MULTI STAGE HIGH PRESSURE CENTRIFUGAL PUMPS

TYPE MS-E

INSTRUCTIONS FOR THE INSTALLATION, OPERATION AND MAINTENANCE

1. Preliminary remarks

Each pump is subjected to a full performance test before leaving our works. By handling correctly it will always performs satisfactorily if operation will be according following instructions.

In order to identify transportation damage in time, check that all shipments are complete and intact. In case of loss or damage contact us and the forwarding agency immediately.

Stuffing box packing is furnished in the box of fittings which accompanies the pump. For putting packing refer to the special instructions for packing.

The pumps must be protected against damage and corrosion, i.e. dampness and dirt, untill it is time for them to be installed.

If the pump is installed a long time before it is put to use, it should be protected against corrosion and dirt. The suction and delivery branches and connected piping should be covered or closed.

If the pumps are filled with water before starting (e.g for the pressure test) they should remain filled. If there is danger of frost, the pump room should be heated.

If the pump is to be idle for an extended period it is considered good practice to rotate the shaft every few weeks. For the above cases we can provide special preservations at extra cost.

We guarantee the pumps according to our conditions of sale, provided they operate under the conditions specifies in our confirmation of order and the installation instructions have been followed. During the guarantee period the pump may be dismantled only with our written agreement or by one of our technicians.

For subsequent repairs we recommend returning the pump to our works or calling one of our technicians, if suitable qualified personnel are not available on site.

The plate of each pump indicates pump type, serial number and performance datas.

Serial number serves to identify the pump.

Please indicate it when ordering spare parts or making enquiries.

2. Description

2.1. The pump type MS are multi stage vertical splinted. Shaft sealing with packing or mechanical seals.

2.2 Applications

In waterworks, in irrigations and sprinkler installations.

As a recirculating pump for cooling and heating water, and also as a fire fighting, boiler feed or pressure boosting pump.

The pumps are used for handling clean or only lightly contaminated media, for oils up to 20° Engler, and for non-aggressive liquids. Liquid termperature up to 100° C for packing and up to 140° C for mechanical seal.

For more details see our pamphlet 22030 - 2 and 22040 - 2

3. Installation

3.1 The correct and carefully installation ensure long life without troubles.

3.2 We are not liable for any damages caused by failure to comply with the provision of this instruction manual.

3.3 Horizontal pumps From H

3.3.1 Driven shaft end can be on discharge or suction or both sides.

For driving on discharge side (standard design) the pump rotate in clockwise direction when we are looking at shaft end. For driving on the suction side the pump rotate in the opposite direction.

3.2.2 The driving is permitted only through a flexible coupling which trasmit only torsional moment and not radial or axial forces. Driving through gear wheels or chains or belts is not permitted. For these cases we recommend the driving through a flexible coupling and intermediate shaft.

3.3.3 The concrete base should be ready in time so that it whould be dry in order pumping unit to be installed.

It must be 100 mm longer and 200 mm larger than the base plate.

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Concrete foundations built up from solid ground are the most satisfactory. The location and the depth of the holes for the foundation bolts are determined from the installation drawing.

The unit should be supported over the foundation by short strips of steel plate close to the foudation bolts allowing a space of 20 to 30 mm between the bottom of the base plate and the top of the foundation for grouting. The strips under the base plate should be adjusted until the base plate is level.

During the leveling work accurate alignment of the coupling halves must be maintained. A straight edge should be placed across the top and sides of the coupling and at the same time the faces of the coupling halves should be checked with a tapered thickness gage or with feeler gage.

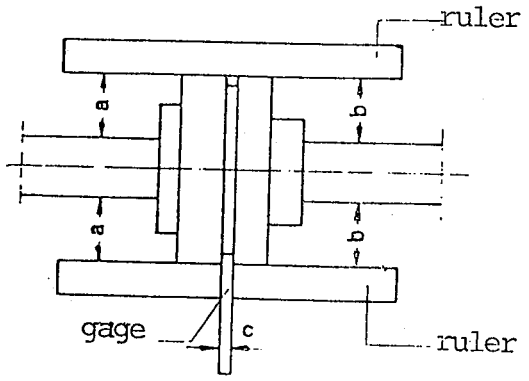

Fig. 1

After the above leveling the base plate is grouted. The usual mixture for grouting is composed of one part pure portland cement and two parts building sand with sufficient water to cause the mixture to flow freely under the base plate when the grout is hard (48 to 72 hours). The foundation bolts should be finally tightened and the coupling halves should be rechecked for alignment.

3.3.4 Bearings are filled with grease before shipment.

3.4 Vertical pumps From V

3.4.1 The pump rotate in clockwise direction when we are looking at the driven shaft end.

The height of the foundation block must be 60 to 600 mm depending on the place of the pipings.

The dimensions of foundation bolts are determined from the installation drawing.

3.5 Piping

3.5.1 Piping should be connected to the pump after the hardering of the grout and the leveling of the unit. All piping should be supported indepently of the pump. The piping should always «line up» naturally with the pumps flanges. Never draw the piping into place by use of force at the flanged suction and discharge connections of the pump as thus may impose dangerous strains on the unit and cause misalignment between pump and driver.

When handling liquids at high temperatures, it is suggested that expansion loops or joints be properly installed in suction and or discharge lines so that linear expansion of the piping will not draw the pump our of alignment.

3.5.2 Suction piping

The suction piping should be as short and direct as possible and never be of smaller diameter than the pump suction. Liquid speed should be lower than 2m/sec. Avoid all unnecessary elbows and fittings as they increase the friction losses in the piping.

Also avoid air pocked.

Suction piping diameter should be as larger as long is the suction piping and air tight (hydraulic test). The horizontal parts should be at least 1% inclined.

Reducer, if used should be ecentric sloping side down.

A foot valve should be installed at the intake of the suction pipe to allow priming. The foot valve should be installed at least 20 cm above the bottom of the well and be adequately immersed to avoid air being drawn into the circuit.

The size of the foot valve should be such that the flow velocity does not exceed 1,5 m/sec for sizes up to 125 MM and 2,0 m/sec for bigger sizes.

Do not install a sluice valve in the suction piping. For flooded suction a foot valve is not required, but a sluice valve should be installed in the intake piping as near the pump as possible.

The values of the NPSH of the performance curves are valid for water temperature 180 C and air pressure 1 bar.

For other values see special installation instructions or refer to the factory.

3.5 3 Discarge piping

The diameter of the delivery piping should be at least equal to discharge pump flange. Larger diameter should be used for relatively long piping to avoid excessive friction losses.

If the discharge head is more than 10 m and long piping it is essential to insert a non - return valve with by - pass to protect pump and foot valve from the effect of water hammer, which might occur if the pump is shut dawn suddenly. To allow adjustment of pump output, a discharge sluice valve should be fitted directly behind the delivery branch.

The check valve should be located between sluice valve and the pump to permit inspection of it.

Avoid air pocked on the discharge piping. Otherwise the piping should be provided with airing valves.

3.6 Finally alignment

After connection of suction and discharge piping, alignment should be rechecked. Rotate pump shaft several times by hand to be sure there is no binding and that all parts are free.

4. Starting

4.1 Pump should rotates in the right direction. Before coupling is connected the motor should be wired and the direction of rotation checked. By wrong direction charge two wires.

4.2 Stuffing box

4,2.1 Packing

Before packing make sure box is clean and contains no foreign materials. Packing are furnished in the box of fitting which accompanies the pumps.

Each ring should be installed separetely. Firmly seat each ring. Stagger joints in each ring 90°. Tighting of the gland must be evently but not tight.

The stuffing box should be tightened so that it drips slightly

If it is tightened too much, the pump will become overheated power consumption will rise and the shaft will wear more quickly.

4.2.2. Mechanical seals

When mechanical seals are furnished they are installed and adjusted at the factory. There are special instructions for the mechanical seals.

4.3 Priming

4.3.1. Before starting the pump must always be fully primed and the suction pipe full of liquid.

Open the air cooks and fill the pump and suction pipe with water until all air is expelled and water emerges from the vent cock.

During this operation the pump shaft should be turned by land.

Then close the air cocks and start the pump.

Before starting against a low head, the discharge sluice valve must be closed to reduce the current taken by the motor.

5. Maintenance

5.1 Check power consumption, bearing temperature and smooth running regularly. Note the gage readings - and flow meter, if fitted and compare them to later readings taken under the same conditions (open valve, same intake water level, same discharge water level). A significant deviation indicates the need for a general inspection.

Periodically check bearing temperature It should not exceed 60° C.

5.2 Periodically inspect stuffing box to see that there is sufficient leakage to lubricate the packing and maintain a cool box.

Never draw up packing so that the stuffing box heats as this will cause damage to both packing and sleeve. Always draw up gland evenly and when pump is running.

If after adjusting several times the packing rings have been pushed together to the extent that they are touching the gland remove the old packing rings and clean the packing chamber. If there are bad score marks on the shaft or shaft sleeve in the packing chamber replace the damaged part. When a new packing is filted use rings which fit exactly. The joints of the rings should touch each other lightly. The joints in successive rings should be offset to each other.

Replacement packings can be purchased at our works.

5.3 Mechanical seal needs no supervision or adjustment.

In case of damage, it has to be replaced. Its operation life is high if the water is clean, while on the contrary, i.e in dirty water is shorter.

Therefore, in case of dirty water, sealing pipes have to be frequently checked and cleaned.

Mechanical seal is a high accuracy component, and as a matter of fact it should be taken in mind when it would need replacement.

Surfaces in contact, must be cleaned with a soft piece of cloth

5.4 The bearing of electromotors supplied by us, have been filled with grease adequate for normarly 20.000 operation hours.

Should untimely or excessive heating occured, (50° over ambient temperature) lubrication has to be checked.

Only LITHIUM GREASE should be used for bearing's lubrication (DRIP POINT 180° C).

Lubrication has to be carried out only by skilled technician

5.5 If there is danger of frost empty the pump completely

5.6 By order of spare parts please give the part and the pump serial number.

5.7 Horizontal pumps. Form H

Ball bearings of new pumps are lubricated for approx. 4000 hours of operation. This period is valid for speed 1450 RPM and must be increased by 50% for 950 RPM and reduced by 50% for 2900 RPM.

Each repacking needs 10 - 15 gr grease for each bearing.

Use only lithium good quality, base grease according to DIN 51825 and the following specifications.

Anti - corrosion additives. Consistency class 2. Worked penetration 265 to 295. Drip point approx. 190° C. Water indissoluble. Temperature range — 40° C to 120°C. For higher ambient temperatures a similar grease of consistency class 3 may be used.

Excessive lubrication of the bearings causes heat accumulation and should be avoided. After grease has been refilled several times or in the case of heat acumulation caused by excessive lubrication remove the bearing cover and remove the superfuous grease.

5.8 Vertical pumps. Form V

Periodically check for loosening of the coupling screws and the coupling fastening screws on the shafts.

By assembly and before fastening the coupling on the motor shaft take care that the impeller are on the right place.

6. Faults — Causes — Remedies

	Cause	Remedy
6.1 Pump not hantling full capacity or not pumping at all :	6.1.1 Water level in sump too low, air in pump casing	Raise water level Vent pump
	6.1.2 Suction or delivery gate valve partly or completely closed	Open valve
	6.1.3 Blockage in pipework, fittings or pump	Remove obstruction
	6.1.4 Wrong rotation	Reverse pump rotation
	6.1.5 Delivery head higher than anticipated or excessive friction losses in pipework	Lower discharge level, increase pipework diameter or fit larger impeller to works
	6.1.6 Worn impeller and/or diffuser	Fit replacement parts
	6.1.7 Pump speed too low due to drop in frequency or supply voltage	Check electricity supply
6.2 Pump output in excess of calculated capacity :	6.2.1 Actual total head below figures stated in order / acknowledgement	Do not let water level rise too high, raise discharge level, cut pump impeller (refer to works)
	6.2.2 Pump speed to high	Check motor for correct speed, cut impeller (refer to works)
6.3 Motor overloaded, starter trips :	6.3.1 Quantity too great, see 9.2	See 6.2
	6.3.2 Worm impeller, diffuser or bearings	Replace worn parts
	6.3.3 Wrong pump unit leveling	Check leveling
	6.3.4 Pump or column piping strained	Check and correct alignment
	6.3.5 Pump gland too tight	Adjust gland
	6.3.6 Motor working on two phases only	Check electricity supply to motor
	6.3.7 Specific gravity of liquid handled higher than stated in order acknowledgement	Fit larger motor (refer to order/works)

DRAKOS-POLEMIS INC
Pump Manufacturers
Kryoneri - Attiki, Tel. 30 01-813.44.11/15, Telex 21.6929
P.O. BOX 24, Kifissia, Athens, Greece

MS-E / FORM V PUMPING UNITS

1. INSTRUCTIONS FOR MOTOR ASSEMBLY AND DISASSEMBLY

MS-E pumping units are shipped assembled from our factory.

In case of assembly and the consequent disassembly the motor is put back in place and secured with the locking screws with no adjustment required.

In case of motor replacement the new motor should have the same basic dimensions as the old one e.g. the flange dimensions, shaft-end diameter as well as shaft-end distance from flange face.

Otherwise a new shaft adjustment (see section 2) or even replacement of the motor adapter will be needed.

2. INITIAL COUPLING OF PUMP AND MOTOR

2.1. On the shaft there is a conical groove machined for the locking screw to fit through.

The two coupling parts should also have the corresponding threaded holes.

The position of the hole on that part of the coupling which is on the pump side has been determined in such a way as to ensure that the coupling face is flush with the shaft-end face (see Fig. 1)

2.2. When assembling the pump that part of the coupling on the pump side is locked in place with the locking screw.

2.3. Install motor adapter and secure with the corresponding bolts.

Measure distances H_1 and H_3 (see Fig. 1) which correspond to the lowest and highest shaft position in the pump (namely the impellers rest on the lowest and highest respectively walls of the stages) and thus determine distance H_2 as :

$$H_2 = \frac{H_1+H_3}{2}$$

2.4. Establish the position of that part of the coupling on the motor side such that in the lowest rotor position the distance from motor flange to coupling face is H_2. Place coupling accordingly and machine the conical groove out on the motor shaft. Install part of coupling on the motor side on motor shaft.

2.5. Install motor and connect the two coupling parts and the motor flange with the motor adapter using the corresponding bolts.

ATTENTION! All contact faces must be clean.

- Be careful not to damage centering seats.

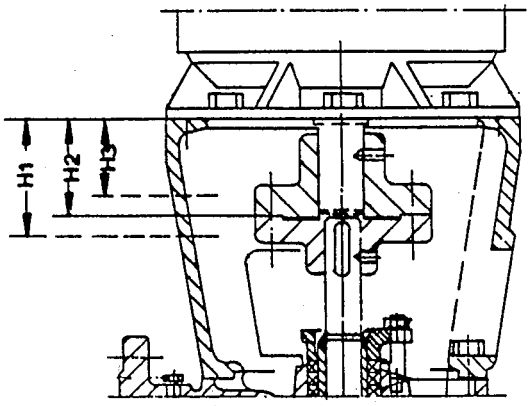

FIG. 1