

## Original manual



This manual contains important instructions and warnings. You must read them before mounting, making the electrical connections and starting up. You must also comply with the instructions for the components related to this pump.



You should also remember that it is essential to keep this Manual close to the motor pump equipment.

**Contents**

<b>1 GENERAL ITEMS .....</b>	<b>3</b>	<b>7 MAINTENANCE/CONSERVATION.....</b>	<b>11</b>
<b>2 SAFETY.....</b>	<b>3</b>	7.1 GENERAL INSTRUCTIONS.....	11
2.1 MARKING OF WARNINGS IN THIS MANUAL.....	3	7.2 MAINTENANCE/INSPECTION.....	11
2.2 PERSONNEL QUALIFICATIONS AND INSTRUCTION.....	3	7.2.1 <i>Checking instructions</i> .....	11
2.3 RISKS OF FAILING TO COMPLY WITH THE SAFETY		7.2.2 <i>Lubrication</i> .....	11
INSTRUCTIONS.....	3	7.3 EMPTYING/DRAINAGE .....	11
2.4 CONSCIENTIOUS SAFETY AT WORK.....	3	7.4 DISMANTLING.....	11
2.5 SAFETY INSTRUCTIONS FOR USERS AND SERVICE		7.4.1 <i>Fundamental instructions/observations</i> .....	11
PERSONNEL.....	3	7.4.2 <i>Coupling</i> .....	11
2.6 SAFETY INSTRUCTIONS FOR MAINTENANCE, INSPECTION		7.4.3 <i>Mechanical seal</i> .....	11
AND ASSEMBLY WORK.....	4	7.4.4 <i>Pump</i> .....	12
2.7 MODIFICATIONS AND ARBITRARY MANUFACTURE OF		7.5 ASSEMBLY.....	12
SPARE PARTS .....	4	7.5.1 <i>Coupling</i> .....	12
2.8 UNAUTHORISED OPERATION MODES .....	4	7.5.2 <i>Mechanical seal</i> .....	12
<b>3 TRANSPORT AND STORAGE.....</b>	<b>4</b>	7.5.3 <i>Pump</i> .....	12
3.1 TRANSPORT AND HANDLING.....	4	7.5.4 <i>Tightening torque of the screws/nuts</i> .....	13
3.2 PROVISIONAL STORAGE/CONSERVATION .....	5	7.5.5 <i>Tightening torque of the impeller nuts</i> .....	13
3.3 DISPOSAL.....	5	7.6 RECOMMENDED SPARE PARTS .....	14
<b>4 GROUP DESCRIPTION .....</b>	<b>5</b>	7.7 PREVENTATIVE MAINTENANCE.....	14
4.1 GENERAL DESCRIPTION .....	5	<b>8 TROUBLE-SHOOTING .....</b>	<b>15</b>
4.2 PRODUCT INFORMATION ACCORDING TO REGULATION		<b>9 ANNEXES.....</b>	<b>16</b>
547/2012 (FOR WATERPUMPS WITH A MAXIMUM SHAFT POWER		9.1 PRIMING SYSTEM BY WAY OF AUXILIARY PUMP VAC ...	16
OF 150 kW) BASED ON DIRECTIVE 2009/125/EC		9.1.1 <i>Exploded view VAC</i> .....	17
“ECODESIGN DIRECTIVE”.....	5	9.1.2 <i>Electrical layout recommended for the control</i>	
4.3 DENOMINATION.....	6	<i>of the auxiliary priming pump system</i> .....	18
4.4 FORM OF CONSTRUCTION.....	6	9.2 PRIMING SYSTEM BY WAY OF KEJEC EJECTOR.....	19
4.5 NAME PLATE.....	6	9.2.1 <i>Electrical layout recommended for the control</i>	
4.6 FORCES AND MOMENTS PERMITTED IN THE NOZZLES ....	7	<i>of KEJEC ejector system</i> .....	20
<b>5 INSTALLATION .....</b>	<b>8</b>	9.3 ILN SERIES CROSS DRAWINGS .....	21
5.1 CHECK BEFORE ASSEMBLY.....	8	9.3.1 <i>Cross drawing 1</i> .....	21
5.2 GROUP POSITIONING .....	8	9.3.2 <i>Cross drawing 2</i> .....	22
5.2.1 <i>Vertical groups</i> .....	8	9.3.3 <i>Cross drawing 3</i> .....	23
5.3 PIPE JOINT .....	8	9.3.4 <i>Cross drawing 4</i> .....	24
5.3.1 <i>Auxiliary connections</i> .....	8	9.4 ILNC SERIES CROSS DRAWINGS.....	25
5.4 ELECTRICAL CONNECTION:.....	9	9.4.1 <i>Cross drawing 5</i> .....	25
5.4.1 <i>Motor connection</i> .....	9	9.4.2 <i>Cross drawing 6</i> .....	26
5.4.2 <i>Time relay adjustment</i> .....	9		
5.4.3 <i>Rotation direction. Check</i> .....	9		
<b>6 START-UP.....</b>	<b>9</b>		
6.1 FIRST START-UP.....	9		
6.1.1 <i>Lubricant</i> .....	9		
6.1.2 <i>Filling (priming) of the pump</i> .....	9		
6.1.3 <i>Final control</i> .....	10		
6.1.4 <i>Start-up</i> .....	10		
6.1.5 <i>Shutdown</i> .....	10		
6.2 SERVICE LIMITS.....	10		
6.2.1 <i>Switching frequency</i> .....	10		
6.2.2 <i>Temperature of the liquid to be pumped</i> .....	10		
6.2.3 <i>Density of the liquid to be pumped</i> .....	10		
6.3 STARTING UP AFTER STORAGE.....	11		

## 1 General items

**Note**

This KSB ITUR pump has been developed in line with state-of-the-art technology, manufactured with great care and put through continuous Quality Control. The present Instructions Manual will provide you with knowledge of the pump and the ways it can be applied.

It contains important instructions to operate the pump appropriately and profitably. It is important to comply with the manual in order to guarantee reliability and a long useful life for the pump, whilst avoiding any possible risks.

This manual does not include any local regulations or any instructions with regards to assembly personnel, which the user shall be responsible for.



This group cannot be used in conditions in excess of those established in the technical documentation with regards to the liquid to be pumped, flow, speed (rpm), density, pressure and temperature, and with regards to the motor power or anything else set out in the instructions manual and contractual documentation. Check with the manufacturer as appropriate.

The factory plate shows the model/size, the main service data and the manufacture number of the pump. Please include these data in any queries, subsequent orders or requests for spare parts.

If you require any additional information or have problems with regards to failures, please contact the nearest KSB ITUR service.

## 2 Safety

This instructions manual contains fundamental indications which must be complied with in assembly, service and maintenance. It must be read by assembly personnel, competent technical personnel and users before installing and starting up, and it must be available at all times at the place of location of the machine.

Proceed not only in line with this main safety chapter, but also observing the instructions described in other similarly important safety points.

### 2.1 Marking of warnings in this manual

All instructions in this manual which may involve personal hazard if not complied with are indicated with a general hazard sign.



Safety instructions which may involve a hazard to people and facilities if not complied with in accordance with ISO 7000-0434.



Safety instructions to prevent electrical hazards in accordance with IEC 417-5036.

**Note**

Safety instructions which may affect the equipment and its operation if not complied with.

The details shown directly on the machine, such as:

- Rotation direction arrow
- Fluid connections identifications

These must be complied with, and conserved in a manner which ensures they are legible.

## 2.2 Personnel qualifications and instruction

All Service, Maintenance, Inspection and Assembly personnel must be duly qualified. The terms regarding responsibility, competence and supervision of personnel must be regulated by the user in an exact manner.

Any personnel lacking appropriate know-how must be duly instructed. This preparation can be obtained upon request by the machine user to the manufacturer or supplier of the machine.

Finally, the user must ensure that all personnel have fully understood the content of the instructions manual.

## 2.3 Risks of failing to comply with the safety instructions

Failure to comply with the safety instructions may lead to risks both for people, the environment and the machine, and may lead to the loss of any entitlement to claims.

In particular, failure to comply may cause the following hazards:

- Failure of important machine/facility functions.
- Failure of the prescribed maintenance and conservation methods.
- Personal hazard resulting from electrical, mechanical or chemical effects.
- Danger to the environment due to escaping noxious products.

## 2.4 Conscientious safety at work

The safety instructions contained in this Manual must be observed, as must international prescriptions on Health and Safety at Work and any possible Safety Regulations at the workplace of the user.

## 2.5 Safety instructions for users and service personnel

- The installer must ensure that the parts of the machine which may create danger due to heat or cold are protected against accidental contact. The operator shall check as well that the coupling guard is in place and firmly secured.
- The contact protections of moving parts (e.g. couplings) must not be removed whilst the machine is in service.
- Provide the personnel with protective equipment and make sure it is used.
- Any possible leaks (e.g. through the shaft sealing) of hazardous products must be channelled in such a manner as they do not present any risk to people or the environment, in line with corresponding legislation.
- Follow safety instructions due to use of power. In this respect refer to the applicable national safety regulations and/or regulations issued by the energy supply company.

## 2.6 Safety instructions for maintenance, inspection and assembly work

The user must ensure that all maintenance, inspection and assembly tasks are carried out by authorised, qualified, specialised personnel who have been sufficiently informed through careful study of the instructions manual.

It is a fundamental principle that any work on the machine must be carried out whilst it is shutdown. It is essential to respect the pump shutdown procedure described in the instructions manual.

When the pump is stopped it is liable to remain under pressure. The pump frame must have returned to environmental temperature. Before dismantling it, it must be depressurised by making drain openings (or air vents) leading to a safe area.

All pumps or motor pumps which pump hazardous materials must be decontaminated.

Connect an earth conductor to the metal casing of the pump or baseplate if the fluid handled is electrostatically charged.

Never connect the earth of the electric welding equipment to pump or baseplate.

As soon as the work is complete, all safety and protection devices must be installed and put into operation.

Before starting up again, all that described in the First Start-Up section must be fulfilled.

Due to the fact that the unit contains small parts such as nuts, screws, etc., whose accidental contact may lead to small cuts on the hands, operators are recommended to use gloves when handling.

The following additional risk-prevention instructions shall be fulfilled:

The pumped liquid may cause injuries, burns, poisoning, etc. It is therefore necessary:

- To check the temperature and amount of leaks occurring at the mechanical seal or packing area. Conduct such leaks to a safe area through a controlled drainage system, specially indicated for the case of break of mechanical seal.
- To take appropriate measures to avoid direct contact with the pumped liquid when it is necessary to prime or fill the pump or unit.
- Before dismantling the pump, if the liquid is toxic or dangerous, it must be decontaminated. For this purpose the unit must be cleaned inside by introducing a cleaning liquid into the pump and emptying it subsequently through the drainage connection. The cleaning liquid must not create hazardous situations and must be compatible with the pump components (CONSULT)
- To take appropriate measures to avoid contact with the pump if liquids are pumped at temperatures over 40°C.
- In the event of a liquid with high steam pressure being used, beware of the danger of explosion due to pressure confinement with the pump stopped. This confinement must be avoided by opening inlet or discharge valves, or by providing a properly conducted air-vent connection in the pump discharge for liquid evacuation.

For rotating parts:

- The pump should never work without its coupling guard in place and firmly secured.
- Do not wear loose or baggy clothing or wear long hair loose near rotation areas to avoid clothes or hair getting caught and causing serious accidents.
- Do not force jammed rotating parts manually when the pump is in operation.

When the pump is joined to considerably long piping, waterhammer may occur when it is stopped. Should this arise, appropriate anti-waterhammer elements must be put in place.

All the safety regulations indicated by the pump drive manufacturer must be observed and complied with.

Inappropriate installation may lead to the unit breaking and consequent risks to persons and/or the environment. It is therefore necessary to:

- Vent the pumps appropriately before operation, checking that the pump is full of liquid.
- Check that the pump discharge and suction valves are fully open and that there is no dirt or foreign bodies in the piping.

Regarding overload conditions:

- Do not exceed the maximum permitted values (temperature, suction pressure, discharge pressure, rpm.) indicated in this instructions manual, offer and technical catalogue.
- Do not exceed the maximum loads permitted on the suction and discharge connections.
- The pumps must only be used in the conditions and with the liquid indicated in the offer and/or order.

An unforeseen failure in the drive power may lead to danger due to spontaneous start-up of the unit; it is up to the customer to take the necessary steps to avoid this.

When the CONTROL SYSTEM is not supplied by KSB ITUR, the customer is responsible for the entire machine complying with the machine safety directive, including these controls

## 2.7 Modifications and arbitrary manufacture of spare parts

The machine must not be modified or changed without prior agreement from the manufacturer. Only original spare parts and accessories approved by the manufacturer can guarantee safety. The use of other parts invalidates any liability of KSB ITUR for consequential damage.

## 2.8 Unauthorised operation modes

The safe service of the supplied pump can only be guaranteed through correct use, in line with section 4 of the Instructions Manual. The operation limits established in the Datasheet must not be exceeded under any circumstance.

## 3 Transport and storage

### 3.1 Transport and handling

#### Note

Improper handling of equipment and / or its individual elements can severely damage the paint or protective coating of them, and can lead to premature oxidation of the surfaces and shorten the operating life of equipment.



The transport and handling of the equipment must be carried out using suitable means in line with the weight to be supported. The weight is generally shown on the delivery note or on the name plate; if it is not, and the equipment cannot be handled safely, please contact KSB ITUR.



Danger to life from falling parts! The pump (or parts) could slip out of the suspension arrangement. Stay at safety distance from the parts during transport.

**Note**

Do not remove the equipment from their transport pallets until final installation is to take place. Once disassembled, the equipment should be kept in a **vertical position for transport**, and never supported or hold by its ends.



When pumps are dismantled from their transport pallet, suitable means must be used to ensure the stability of the equipment, until it is finally secured at its definitive location.

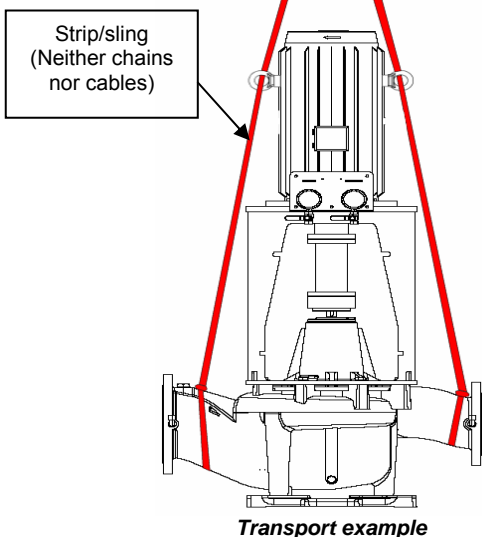


Remember that the equipment must never be lifted using only the eyebolts or lifting lugs of each element (e.g. by means of eyebolts of motor and pump) because they are designed for the individual transport of the element. Never lift or transport the pump or the equipment by the free end of the shaft. It is also important not to use the pump and pipe flanges either joining elements (e.g. couplings)

Use adequate lifting straps or slings that encircle the pump nozzles and passing them as well by motor eyebolts (see transport example below)



Lifting straps or slings must not bear against sharp edges and corners.



**Note**

In line with previous recommendations, do not use transport elements or means that can damage paint or protective coating of the equipment and components. That it is not advised the use of chains and similar items to wrap pump, columns and other components. We also discourage the use of hooks. Appropriate and approved lifting tools should be used.

**3.2 Provisional storage/conservation**

The equipment and its components must be stored indoors, in a clean, dry place, away from vibrations and where relative humidity is as constant as possible.

All caps or covers of piping connections must be installed to prevent dirt and other materials get into the equipment. Do not remove them until it is required during the installation of equipment!



The electric motor must be disconnected, the connection cables removed and the terminal box closed with its cover on. Switchboards must be in vertical position and disconnected.

If commissioning does not take place immediately after delivery, it is advisable to store equipment and its components taking following measures:

**Short term storage (less than 6 months)**

- Inspect the protective coating or painted surfaces. If any deficiency is to be seen, proceed to repair it. If repainting needed consult KSB ITUR for the characteristics of the paint.
- It is necessary to protect with preservation products the low alloy parts (e.g. grey casting, nodular casting, etc...) in contact with liquid. Preservation products available on the sector market can be used, in line with the manufacturer's instructions on application and disposal.
- The shiny (mechanised) parts and surfaces of the equipment and elements must be protected from corrosion using silicone-free grease or oil.
- Turn shaft by hand (at least once a month)

**Long term storage (exceeding 6 months)**

Consult KSB ITUR.

**3.3 Disposal**



Fluids and supplies posing a health hazard and/or hot fluids and supplies. Hazard to persons and environment!

- Collect and properly dispose of flushing medium and any residues of the fluid handled.
  - Wear safety clothing and a protective mask, if required.
  - Observe all the legal regulations on the disposal of fluids posing a health hazard.
1. Dismantle the pump (set). Collect greases and other lubricants during dismantling.
  2. Separate and sort the pump materials, e.g. by:
    - Metals
    - Plastics
    - Electronic waste
    - Greases and other lubricants

Dispose of materials in accordance with local regulations or in another controlled manner.

**4 Group description**

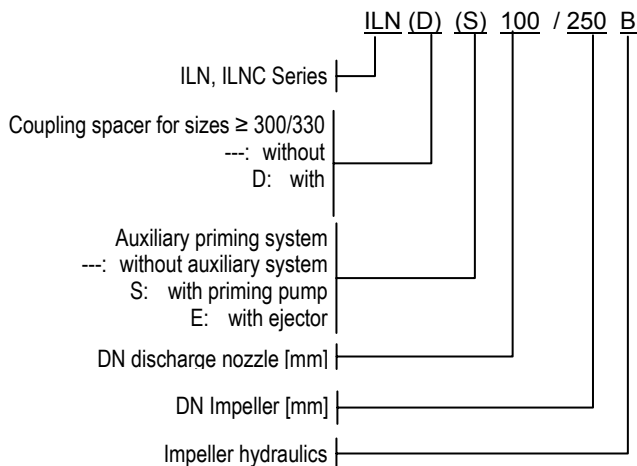
**4.1 General description**

Vertical centrifugal pump with in line suction and discharge, for clean liquid pumps or pumps with little load (freshwater, saltwater...)

**4.2 Product information according to Regulation 547/2012 (for waterpumps with a maximum shaft power of 150 kW) based on Directive 2009/125/EC "Ecodesign Directive"**

- Minimum efficiency index: see the name plate
- The benchmark for most efficient water pumps is MEI  $\geq 0,70$
- Construction year: see name plate
- Manufacturer name or plant mark, commercial registry number and manufacturing place: see datasheet and order documentation
- Type and product size indications: see name plate
- Hydraulic efficiency (%) with a trimmed impeller: see datasheet
- Pump performance curves, efficiency curves included: see the performance curve from the documentation
- The efficiency of a pump with a trimmed impeller is usually lower than that of a pump with the full impeller diameter. The trimming of the impeller will adapt the pump to a fixed duty point, leading to reduced energy consumption. The minimum efficiency index (MEI) is based on the full impeller diameter.
- The operation of this water pump with variable duty points may be more efficient and economic when controlled, for example, by the use of a variable speed drive that matches the pump duty to the system
- Information on dismantling, recycling and disposal, see chapter 3.3
- Information on benchmark efficiency and benchmark efficiency graph for MEI = 0,7 (0,4) for the pump based on the model shown in the figure is available on: <http://www.europump.org/efficiencycharts>

**4.3 Denomination**



**4.4 Form of construction**

Volute pump casing with coaxial impulsion and suction flanges (In Line). Single-stage closed impeller with single or double suction depending on pump size (check table below)

Pump size ILN	Suction
65/--- up to 250/--	single
$\geq 300$ /---	double
Pump size ILNC	Suction
all	single

**Coupling:** The ILN series of single suction incorporates a flexible coupling with a spacer. The ILN series of double suction incorporates a flexible coupling without spacer. For this case there is as well spacer option (option marked with D letter).

The ILNC series (compact) includes a rigid coupling.

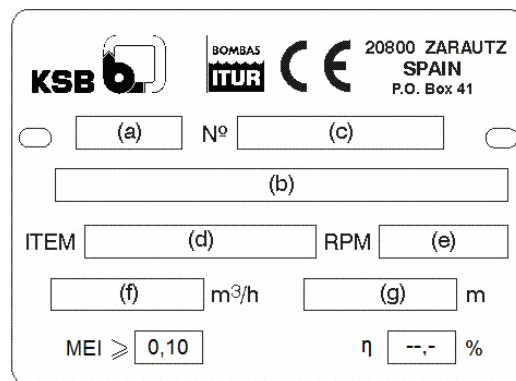
**Priming:** When the letter S is added to the ILN and ILNC series, this means automatic priming by way of an auxiliary priming pump is included.

When the letter E is added to the ILN and ILNC series, this means automatic priming by way of injector is included.

**Bearings:** Ball bearings greased for life. The ILN series of single suction incorporates a support with two bearings. The ILN series of double suction incorporates one bearing and a friction bearing bush lubricated by pumped media. The ILNC series (compact) includes a bearing.

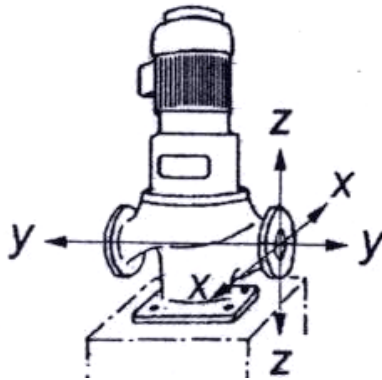
**Shaft sealing:** Mechanical seal.

**4.5 Name plate**



a	Year of construction	f	Flow rate in m <sup>3</sup> /h
b	Pump model	g	Headt in metres
c	Pump No	MEI	Minimum efficiency index
d	Customer item	$\eta$	Efficiency
e	Speed in rpm		

4.6 Forces and moments permitted in the nozzles



PUMP SIZE	SUCTION						DISCHARGE					
	FORCES [N]			MOMENTS [N.m]			FORCES [N]			MOMENTS [N.m]		
	Fx	Fy	Fz	Mx	My	Mz	Fx	Fy	Fz	Mx	My	Mz
32/---	600	600	500	450	250	300	350	400	300	300	100	150
40/---	700	800	600	500	300	350	400	500	400	400	200	250
50/---	700	800	600	500	300	350	600	600	500	450	250	300
65/---	850	900	800	550	300	400	700	800	600	500	300	350
80/---	850	900	800	550	300	400	850	900	800	550	300	400
100/---	1700	1900	1500	1000	600	750	1100	1250	1000	600	350	450
125/---	1700	1900	1500	1000	600	750	1350	1500	1200	800	500	700
150/---	2250	2500	2000	1350	900	1050	1700	1900	1500	1000	600	750
200/---	2800	3100	2500	1950	1300	1550	2250	2500	2000	1350	900	1050
250/---	3350	3750	3000	2750	1900	2200	2800	3100	2500	1950	1300	1550

## 5 Installation

**Note**

The design of the pipe systems, anchorings and other installation areas corresponds to other parties. KSB ITUR only offers details and comments as a help, but does not assume any responsibility with regards to the design, assembly and operation of any installation. We recommend that customers check with a specialist in the design of castings, pipes, wells, etc in order to interpret and supplement the information given by KSB ITUR and to ensure correct operation.

### 5.1 Check before assembly

Before positioning, check that the assembly base is in line with the dimensional plan of the equipment.

The upper surface of the base must be horizontal and flat.

If the anchor pins are to be placed in existing holes, place the anchor pins in their orifices suspended from the pump.

Do not connect the suction and impulsion nozzles until the equipment is completely installed on its base.

### 5.2 Group positioning

#### 5.2.1 Vertical groups

##### Levelling

Use a spirit level to level the equipment. Use wedges to alter the height at different points. The maximum deviation permitted is 0.2 mm/m.

The correct separation between the two coupling halves must be maintained. Check the approximate measures:

Size	110	125	140	160	180	200	225	250	280
S	5	5	5	6	6	6	6	8	8

S = Gap between coupling halves / Size = Coupling external diameter



The maximum inclination of the group must be 30° with regards to the vertical axis, once the pump is anchored in its base. Should this inclination be exceeded, the motor must be safely reinforced.

##### Pump - motor alignment

The equipment is aligned at factory, and this alignment must never be lost. The following instructions must be followed when dismantling or returning the motor:

- Check that the flange support surface of the motor support and of the motor itself are perfectly clean and smooth.
- Check the correct separation between the two halves of the coupling.
- Check that the alignment between both axes is correct by turning the equipment by hand.

### 5.3 Pipe joint

In no case can the pump be used as a fixed point for the pipes.



The pipe system must at no time exercise force in excess of the values shown in the chart in point 4.6 (due to connection, thermal variation, etc) in the pump.

The short pipes must be of at least the diameter of the pump connections. The diameter of long pipes is, in some cases, determined by economic criteria.

Transition pieces at larger diameters must have an extension angle of around 8°, in order to prevent pressure drops.

**Note**

The convenience of installing foot valves when the pump is working in suction or retention when loaded, along with seal valves, will depend on the type of installation.

The thermal expansions of the pipes must be compensated with suitable measures, in order not to exceed the maximum strains permitted on the pump.

The diameters of the pipes, valves and accessories must be calculated in line with the load losses envisaged in the installation, meaning the fluid speeds will be:

- Speed in the discharge pipe: from 2 to 3 m/s
- Speed in the suction pipe: from 1 to 2 m/s



Exceeding the admitted strains of the pipes may lead to leaks in the pump and to the fluid escaping. Hazard of death with hot liquids!

When designing the suction piping check that the available NPSH is higher than required NPSH of the pump in order to avoid cavitation in whole admissible operation range.

The suction and impulsion nozzle covers of the pump must be removed before connecting the pipes.

Before starting up a new installation, it is necessary to thoroughly clean the tanks, pipes and accessories by brushing and blowing. Welding material, scales and other impurities are often cast off some time after. We recommend using an oversized sieve filter in suction in order to prevent dirt larger than that permitted by the pump from coming in.

**Note**

In groups with an auxiliary priming system, position a check valve in the discharge pipe immediately after the pump.

High suction pressure may overload the bearings and lead to their overheating. This circumstance must be avoided, to which end the suction pressure must not exceed that shown in the data sheet, either through manual control by the operators or through devices which shut down the equipment in the event of excessive pressure.

The pump must not work without liquid under any circumstance. If this condition may come about, the installation must be fitted with safety devices which prevent the operation of the pump without liquid inside, or have automatic devices to discharge the minimum flow of the pump. See the section on minimum flow

#### 5.3.1 Auxiliary connections

The equipment is normally delivered mounted and ready for immediate operation, with only the hydraulic and exterior electrical connections being necessary.

When using clean fluids, the cooling of the mechanical seal is by way of the recirculation of the pumping fluid (it is not necessary to inject exterior fluid).

In equipment with an auxiliary priming system, complete the installation in line with that shown in the annexes 9.1 or 9.2 depending on the priming system.

**Note**

Auxiliary pipes are designed exclusively to support internal strains due to the pressure of the circulating fluid, to which end it is forbidden to subject them to additional exterior strains (e.g. support, etc).



**5.4 Electrical connection:**



The electrical connection must be carried out by a specialist electrician. Applicable regulations must be complied with.

Check the mains voltage available and the factory plate, and choose the appropriate connection.

The technical connection conditions and the conditions of the local energy supply company must be observed when carrying out the connections.

We strongly recommend the use of a safety circuit breaker for the motor and a thermistor associated to a trigger device.

These instructions apply to asynchronous three-phase standard electric motors with a squirrel cage both in horizontal and vertical execution, in IP-23, IP-54 and IP-55 protection grades, with frame sizes of between 56L and 355S, both inclusive, with voltages of 200 to 500 V between phases

The electric motor as well as whole electric installation shall accomplish with all safety norms that may be applied to it.

**Earthing**

Before starting up the pump, the earth of the pump, the baseplate or the motor must be connected to an effective earthed point of the installation.

**5.4.1 Motor connection**



Whilst connecting the cables, ensure it is not possible for voltage to appear.



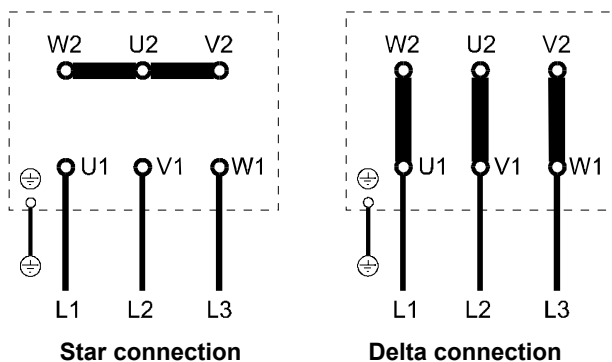
Check that the earth connection is in line with local regulations.

**Connection in single speed motors**

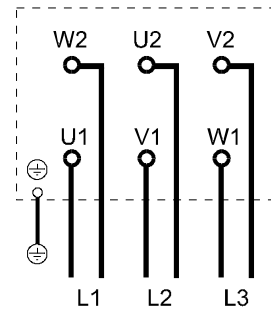
Direct start-up:

In direct start-up the motor can be used in two different connections:

The voltage and the connection, e.g. 400 VY, 240 VD is stamped on the motor plate. This means that the motor can connect at 400 volts in star connection (Y) or at 240 volts in delta connection (D).



Connection to the star-delta contactor



**5.4.2 Time relay adjustment**

In the star-delta start-up of three-phase motors, it is necessary to ensure that the switching from star to delta takes place quickly. Prolonged switchover period will cause damage to the pump.

Time relay adjustment in the star-delta connection:

Motor power	Time adjustment -Y
≤ 30 kW	< 3 sec.
> 30 kW	< 5 sec.

**5.4.3 Rotation direction. Check**

**Note** Check the motor rotation direction by starting up and immediately shutting down. The rotation direction must correspond with that shown by the pump arrow located on the pump casing or support. If the rotation direction is not correct, any two phases L1, L2 or L3 of the power cable must be inverted in the motor terminal box.

**6 Start-up**

Start-up shall be carried out when all the necessary mechanical, hydraulic, electrical and pneumatic connections are complete. The coupling guard must as well be in place and firmly secured.

**Motor checks.**



When making the electrical connection, ensure the type of current and nominal voltage shown on the motor's factory plate concur with the type of current and the mains voltage in the place of installation.

Follow the indications described in the motor manual.

**6.1 First start-up**

**6.1.1 Lubricant**

**BEARINGS:**

The pump bearings are closed on both sides and have lifetime lubrication. Lubricant is not required.

**6.1.2 Filling (priming) of the pump**

The pump must be primed before starting up for the first time or following a long period of inactivity. To do this:

- Group with auxiliary priming pump: proceed to fill this with liquid. Check that the auxiliary priming pump is not blocked. In order to proceed with the priming of the main pump, see annex 9.1
- Group with ejector: check the compressed air supply and that ejector discharge/output is not blocked. In order to proceed with the priming of the main pump, see annex 9.2.
- Group without auxiliary priming system: proceed to prime the main pump as shown below.

Star-delta start-up:

In star-delta start-up, the line voltage must coincide with the voltage shown on the motor for delta start up (D). The six terminals indicated in the following diagram will be connected:

**EQUIPMENT WITHOUT AUXILIARY PRIMING SYSTEM:**
EQUIPMENT IN LOAD:

3. Disconnect the voltage from the motor or batteries.
4. Close the suction valve and the discharge valve.
5. Remove the venting plug located in the casing or open a discharge pipe vent (before the check valve).
6. Partially open the suction valve until the liquid overflows through the vent.
7. Close the vent.
8. Fully open the suction valve.
9. Check the rotation direction of the pump.
10. Fully open the discharge valve.

EQUIPMENT IN SUCTION:

1. Disconnect the voltage from the motor or batteries.
2. Remove the venting plug located in the casing or open a discharge pipe vent (before the check valve).
3. Close the discharge valve.
4. Pour the liquid to be pumped through the vent until it overflows.
5. Close the vent.
6. Check the rotation direction of the pump.
7. Fully open the discharge valve.

The priming should be checked in subsequent start-ups.

**Shaft sealing**

Mechanical seal: The mechanical seal does not require maintenance. Check that there are no leaks.

**6.1.3 Final control**

Make the final check of the group alignment in accordance with 5.2. The coupling/shaft must allow easy manual rotation.

<b>Note</b>
-------------

Check all the auxiliary connections are correct and functioning.



According to the **rules on the prevention of accidents at work**, equipment cannot be started up without protection for the coupling. If the buyer has expressly requested that this guard be excluded from supply, it must be provided by the user.

Before and during the operation of the pump, the coupling guard must be in place and firmly secured. Regularly check this state in order to prevent problems resulting from incorrect positioning or deficient attachment. The coupling guard must be free of any foreign elements.

**6.1.4 Start-up**

Before starting up the group, check all the sections with regards to chapter 6.

The start-up must be carried out with the suction valve completely open and the impulsion valve partially closed. Once the pump has reached its service speed and the suction air has been eliminated, regulate the operation point using the impulsion valve.

During the priming stage, check that all the suction pipe air is perfectly discharged.

If the electric motor guard is triggered when starting up, close the impulsion valve more until the equipment starts up normally.



The pump must NEVER work with zero flow or flow which is less than the operating minimum, as internal recirculation will cause the fluid to heat up quickly, leading to hazards (including explosion) as a result of the high pressures reached within the frame. Check the minimum flow in the operation curves.

**6.1.5 Shutdown**

Close the discharge pipe valve.

If there is anti-return valve in impulsion with counterpressure, leave the impulsion valve open.

- Shutdown the motor. Check that shutdown is normal.
- In prolonged periods of non-operation, close the suction pipe valve and the auxiliary connection valves.
- In suction pumps using a low vacuum tank, the supply of liquid must also be maintained at the shaft seal whilst the pump remains shutdown.
- The pump must be protected from freezing whenever this risk exists, and must be emptied in prolonged periods of non-operation.

If, whilst the pump is shutdown, it must remain on standby for service, start up at regular intervals for around 5 minutes (see also 7.2)

- Fire pumps: 1x/month, at minimum.
  - Drink-safe water pumps: 1x/48 hours, at minimum.
  - Reserve pumps: 1x/week, at minimum.
- (It is best to change the operating pump every day).

The seal tightness and function of the auxiliary connections must be examined during these start-ups.

**6.2 Service limits**
**6.2.1 Switching frequency**

In order to prevent abnormally high temperatures and overloading of the motor, pump, coupling, seals, etc, the start-up frequencies shown below must not be exceeded:

MOTOR POWER	MAX. START-UPS/HOUR
Up to 3 kW	20
From 4 to 11 kW	15
From 11 to 45 kW	10
From 45 kW	5

**6.2.2 Temperature of the liquid to be pumped**

<b>Note</b>
-------------

Never operate the pump at a temperature higher than that shown in the data sheet and/or factory plate.

**6.2.3 Density of the liquid to be pumped**

The power absorbed by the pump increases in direct proportion to the density of the impelled liquid. In order to prevent overloading in the motor, pump and coupling, this density must not exceed that shown in the order.

### 6.3 Starting up after storage

If the storage and/or shutting down of the pump has been for a prolonged period of time (over 6 months), it is necessary to:

- Check the state of the joints.
- Check the levelling.
- Check all the auxiliary connections.
- After a short storage period, simply turn the pump shaft manually to unlock the rotor equipment.
- Follow the specific post-storage instructions in the motor manuals and other items.
- Observe all the steps shown in the "Start-up" section.

**Note**

If the equipment is to be shutdown for a certain period of time and there is the possibility of freezing temperatures, it is necessary to completely drain the pump in order to prevent any deterioration from the freezing of the contained fluid.

## 7 Maintenance/Conservation

### 7.1 General instructions

Before dismantling, ensure that:



The motor cannot be operated accidentally, by disconnecting from the electricity supply (e.g. removing cut-outs, unplugging, disconnecting the automatic circuit breaker, etc) or the start-up batteries (disconnect operating energy).



The pump is free of pumped fluid, cleaning it internally with appropriate liquid whenever it is a hazardous fluid (hot, contaminant, inflammable...)

### 7.2 Maintenance/inspection

#### 7.2.1 Checking instructions

During the first minutes of operation:

In cases of mechanical seal

- There may be a brief large leak during start up. Should this leak persist, shutdown the group and determine the cause. The causes may be, amongst others, dirt in the pumped area or dry operation due to incomplete discharge of the pump air.

After a few hours operation:

**Note**

Check the bearing temperature at the point in the bearing location area. Normal temperature can reach up to 40°C above environmental temperature, but must never exceed 90°C.

Observe the possible anomalies shown in point 8 of this manual.

The reserve pumps should be started up and shutdown once a week, in order to ensure they are always in service conditions.

#### 7.2.2 Lubrication

**BEARINGS:**

**Lubricated with grease. PUMP WITHOUT GREASE NIPPLES:**

The pump has special bearings, with dual closure and grease in the interior, capable of working without outer grease maintenance. The pump does not, therefore, have grease nipples in the support.

Special attention must be paid to the type of bearing when this is replaced, which must be of the same type (2RS).

### 7.3 Emptying/Drainage



The emptying and drainage of pumps used to expel liquids which are a health hazard must be carried out in such a way as there is no risk to people or to the environment, in line with legislation. If necessary, use protective clothing and mask.

### 7.4 Dismantling

#### 7.4.1 Fundamental instructions/observations

**Note**

Before dismantling, ensure the pump cannot be started up.

The suction and impulsion valves must be closed.

The pump frame must have returned to environmental temperature.

The pump frame must be depressurised and emptied.

Comply with all safety measures in accordance with 7.1. When working on the motor, also take into account the rules and instructions of the manufacturer.

#### 7.4.2 Coupling

Dismantling of coupling depends on pump type and its suction. Check suction type of ILN pump in table of chapter 4.4

##### Flexible coupling ( ILN single suction)

- Dismount the coupling guard.
- Release the coupling attachment screws and remove the intermediate pipe. Separate the male coupling.
- Use an extractor to release the coupling. Never bang in order to extract, as this may cause serious damage to the bearings or mechanical seal.

##### Flexible coupling ( ILN double suction)

- Release and lift motor with its half coupling.
- Use an extractor to release the coupling. Never bang in order to extract, as this may cause serious damage to the bearings or mechanical seal.

##### Rigid coupling (ILNC)

- Dismount the coupling guard.
- Release the screws which join the motor to the support.
- Release the shaft Allen pins.
- Remove the motor.

#### 7.4.3 Mechanical seal

Dismantling of mechanical seal depends on pump suction. Check suction type of ILN pump in table of chapter 4.4

For the main pumps of single suction, once dismantled the coupling:

- Release the screws which join the volute casing and pump cover and extract the moving part.
- Release the impeller nuts and extract the impeller.
- Remove the moving part of the mechanical seal (spring and moving face), sliding this along the shaft.
- Release the bearing cover or lantern support and extract it by carefully sliding along the shaft.

- The fixed part of the mechanical seal can then be extracted, taking care not to touch the contact face.

For the main pumps of double suction, once dismantled the coupling:

- Release the screws which join the volute casing and pump cover and extract the moving part.
- Release and extract bearing cover.
- Release bearings circlips and extract bearing housing carefully.
- The fixed and moving part of the mechanical seal can then be extracted, taking care not to touch the contact face.

**For the auxiliary priming pumps:**

Refer to own instructions manual.

**7.4.4 Pump**

For the extraction of bearings, shaft, etc. it is necessary to dismount almost the entire pump. To do this, observe the attached sectional drawing.

Dismantling of mechanical seal depends on pump suction. Check suction type of ILN pump in table of chapter 4.4

As a general guide to dismount the equipment, follow these steps:

**ILN type pump (single suction)**

- Release the coupling. (See point 7.4.2)
- Release the screws which join the pump casing and cover and extract the moving part. The casing wear ring will be accessible at this moment.
- Release the impeller nuts and extract it. The cover wear ring will be accessible at this moment.
- Remove the moving part of the mechanical seal (spring and moving face), sliding this along the shaft.
- The fixed part of the mechanical seal can then be extracted, taking care not to touch the contact face.
- Remove the shaft deflector and release the circlip.
- Extract the shaft with the bearings, by hitting the pump end with a plastic hammer.

**ILN type pump (double suction)**

- Release the coupling. (See point 7.4.2)
- Extract mechanical seal (See 7.4.3)
- Release pins that fix the shaft sleeve
- Remove impeller from shaft

**ILNC type pump:**

- Release the rigid coupling system and remove the motor (See point 7.4.2)
- Remove the deflectors.
- Release the screws which join the pump casing and support and extract the moving part. The casing wear ring will be accessible at this moment.
- Release the impeller nuts and extract it. The cover wear ring will be accessible at this moment.
- Remove the moving part of the mechanical seal (spring and moving face), sliding this along the shaft.

- Release the ball bearing attachment circlip on the support and extract this by banging the end of the pump side with a plastic hammer.

- The fixed part of the mechanical seal can then be extracted, taking care not to touch the contact face.
- Extract the shaft bearing.

**7.5 Assembly**

**7.5.1 Coupling**

**Flexible coupling (ILN single suction)**

- Mount the male coupling, introducing its teeth in the rubber plugs located in the female coupling. Mount the intermediate pipe and secure it using the screws, both to the plate and to the male coupling.
- Align the coupling. (See point 5.2.1)

**Flexible coupling (ILN single suction)**

- Mount the male coupling, introducing its teeth in the rubber plugs located in the female coupling.

**Rigid coupling (ILNC)**

- Mount the motor, introducing the motor shaft in the pump shaft.
- Position and tighten the motor screws in the lantern.
- Position the shaft and tighten the Allen pins.
- Check the alignment (see point 5.2.1)

**7.5.2 Mechanical seal**

Mount in reverse order to when dismantling the mechanical seal (see point 7.4.3)

**Additional observations:**

- Take great care when cleaning the different parts of the mechanical seal, especially the contact faces. Do not use lubricant; use only clean water with a cloth for cleaning optical devices.
- Do not damage the O-rings during assembly.
- Do not turn the mechanical seal **either the friction bearing bush** while dry.

**7.5.3 Pump**

Mount the pump in reverse order to when dismantling (see point 7.4.4)

**Additional observations:**

- All the joints intervening in the dismantling of the pump must be renewed.
- Use the bearings (320) indicated.
- Do not forget to correctly position the deflector (507) through the window of the cover (161).

**Note**

- Check the correct location of pieces, especially the seals and impellers, and tighten the impeller nuts as shown in the chart in point 7.5.5.



- Do not forget to position all the safety and protection elements, such as coupling guards, before starting up the equipment.

**7.5.4 Tightening torque of the screws/nuts**

ISO Metric thread	Steel	Stainless steel
	Tightening Torque in [N·m] (for non-lubricated thread)	
M4	3.1	2.15
M5	6.1	4.25
M6	10.4	7.3
M8	25.2	17.7
M10	49.5	34.8
M12	85.2	59.9
M16	211	148
M20	412	290
M24	710	276
M27	1050	409
M30	1420	554

**7.5.5 Tightening torque of the impeller nuts**

Metric thread	Tightening Torque in [N·m] (for non-lubricated thread)
M14x1.5	38
M20x1.5	100
M27x1.5	250
M33x1.5	460
M52x1.5	2000

**7.6 Recommended spare parts**

Description	Part No.	Recommended spare parts (1)		
		Start-up	2 years	5 years
Joints (set)	---	1	2	5
Mechanical seal	433	1	2	3
Bearing (set)	320		1	2
Wear ring (set)	502		1	2
Deflector protection	507		1	2
Shaft protecting sleeve+friction bearing bush (2)	524+545		1	2
Flexible coupling (set)	---		1	2
Impeller nut	922		1	2
Circlip (set)	932		1	2
Key (set)	940		1	2
Pump shaft(s) (set)	210			1
Impeller	230			1
Coupling (3)	840			1

(1) Amounts recommended for a continuous service pump

(2) Only for ILN pump with double suction. Check suction type in table 4.4

(3) Only for ILN pumps

Additional spare parts for priming auxiliary pump VAC (only for ILNS and ILNCS)				
Joints (set)	---	1	2	5
Mechanical seal	433	1	2	3
Key	940		1	2
Valve plate	20		1	2
Valve	21		1	2
Impeller	230			1

**7.7 Preventative maintenance**

No.	DESCRIPTION OF THE OPERATION TO BE CARRIED OUT	PROCEDURE	REGULARITY	CONSEQUENCE
1	Clean the S priming system filter	Dismount the filter	Monthly	
2	Check for mechanical seal leaks	Visual inspection	Quarterly	13
3	Check for leaks between casing and cover	Visual inspection	Quarterly	12
4	Check for leaks between flanges and priming system	Visual inspection	Quarterly	12
5	Check for heating of the bearings	With thermocouple	Quarterly	7, 10, 11
6	Check tightness of connecting bolts for motor/base frame, pump/base frame, cover/casing, support/support supplement, flanges/casing	Manually, point 7.5.4	Quarterly	7
7	Checking and aligning the coupling (1)	See point 5.2.1 of the manual	Twice a year and every time it is dismantled	
8	COMPLETE PUMP CHECK	Checking and dismantling the pump See point 7 of the manual	Yearly	2,3,4,5,6,7,9,10, 11,12,13,15
9	Check for wear of the impeller and rings	Dismount casing, visual inspection	Yearly	
10	Check for wear of the shaft and bearings	Dismount support visual inspection	Yearly	
11	Change the flexible coupling part (1)	See point 7.4.2 and 7.5.1 of the manual	Twice a year	
12	Change the joints	Manually	Every time they are removed	
13	Change mechanical seal	See point 7.4.3 and 7.5.2 of the manual	When leaks are detected	
14	Check concentricity between motor shaft and pump shaft	See point 5.2.1 of the manual	Every time they are removed	
15	Check functional characteristics loss	Instrument reading	In accordance with use	Check the installation, 8

(1) Only ILN series pumps

## 8 Trouble-shooting

The pump does not move the fluid

- | Insufficient pressure or flow
- | | Excessive absorbed power
- | | | Excessive vibrations and noise
- | | | | Excessive bearing support temperature
- | | | | | Leakage through the mechanical seal
- | | | | | | Wear rings deteriorate quickly
- | | | | | | | The automatic priming system does not prime (1)
- | | | | | | | | The main pump does not prime (1)
- | | | | | | | | | The automatic priming system primes but does not shutdown (1)

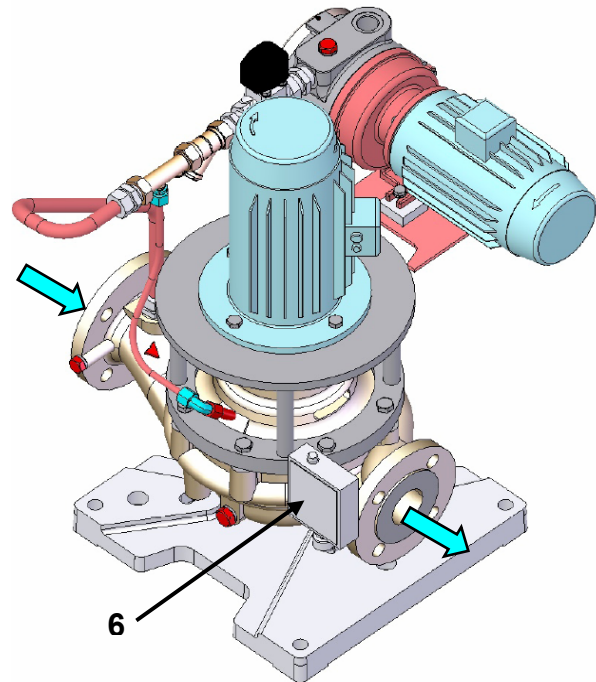
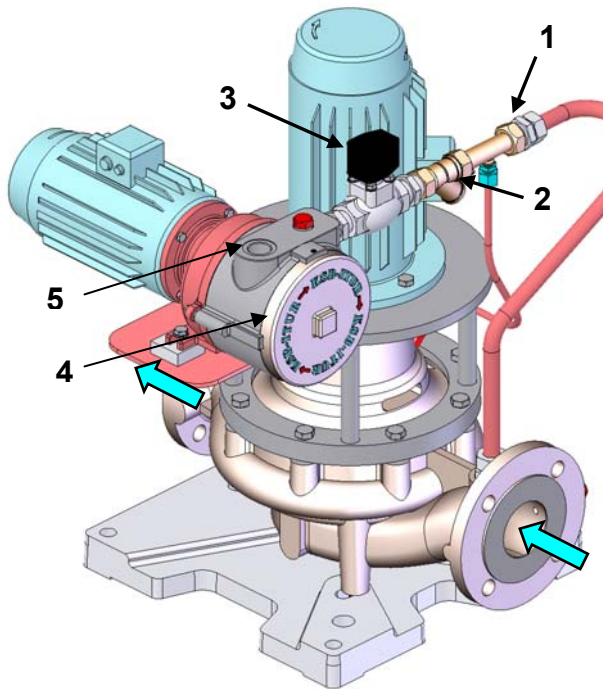
													Cause	Solution
X	X												Suction or impulsion valves closed or poorly regulated	Open the suction valve or search for work point with the impulsion valve
X								X					Rotation direction of the pump or of the auxiliary pump incorrect	Change the motor connections
X								X	X				Air comes in through the suction pipe, or through another point between the pump and the check valve in the discharge pipe, or through the discharge pipe through the check valve.	Check the seal tightness of the pipe, or of the corresponding part of the pipe, or of the check valve, and change as necessary.
X													Pump or suction pipe poorly primed (2)	Correctly prime the pipe by positioning vent connections in the highest points
X													Maximum height generated by the pump lower than that required by the installation	Increase the rotation speed. If this is not possible, a larger impeller or larger pump needs to be assembled. Please ask
	X												Rotation speed incorrect	Measure the speed, check the motor drive power supply voltage
	X												Poorly primed	Refill the pump and pipes and carefully discharge the air
	X							X	X				Air comes in through the sealing system	Dismount the seal system and check it, or check the seal tightness.
	X	X				X							Impeller obstructed, deteriorated or imbalanced	Dismount the impeller, and inspect, balance or change it.
	X	X											Wear rings deteriorated or incorrectly assembled	Dismount the rings and change them
		X											Counter pressure too high	Increase the rotation speed. If this is not possible, a larger impeller or larger pump needs to be assembled. Please ask
		X											Liquid viscosity or density greater than normal.	Reduce the design point or change the motor
		X	X	X		X							Poor alignment between the pump and motor	Align the coupling
		X											Obstruction inside the pump, impeller or nozzles	Dismount the pump and clean
		X											The real height to be generated by the pump is lower than that of the design point, meaning the flow and power are greater	Partially close the impulsion valve
		X	X	X									Ball bearings deteriorated, poorly assembled or poorly lubricated	Change them, check the assembly or lubricate them
		X											Excessive contact in rotating parts	Dismount the pump and check its elements are correctly assembled
			X			X							Misaligned or deformed shaft	Dismount it and replace it
			X										Loose impeller support nuts	Dismount the pump and tighten them
			X	X		X							Pipe tensions on the pump	Reinforce the pipes and level the equipment
			X										Lack of rigidity in the foundations or anchor bolts loose	Make new foundations or tighten the bolts
			X	X									Pump cavitation	Improve the suction. Please ask.
			X										Coupling plugs deteriorated	Change the plugs
			X										Insufficient pipe diameters	Larger diameter pipes, whenever possible
				X									Poorly assembled coupling, without suitable separation between its two parts	Check the coupling
					X								Very deteriorated mechanical seal, seal spring broken or without elasticity, poorly assembled seal, or joints broken, deformed or without elasticity.	Dismount and replace the seal, or dismount, review damage and change as appropriate.
				X									High suction pressure	Please ask
						X							The check valve has not been installed or is operating incorrectly.	Check and/or install a check valve
						X							Filter dirty or auxiliary pump suction pipe obstructed	Clean the filter and check the auxiliary pump suction pipe
						X	X						Suction height of the installation greater than the suction capacity of the main pump and/or priming system.	Reduce the suction height or change the pump for one with greater suction capacity. Please ask
	X												Pipe obstruction	Clean the pipes
						X							Pressure/flow of air to the ejector insufficient	Check and increase
						X							Incorrect operation of the ejector	Check and ask
						X							Obstruction in the ejector air output pipe	Check
							X						The disconnection pressure of the pressure switch is too high	Check / Ask

(1) Only with equipment with automatic priming system

(2) Only with equipment without automatic priming system

## 9 Annexes

### 9.1 Priming system by way of auxiliary pump VAC



rear view

Mark	Description	Size	To be connected by customer
1	Check valve	---	---
2	Filter	---	---
3	Electrovalve	---	220 V II + earth 50/60 Hz
4	Auxiliary priming pump	---	---
5	Discharge air/water	3/4" G	Leave connection free or connect to safe drainage
6	Pressure switch (on discharge of main pump)	---	Start-up: 0,4 bar Shutdown: 70% of the operating pressure of main pump or min. of the pressure switch

#### Note

The electrical control devices of the auxiliary priming pumps are not within the scope of supply of KSB ITUR, except for the case of being expressly requested (see diagram point. 9.1.2 of this manual)

#### Operation

#### Note

When starting up the equipment, the auxiliary priming pump starts up and electrovalve opens, beginning to extract the air existing in the pipe. After a period of time T1 the main pump starts up, with both operating simultaneously.

When the water reaches the main pump, the pressure increase is detected by the pressure switch, connecting to a second timer, which disconnects the auxiliary priming pump and the electrovalve after a period of time T2

When depriming occurs in the facility, the pressure switch detects the pressure drop and starts up the auxiliary priming pump (the main pump remains in operation).

The start-up time (T1) of main pump depends on the volume of air to be discharged. During priming tests it must be adjusted experimentally to the minimum.

T2 shutdown time depends on any instability which may come about during start-up

#### Note

The VAC auxiliary pump is not designed for continuous pumping of water without air. That is why if T2 time is excessive, the motor of the auxiliary pump may be overheated. Thus adjust T2 to a few seconds ( $\approx 5$  sec.) or to star-delta start-up time. In any case, the total time that the auxiliary pump works only with water shall not exceed 15 sec.

#### Installation

The discharge of auxiliary pump (mark 5) should not be closed or impeded.

When the pumping liquid is water, the maximum installation height on the lowest level of the liquid must not exceed 6 m, minus the dynamic losses of the suction system.

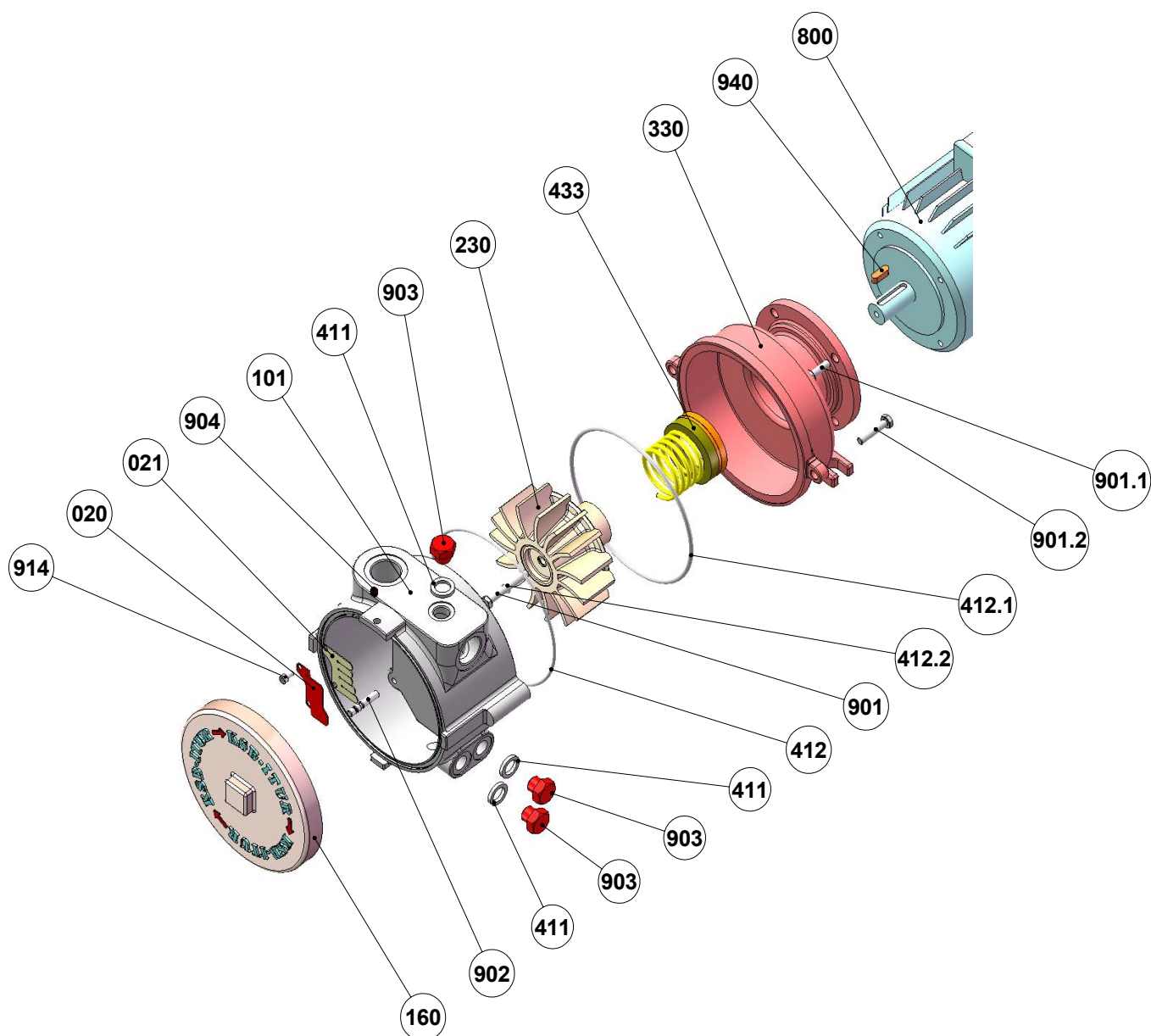
#### Start-up

Bear in mind the following points when starting up:

- Check all the connections and the pipes to ensure seal tightness.
- Prime the auxiliary pump, if it is first start-up
- Check all the electrical connections.



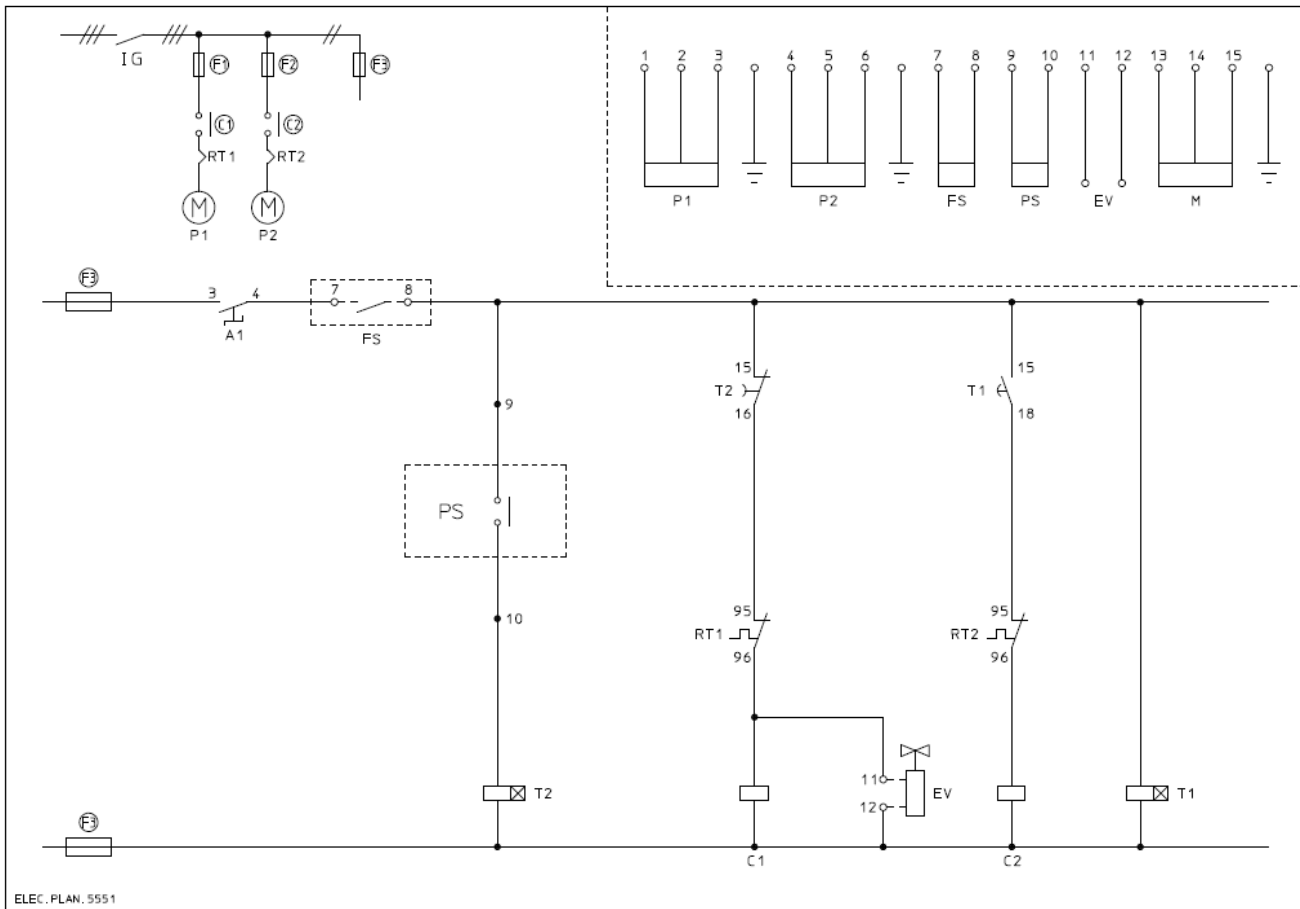
## 9.1.1 Exploded view VAC



Part No.	Description
020	Valve plate
021	Valve
101	Pump casing
160	Cover
230	Impeller
330	Support
411	Circular gasket
412	O-ring

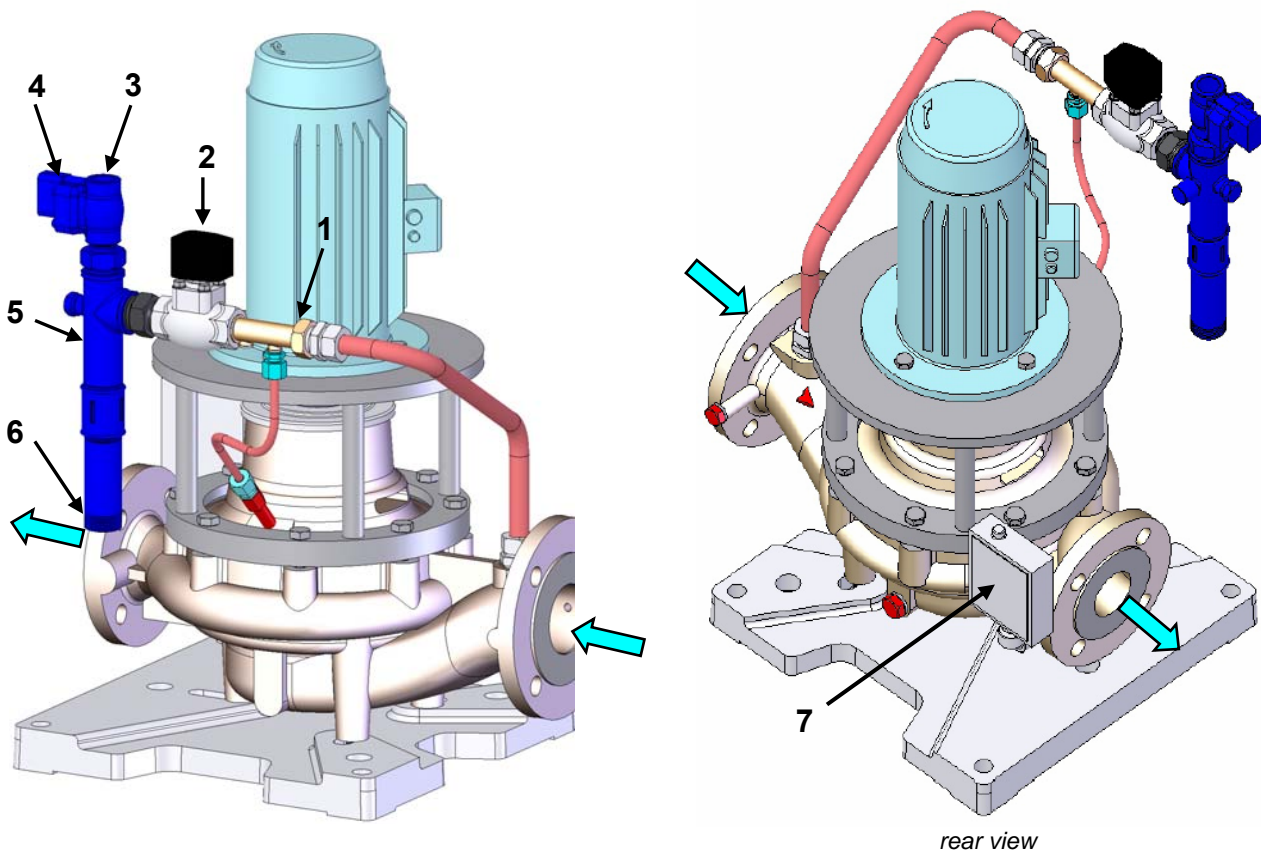
Part No.	Description
433	Mechanical seal
800	Motor
901	Hexagon head screw
902	Bolt
903	Plug
904	Setscrew
914	Allen screw
940	Key

9.1.2 Electrical layout recommended for the control of the auxiliary priming pump system



Mark	Description
P1	Auxiliary priming pump
P2	Main pump
FS	Buoy insufficient water
PS	Pressure switch
EV	Electrovalve
M	Line input
T1	Timing relay with T1 delay in sec. for the main pump start-up
T2	Timing relay with T2 delay in sec. for the shutdown of auxiliary priming pump

## 9.2 Priming system by way of KEJEC ejector



Mark	Description	Size	To be connected by customer
1	Check valve	---	---
2	Suction electrovalve	---	220 V II + earth 50/60 Hz
3	Compressed air input	½ "G	125 l/min of air at 5-7 bar
4	Air compressed electrovalve	---	220 V II + earth 50/60 Hz
5	KEJEC ejector	---	---
6	Ejector discharge	Male 1 " G	Leave connection free or connect to safe drainage
7	Pressure switch (on discharge of main pump)	---	Start-up: 0,4 bar Shutdown: 70% of the operating pressure of main pump or minimum of pressure switch

### Note

The electrical control devices of the auxiliary priming pumps are not within the scope of supply of KSB ITUR, except for the case of being expressly requested (see diagram point. 9.2.1 of this manual)

### Operation

#### Note

When starting up the equipment, electrovalves open, beginning to extract the air existing in the pipe. After a period of time T1 the main pump starts up, with both operating simultaneously.

When the water reaches the main pump, the pressure increase is detected by the pressure switch, connecting to a second timer, which disconnects electrovalves after a period of time T2

When depriming occurs in the facility, the internal pressure switch of suction electrovalve detects the pressure drop and starts up the electrovalves (the main pump remains in operation).

The start-up time (T1) of main pump depends on the volume of air to be discharged, although for installations with short suction pipes we can use following orientative values:

Ø Suction pipe	Time T1
< 50 mm	60 seconds
≤ 125 mm	120 seconds
> 125 mm	180 seconds

T2 ejector shutdown time depends on any instability which may come about during start-up and can be taken a value between 10 and 30 seconds.

### Installation

The discharge of ejector (mark 6) should not be closed or impeded.

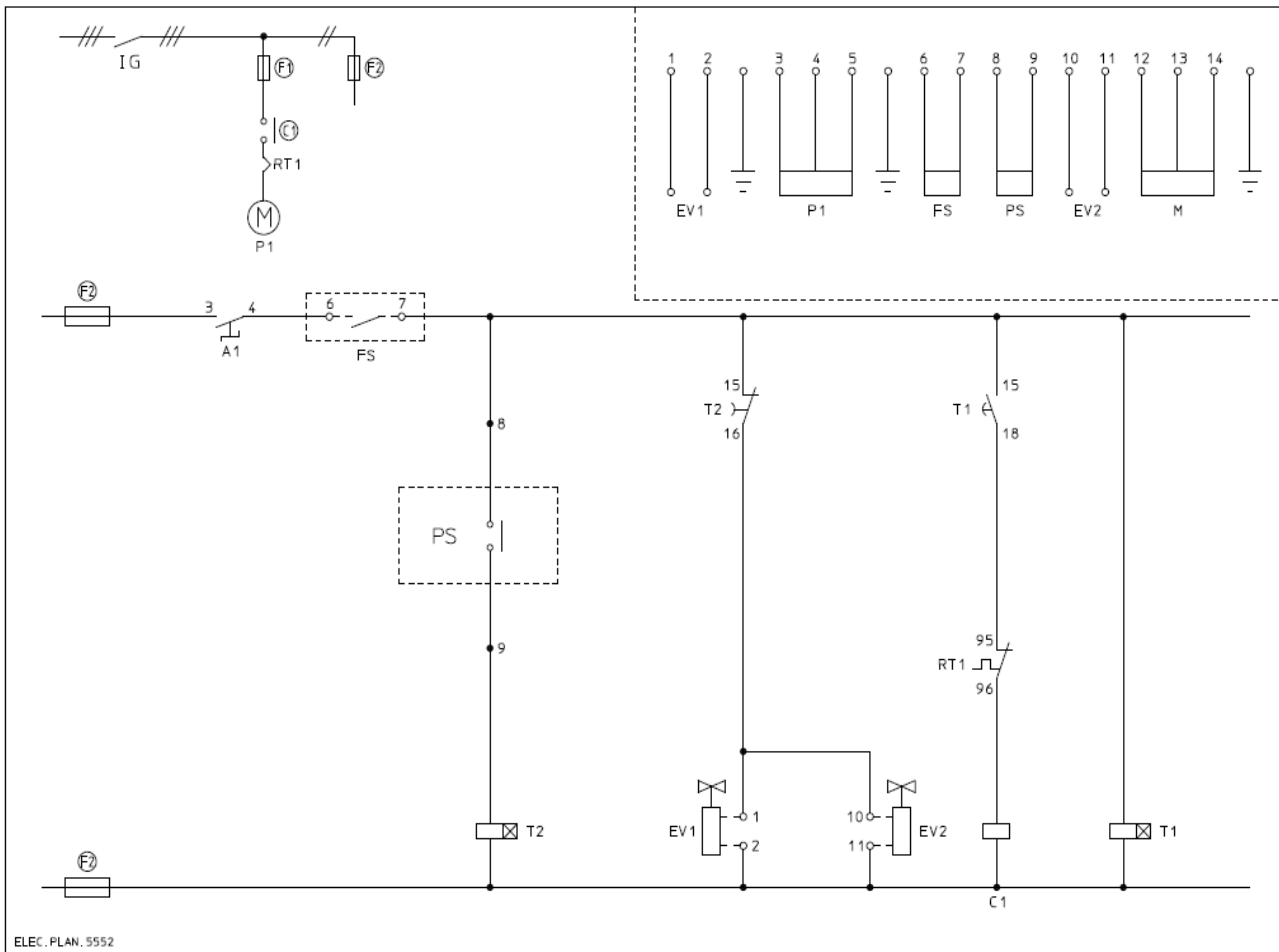
When the pumping liquid is water, the maximum installation height on the lowest level of the liquid must not exceed 6 m, minus the dynamic losses of the suction system.

### Start-up

Bear in mind the following points when starting up:

- Check all the connections and the pipes to ensure seal tightness.
- Check all the electrical connections..

9.2.1 Electrical layout recommended for the control of KEJEC ejector system

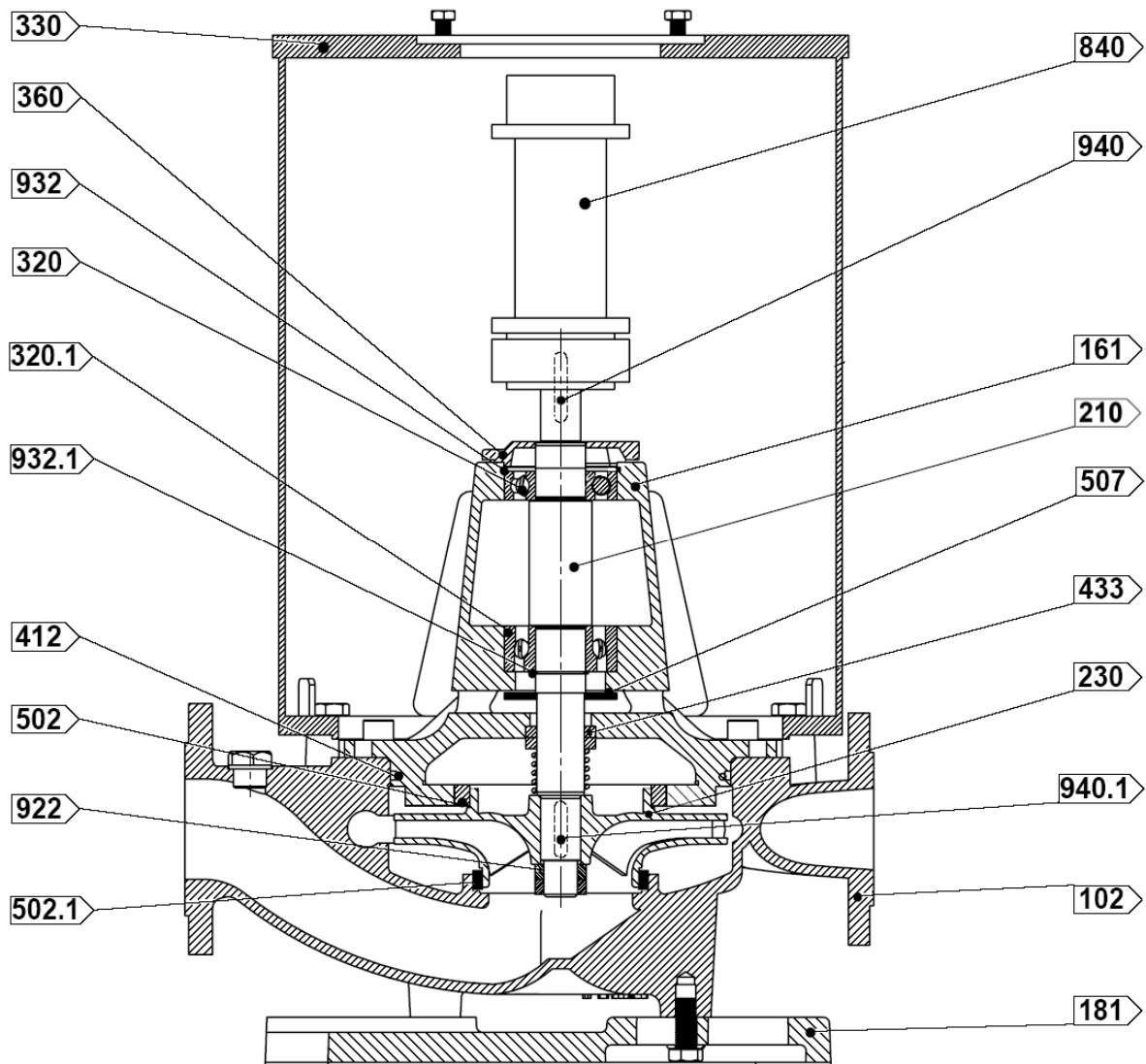


Mark	Description
P1	Main pump
P2	Main pump
FS	Buoy insufficient water
PS	Pressure switch
EV 1 / 2	Electrovalves
M	Line input
T1	Timing relay with T1 delay in sec. for the main pump start-up
T2	Timing relay with T2 delay in sec. for shutdown of electrovalves

### 9.3 ILN series cross drawings

#### 9.3.1 Cross drawing 1

CROSS DRAWING 1 FOR ILN SIZES		
65-160	65-250	
80-160	80-200	80-250
100-250		
125-250	125-315	
150-250		



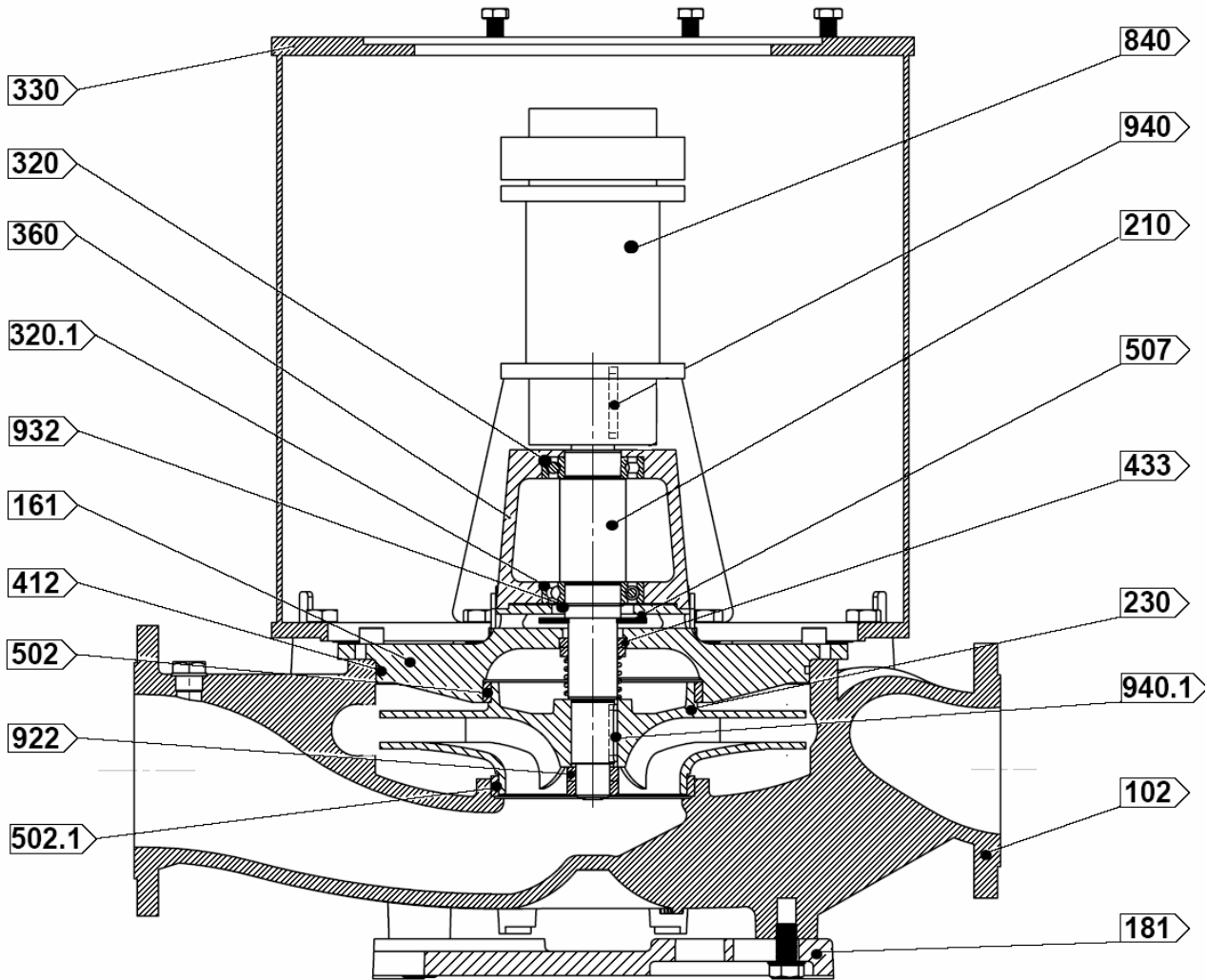
*Cross drawing 1*

Part No.	Denomination
102	Volute casing
161	Pump cover
181	Pump pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover

Part No.	Denomination
412	O-ring
433	Mechanical seal
502	Wear ring
507	Deflector protection
840	Coupling
922	Impeller nut
932	Circlip
940	Key

9.3.2 Cross drawing 2

CROSS DRAWING 2 FOR ILN SIZES	
65-315	
80-315	80-400
100-315	100-400
125-400	
150-315	150-400
200-330	
250-330	



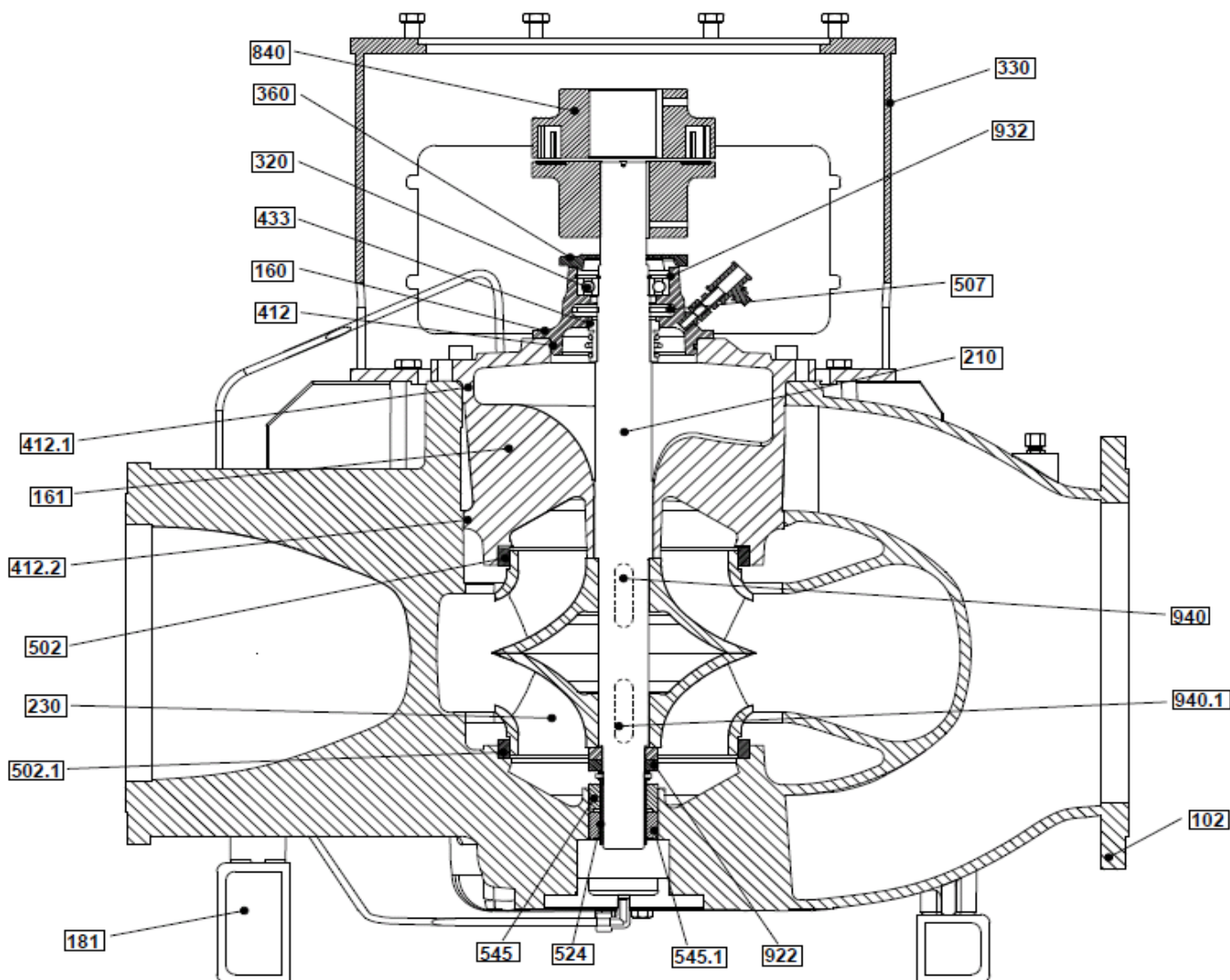
Cross drawing 2

Part No.	Denomination
102	Volute casing
161	Pump cover
181	Pump pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover

Part No.	Denomination
412	O-ring
433	Mechanical seal
502	Wear ring
507	Deflector protection
840	Coupling
922	Impeller nut
932	Circlip
940	Key

## 9.3.3 Cross drawing 3

CROSS DRAWING 3 FOR ILN SIZES (WITHOUT PRIMING SYSTEM)	
300-330	
400-430	



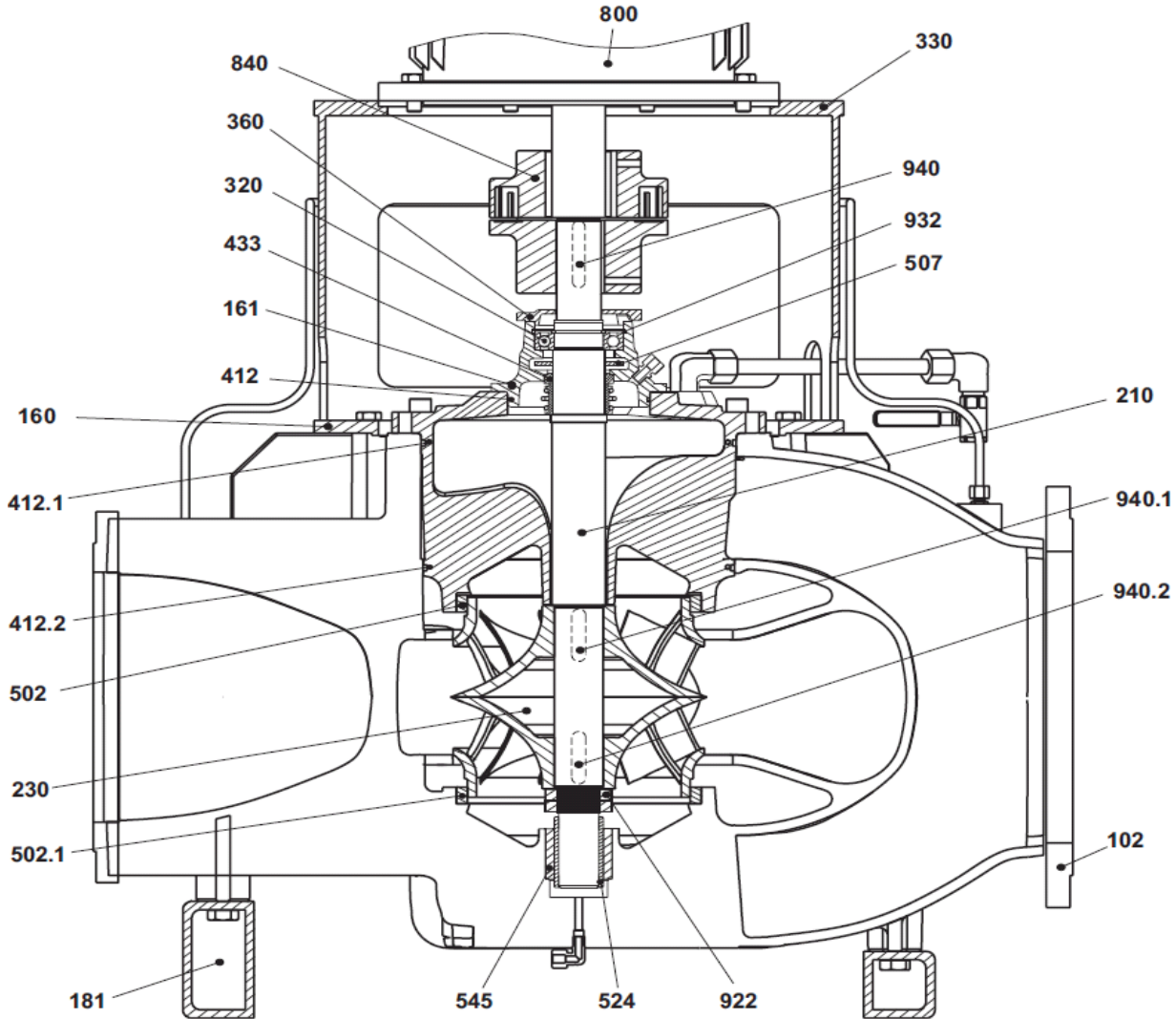
Cross drawing 3

Part No.	Denomination
102	Volute casing
160	Cover
161	Pump cover
181	Pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover
412	O-ring

Part No.	Denomination
433	Mechanical seal
502	Wear ring
507	Deflector protector
524	Shaft protecting sleeve
545	Friction bearing bush
840	Coupling
922	Impeller nut
932	Circlip
940	Key

9.3.4 Cross drawing 4

<b>CROSS DRAWING 4 FOR ILN SIZES (WITH PRIMING SYSTEM)</b>
300-330
400-430



*Cross drawing 4*

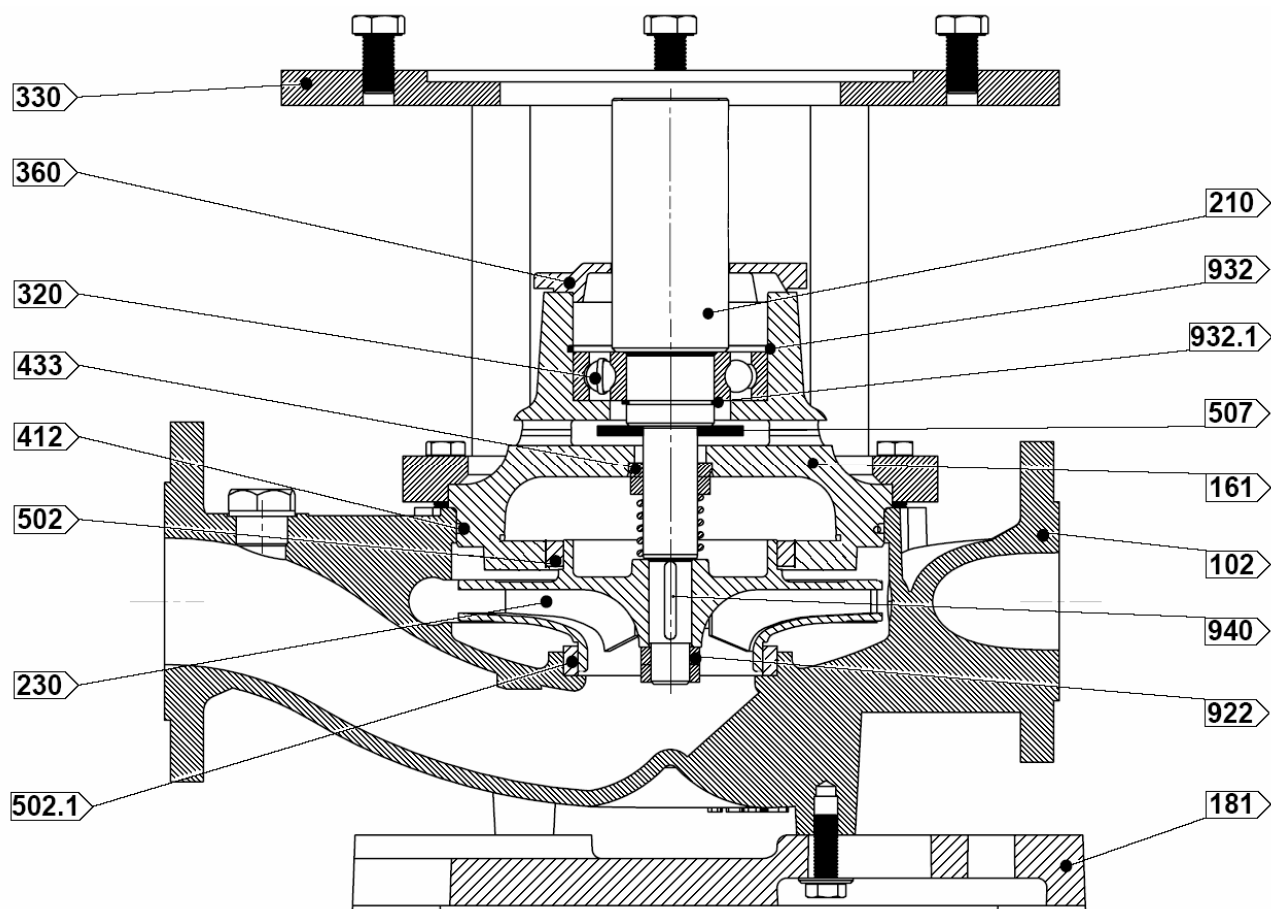
Part No.	Denomination
102	Volute casing
160	Cover
161	Pump cover
181	Pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover
412	O-ring

Part No.	Denomination
433	Mechanical seal
502	Wear ring
507	Deflector protector
524	Shaft protecting sleeve
545	Friction bearing bush
800	Motor
840	Coupling
922	Impeller nut
932	Circlip
940	Key



**9.4 ILNC series cross drawings**
**9.4.1 Cross drawing 5**

CROSS DRAWING 5 FOR ILNC SIZES		
32-160	32-200	32-250
40-160	40-250	
50-200		
65-160	65-250	
80-160	80-200	80-250
100-250		
125-250		

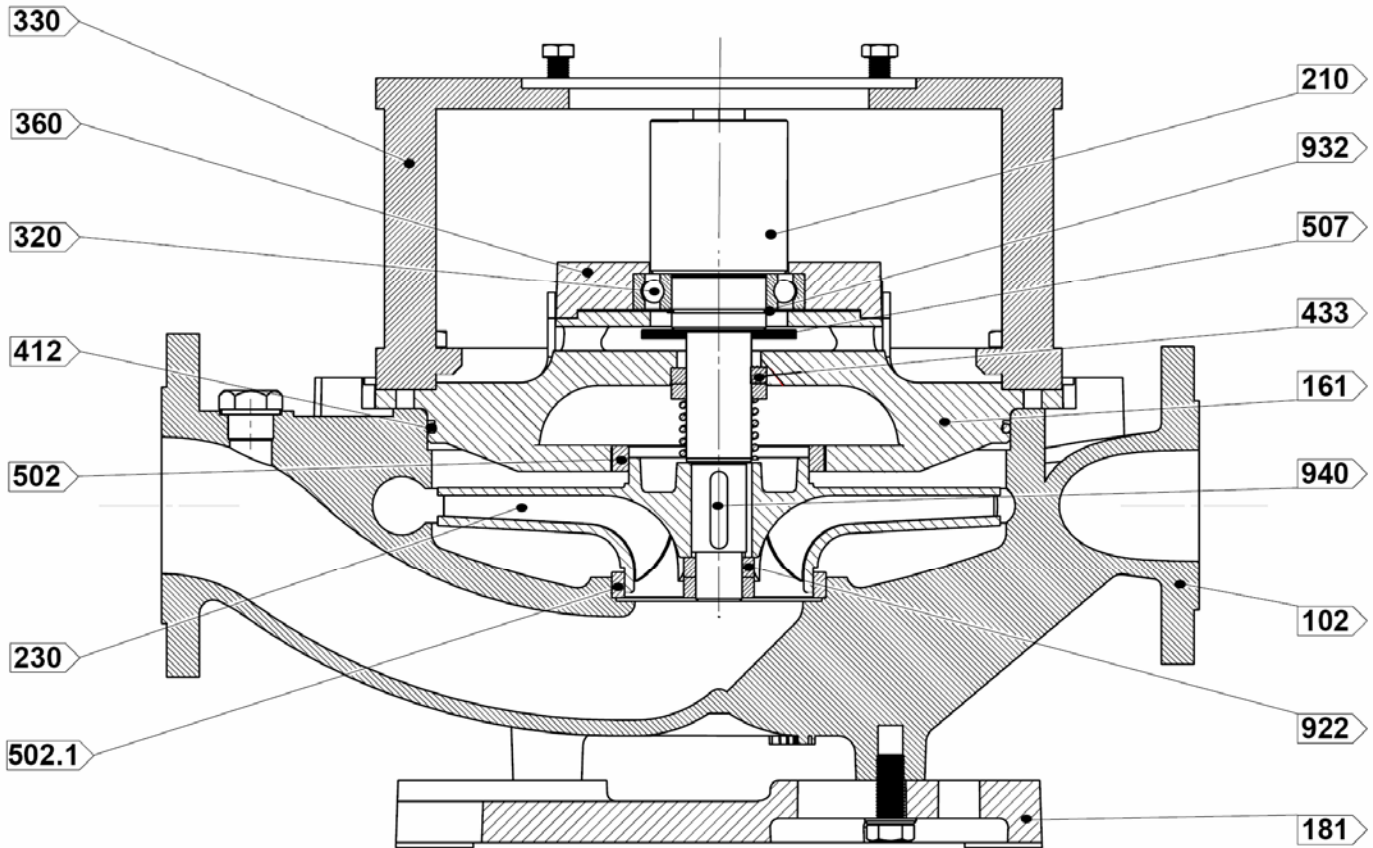

**Cross drawing 5**

Part No.	Denomination
102	Volute casing
161	Pump cover
181	Pump pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover

Part No.	Denomination
412	O-ring
433	Mechanical seal
502	Wear ring
507	Deflector protection
922	Impeller nut
932	Circlip
940	Key

9.4.2 Cross drawing 6

CROSS DRAWING 6 FOR ILNC SIZES
65-315
80-315
100-315



**Cross drawing 6**

Part No.	Denomination
102	Volute casing
161	Pump cover
181	Pump pedestal
210	Shaft
230	Impeller
320	Bearing
330	Support
360	Bearing cover

Part No.	Denomination
412	O-ring
433	Mechanical seal
502	Wear ring
507	Deflector protection
922	Impeller nut
932	Circlip
940	Key

This page has been left blank on purpose.

# WARRANTY

KSB ITUR undertakes:

To repair or replace at any of its ASSOCIATED TECHNICAL SERVICE CENTRES or at its factory in Zarautz, free of charge and for a period of 12 months as of the date of dispatch from our warehouses, any product which shows manufacture defects. This warranty will be reduced to 6 months for continuous or permanent operation pumps. This warranty does not include any pieces which are liable to experience deterioration through the envisaged use of the product. The instructions set out in the maintenance and operation manual for the equipment must be fulfilled in order to prevent excessive wear and tear.

Whenever the equipment or pumps supplied by KSB ITUR are to be used prior to installation, in such a manner as they require handling, assembly and adjustment either before or after installation by parties other than KSB ITUR, KSB ITUR shall not be liable for any defects in the equipment following installation unless the purchaser is able to legally prove that these defects existed prior to installation and assembly.

KSB ITUR shall in no case be liable for any direct or indirect damage which the Product may suffer as a result of defective installation, incorrect storage, lack of maintenance, negligent handling, handling by unauthorised personnel, overloading or deficient functions, or for any damages resulting from external influences such as chemical, electrochemical and electrical agents. The responsibility of KSB ITUR is limited in all cases to the replacement, as speedily as possible, of the defective part, without it being in any way liable for other responsibilities or compensation.

## EC DECLARATION OF CONFORMITY

*(Directive 2006/42/EC ANNEX IIA)*

**KSB ITUR Spain, S.A.**, with address in footer

**PUMP SERIES: ILN, ILNC**

**S/N: 997242000000 000000 - 998000000000 000000**

*KSB ITUR hereby declares, under its responsibility, that its aforementioned machine, to which this Declaration refers, is in conformity with the applicable provisions of the following Directives:*

*Machinery: 2006/42/EC*

*Ecodesign: 2009/125/EC, Regulation 547/2012 (In case it applies)*


*Applied harmonised standards: EN 14121-1, EN 809/A1*

*The collection of relevant technical documentation will be made in the address in the footer*

Zarautz, 29.12.2009

Post Head of Engineering

Name Ángel Fernández



**KSB ITUR Spain, S.A.**

P.O. Box 41 / Camino de Urteta, s/n

20800 ZARAUTZ (Gipuzkoa) Spain

Tel.: +34 943 899 899 – Fax +34 943 130 710

E-mail: [postventa@ksb-itur.es](mailto:postventa@ksb-itur.es) – [www.ksb-itur.es](http://www.ksb-itur.es)