is not recommended unless agreed upon in writing by the manufacturer.

**THE MANUFACTURER DOES NOT ACCEPT RESPONSIBILITY FOR ANY DAMAGE TO PERSONS OR OBJECTS CAUSED BY INCORRECT USE OF PUMPS.**

### GENERAL PRECAUTIONS

#### **CAUTION!**

The user and the maintenance personnel must carefully follow local rules regulations, laws and safety standards as applicable in the country where the pump is installed. Furthermore, they are responsible for:

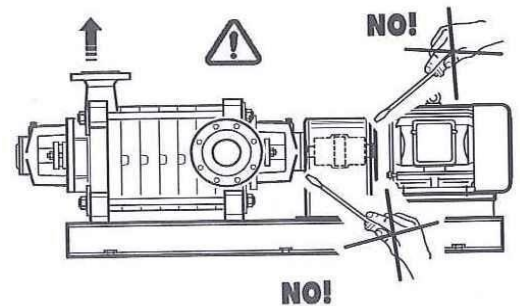
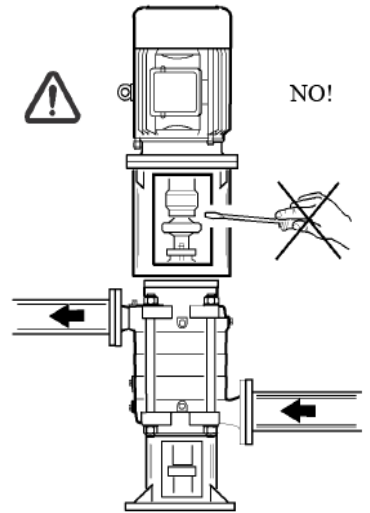
- neither move nor remove mechanical and electrical protections or safety devices;
- pay attention to the warnings tags and nameplates attached to the pump and listed in the manual.
- use personal protection measures like safety shoes, glasses and gloves when working on the pump

**Safety warnings may be indicated as follows:**

**DANGER:** warns of an imminent danger harmful to persons (serious injury, even death).



**CAUTION:** warns of situations and/or attitudes that are less harmful to persons (less serious injury)



#### **ELECTRIC SHOCK HAZARD**

It is a particular safety warning reported in the rating plate of the pump panel only where the hazard of electric shock is very high.

### HAZARDS AND PROTECTIONS

A detailed list of hazards the user or the maintenance personnel can encounter during assembly or maintenance, and a list of the safety precautions the manufacturer has adopted to reduce these hazards to a minimum. (fig.16).



#### **CAUTION!**

The purchaser must verify the correct use of the pump and its compliance with safety measures according to the type of installation.

Connection of the pipework to the respective system must always be carried out by qualified personnel and in compliance with the laws of the country where the pump is installed.

#### **• COLLISION HAZARD**

Due to the pump parts at user height.

#### **• ENTANGLEMENT HAZARD**

Rotating parts must be suitably protected at all times.

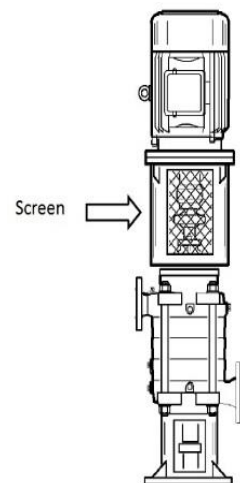
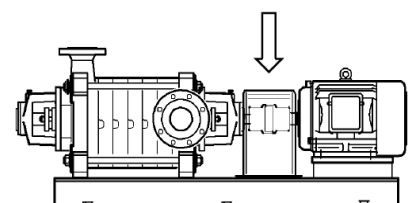


Fig. 16



Coupling guard

### 3. SAFETY

#### • CRUSH HAZARD

During every step of the handling, assembly and maintenance process, always utilize individual protection equipment, such as gloves, safety shoes and other equipment as per the laws enforced in the country.

#### • SLIPPING HAZARD

Due to wet or oily areas of the floor.

To prevent slipping hazard, it is advisable taking specific precautions (safety shoes).

#### • BREAKDOWN OR HIGH PRESSURE WATER LOSSES

Use the pump and the piping always in accordance with the performance range reported in the rating nameplate.

⚠ Be careful with accidental losses: please call immediately the maintenance personnel. While starting up, remember to prime the pump and to open the delivery valve as soon as possible after start: Overheating danger.

#### • HAZARD OF COMPONENT FAILURE DURING OPERATION

Even though the manufacturer has utilized suitable materials and followed suitable design/manufacturing procedures for a safe equipment it is, however, required to comply with the use of the pre-set design purpose (pump/motor) and with suggested inspections and maintenance as per chapter 6 “MAINTENANCE”.

#### • HAZARD OF ELECTRIC SHOCK

Avoid water jet, stream jet, solvent or varnish jet near electric connections of the pump, and in particular when close to the power panel.

Always disconnect the power to the pump prior to maintenance or repair.

⚠ Always carry on the grounding!

#### • DARK AREA HAZARD (where applicable)

Operator and service man must verify and make sure that all pump parts are always properly lit and in compliance to what is expected by the local rules and regulations.

#### 1. NOISE HAZARD

In the event of application of the pump with a motor supplied by another supplier and in any case of installation in the pump room, the overall noise level of the premises must be checked in compliance with the laws in force in the country of installation.

⚠ Pay attention to any abnormal noise emissions during operation.

#### INCORRECT USAGE HAZARD

Utilizing the pump for any other application other than its intended design, can be seriously harmful for those who are working near the pump.

It is extremely important to follow carefully all the instructions concerning use, maintenance and safety described in this handbook.

#### CAUTION!

Be careful of high temperature in case of applications with hot or pressurized fluids in some areas of the pump, particularly in the bearings supports; do not get near the pump and avoid any contact until the pump is fully stopped and is cooled down. (fig.17).

#### ⚠ DANGEROUS LIQUIDS AND ENVIRONMENT HAZARD

See applicable special instructions from the manufacturer.

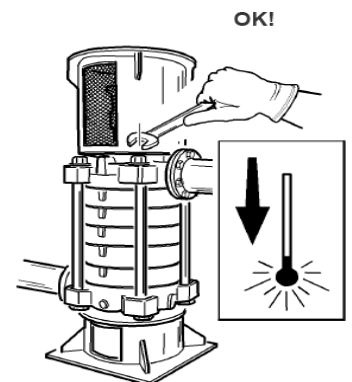
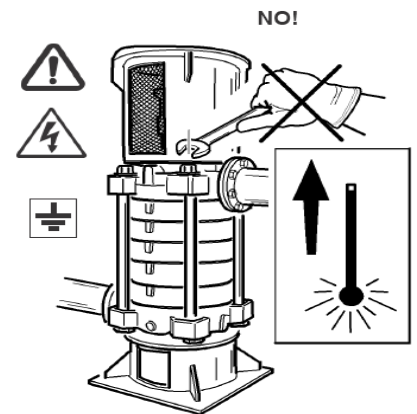
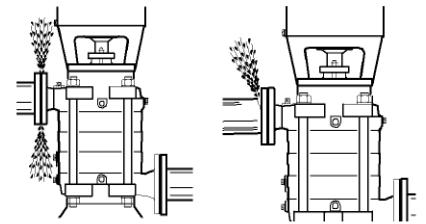


Fig.17

### 3. SAFETY



#### Noise level



When pump noise level exceeds 85dBA attention must be given to prevailing Health and Safety Legislation, to limit the exposure of plant operating personnel to the noise. The usual approach is to control exposure time to the noise or to enclose the machine to reduce emitted sound. If no noise requirements were defined, then machines above a certain power level will exceed 85dB(A). In such situations consideration must be given to the fitting of an acoustic enclosure to meet local regulations.

Pump noise level is dependent on a number of factors - the type of motor fitted, the operating capacity, pipework design and acoustic characteristics of the building. Typical sound pressure levels measured in dB and A-weighted are shown in the table below.

The figures are indicative only, they are subject to a +3 dB tolerance, and cannot be guaranteed.

The values are based on the noisiest ungeared electric motors which are likely to be encountered. They are LpA sound pressure levels at 1m (3.3ft) from the directly driven pump, for "free field over a reflecting plane".

If a pump only has been purchased, for fitting with your own driver, then the "pump only" noise levels from the table should be combined with the level for the driver obtained from the supplier. If the motor is driven by an inverter, it may show an increase in noise level at some speeds. Consult a Noise Specialist for this calculation

In areas where the staff has to intervene, remember that when the level of the sound pressure is:

- Below 70 dB(A): It is not necessary to take special precautions.
- Above 70 dB(A): People working continuously in the machine room must be supplied with protective devices against the noise.
- Below 85 dB(A): No particular measures need to be taken for casual visitors staying in the room during a limited period.
- Above 85 dB(A): The room must be considered as a dangerous area because of the noise and a warning sign must be fixed at each entry point warning the people coming into the room, even for a short period, that they must wear hearing protection.
- Above 105 dB(A): Special hearing protection adapted to this noise level and to the spectral noise components must be installed and a warning sign to this effect erected at each entry. The staff in the room must wear ear protection.

Make sure that the noise, which travels through the walls and windows, does not generate too high noise levels in the machine room's surroundings.

		LpA [dB] pump only				LwA [dB] pump + motor			
		3500 rpm	2950 rpm	1750 rpm	1450 rpm	3500 rpm	2950 rpm	1750 rpm	1450 rpm
HP - HPM HV - HVM	25	<=88	<=84	<=77	<=75	<=102	<=100	<=92	<=89
HP - HPM - HPR HV - HVM	32								
HP - HPM - HPR HV - HVM	50								
HP - HPM - HPR HV - HVM	80								
HP - HPM - HPR HV - HVM	100	92	88	79	76	102	100	93	91
HP - HPM - HPR HV - HVM	125	101	97	84	80	104	102	96	95
HP - HPM - HPR HV - HVM	150	111	107	90	84	106	104	100	99
HP - HPM	250			100	95			118	112

## 4. INSTALLATION

PUMP INSTALLATIONS MUST BE DONE BY QUALIFIED TECHNICIANS; IF CARRIED OUT BY OTHER PERSONS DANGEROUS SITUATIONS CAN OCCUR WITH POTENTIAL SERIOUS RISK TO PERSONS AND/OR TO THE PUMP

### 4.1 • INSTALLATION LOCATION REQUIREMENT

Standard pump is manufactured for usage in closed and protected areas. The chosen working place must be far from any painting room, storerooms containing solvents or paints, and from potential explosive areas.

#### • SAFE SPACE AROUND THE PUMP

The pump must be installed in compliance with suitable safe distance from the walls, pillars or other machinery etc. according to the statutory laws and regulations in force in the country where the pump is installed.

For maintenance purposes see also suggested clearances per (fig.18):

- space height: minimum 3,0 m.
- distance from the walls: minimum 0,5 m.
- working space: minimum 0,5 m.
- panel space
- maintenance space, assembly and disassembly space, entry and exit ways in case of emergency
- position of other machines
- capability to perform electrical connection

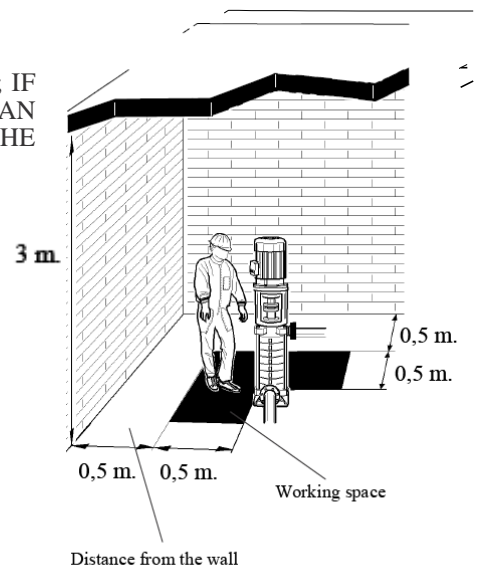


Fig.18

#### • LIGHTING

Every pump part must be lit uniformly and as much as to guarantee adjustment and maintenance in accordance with the manual, avoiding shade reflection dazzling and sight weariness.

Lighting must comply with the present rule in force in the country where the pump is installed and under the responsibility of lighting installation personnel.

#### • FLOOR

The pump must be installed on a horizontal foundation with adequate resistance, made of batched concrete or made of by strong supports. Furthermore, the floor must be flat and good levelled (10 mm of tolerance on the levelling). In case of particular applications, please contact the manufacturer.

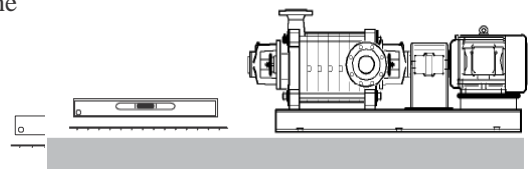
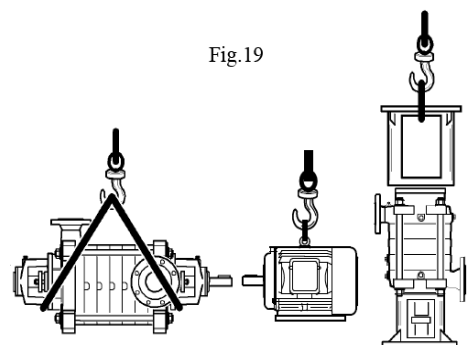


Fig.19

#### • ELECTRICAL CONNECTIONS

ATTENTION! Before electrical connection, check following:

- the pump feeding system must be protected in accordance with the norm in force in the country where it is installed.
- the supply line must be suitable for required power and tension of the pump (check data in the motor sticker).



### 4.2 • PUMP ASSEMBLY TO THE MOTOR

When a bare shaft pump is supplied, it is the costumers responsibility to carry out correctly the assembling of the group.

It is however recommended to follow the instructions below:

- lift the pump unit with a crane or suitable lifting device with the correct capacity. For a vertical pump, lift the assembly through the support (Fig.19) or the eyes bolted on the flanges. For a horizontal pump unit, lift by holes in base frame.
- level the pumps; in case of pump assembly on a common base, verify that the common base is flat through a level put on the delivery port (fig.20) or on the pump shaft.  
If necessary, insert some shims under the pump feet.
- check the correct alignment of the pump-motor.
- connect the motor to the main
- check the rotation direction of the motor matching it with the arrow shown on the pump.

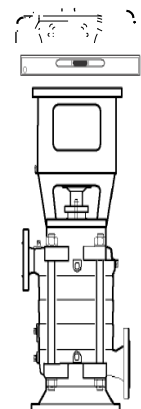


Fig.20

## 4. INSTALLATION



### CAUTION!

Lifting equipment (chains, ropes, lifting eyes) must bear the weights of pump parts and the weights of possible accessories as well (pipeline weights). When lifting bare shaft pumps, lifting hooks should be applied to each pump end, close to the mounting feet. Never attach lifting hooks to pump drive shaft ends.



### CAUTION!

Check the motor rotation direction after assembly and during pump operation, as it leads to failure and hazards/faults to the pump.



### CAUTION!

**RESPECT AND FOLLOW ALL SAFETY MEASURES WHEN CONNECTING PUMP TO THE MOTOR.**

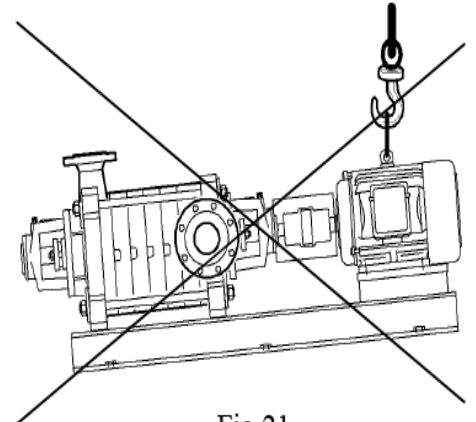


Fig.21

**Never lift pump units using the motor lifting eye. (Fig. 21)**

Follow the instructions described on the manual of the flexible coupling as well as chapter 6 "MAINTENANCE".

### 4.3 • INSTALLATION OF ELECTRIC MOTOR – PUMP/MOTOR ASSEMBLY

In this case, when the pump is supplied with motor already assembled.

The package handling has always to be carried out by lifting equipment having a suitable capacity for the package itself (see weights on the packing). (fig.22).

Before installing the unit, check the suitability of the foundation (see "Floor" at point 4.1).

The welded baseplate is equipped with 4 or 6 holes to be fastened to the concrete floor. Trace the holes on the floor using the base frame as a stencil; after drilling, insert FISCHER GM type anchors or equivalents into the hole of the sleeve support. Position the pump unit on the mounting base. With the aid of a spirit-level ensure that the pump unit base frame is truly horizontal in both planes; if necessary, insert metallic shims between the surface of the mounting base and the pump unit base frame, near the mounting holes at both ends.

If the distance between the holes is more or equal to 800 mm, insert the shims in the center line as well.

Tighten the mounting bolts to the tightening torques shown in the Table (Tab.1)

Ø	TIGHTENING TORQUES Nm		
	5.6	6.6	8.8
M12	40	50	75
M16	70	95	120
M20	120	180	230

Tab.1

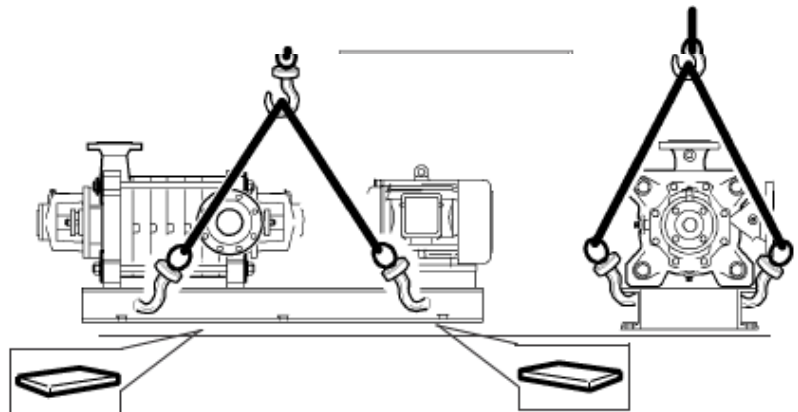
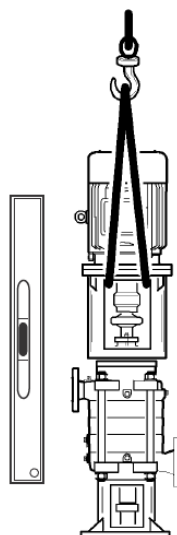


Fig.22



## 4. INSTALLATION

### 4.4 • DELIVERY AND SUCTION PIPES

**CAUTION!** Always ensure that the pipes can withstand the maximum working pressure of the pump (see rating plate).

#### DANGER OF EXPLOSION!

Delivery and suction pipes and their accessories must not subject the pump to any anomalous loads or forces.

High moment and force loads from rigidly mounted, or misaligned pipe work, can cause pump damage, broken flanges, etc.

Pipe work should be correctly aligned and supported to avoid vibration and movement during the pump operation.

Delivery and suction pipes and their accessories must be clamped, so that their weights and any dynamic or thermic loads are not transmitted to the pump suction and delivery flanges.

The only sure way to avoid the above problems is to use a flexible joint, or a short length of flexible pipe to connect any rigid pipe work to a pump flange.

Delivery and suction pipes must have a bigger or equal diameter than the pump diameter.

**CAUTION!** Flange diameter of the pumps cannot be considered as pipe diameter; this must be dimensioned depending on the plant installation taking into account all frictional losses.

If the pipes are very long, pumps must be equipped with extension couplings that can compensate possible thermic expansions.

Pipe flanges must be connected parallel to the pump flanges.

To avoid relevant head losses, adapters having bigger diameter must have approx. 8° expanding angle.

#### SUCTION PIPES (Fig. 23)

Suction pipe must be designed to avoid air pockets because they can cause pump problems during operation.

Isolating valve must be located at a distance of minimum 10 times its nominal diameter.

Elbows, valves and all the fittings on the suction pipes can produce friction losses that can lead to an incorrect operation of the pump.

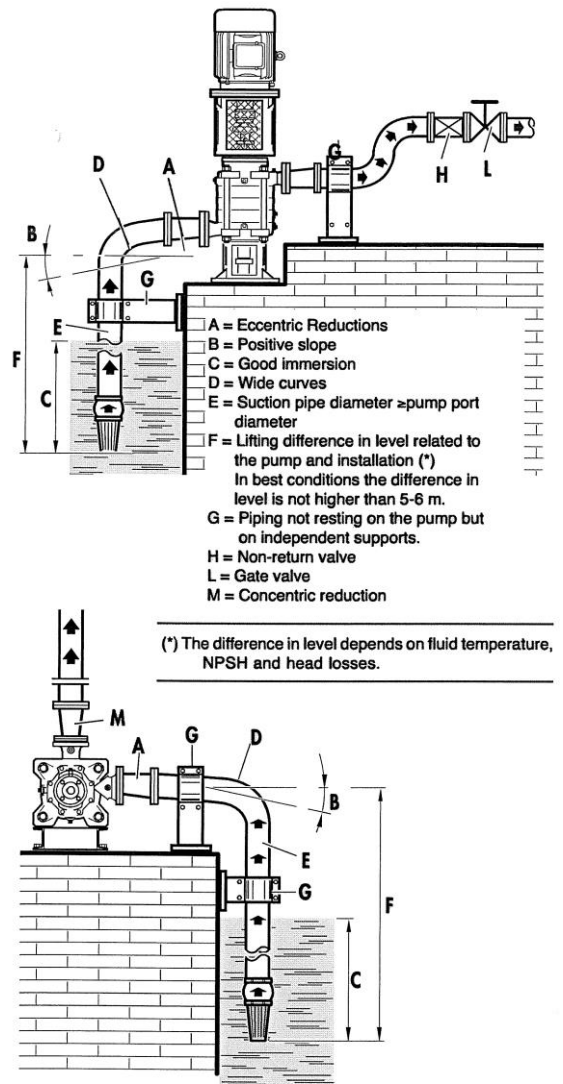


Fig. 23

**CAUTION!** Any welding scale, dust or other impurities left in the suction line can damage pumps. We recommend that all newly manufactured pipe work is thoroughly flushed through and cleaned, before connecting to the pump.

#### - PUMP WITH FLOODED SUCTION

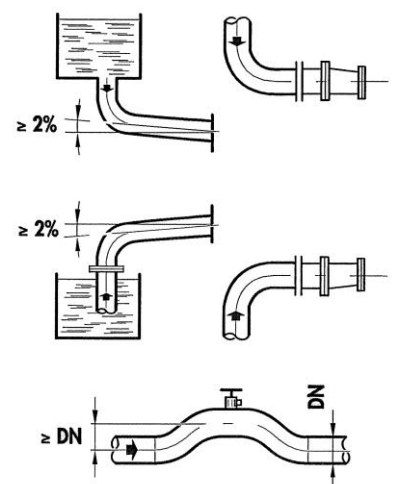
Piping horizontal parts must have a descending trend towards the pump (minimum slope 2%).

If the pipes have a bigger diameter than the pump port, we recommend to use a reverse eccentric reduction.

#### - PUMP ARRANGED FOR SUCTION LIFT

Piping horizontal part must have an ascending trend towards the pump (minimum slope 2%).

If necessary, the fittings with the pump port must have an eccentric reduction in normal position.



If suction piping is long, we suggest using a siphon before the pump, so that the fluid reaches the impeller only after filling the tube completely.

## 4. INSTALLATION

### DISCHARGE PIPES (Fig.24)

If the delivery pipes have a bigger diameter than the pump port, fittings must be adapted through a concentric reduction for the upwards delivery, and through an eccentric reduction for the side delivery.

Horizontal pipe sections must have a minimum upward slope of 2%.

A non-return valve should be fitted in the delivery line to isolate the pump from over-pressure due to water-hammer. Install a gate valve, butterfly valve, or ball valve, in the delivery line down-stream from the non-return valve.

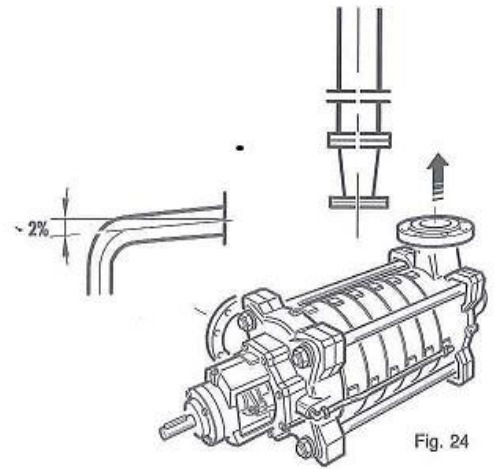


Fig. 24

### PIPING CONNECTION (Fig.25)

#### CAUTION!

Pipes must be thoroughly cleaned from dirty and foreign bodies before connecting to the pumps. Remove any trace of scale if there are welded parts.

- Check the alignment of the pipe flanges with those of the pump. The two facing surfaces must be parallel, aligned and must be at the required distance from the gasket.
- Center the gaskets between the flanges.
- Screw the tie rods/bolts of the flanges.
- Slacken the mounting base bolts allowing the pump unit to align to the pipe work. This will minimise pump flange and pipe loads.
- Re-tighten the mounting base screws.

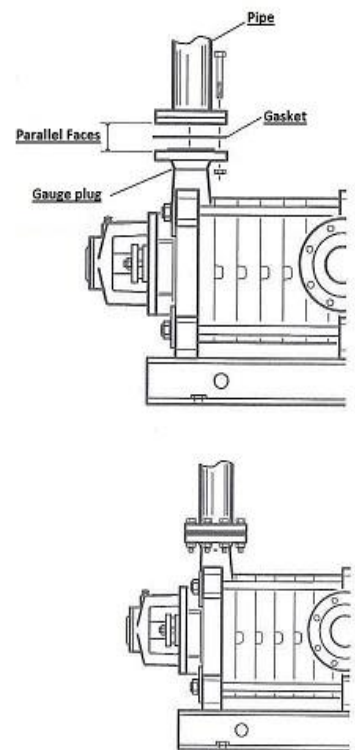
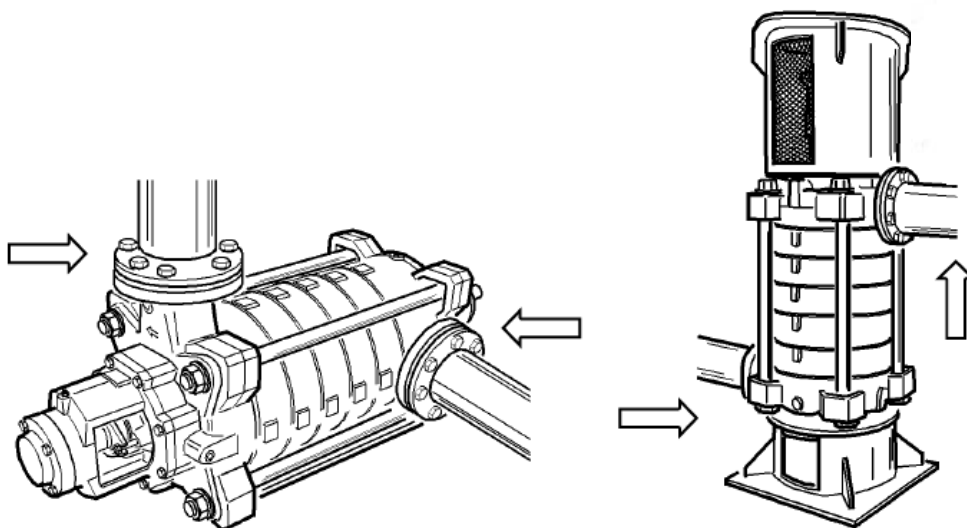


Fig. 25

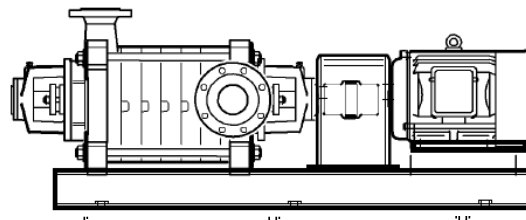


## INSTALLATION

### 4.5 • ALIGNMENT OF THE PUMP UNIT

Alignment is usually done at our factory; we however recommend you to check once again after installation.

*The final alignment must be done after attaching the pipes connections to the pump.*



#### CAUTION!

Before checking the final alignment of the unit, verify that the electric motor rotation and the pump rotation, possibly with motor disconnected from the pump, are the same.

#### COUPLING ALIGNMENT

The flexible coupling requires careful alignment.

Incorrect alignment will cause rapid wear of the elastic parts of the flexible coupling, local bearings and both drive and driven shafts. Alignment tolerances for the standard coupling range are on table 2 Fig.27 or follow coupling manufacturer instructions

Coupling alignment can be achieved as follows (Fig.26)

##### - Straight edge & feeler gauges.

Hold the straight edge on the outside of the coupling parallel to the axis of rotation and record both vertical & horizontal misalignment using a feeler gauge. The second feeler gauge being used to ensure that the gap between the mating faces of each coupling half is correct.

##### - Dial indicator & feeler gauge.

A dial indicator can be used instead of the straight edge to record the parallel misalignment of motor semi-coupling, and the feeler gauge to check both axial and angular clearance between.

##### - Two dial indicators & feeler.

Check both axial angular misalignments by positioning the dial indicators on both half couplings. The distance shall be checked with the gauge.

When the pump is working at high temperature, over 130° C, pump to prime mover alignment must be checked while pump and drive system is hot.

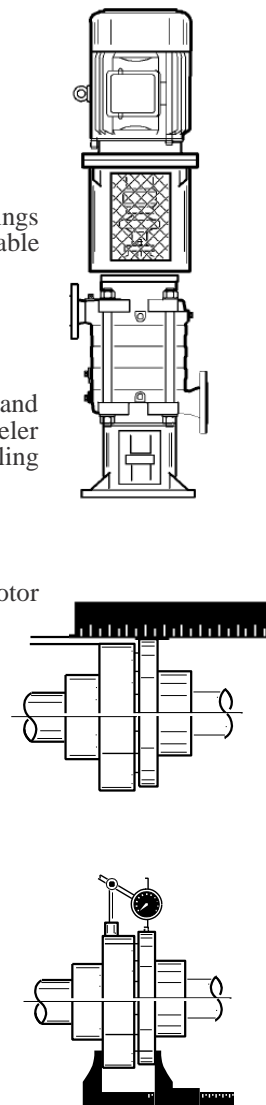


Fig.26



#### CAUTION!

In case of special couplings, follow the coupling manufacturer recommendations when aligning the pump / motor coupling.

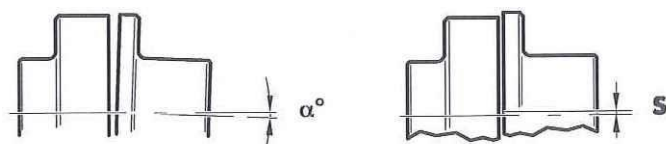


Fig.27

#### MAX ALLOWABLE OFFSET

	COUPLING SIZE											
	8	14	20	27	40	55	88	110	145	180	250	330
$\alpha^\circ$	60'	60'	55'	50'	45'	40'	35'	35'	30'	30'	25'	25'
S	0,2	0,2	0,2	0,2	0,25	0,25	0,30	0,30	0,35	0,35	0,40	0,40

## 4. INSTALLATION

### 4.6 • COUPLING GUARD ASSEMBLY

After the coupling alignment, assembly coupling guard by tightening applicable screws. (Fig.16)

#### CAUTION!

The pump unit must not operate without guards covering all rotating shafts & coupling.

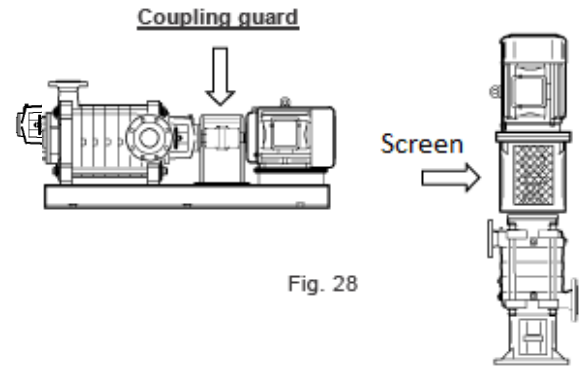


Fig. 28

### 4.7 • LUBRICATION

#### Bearings lubricated by grease.

These bearings are supplied already greased.

#### Bearings lubricated by oil.

Support must be filled in with one of the following type of oil:

- AGIP ACER 46 - ESSO Tesesso 68
- MOBIL D.T.E. Oil Medium - SHELL Tellus 68

#### OIL FILLING

Remove oil filler/breather plug from top of bearing housing and fill with oil to mark on level indicator (Fig.29)

Ensure that oil level has stabilized, and then re-fit oil filler/breather. Repeat above for bearing housing at other end of pump.

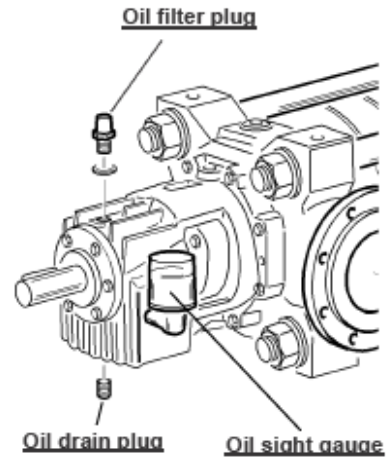


Fig. 29

### 4.8 • ELECTRICAL SYSTEM



#### CAUTION!

Only qualified and skilled electricians should be allowed to connect motor and related electrical systems following local laws, regulations and safety standards.

Any electric connecting task must be performed with power turned off. Please check that the voltage corresponds to that reported on the motor nameplate.

The power supply cable must be sized according to the motor input Amps and to the cable length (ref. pump metallic label).

#### THREE PHASE MOTORS

We suggest a star delta starting for motor with power higher than 7.5 Kw.

Check the type of connection indicated on the motor nameplate.

This connection varies depending on the motor winding and voltage. Verify that terminals of the electric box are connected as per correct table. (Fig.30)

#### CAUTION!

Always carry out the grounding. The body of the motor must be grounded with proper connections.

Check insulation before starting.

Always protect motor against overloads by means of a magnetic overload breaker, positioned before the main switch, and set at a breaking current not exceeding that of 1.15 the nominal motor current.

It is technician's responsibility to carry out final electrical tests in compliance with the regulations and to issue a Certificate of Conformity for the electrical installation.

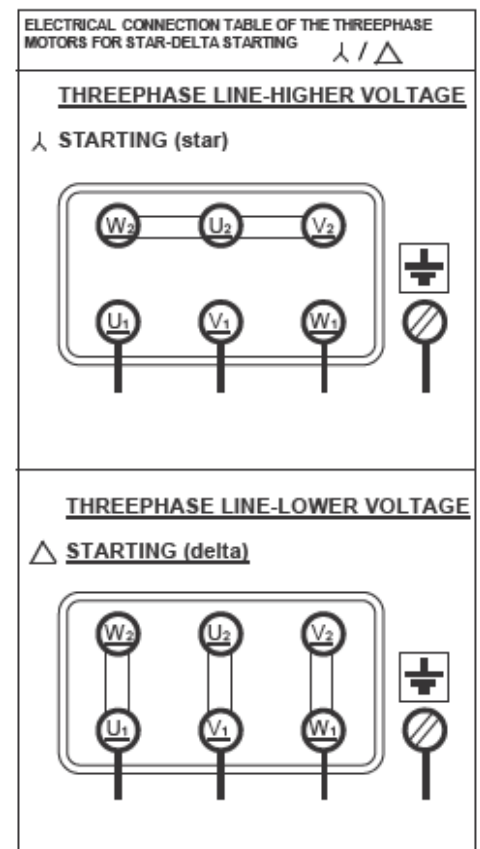


Fig. 30



## 5. OPERATION

### 1. PRE-START CHECKUP

#### **⚠ CAUTION!**

Before starting the pump, please follow the instructions below (Fig.31):

- check the port connections to the pipes.
- check flushing connections and cooling circuit connections (where applicable).
- check the rotation direction by starting the pump and switching it off immediately, as it must not work dry.
- ensure the suitability of the lubricating oil and its right quantity.
- check the conformity of the electric connections and protections.
- check the protections of all the rotating parts.
- check that the installation is ready to be started.

#### **5.1 • START/ STOP**

### 2. STARTING AND OPERATING

- When installed, activate the seal flushing and the cooling/heating system.
- Close the pump discharge valve all the way.
- Open the pump isolating valve in the intake piping all the way.
- Prior to starting the pump, fill suction piping and pump with same fluid to be handled. Be sure to bleed the air out of pump and pump suction line.
- When the pump is below head, this will take place automatically when the intake valve opens.
- When the pump is above head, use a connection of the delivery piping.
- Open completely all of the auxiliary connections (fluid seal, washing fluid), then make sure the fluid freely flows out.
- Start the motor and check the mechanical operation.
- When the motor has reached the working speed, open the discharge valve until reaching the pump rating head (pressure).
- If the OIL BEARINGS COOLING KIT is present, follow the instructions in the dedicated paragraph.

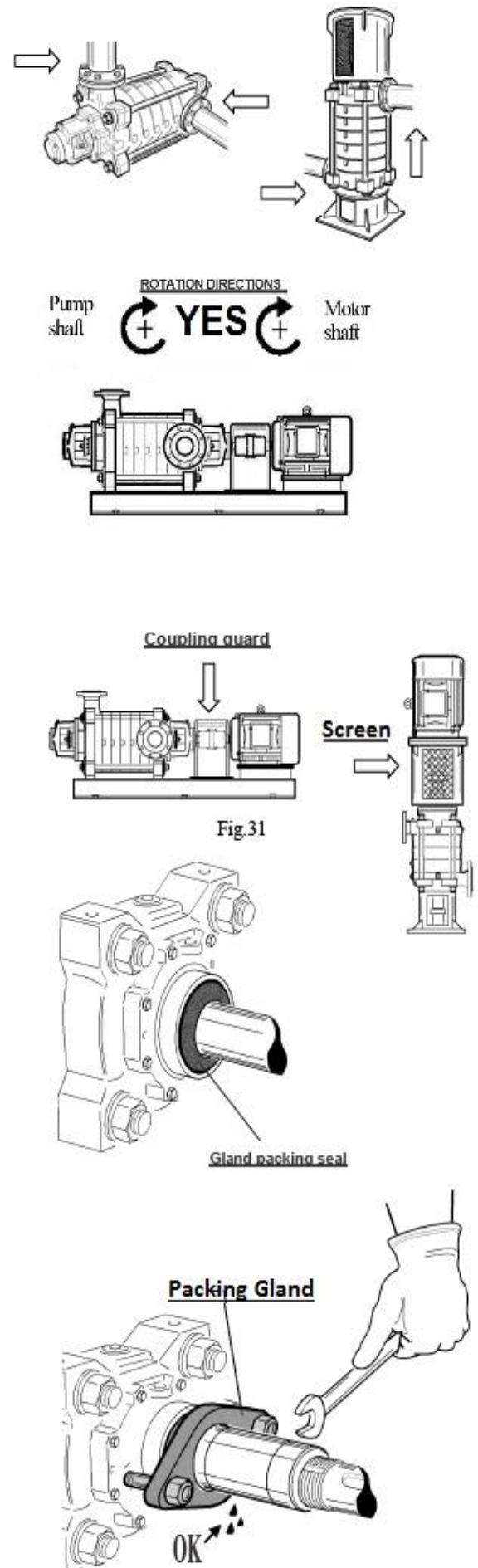
#### **⚠ CAUTION!**

Do not run pump for long periods with the gate valve in the output line closed.  
This will cause overheating and ultimately pump failure.

- Do not run pump dry. When running, the pump should be quiet and run smoothly without excessive vibrations.
- If the pump is fitted with a packed gland, adjust packing compression so that there is a slight leak through the packing. This will ensure that the packing contact surfaces are lubricated and will not overheat. (Fig.32)
- If the pump is fitted with a spring-loaded mechanical seal, no adjustment is necessary
- Check that the maximum input energy for the electric motor driving the pump does not exceed the maximum rated power shown on the pump nameplate.

#### **⚠ CAUTION!**

Start and check stand-by pumps on a weekly basis. This will ensure mechanical integrity and correct operation.





## 5. OPERATION

### STOP

The pump is stopped by switching off the electric supply to the motor. Centrifugal pumps can be stopped with the gate valve in the output line either open, or closed.

To avoid water hammer, a non-return valve must be fitted in the delivery line. Cooling lines, if present, must be shut-off only after pump has reached room temperature. (fig.33).

In case of lengthy pump stoppages, to avoid the risk of freezing during the cold season or prevent corrosion due to the possible chemical alteration of any stagnating liquid in the pump, drain the pump completely of any residual fluid.

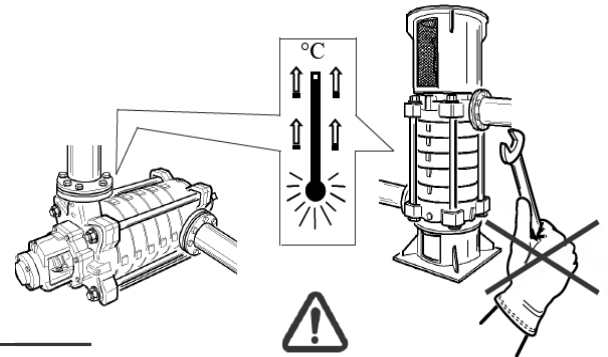
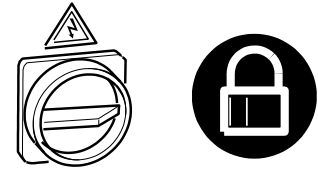


Fig.33

### 5.2 • SETTING & OPERATION CHECKING

Following is a list of the main checks the user must carry out after pump starting.

For problems and solutions please refer to chapter 7 “TROUBLESHOOTING”.

### HEAD

Pump capacity depends on head (pressure) as per to the operating curve. After starting, the pump head has to be the same as the head printed on the nameplate.

For calculation, read the values taken from the delivery pressure gauge and from the suction compound gauge, apply following formula:

$$H = \frac{10.2 (P_m - P_a)}{Y}$$

- H = differential head (m)  
Y = specific weight at pumping temperature (Kg/dm<sup>3</sup>)  
P<sub>m</sub> = delivery pressure (bar)  
P<sub>a</sub> = suction pressure (bar)

In the event pump head is lower than the expected (rated) pump pressure, slowly close gate valve in the discharge line to obtain the required operating pressure.

Pressure losses higher than those expected will cause a pump head higher than the nominal one. Modify the installation to reduce the losses and to reach the correct total head.

### VIBRATIONS/NOISE

The pump should work at its rated flow & pressure, without undue noise or vibration. In the negative, stop the pump and investigate.

### TEMPERATURE OF THE ROLLING BEARINGS

The temperature of the rolling bearings, which rotate at 3000 or 3600 rpm, can easily exceed 80°C. It is not possible to manually control the temperature

- The bearings only reach a normal temperature after operating for a few hours.
- When commissioning new pumps, the temperature can exceed 95 °C. Temperature slowly starts to decreasing after about 2- 3 hours of operation and reaches a constant value after about a week.
- The cause that lies behind an increase in temperature can be verified by dismantling the bearings or the hydraulics. However, if the temperature exceeds 100 °C when commissioning takes place, the pump must be stopped and the inspections described in chap.7, point 6 must be carried out.

## 5. OPERATION

### SEAL

- Mechanical seal (Fig. 34).

During the early stages of running, there might be a slight leak from the mating faces of the seal while it is bedding in.

If any leak persists, it should be investigated, as the mechanical seal has a controlled axial load which cannot be adjusted.

- Gland packing seal (Fig.35)

To ensure correct operation and long life, the gland packing seal nuts should be adjusted correctly.

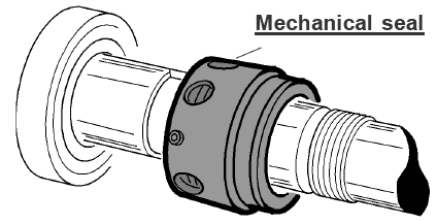


Fig.34

### ⚠ CAUTION!

All gland packing adjustments must be made while pump is idle.

Adjust the packing gland seal nuts so that there is a slight leak from each stuffing box seal. This will ensure that the packing rings surfaces are lubricated and cooled.

The leakage rate from each gland packing, is a function of pump size and packing box pressure.

Before the first start, back off gland nuts slightly to ensure that the leakage rate is high. When the pump has reached its rated speed, re-tighten the gland nuts to reduce the leakage rate to give a slight, but continuous leak. Periodically, check the leakage rate from the gland seals and adjust if necessary.

Replace all gland packing rings when the leakage rate is too high and all adjustments have been exhausted.

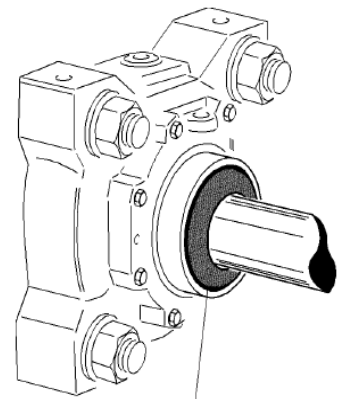


Fig. 35

### MOTOR INPUT POWER

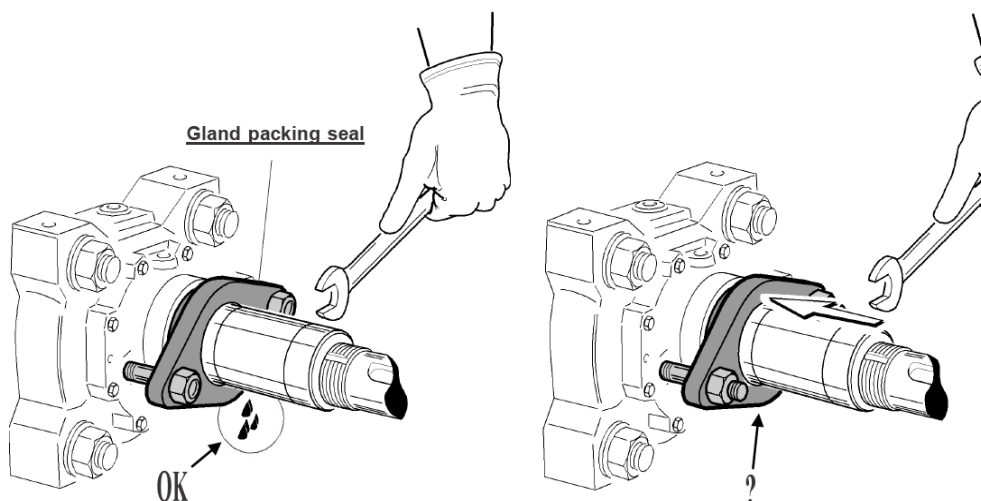
When the pump is running at full flow condition, i.e., end of performance curve, the electric motor absorbed Amps must not exceed the values stated on the motor nameplate (F.L.A.).

### MINIMUM OPERATING FLOW

### ⚠ CAUTION!

Avoid operating pump for long time with closed outlet valve, i.e., zero flow will cause overheating and result in pump damage.

The minimum acceptable flow for these pumps, is 20% of the flow at maximum efficiency point.



## 6. MAINTENANCE

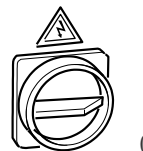


### CAUTION!

All adjustments have to be carried out exclusively by skilled and qualified workers that are familiar with electro-pump and the relevant manual.

While servicing the electro-pump, it is absolutely important to take all required safety measures to avoid an accidental start of the group itself

- The main power switch feeding the power group must be blocked on position "0" through a padlock.
  - The key to the padlock must given to and held by the maintenance man for the duration of the servicing.
- Always keep in mind all the main possible risks and the safety instructions listed in Chapter 3 - "Safety"



### SHOCKS AND FATAL HAZARDS

MAINTENANCE WHILE PARTS ARE IN MOVEMENT IS STRICTLY PROHIBITED.

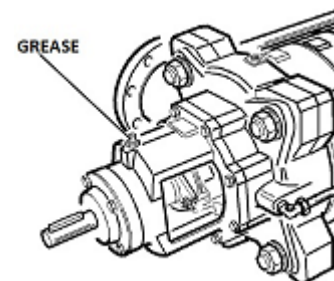
IN CASE OF TOXIC/HARMFUL FLUIDS, ALWAYS DECONTAMINATE THE PUMP BEFORE SERVICING.

AFTER ANY MAINTENANCE SERVICE, IT IS ALWAYS NECESSARY TO REINSTALL ALL COMPONENTS AS PER THE ORIGINAL INSTALLATION, INCLUDING SAFETY GUARDS.

In order to obtain a good maintenance service, it is important to

- verify immediately the causes of any possible anomaly (excessive noise, overheating, overflowing fluids)
- pay particular attention to the safety devices
- use all documentation provided by the manufacturer such as operating manual, schematics, electrical diagrams and so on)

Only use proper and qualified tools for maintenance as well as original spare parts



### 6.1 • PERIODICAL LUBRICATION

#### GREASING

Use high quality mineral-base grease with anti-oxidation, anti-corrosion and anti-foam additives.

As complimentary information, we list hereafter some recommended type of greases:

CASTROL.....SPHEEROL  
IP.....ATHESIA EP  
CHEVRON.....DURALIT  
BP.....ALVANIA EP  
MOBIL.....MOBILUX EP  
ESSO.....BEALON EP

**DO NOT OVERGREASE!** An excessive quantity of grease can cause an overheating of the bearings.

Grease lubrication intervals (actual operation hours).

First change	Following	Max. durations
300 hours	3000 hours	1 year

Unfavourable working conditions, such as a high room temperature, a high air humidity, dusty air, an aggressive industrial atmosphere etc., make it necessary to service the bearings more often; in particular cases, they will need to be washed and re-greased (with new grease).

Before substituting the grease brand, completely remove the old grease (fig. 36). To assure a proper substitution, request technical assistance for this maintenance, if required.

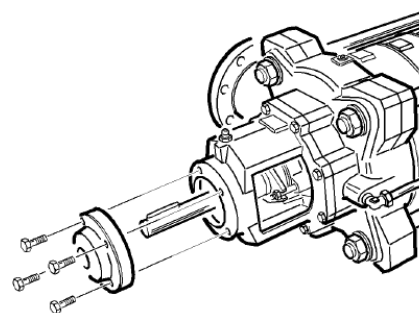


Fig.36

## 6. MAINTENANCE

### OIL LUBRICATION (Fig. 37)

Use high quality mineral-base oil with anti-corrosion and anti-foam additives. Hereafter some recommended type of oils:

AGIP .....	Acer 46 - Blasia 68
ESSO .....	Teresso 68
SHELL .....	Tellus Oil 68
MOBIL .....	DTE 15 - DTE 16
IP.....	Hidrus 68
CASTROL.....	HY SPIN VG 46

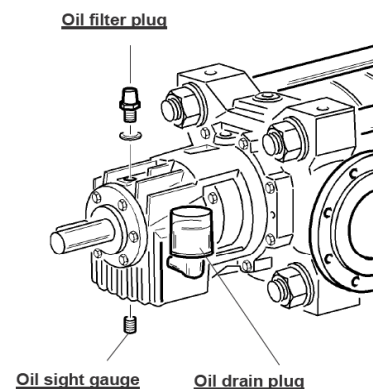
Bearing housings must not be contaminated by any solids or by any other fluid which can damage the bearings.

Check periodically the oil neutralization number and the oxidation grade (please contact the manufacturer for reference values).

The frequency of oil change depends on the operation conditions and on the kind of service. High working pressures usually require frequent oil changes.

Oil lubrication intervals (actual operation hours).

First change	Following	Max. durations
300 hours	3000 hours	6 months



### 6.2 • DISASSEMBLY INSTRUCTIONS

- Shut down the pump unit.
- Close all the gate valves on the delivery and suction piping, and on any other auxiliary connections (flushing, cooling)
- In case of bearing oil lubrication, drain the oil.
- Disconnect the pump ports from the piping and the auxiliary connections.
- Remove the coupling guard.
- Disconnect the feeding cable from the motor.
- Unscrew the screws which fix the pump.
- Move back the motor and uncouple the pump.
- Unscrew the screws which fix the pump.

Fig.37



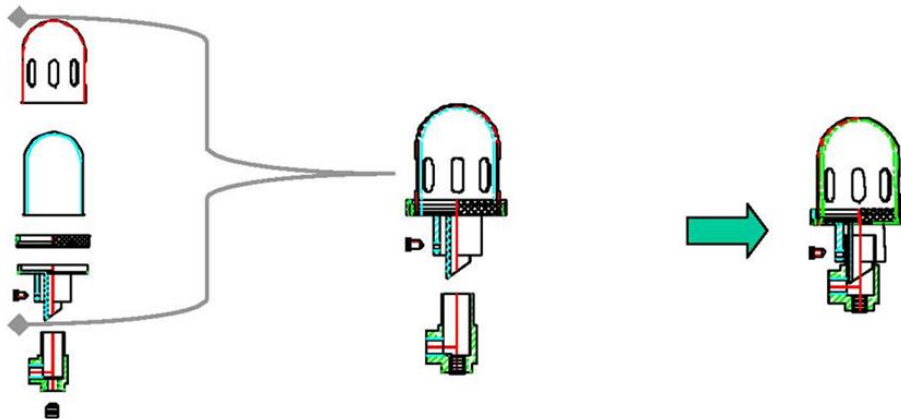
For pump disassembly details, follow manufacturer instructions or request a skilled authorized technician.

**CAUTION! Never force the parts during disassembly or assembly operations!**

Dimensions are mm

Pump Series	Hydraulic	SUCTION IMPELLERS				STAGE IMPELLERS				
		ø nominal	Nominal clearance		max clearance after wear	ø nominal	Nominal clearance		max clearance after wear	
			min	max			min	max		
HP 25	1-2					72	0.3	0.39	0.75	
HP32	2					78	0.3	0.39	0.75	
HP 50	2	105	0.30	0.39	0.80	92	0.30	0.39	0.80	
	4									
	6					118	0.30	0.39		
HP80	2	118	0.30	0.39	0.80		0.30	0.39	0.80	
	4	130	0.30	0.39		118	0.30	0.39		
	6	145	0.30	0.39			0.30	0.39		
HP100	2	148	0.30	0.39	1.00	132	0.30	0.39	1.00	
	4	158	0.30	0.39		138	0.30	0.39		
	6									
HP125	2	192	0.40	0.49	1.20	174	0.40	0.49	1.20	
	4									
	6						195	0.40		0.49
HP150	2	232	0.40	0.50	1.50	208	0.40	0.50	1.50	
	4									
	6					240	0.40	0.50		220
HP250	2					270	0.40	0.50	1.50	
	4									

# OILER ASSEMBLY INSTRUCTION



**CAUTION! Never force the parts during disassembly or assembly operations!**

1.  
Connect “Securoil” to the connection in the bearing housing using a pipe nipple.

2.  
Check the correct alignment of the connection pipe axis (fig. 1).

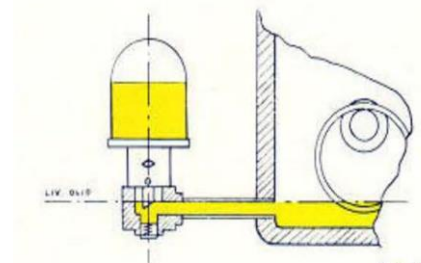


Fig. 1 CORRECT ASSEMBLY

2.1.  
If wrongly assembled, as in the - fig. 2- the oil flow could be interrupted.  
Possible causes of flow interruption are:

- ☐ connection badly machined
- ☐ connection pipe misalignment
- ☐ bearing housing misaligned.

In this case, check again the alignment of the assembly, various parts and, if needed, make a new hole in the bearing housing. Keep the oil flow passages clean to allow easy flowing.

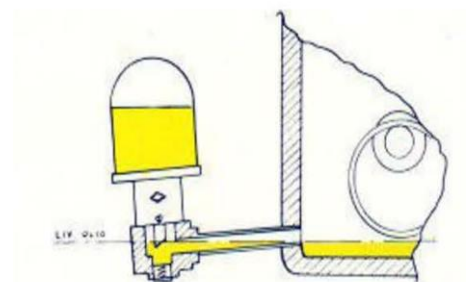
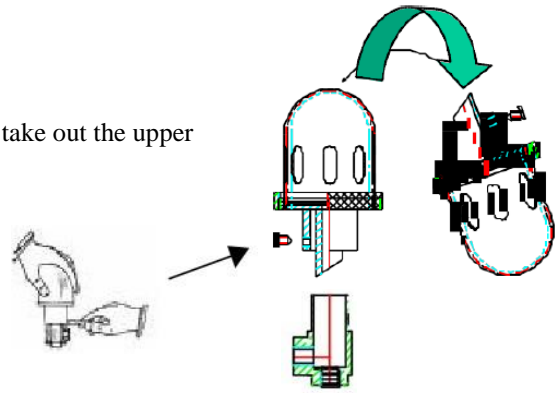


Fig. 2 WRONG ASSEMBLY



3.  
When the lubricator is well aligned (fig. 1) loosen the set screw, take out the upper component and capsize it.

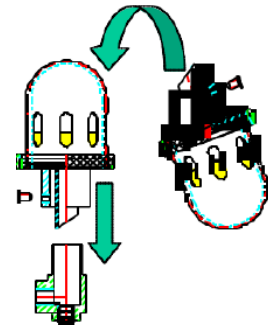


4.  
fill the bowl with oil.

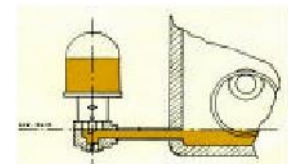
OIL



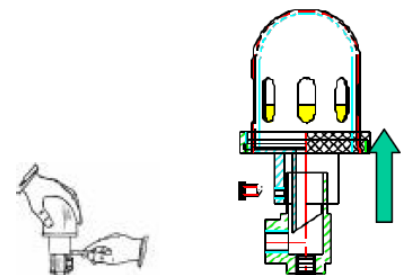
5.  
Capsize the upper component and insert it in the square support, so that the oil will flow into the bearing housing.



This step may have to be repeated to get the level required.  
Usually the oil level is 3-4 mm higher than the external ring of the bearing.



6.  
If the oil is below this level, loosen the set screw, move the upper component up as far as needed and tighten the screw.  
No further setting operation is needed, just make sure that there is always oil in the bowl.



# COOLING KIT INSTALLATION INSTRUCTIONS

## Where required:

- PUMPED LIQUID Temperature is over 100°C
- AMBIENT Temperature is over 35°C (25°C when driven by diesel engine or turbine)

Pump design will be configuration:

OIL LUBRICATION & BEARING HOUSING COOLING KIT AT NON-DRIVE END.

The kit mainly consists of two (2) additional components:

- SELF-PRIMING VOLUMETRIC PUMP: circulator
- STAINLESS STEEL PLATE HEAT EXCHANGER

Pump will be supplied with "circulator" already assembled to the N.D.E. bearing housing, opposite side to coupling, and heat exchanger needs to be assembled, unless otherwise specified.

Unless otherwise specified, the following components are not included in the supply:

- ISOLATING COCK
- CHECK VALVE
- PIPES

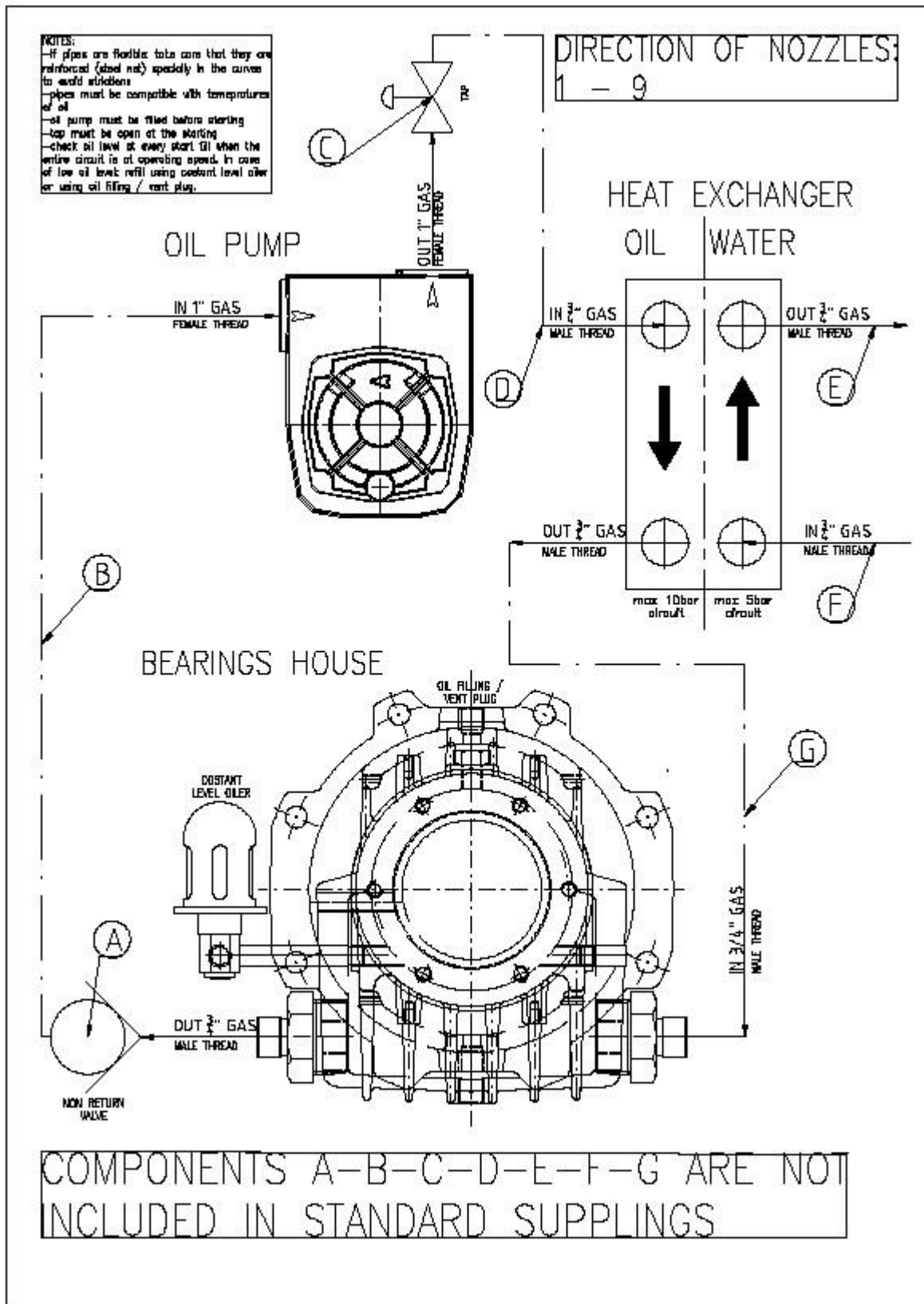
Purchaser/installer is responsible for correctly following these installation instructions.

The manufacturer will be pleased to provide any technical clarification in case of doubts, as well as provide additional detailed instructions and diagrams.

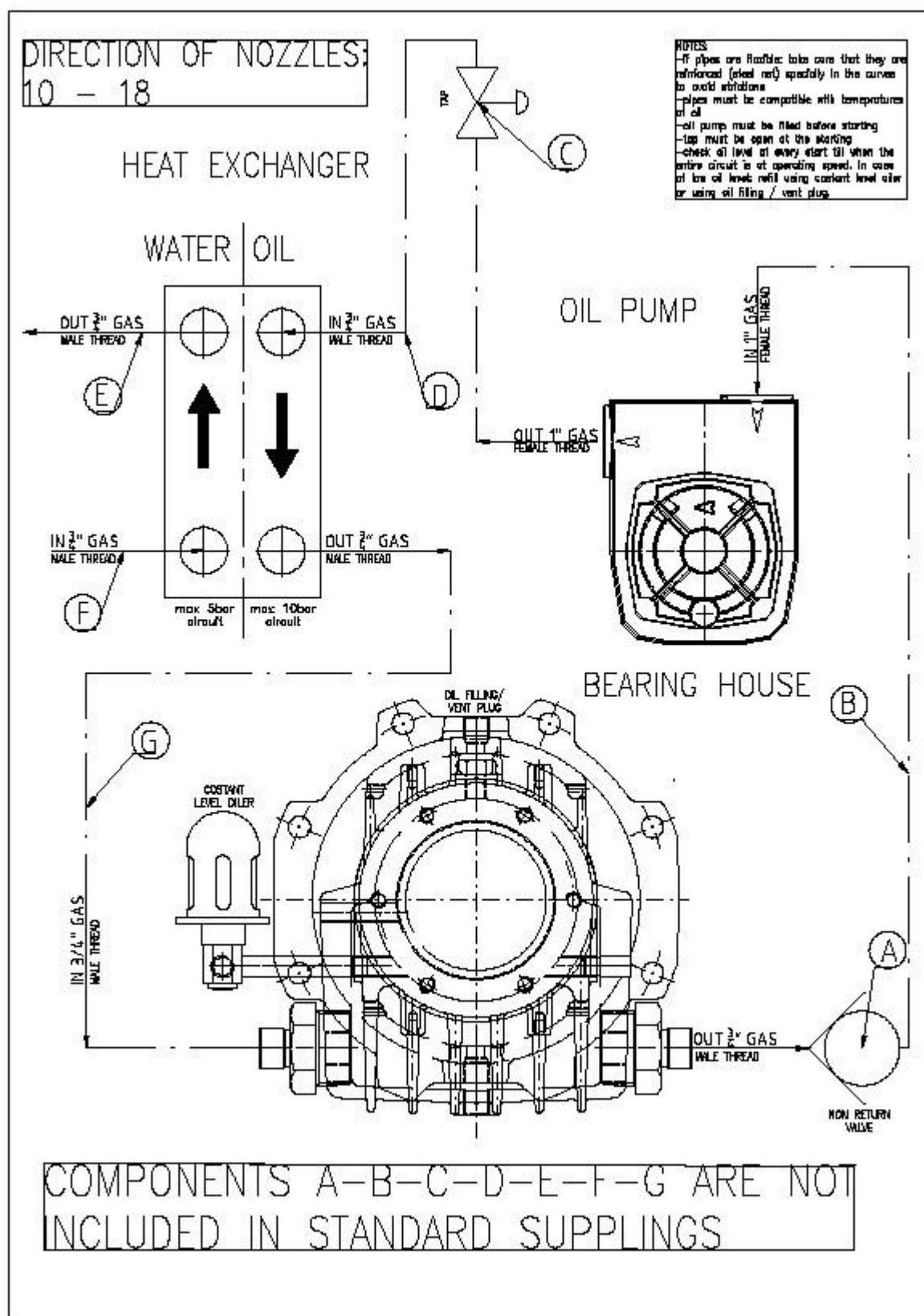
Firstly, please note the following:

- READ THE INSTRUCTIONS ATTACHED TO THIS MANUAL CONCERNING THE HEAT EXCHANGER
- The heat exchanger **MUST BE PLACED BELOW THE OIL LEVEL IN THE BEARINGS.**
- The cooling water supply **MUST** have a minimum pressure of 2.5barG and a maximum pressure of 4barG. It must be clean water without solids in suspension, with a salinity below 0.05%, a maximum hardness of about 2.5mmol/l and a **MAXIMUM TEMPERATURE** of 20°C (if not, the cooling effect will proportionally decrease). Should the water have a temperature below 0°C, it must be suitably mixed with a percentage of Glycol to prevent it from freezing. However, the coolant fluid must be classified as fluid belonging to group 2, according to Directive 97/23/EC.
- The piping must comply with the maximum oil temperature (normally around 100°C).
- If flexible piping is used it must be the reinforced with wire mesh type, to avoid restrictions especially in the bends.
- If possible, the piping must be as short as possible.
- The oil side circuit connects in the 10 bar part of the heat exchanger, the water side is the 5 bar portion.
- The connections must be made, respectively, in the long side of the heat exchanger and the oil side and water side flux direction is identified by an arrow: the two circuits are "COUNTER- CURRENT"
- Make sure that the heat exchanger is located in an accessible and clean place: it must be secured to a frame that allows its connection and maintenance.
- The connection diagram is given in the figure "DIAGRAM 1".
- The kit requires the following precautions when commissioned and at every restart in general:
- Filling the oil support to which it is connected with oil up to the prescribed level [see chap 4.7] Filling of circulator body with the same type of oil
- Open the oil side circuit delivery cock before start-up.
- Upon start-up, top-up with oil through the constant level oiler or breather cap, until it remains constant. (The entire system requires a few minutes to get fully operational; until it is all "filled" with lubricant, it is possible that the level in the support drops).
- The bearings will quickly heat-up and then stabilise at a temperature level to then decrease to a lower temperature after a few hours of operation. The temperature **MUST** be kept below the maximum permissible temperature by adjusting the water flow in the heat exchanger [see CHAP. 5.1]. Regularly monitor the temperature until it is stable. The cooling system was generously dimensioned to allow full control of the temperature by adjusting the cooling water inflow. Please note that an excessively low temperature is not recommended. Therefore, stay at a temperature that varies from a minimum of 50°C to the maximum indicated in CHAP 5.1.

## SCHEMATIC FOR CW PUMP ROTATION



## SCHEMATIC FOR CCW PUMP ROTATION



## 6. MAINTENANCE

### 6.3 • INSTRUCTIONS FOR REASSEMBLY

#### CAUTION!

For a correct reassembly, take care of the following:

- plastic or wooden hammers are recommended. If you use steel hammers, use a wooden drift with it.
- bearings are fixed by retaining rings, so they can be assembled without any problems.
- do not damage the mechanical seals during assembling, handle with care.

Then proceed as in fig. 38:

- before reassembly, smear graphite grease or equivalent products on all components, including coupling bolts.
- check whether O-rings and the radial seal rings are damaged.
- replace the flat gaskets with other similar gaskets of same thickness.
- reassemble the single parts according to the correct sequence following the reverse order of disassembly sequence.
- make sure that the wear rings clearance between the diffusers and the impellers is not too much and does not exceed the allowable tolerances; otherwise, replace the wear rings before reassembling.
- As for wear rings clearance between the diffusers and the impellers (fig.39), please refer to cap.6 MAINTENANCE for cast iron and well as stainless steel pumps

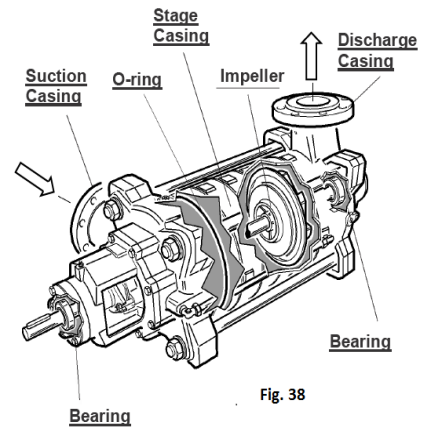


Fig. 38

#### PUMP OVERHAUL

The pumps must be periodically disassembled to check their components; if they are damaged, they need to be replaced with original spare parts. Periodically check possible for fluid or lubricant leakages from the flange joints and from the oil retaining rings. The O-rings can be reused only if they are in good condition. Check the internal parts of the pump for sediment and scale build up. Remove, using water or suitable solvent in conjunction with soft scraper or brush. Also make sure that the cooling chamber and pipe work are free from scale build up and clean. Check the seals.

#### SHAFT SEAL (Fig. 39)

Check before assembling the new packing seals; if they are scuffed or worn, clean the packing box casing and the shaft protection sleeve with an abrasive cloth. Ask the manufacturer for a new packing set.

Cut the packing at 45° as per drawing. Insert the first packing ring into the packing box. Each subsequent packing must have the scarf joint displaced by 90° to the adjacent packing. This will minimise the direct leakage path, as only every 5th packing is in line.

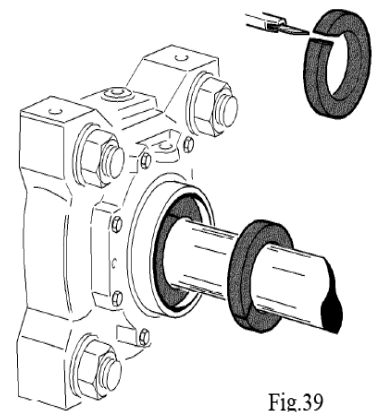
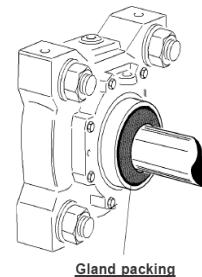
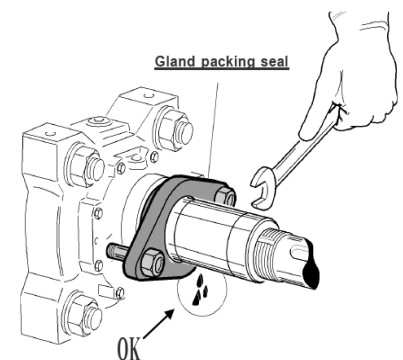


Fig.39



The packing box nuts, must be uniformly and evenly tightened so that the rotor shaft can turn easily. Before starting, when the pump is full of water, both packing sets should leak slightly. After the pump has run for approximately 10 minutes, each packing assembly should be evenly re-tightened to reduce the leakage rate to a minimum.

Please note however, that there should be a slight leak from each packing assembly at the minimum operating pressure. This will ensure that the packings do not overheat and fail.





## 6. MAINTENANCE

### MECHANICAL SEAL (fig. 40)

Before reassembly, clean the shaft sleeve, remove possible scuffing and scratches by smoothing with an extra fine emery cloth. Should the scuffing and scratches still be evident, replace the sleeve. Clean the shaft, the counter-ring casing and remove all scale build up.

Reassemble following the reverse order of disassembly sequence.

For mechanical seal assembly, please follow these rules:

- take care and keep clean
- avoid damaging the sliding surfaces and the O-rings
- while assembling the seal, it is possible to reduce the friction by moistening with water, white spirit or Vaseline on the shaft protection sleeve.

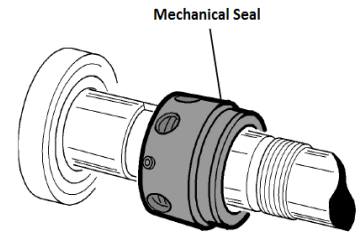


Fig.40

### 6.4 • PERIODIC MAINTENANCE

**1 MONTH AFTER** the installation, make sure that the fastening bolts are correctly locked to the base fig. 41 and also check the suitability of connecting bolts to the flanges; furthermore, check the correct operation of the electric motor and pump assembly, including power input and gland packing leakage.

#### EVERY 12 MONTHS (Fig.42)

- check visually every component to ensure that there are no faults or problems.
- an electrician must check the electric system, included the motor, cables, fluid level shutdowns, electric contacts and panel.
- it is advisable to check the electric motor to pump coupling.
- check the seals
- check the lubrication (oil and grease, see point 6.1).

**⚠ CAUTION!** If the pump is going to be idle for long periods, it should be run at least once a month, to clear scale build up and avoid rotor locking up.

Pump overhaul or repair should be done by the manufacturer or by his authorized workshop, following assembly and disassembly manuals and respective lists of spare parts.

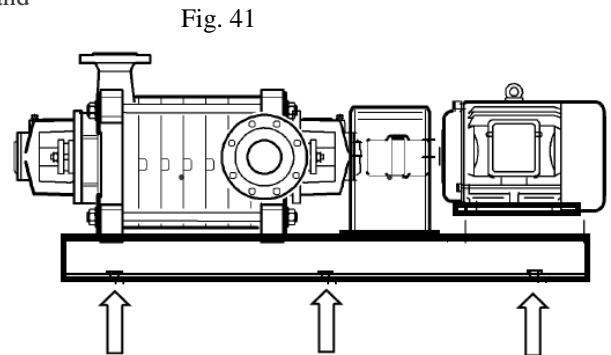


Fig. 41

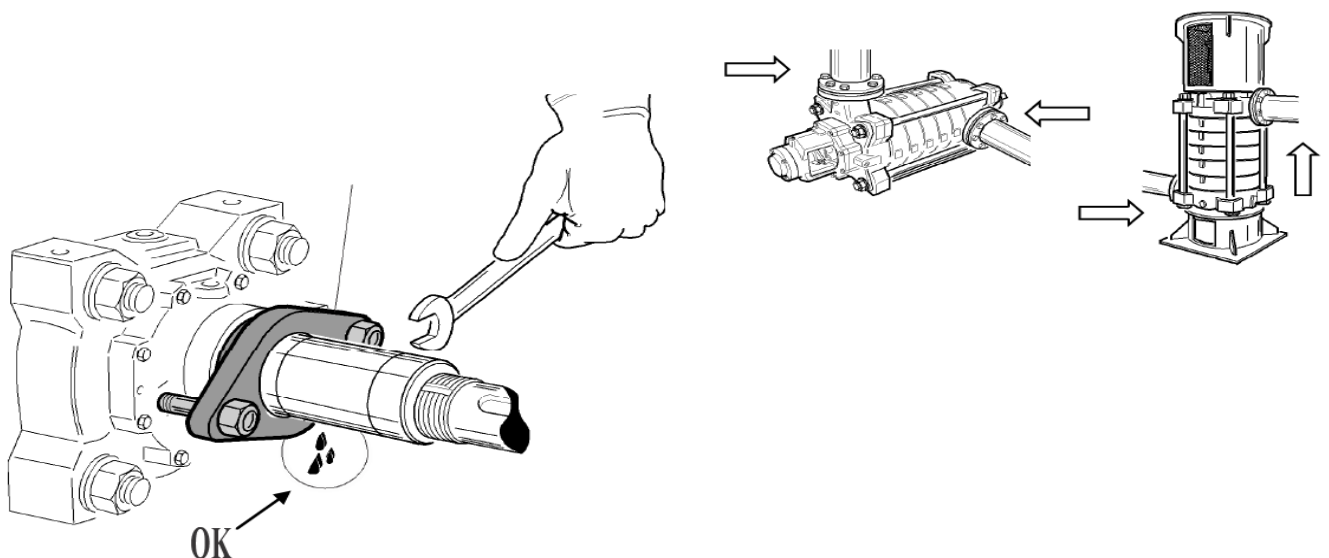


Fig. 42

## 7. PROBLEMS, CAUSES AND SOLUTIONS

### • TROUBLE SHOOTING TABLE

The search for the failures and for the possible repair interventions must comply with all the safety precautions reported in chapter 6 “MAINTENANCE” and in chapter 3 “SAFETY”.

PROBLEMS	PROBABLE CAUSES	POSSIBLE SOLUTIONS
1 - The pump set does not start .....	A) - No mains voltage ..... B) - Motor or supply cable short circuit C) - Impeller blocked because of settlements or foreign bodies (check rotation in the manual). D) - Impeller blocked for wrong reassembly (check rotation in the manual).	A) - Provide electric input. B) - Repair the motor or replace the cable (call in the electrician). C) - Disassemble the pump and remove any settlements from the wear rings and from the impeller. D) - Disassemble the pump and reassemble the rotor correctly.
2 - The pump delivers no fluid .....	A) - Wrong rotation direction ..... B) - Too low rotation speed ..... C) - Cavitation ..... D) - Clogged piping ..... E) - Obstructed impeller ..... F) - Obstructed foot valve or filters.....	A) - For three phase motors, change the phases; for single phase motors, change type of connections. B) - Check supply frequency and increase the speed (combustion engines). C) - Check suction height. Overhaul the installation. D) - Check and clean. E) - Disassemble and clean. F) - Check and clean.
3 - The pump delivers an insufficient capacity.	A) - Wrong rotation direction ..... B) - Too low rotation speed ..... C) - Cavitation ..... D) - Clogged piping ..... E) - Obstructed impeller ..... F) - Obstructed foot valve or filters ..... G) - Air in the piping ..... H) - Required head of installation higher than the project head. I) - Worn wear rings.....	A) - For three phase motors, change the phases; for single phase motors, change type of connections. B) - Check supply frequency and increase the speed (combustion engines). C) - Check suction height Overhaul the installation. D) - Check and clean. E) - Disassemble and clean. F) - Check and clean. G) - Deaerate. H) - Overhaul the installation Increase the speed (combustion engines). Increase impeller diameter. I) - Check and replace.
4 - The electro pump vibrates and is noisy.	A) - Air in the pump ..... B) - Water with a high content of air (air entrance from the suction piping). C) - Cavitation ..... D) - Obstructed impeller ..... E) - Misaligned coupling ..... F) - Too heavy piping loads on the pumps. G) - Worn pump bearings ..... H) - Worn motor bearing ..... I) - Unbalanced impeller .....	A) - Vent the air. B) - Check the suction piping. C) - Check suction height D) - Disassemble and clean. E) - Check and align. F) - Check flanges alignment, piping fixing and fastening to the basement. G) - Check and replace. H) - Check and replace. I) - Check and balance.

## 7. PROBLEMS, CAUSES AND SOLUTIONS

PROBLEMS	PROBABLE CAUSES	POSSIBLE SOLUTIONS
5 - The seal is leaking.	A) - Misaligned coupling ..... B) - Damaged seals ..... C) - Unsuitable seal materials ..... D) - Wrong sleeve ..... E) - Wrong reassembly .....	A) - Check and align. B) - Check and replace. C) - Check and replace. D) - Check and replace. E) - Check and correct.
6 - Pump bearing overheating.	A) - Fluid viscosity higher than that provided. B) - Misaligned coupling ..... C) - Overload on the pump piping .....  D) - Worn pump bearings ..... E) - Wrong reassembly ..... F) - Too low capacity ..... G) - Lack of lubricant or unsuitable type. H) - Too much grease .....	A) - Check viscosity with pump in standard conditions. B) - Check and align. C) - Check flanges alignment, pipes fixing and base fastening. D) - Check and replace. E) - Check and correct. F) - Increase. G) - Check and add. H) - Check and remove.
7 - Bearing wear.	A) - Misaligned coupling ..... B) - Overload on the pump piping .....  C) - Wrong reassembly ..... D) - Too low capacity ..... E) - Lack of lubricant or unsuitable type.	A) - Check and align. B) - Check flange alignment, pipe fixing and base fastening. C) - Check and correct. D) - Increase E) - Check and add
8 - Motor is overloaded.	A) - Required head of installation higher than the project head. B) - Fluid viscosity higher than ..... that provided. C) - Specific weight higher than the project weight. D) - Low voltage .....	A) - Overhaul the installation. Decrease the speed (combustion engines). Reduce impeller diameter B) - Check viscosity with pump in standard conditions. C) - Choke the check valve. D) - Adjust.

## 8. SET DISASSEMBLY



### CAUTION!

PUMP AND PUMPSET DISASSEMBLY MUST BE DONE IN COMPLIANCE WITH ALL SAFETY REGULATIONS SHOWN IN CHAPTER 3

Pump disassembly as well as pump assembly, must be carried out by skilled and authorized technicians.

Metal parts can be disposed as scrap iron.

In any case, all the materials rising for disposal must be disposed of in compliance with the local laws as applicable in the country where the pump is installed.



## 9. SPARE PARTS

Pump overhaul and repair should be done by the manufacturer or by authorized workshop following the assembling and disassembling manuals and to the spare parts lists.

Spare parts replacement and repair service must be in accordance with all the safety precautions indicated in chapter 6 “MAINTENANCE” and chapter 3 “SAFETY”.

### • ORDERING SPARE PARTS

Order spare parts as follows:

- 
- specify the serial numbers both of the motor and of the respective pump.
  - specify the manufacturing year.
  - specify the required part code reference: Item number  
(See tables in the technical catalogues or in the exploded views)
  - specify the required quantity.

Enquires must be addressed to the Manufacturer or to the authorized distributor.

Enquires must be addressed to **PREMIER FLUID SYSTEMS INC.**  
**4161 Morris Drive, Unit 5**  
**Burlington, Ontario Canada L7L 5L5**  
**905-637-2611 – Fax: 905-333-4722**  
**info@pfspumps.com \* www.pfspumps.com**