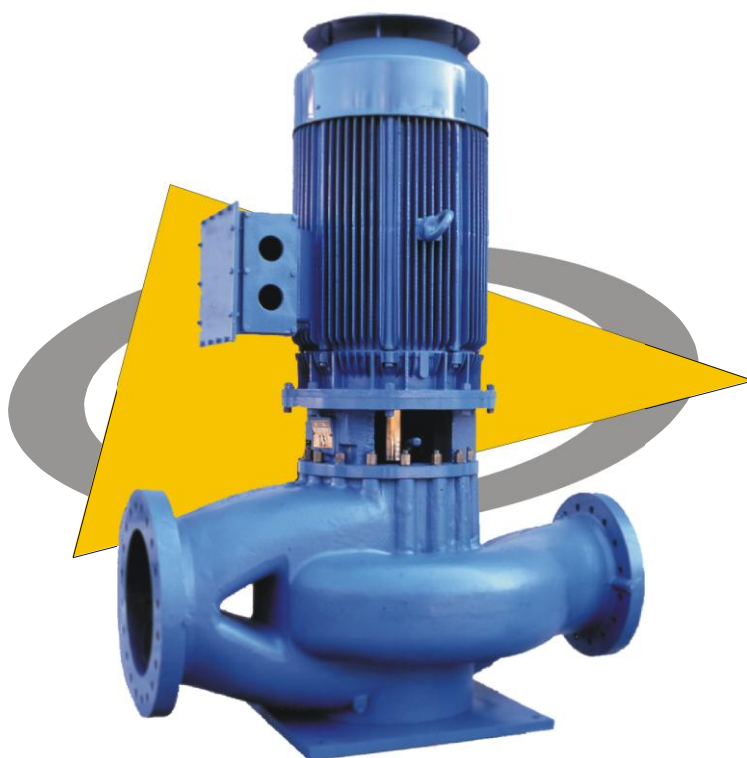




NCL – NCLD SERIES

(SCL open impeller - SCLX vortex impeller)

INSTALLATION, USE AND MAINTENANCE MANUAL



IDROCHEMICAL s.r.l. - Via Doss, 13 - 38076 MADRUZZO - ITALY

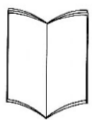
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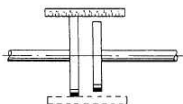


SAFETY NOTICE

Before starting the pump carry out the following operations



Install and operate the pump according to the instruction indicated in this manual



Make sure that the pump lay on a stable foundation and that the alignment between pump and motor is correct before and after fixing baseplate and piping



Fill the bearing house with the recommended oil



Make sure that the coupling guard is correctly and safely installed



Make sure that all the external connections to the pump and to the shaft seal are connected properly

Never operate the pump when dry

1. GENERAL

1.1. GUARANTEE

We undertake to guarantee the construction materials only if the pump is operated according to the conditions of service given in our order confirmation.

The operating and maintenance personnel should study these operating instructions before erecting and commissioning the pump.




In accordance with our terms of delivery we cannot accept responsibility for damages resulting from the failure to follow these instructions.

1.2. TESTING

Before leaving our works all pumps are subjected to performance test. Only pumps in perfect working order which meet the design performance figures leave our works. By observing the following instructions the pump will give trouble-free operation and meet the specified design performance.

1.3. RATING PLATE

The work and item numbers are stamped on the rating plate. When ordering spare parts, you are required to provide these numbers as well the exact description of the part and its number as listed in the component list.

 IDROCHEMICAL <small>38076 LASINO - TN - ITALY - www.idrochemical.com tel.: +39 0461 564359 info@idrochemical.com</small>			
TYPE	<input type="text"/>		
SERIAL No.	<input type="text"/>		
ITEM	<input type="text"/>	YEAR	<input type="text"/>
m ³ /h	<input type="text"/>	H [m]	<input type="text"/>
RPM	<input type="text"/>	kW	<input type="text"/>
 		<input type="text"/>	

2. DESCRIPTION

2.1. CONSTRUCTION

Process-type pump, close coupled to the motor. Removal of motor support nuts allows complete rotating element and motor to be withdrawn upwards for inspection and maintenance, without disturbing connection between pump and pipes. Volute type casing with suction passage designed for minimum NPSH requirements. Ribbed to ensure absence of deformation from pipe stresses and provided with a foot which can be used for supporting heavy motors.

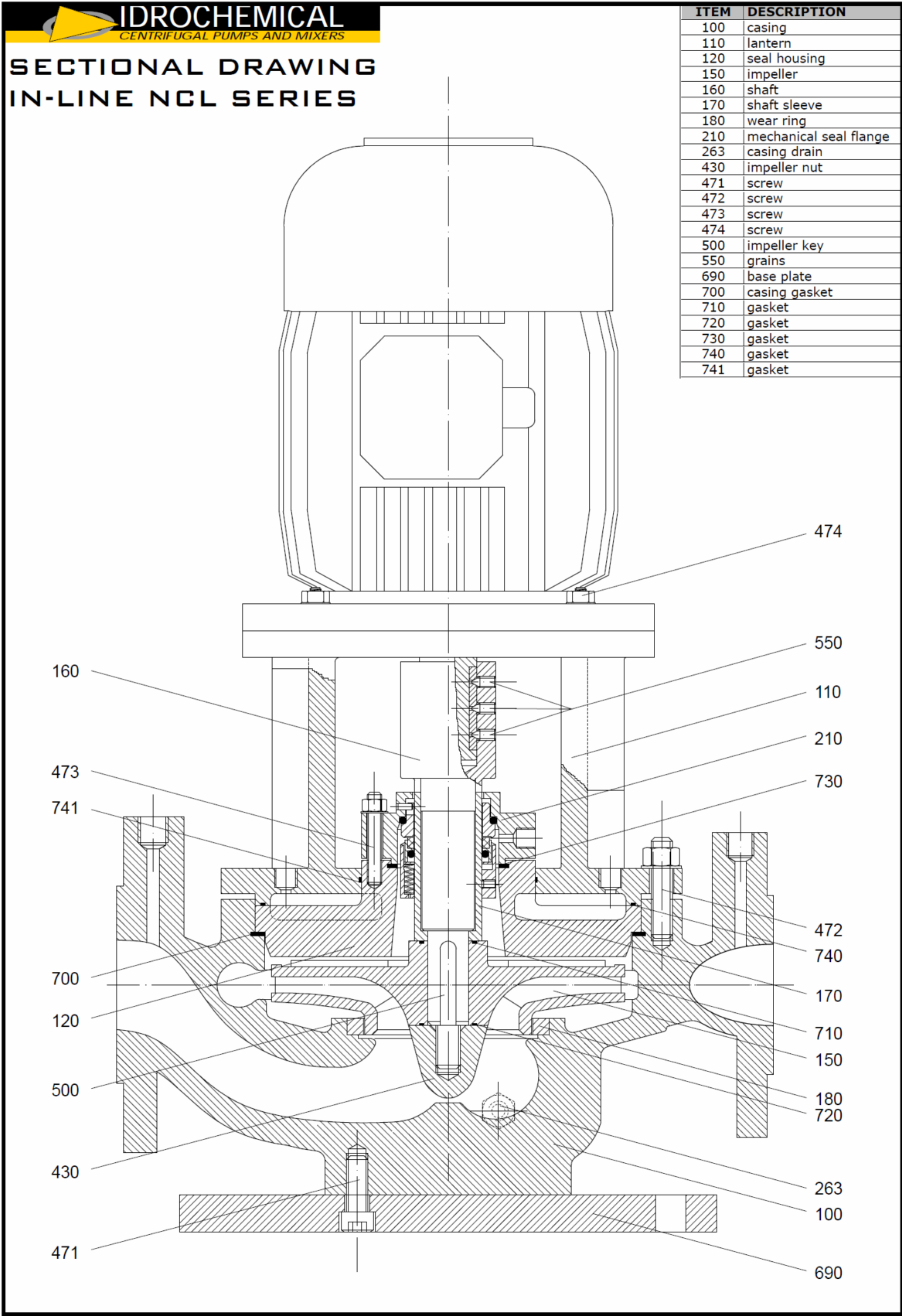
The volute casing is sealed on the discharge side by means of a casing back plate. The impeller is mounted on an overhung shaft.

The axial thrust is hydraulically balanced by means of back vanes on the impeller or balancing holes. The back vanes are left or trimmed according to suction pressure, so that the pressure on the stuffing box/mechanical seal can be balanced.

The clearance between the impeller and wear ring is determined by the temperature of the fluid and the construction materials.

The impeller is located on the shaft by means of parallel key and retained by a cap nut.

To prevent the medium coming into contact with the shaft sealing rings of suitable material are fitted between the impeller nut, impeller, shaft sleeve and flinger ring.



2.2. SHAFT SEALING STUFFING BOX

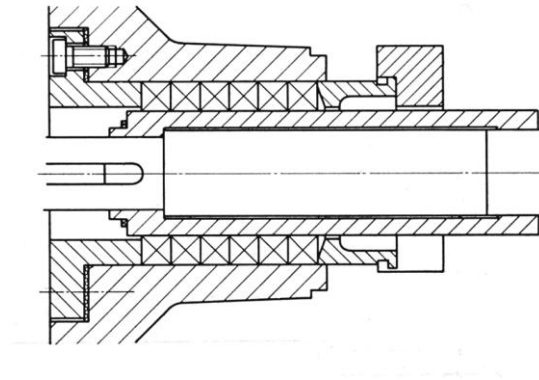
The pump shaft is sealed at the casing back plate by soft stuffing box packing. The stuffing box is normally packed with 4 packing rings and a lantern ring, or 6 packing rings if the lantern is not required.

To repack the stuffing box the lantern ring, gland ring and gland can be removed as the gland is open at the bottom and the lantern and gland rings are split.

Fluid is fed to the lantern ring when:

- The packing must be cooled or lubricated
- The packing must be flushed because the medium contains solids which can damage the packing
- The medium is toxic or pungent so that it does not leak out to the atmosphere
- The medium evaporates at atmospheric pressure

Arrangement a) stuffing box without lantern ring

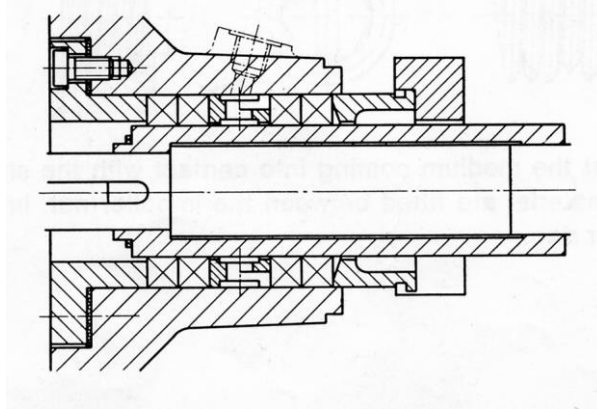


2. DESCRIPTION

The medium should be clean and free from impurities and have a good lubricating properties and a moderate temperature.

The suction pressure must be somewhat greater than the atmospheric pressure so that small quantities of the medium are forced out through the stuffing box packing to ensure that the gland is adequately lubricated.

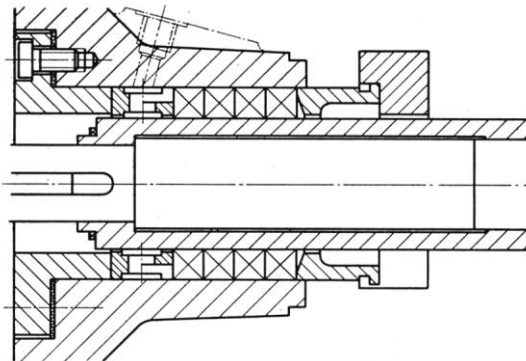
Arrangement b) Stuffing box with lantern ring between 4 packing rings



For fluids with poor lubricating qualities and a high temperature but clean and free from abrasive impurities.

The suction pressure must be less than atmospheric pressure and the sealing fluid must be fed in at a pressure of 1-2 atmospheres greater than the suction pressure. As small quantities can penetrate into the pump, the sealing fluid must be compatible with the pumped fluid.

Arrangement c) Stuffing box with lantern ring at bottom end of stuffing box



This arrangement is recommended for fluids with high temperatures that contain abrasive solids or tend to crystallize

2.3. SHAFT SEALING – MECHANICAL SEALS

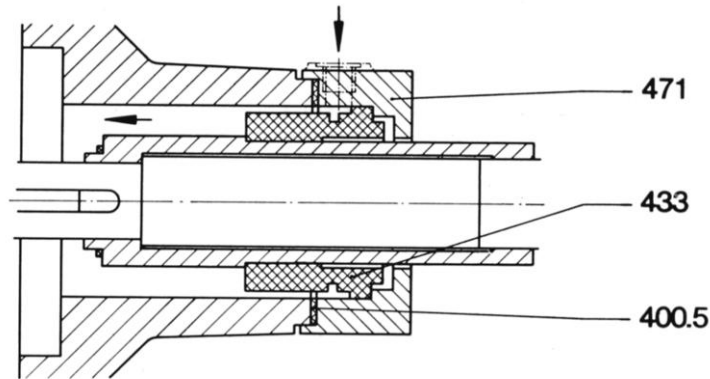
The advantage of a mechanical seal over a stuffing box is that the seal face which is subjected to wear, is at right angles to the surface of the shaft. Sealing takes place in the radial gap between finely lapped stationary and rotating faces which are forced together by a spring. While the pump is in operation the mechanical seal requires no servicing and seals so that no leakage occurs.

2. DESCRIPTION

In a short time a film of fluid penetrates between the seals faces which removes the frictional heat by its circulatory effect. The circulating fluid depends on the liquid pumped. It can be the liquid pumped provided it is clean or a compatible fluid introduced from an external source.

The choice of seal depends on the conditions of service.

Arrangement a) Single, unbalanced mechanical seal.



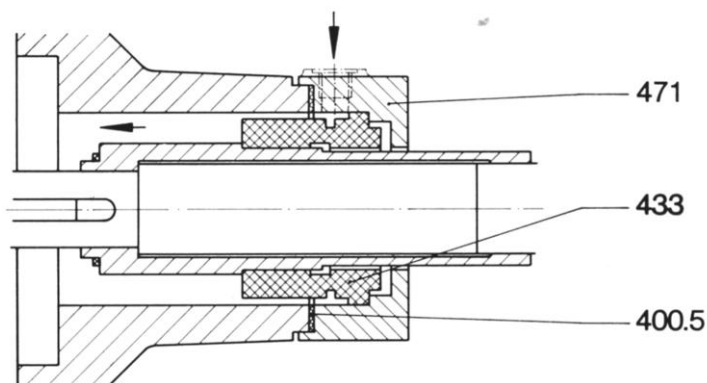
471=MECHANICAL SEAL FLANGE

433=MECHANICAL SEAL

400.5= FLANGE GASKET

This seal can only be employed when the fluid pumped is free from solids and does not crystallise. The maximum permissible stuffing box pressure varies depending on the seal manufacture. The circulating fluid is introduced at the seal faces by means of a recirculation harness from the discharge nozzle to the sealing cover plate and drawn back into the suction side of the pump by means of the impeller back vanes. The required flow of the recirculating fluid depends on the fluid pumped and its temperature and can be regulated by an orifice or a valve in such a way that the temperature at the sealing cover plate is not appreciably higher than elsewhere in the pump.

Arrangement b) Single balanced mechanical seal



471=MECHANICAL SEAL FLANGE

433=MECHANICAL SEAL

400.5= FLANGE GASKET

For higher stuffing box pressures. This seal can also only be employed when the fluid pumped is free from solids and does not crystallise. The temperature of the liquid pumped and the circulating fluid is as described in Arrangement a) The maximum permissible internal pressure at the stuffing box is

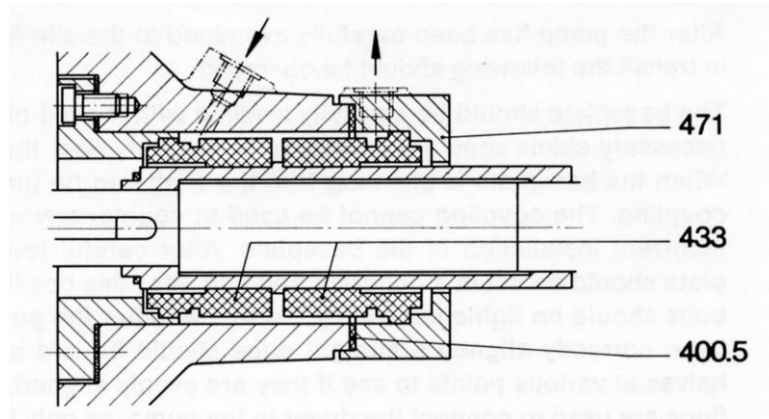
2. DESCRIPTION

limited by the maximum permissible pump pressure.

Arrangement c) Double, unbalanced mechanical seal.

This arrangement is employed when the liquid contains solids, gels or crystallises when cooled, is toxic or is near saturation and the danger of evaporation exists.

A compatible sealing fluid must be chosen as small quantities penetrate into the pump. The sealing fluid is externally introduced into the seal housing through the casing backplate and emerges through a connection in the sealing cover plate. The pressure of the sealing fluid must be 1—2 atmospheres above the internal pressure at the in-board seal face but should not exceed a certain given design pressure. The flow of the sealing fluid can be regulated by an orifice or a valve in such a way that the temperature at the sealing cover plate is not appreciably higher than elsewhere in the pump.

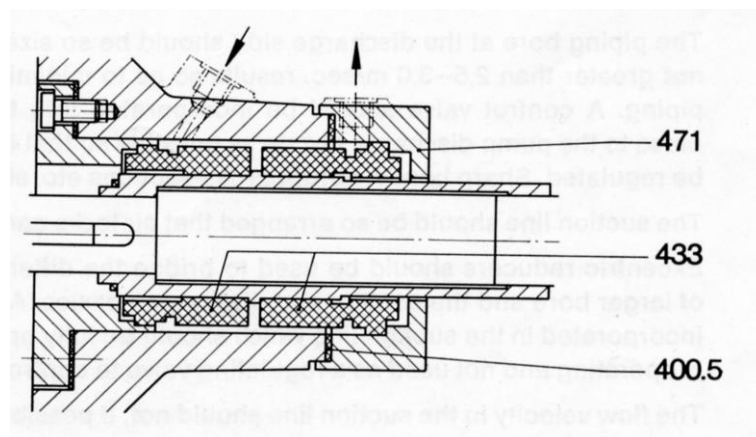


471=MECHANICAL SEAL FLANGE

433=MECHANICAL SEAL

400.5= FLANGE GASKET

Arrangement d) Double mechanical seal balanced at the atmospheric end.



471=MECHANICAL SEAL FLANGE

433=MECHANICAL SEAL

400.5= FLANGE GASKET

3. ERECTION OF THE PUMP

3.1. SETTING UP THE PUMP

After the pump has been carefully examined at the site for possible damage in transit the following should be observed:

The baseplate should be carefully levelled with the aid of a spirit level and if necessary shims should be inserted, particularly near the anchor bolt holes. After careful levelling up the baseplate should be set in a concrete bed and after this has firmly set the anchor bolts should be tightened evenly.

3.2. CONTROL

The direction of rotation of the driver must be the same as that of the pump —see arrow on the casing.

The direction of rotation can be altered by changing the poles of two phases.

3.3. PIPING

The bore of the piping should not be smaller than the respective pump nozzles and free from scale, welding beads and other foreign bodies. The piping should be so laid that it transmits no stress to the flanges and nozzles when connected.

The piping bore at the discharge side should be so sized that a flow velocity not greater than 2,5—3,0 m/sec. results so as to minimize friction loss in the piping. A control valve should be incorporated into the discharge line as close to the pump discharge nozzle as possible so that the flow and head can be regulated. Sharp bends, abrupt cross-sections etc. should be avoided.

The suction line should be so arranged that air locks cannot form.

Eccentric reducers should be used to bridge the difference between piping of larger bore and the suction and discharge nozzles. A stop valve should be incorporated in the suction line which should be fully opened when the pump is operating and not used as a regulating valve to control the flow.

The flow velocity in the suction line should not, if possible, exceed 2,5 m/sec.

4. OPERATION OF THE PUMP

4.1. STARTING UP

Turn on the sealing/flushing fluid supply and check its flow. Open the stop valve in the suction line and close the valve in the discharge line. Start the driver. As soon as the necessary i.e. has been attained, slowly open the valve in the discharge line until the pump has attained the required discharge head.

4.2. SHUTDOWN

First close the discharge valve, then switch off the driver, close the valve in the suction line and finally turn off the sealing/flushing fluid.

4.3. SUPERVISION AND MAINTENANCE

The Chemical Centrifugal Pump requires little supervision after it has been run-in. The following points should, however, be observed:

During operation the stuffing box should weep slightly.

Initially the stuffing box should only be very lightly tightened and then evenly tightened up over a prolonged period after running in.

Trouble free sealing depends upon the choice of the packing material and the careful supervision of the stuffing box.

Before fitting new packing the stuffing box housing and gland should be carefully cleaned. If the shaft sleeve is worn it should be replaced. When inserting the packing rings care should be taken to ensure that the lantern ring is correctly placed under the sealing fluid inlet. See sectional drawing of the pump.

4.4. OPERATING TROUBLES AND THEIR POSSIBLE CAUSES

If the capacity of the pump drops it may be traced to one of the following causes:

1. Driver speed too low
2. Increase in the discharge pressure resulting in a smaller capacity. This can be deviated by increasing the speed of the pump or fitting a larger impeller.
3. Cavitation of the pump sets in. This can be caused by a drop in the pressure in the suction line or by too low a discharge pressure. This can be remedied by throttling the discharge or raising the suction pressure.
4. Excessive wear of wear ring and impeller boss:
 - a) By pumps with shrouded impellers fit new wear ring and if necessary refurbish impeller
 - b) By pumps with open impellers adjust clearance between impeller and wear plate (see sec. V/3g). Renew worn parts
5. Ingress of air into the stuffing box when the pump is operating under suction lift conditions. Provide sealing fluid to the stuffing box.
6. If the mechanical seal leaks:

The seal faces have been worn by normal use, or damaged by running dry or by solids in the fluid.

The seal faces should be replaced or a new mechanical seal fitted.

5. INSPECTION AND RENEWAL OF WEAR PARTS

5.1. GENERAL

Due to closed coupled layout volute casing can be left attached to the piping and baseplate when the pump is dismantled.

When dismantling the pump all parts should be handled with care and knocks and blows be avoided.

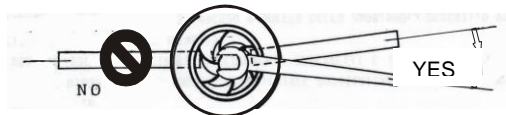
5.2. DISMANTLING THE PUMP

With the help of the cross-sectional drawing the pump can be dismantled as follows:

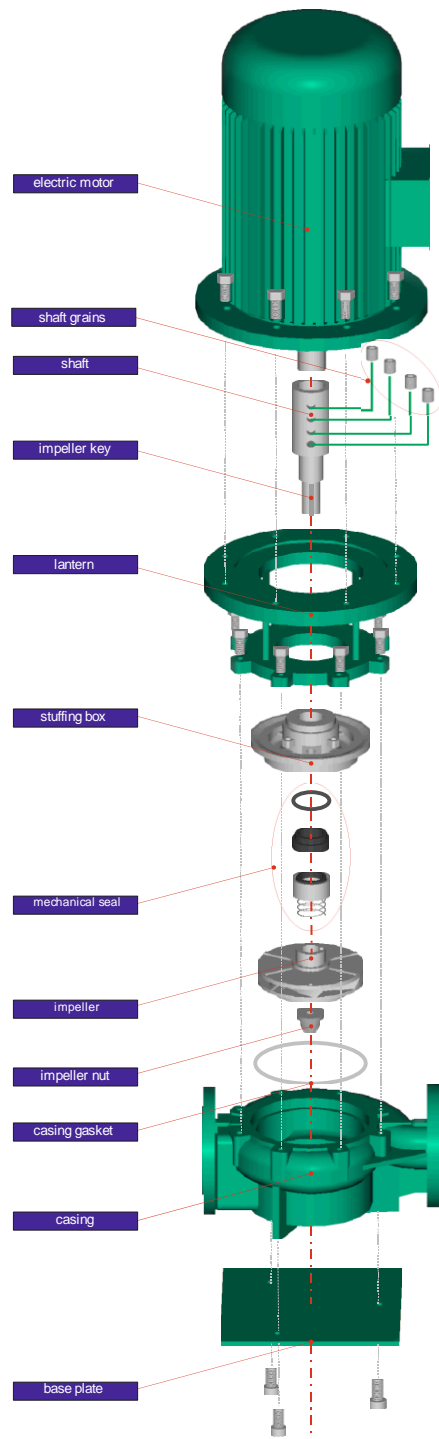
1. close discharge valve
2. close suction valve
3. avoid the possibility off turning on the pump
4. drain pump by opening drain plug (POS. 263)
5. undo auxiliary piping for cooling/flushing fluid.
6. undo Nuts (POS: 472) on casing.
7. extract rotating assembly from casing.
8. remove the casing gasket (POS. 700)
9. check wearing rings (POS. 180) and remove them if damaged
10. bring rotating parts in a clean place

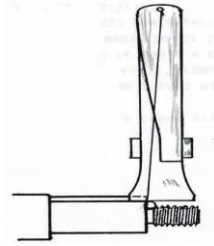
If mechanical seal arrangement is double continue to point 11 otherwise skip to point 16

11. loose the 4 nuts of mechanical flange (POS. 473)). Remove very carefully the seal flange (POS: 210) using two levers
12. loose impeller nut (POS. 430) by means of two lever as shown in the following picture:



13. remove the gasket (POS 720), and remove the impeller by means of an extractor positioning the jaws on impeller blades
14. remove the impeller key (POS. 500) as shown in the following picture





15. remove the gasket (POS. 710)
16. In case of single mechanical seal arrangement without mechanical seal flange (POS. 210), remove carefully the stuffing box (POS. 120) and the mechanical seal by means of 2 levers. If the mechanical seal is double the stuffing box is independent from mechanical seal. Remove then the mechanical seal, the shaft sleeve and the mechanical seal flange.

5.3. REASSEMBLY OF THE PUMP

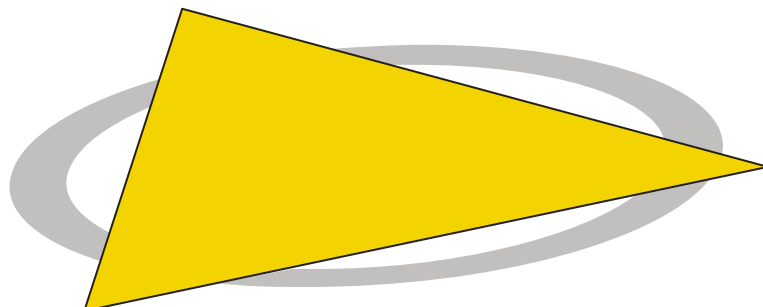
The reassembly of the pump is carried out in the reverse order. To ensure trouble free running the pump should be reassembled with the greatest of care.

The following points should be carefully observed.

- a) If new bearings are to be fitted ensure the correct sizes and quality are fitted —
- c) Take care not to damage the mechanical seal when fitting.
- d) The shaft sleeve of soft packed pumps should be free from wear grooves and remnants of old packing.
- e) Carefully fit keys and shaft sealing rings, making sure that the gaskets and sealing faces are clean.
- f) By pumps with open impellers the clearance between the impeller and wear plate must be adjusted to approx. 1 mm by means of screws

APPENDIX A – RECOMMENDED SPARE PARTS

RECOMMENDED SPARE PARTS FOR 2 YEARS WORKING									
POS.	DESCRIPTION	No. OF PUMPS							
		1	2	3	4	5/6	7/8	9	10 (+)
160	SHAFT	0	1	1	2	2	2	3	30%
150	IMPELLER	0	1	1	2	2	2	3	30%
180- 190	WEARING RINGS (if provided)	1	2	2	2	2	3	4	50%
170	SHAFT SLEEVE (if provided)	1	1	1	1	1	2	2	20%
700- 720- 710- 730	GASKET SET	2	5	7	9	10	10	12	120%
-	MECHANICAL SEAL	1	2	3	4	5	7	9	100%



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