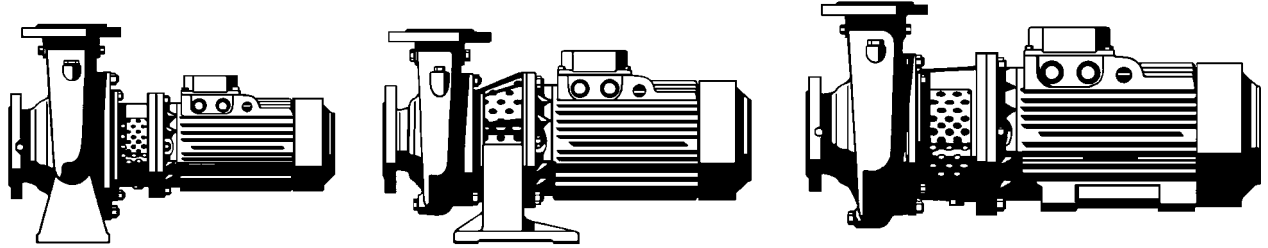


## Monobloc Pumps



## 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.



Please remember that this Manual must be kept close to the motor pump group.

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## 1 General items

**Note**

This KSB ITUR equipment 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 equipment and the ways it can be applied.

It contains important instructions to operate the equipment 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 equipment. 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.



Safety instructions to prevent the risk of explosion. Only applicable to groups with ATEX plate, specially designed to satisfy Directive 94/9/EC on the prevention of the risk of explosion.

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 operator is responsible for keeping the temperature of the fluid within the pump classification temperature limits.

- 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.


## 2.9 Warnings for equipment with marking

 KSB ITUR pumps marked with the ATEX plate are valid for group II category 2 and 3, zones 1, 21, 2 and 22 temperature class as shown on the plate and Conformity Certificate.

 Reliability may be lost through incorrect use, poor connections or any modifications, however small.


 If the liquid is fuel, the pump frame pieces are constructed from ductile material and the impact test described in EN 13463-1 has been passed.

 It is necessary to take into account the rules on the connection and use of electrical devices in hazardous areas, in particular national regulations on installation. Only qualified personnel who are familiar with these rules should handle this type of machine.

 Any repair made by the end user, unless explicitly approved by KSB ITUR, shall release the manufacturer from any liability relating to Directive 94/9/EC. Individual pieces supplied as spare parts must be originals, supplied and checked by KSB ITUR.

### 3 Transport and storage


#### 3.1 Transport and handling

 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 factory plate; if it is not, and the equipment cannot be handled safely, please contact KSB ITUR.

Remember that the equipment must never be lifted using the ring bolts of the different items (e.g. motor and pump ring bolt), which are exclusively for independent transport.

**Note** It is also important not to use the pump and pipe flanges or joining elements, e.g. couplings

**Note** If the equipment is to be lifted using straps, these must always be run underneath the motor and pump support.

 When the 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.

#### 3.2 Provisional storage/Conservation


During provisional storage, it is necessary to protect the parts with preservation products from contact with the low alloy liquid (e.g. grey casting, nodular casting, etc). Preservation products available on the sector market can be used, in line with the manufacturer's instructions on application and disposal.

The pump, or motor pump, shall be placed in a dry site where the relative humidity is as constant as possible.

When stored outside, it is necessary to keep the pump/motor pump in an impermeable box, ensuring it does not come into contact with external humidity.

**Note** Protect the stored product from humidity, dirt, parasites and unauthorised access. All openings must remain closed, and must not be opened until necessary during assembly.

The shiny (mechanised) parts and surfaces of the pump must be protected from corrosion using silicone-free grease or oil.

 All equipment supplied on a transport bench (forklift truck, carriage, etc) should be secured using the envisaged attachment device or brake. Ask KSB ITUR for the specific instructions manual for your transport bench if you do not have one already. (see annex 9.2)



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

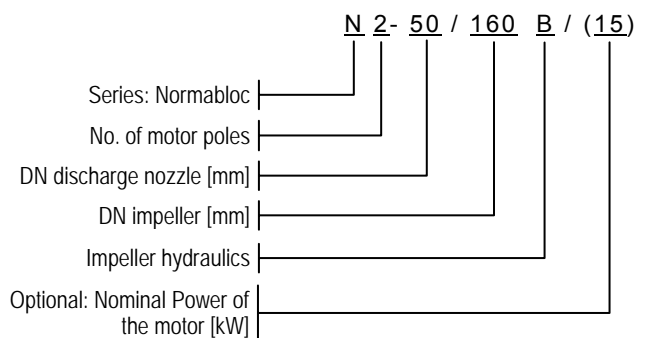
The switchboards must be in vertical position and disconnected.

## 4 Group description

### 4.1 General description

Horizontal centrifugal monobloc pump, with incorporated electric motor, attached to the pump by way of a rigid coupling. For the pumping of clean liquids or liquids with very little load.

### 4.2 Denomination



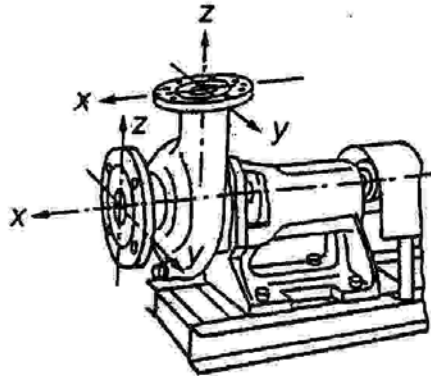
### 4.3 Form of construction

Spiral pump casing with axial suction and radial impulsion. Single-stage impeller closed.

Bearings: Monobloc construction without friction bearings in the pump.

Shaft sealing: Mechanical seal.

4.4 Forces and moments permitted in the nozzles



| CAST IRON OR BRONZE CASING |                |                |                |                |                |                |                |                |                |                |                |                |
|----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| SUCTION                    |                |                |                |                |                |                |                |                |                |                |                |                |
| PUMP SIZE                  | FORCES [N]     |                |                | MOMENTS [N.m]  |                |                | FORCES [N]     |                |                | MOMENTS [N.m]  |                |                |
|                            | F <sub>x</sub> | F <sub>y</sub> | F <sub>z</sub> | M <sub>x</sub> | M <sub>y</sub> | M <sub>z</sub> | F <sub>x</sub> | F <sub>y</sub> | F <sub>z</sub> | M <sub>x</sub> | M <sub>y</sub> | M <sub>z</sub> |
| 32/---                     | 330            | 300            | 270            | 280            | 200            | 230            | 180            | 170            | 210            | 220            | 150            | 170            |
| 40/---                     | 420            | 370            | 340            | 300            | 220            | 240            | 220            | 200            | 250            | 260            | 180            | 210            |
| 50/---                     | 420            | 370            | 340            | 300            | 220            | 240            | 300            | 270            | 330            | 280            | 200            | 230            |
| 65/---                     | 500            | 450            | 410            | 320            | 230            | 260            | 370            | 340            | 420            | 300            | 220            | 240            |
| 80/---                     | 670            | 600            | 540            | 350            | 250            | 290            | 450            | 410            | 500            | 320            | 230            | 260            |
| 100/---                    | 790            | 710            | 640            | 420            | 300            | 380            | 600            | 540            | 670            | 350            | 250            | 290            |
| 125/---                    | 1000           | 900            | 810            | 500            | 350            | 410            | 710            | 640            | 790            | 420            | 300            | 380            |
| 150/---                    | 1340           | 1200           | 1080           | 650            | 460            | 530            | 900            | 810            | 1000           | 500            | 350            | 410            |

## 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 should check with a specialist in the design of castings, pipes, wells, etc. to supplement and interpret the information provided by KSB ITUR and to ensure proper operation.

### 5.1 Check before assembly

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

The slab upon which the equipment is to be positioned must have completely set.

The concrete used must be of sufficient resistance (minimum X0) to allow functional assembly in line with DIN-1045.

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 and the cement has completely set.

### 5.2 Group positioning

#### 5.2.1 Monobloc 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.

##### 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:

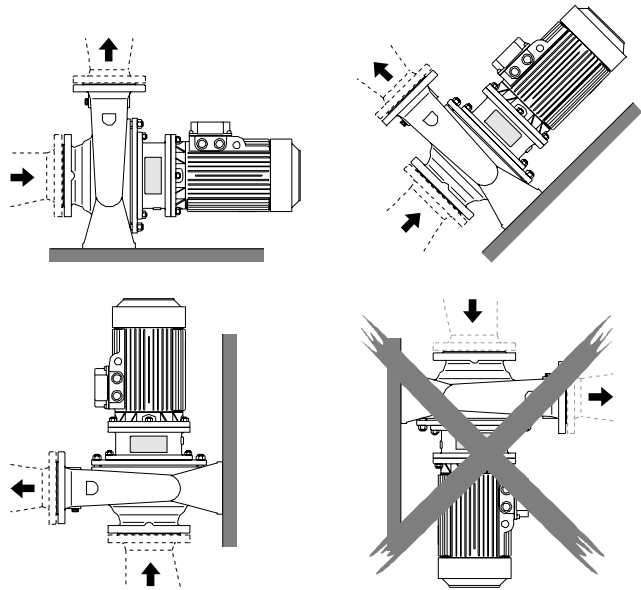
- Check that the flange support surface of the motor support and of the motor itself are perfectly clean and smooth.
- The motor shaft should easily enter the pump shaft (or bushing). If it is not, do not force assembly as this will damage the motor bearings. Check the alignment between both shafts and repair or replace them as necessary.



All equipment supplied on a transport bench (forklift truck, carriage, etc) should be secured using the envisaged attachment device or brake. Ask KSB ITUR for the specific instructions manual for your transport bench if you do not have one already. (See annex 9.2)

#### 5.2.2 Assembly positions

NORMABLOC electropumps can be mounted with the shaft in any position, but never with the motor downwards.



### 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 4.4 (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 stresses 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 stresses 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.

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 shutdown 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).

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

 If the pumping liquid is fuel and the leak can lead to ignition, this contingency should be avoided through constant control of the seal tightness of the auxiliary pipe joints by the plant operator.

**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.

 The motor may produce a source of ignition or high temperature in the event of incorrect operation. For this reason, the motor must be classified with at least

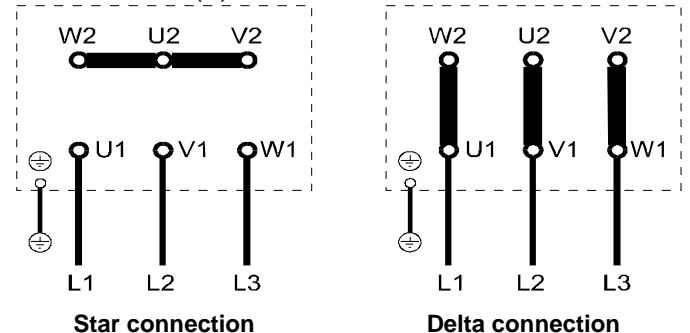
the same type of zone and temperature as the pump. It is necessary to follow the instructions in the motor manual which is supplied with the pump manual.

**Connection in single speed motors**

Direct start-up:

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

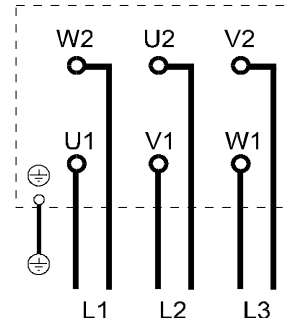
The voltage and the connection, e.g. 400 VY, 240 VD is stamped on the motor plate. This means that the motor can connect at 400 volts in star connection (Y) or at 240 volts in delta connection (D).



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:

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 time will cause damage to the pump.

Timer 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.

The incorrect rotation of the pump may lead to the incorrect operation of the seal and the heating of its faces. For this reason, correct rotation direction must be ensured using the arrow shown on the pump, with the pump completely filled with liquid and properly vented.

## 6 Start-up

Before starting up, both the pump and the mechanical seal process pipes, where appropriate, must be completely filled with liquid.

It is necessary to prevent the formation of explosive atmosphere within the frame and the seal housing. Although there are interior evacuation conducts which remove the possibility of the air becoming blocked, it is necessary to fully vent the pump and its process pipes, when fitted, before starting 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

The pump cannot operate with a closed impulsion valve, as this may lead to overheating of the pumped liquid. If it is necessary to work with the discharge valve closed, a minimum flow relief device is required at the output. This device does not form part of the pump and will be separate from the pump's discharge flange.

Other recommended devices include the constant output orifice plates, constant bypass valves and automatic recirculation valves. If you require further details, please check with KSB ITUR.

The pump cannot work in closed suction valve conditions. If this condition may come about, the plant operator must use a device which detects this condition and forces the pump to halt when it occurs.

#### 6.1.1 Lubricant

Monobloc pumps do not have friction bearings, meaning they do not require lubricant.

#### 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:

##### EQUIPMENT IN LOAD:

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

##### EQUIPMENT IN SUCTION:

1. Disconnect the voltage from the motor or batteries.

2. Close the discharge valve.
3. Remove the venting plug located in the casing or open a discharge pipe vent (before the check 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 5.2.1. The coupling/shaft must allow easy manual rotation.

##### **Note**

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.

##### Minimum flow necessary for the pump

The pumps cannot work below the minimum flow specified in the datasheets.

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 necessary flow of the pump.

For liquids other than water, the minimum flow is determined by the following formula:

$$Q_{min} = \frac{3.600.000 \times Pa}{Pe \times Ce}$$

In which:

*Qmin*: Minimum flow in m<sup>3</sup>/h

*Pa*: Power absorbed by the pump in kW at closed valve.

*Ce*: Specific heat of the fluid in J/kg\*°C.

*Pe*: Specific weight of the fluid in kg/m<sup>3</sup>

Maximum flow permitted by the pump

Unless indicated in another datasheet, the maximum flow permitted is 1.1x optimum flow of the pump with the supplied impeller diameter.

### 6.1.5 Shutdown

Close the discharge pipe valve.

If there is anti-return 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 switching frequencies indicated below must not be exceeded:

| MOTOR POWER      | MAX. SWITCHING/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

 The permitted operation temperature is indicated in the order and in the ATEX conformity declaration. If the pump is to work at a higher temperature or you do not have the data sheet, please ask KSB ITUR.

### 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 and in the ATEX declaration of conformity.

### 6.2.4 Viscosity of the liquid to be pumped

 The power absorbed by the pump increases with the viscosity of the impelled liquid. In order to prevent overloading in the motor, pump and coupling, this viscosity must not exceed that shown in the order and in the ATEX declaration of conformity.

### 6.2.5 Maximum pump speed

In order to protect the pump from over speed, the maximum rotation speed shall be that shown on the name plate engraved in the pump- If the speed shall not be indicated in the name plate it is necessary to consult with KSB ITUR.

If eventually it would be wished to perform the pump at higher speed, it is necessary to consult with KSB ITUR.

## 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.
- Renew the lubrication of the bearings (where fitted).
- Change the gasket (when fitted).
- 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 halted 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 must not be started up involuntarily, and so must be disconnected from the grid (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.

In cases of gasket seal:

- There is no leak; immediately loosen the gland to obtain small dripping.
- Excessive fluid leak; leave to settle for 10 minutes; tighten the gland by turning 1/6th and leave for 5 minutes. Repeat the process until between 20 and 60 drops per minute are achieved.

After a few hours operation:

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.



The failure of one or both sides of the seal may lead to excess heating. This can be corrected by following the instructions of the seal manufacturer, both with regards to its assembly and the maintenance of the auxiliary seal devices, where appropriate. Alternatively, the pump may be fitted with a monitoring device if the purchaser has so specified.

#### 7.2.2 Lubrication

Monobloc pumps do not have friction bearings, meaning they do not require lubricant.

### 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 Dismounting

### 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 Mechanical seal

Dismount the mechanical seal in reverse order to assembly.

#### Note

For the correct operation of the seal it is necessary to:

- Take great care when cleaning the different parts of the mechanical seal, especially the contact faces. Never use lubricant on the contact faces, use only clean water with a cloth specifically for cleaning optical devices.
- Not damage the O-rings during assembly.
- Not turn the mechanical seal while dry.

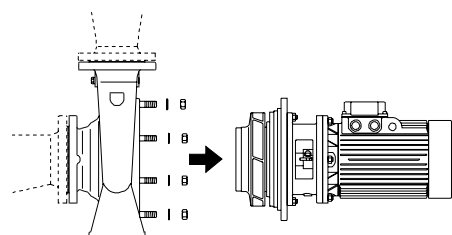
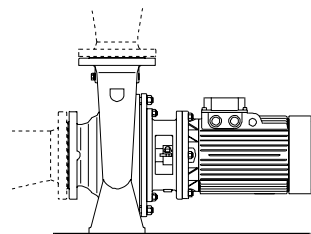
### 7.4.3 Pump

It is necessary to dismount practically the entire pump in order to extract the bearings, shaft, etc.

To do this, observe the attached sectional plan.

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

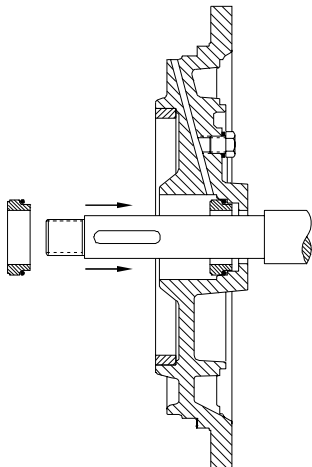
- Extract the support-motor equipment, including the moving parts. The wear rings are accessible at this moment.
- Release the impeller nuts and extract it.
- Extract the seal
- Release and extract the pump cover.
- Release the motor support.
- Remove the shaft.



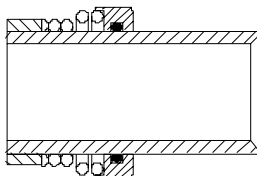
## 7.5 Assembly

### 7.5.1 Mechanical seal

- Mount the fixed part of the mechanical seal.



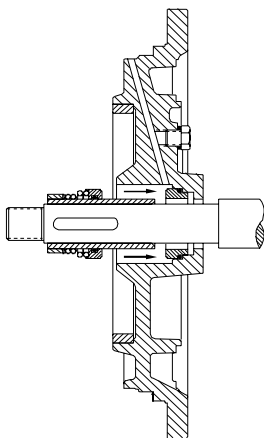
- Mount the rotating part of the seal on the shaft wearing sleeve, taking care not to damage the O-ring.



If locking bushing is included, take the exact measures for location in accordance with the manufacturer's catalogue or plan.

If separation bushing is included, attach it to the shaft wearing sleeve using the bushing, or introduce it in the shaft up to the stopper.

- Form a coil with PTFE tape in the area of the shaft where the shaft wearing sleeve is to be supported. The height of the coil must be equal to or greater than the shaft wearing sleeve
- Introduce the shaft wearing sleeve (already with rotating part of mechanical seal)



- Mount the impeller until it comes into contact with the shaft wearing sleeve or shaft.
- Firmly tighten the impeller nuts until the shaft wearing sleeve comes into contact with the shaft.
- Remove the excess PTFE.
- Finish mounting the pump.

### 7.5.2 Pump


Mount the pump in reverse order to that described.

For the adjustment, with the cover of the pump, screw and nuts in place and tightened, proceed as follows:

- Move the pump shaft back towards the motor until it comes into contact. Mark a line between the pump shaft and the motor.
- Move the pump shaft forward 2mm towards the suction.
- Firmly tighten the coupling fastener screws.
- Manually check that the shaft rotates freely.

**Note** Check the correct positioning of pieces, most notably seals, impellers and shafts.

**Note** If the shaft has been released, check it is thoroughly clean when reinserting it in the coupling. Firmly tighten the coupling screws.

 The pump materials have been selected in accordance with the process fluid indicated in the datasheets. If this fluid is modified, check with KSB ITUR that the new fluid is suitable for the pump.

### 7.5.3 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             |



1) For 00 material variant (volute casing and casing cover in GG-25/JL1040 and screw/nuts class 8.8) apply following tightening torque in screws/nuts between volute casing and casing cover in "X" sequence:

| ISO Metric thread | Tightening Torque in [N·m] (for non-lubricated thread) |
|-------------------|--|
| M8                | 20   |
| M10               | 33   |
| M12               | 57   |
| M16               | 136  |

### 7.5.4 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**

| Piece denomination   | Reference N° | Recommended spare parts (1) |         |         |
|----------------------|--------------|-----------------------------|---------|---------|
|                      |              | Start-up                    | 2 years | 5 years |
| Joints (set)         | ---          | 1                           | 2       | 5       |
| Mechanical seal      | 433          | 1                           | 2       | 3       |
| Wear ring (set)      | 502          |                             | 1       | 2       |
| Shaft wearing sleeve | 523          |                             | 1       | 2       |
| Impeller nut         | 922          |                             | 1       | 2       |
| Key (set)            | 940          |                             | 1       | 2       |
| Pump shaft(s) (set)  | 210          |                             |         | 1       |
| Impeller             | 230          |                             |         | 1       |

(1) Amounts recommended for a continuous service pump.

**7.7 Preventative maintenance**

| N° | DESCRIPTION OF THE OPERATION TO BE CARRIED OUT  | PROCEDURE  | REGULARITY                  | CONSEQUENCE              |
|----|---|--|-----------------------------|--------------------------|
| 1  | Check for mechanical seal leaks   | Visual inspection  | Weekly                      | 9                        |
| 2  | Check for leaks between the casing and the cover  | Visual inspection  | Monthly                     | 8                        |
| 3  | Check for leaks between flanges   | Visual inspection  | Monthly                     | 8                        |
| 4  | Check tightness of connecting bolts for motor/base frame, pump/base frame, cover/casing, support/support supplement, flanges/casing | Manually   | Twice a year                |                          |
| 5  | COMPLETE PUMP CHECK   | Checking and dismantling the pump. See point 7 of the manual | Yearly                      | 1, 2, 3, 4, 6, 7         |
| 6  | Check for wear of the impeller and rings  | Dismount casing, visual inspection                           | Yearly                      |                          |
| 7  | Check for wear of the shaft   | Dismount support, visual inspection                          | Yearly                      |                          |
| 8  | Change the joints   | Manually   | Every time they are removed |                          |
| 9  | Change the mechanical seal  | See point 7.4.2 and 7.5.1 of the manual                      | When leaks are detected     |                          |
| 10 | Check functional characteristics loss   | Instrument reading   | In accordance with use      | Check the installation 5 |

## 8 Trouble-shooting

The pump does not move the fluid

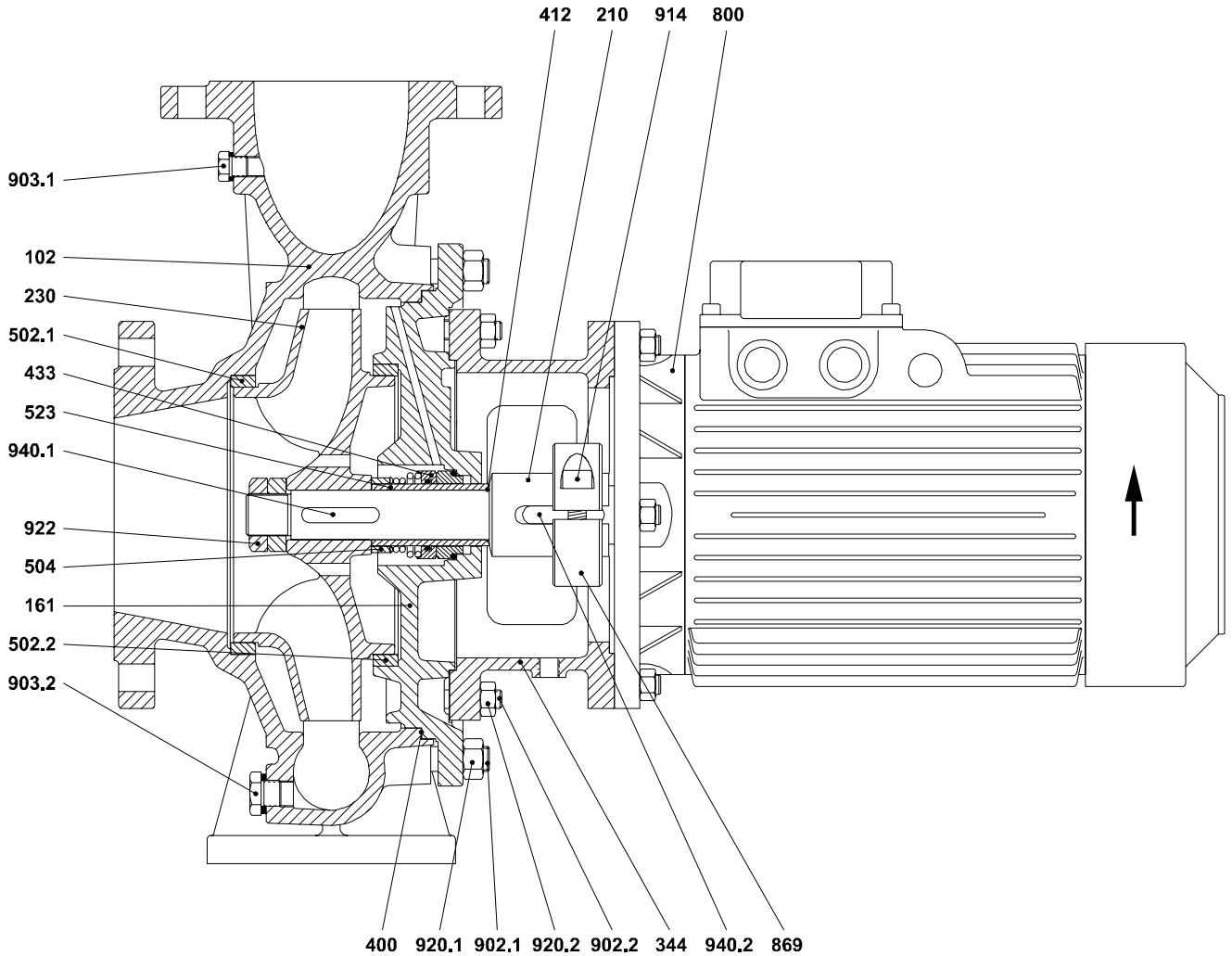
- | Insufficient pressure or flow
- | | Excessive absorbed power
- | | | Excessive vibrations and noise
- | | | | Loss of fluid through the mechanical seal
- | | | | | The wear rings deteriorate quickly

|   |   |   |   |  | 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 |   |   |   |  | Incorrect rotation direction  | Change the motor connections  |
| x |   |   |   |  | Air comes in through the suction pipe,  | Check the seal tightness of the pipe  |
| x |   |   |   |  | Pump or suction pipe poorly primed  | 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 |   |   |  | Air comes in through the sealing system   | Dismount the seal system and check it, or check the seal tightness.   |
|   | x |   |   |  | Pipe obstruction  | Clean the pipes and/or suction filters  |
|   | x | x | x |  | Impeller obstructed, deteriorated or imbalanced   | Dismount the impeller, and inspect, balance or change it.   |
|   | x |   |   |  | Wear rings deteriorated or incorrectly assembled  | Dismount and change them or reinstall 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.  | Increase the design flow or change the motor  |
|   |   | x | x |  | Pump impeller displaced   | Position it in its original position and secure it.   |
|   |   | x |   |  | Obstruction inside the pump, impeller or nozzles  | Dismount the pump and clean   |
|   |   | x |   |  | 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 |   |  | 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 |  | 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 |   |  | Pump cavitation   | Improve the suction, contact us.  |
|   |   | x |   |  | Insufficient pipe diameters   | Larger diameter pipes, whenever possible  |
|   |   |   | x |  | Very deteriorated mechanical seal, seal spring broken or without elasticity, poorly assembled seal, o-rings broken, deformed or without elasticity. | Dismount and replace the seal, or dismount, review damage and change as appropriate.                                      |
|   |   |   | x |  | Re-changeable sleeve scratched or deteriorated  | Dismount and change the sleeve  |

9 Annexes

9.1 Cross sectional drawing

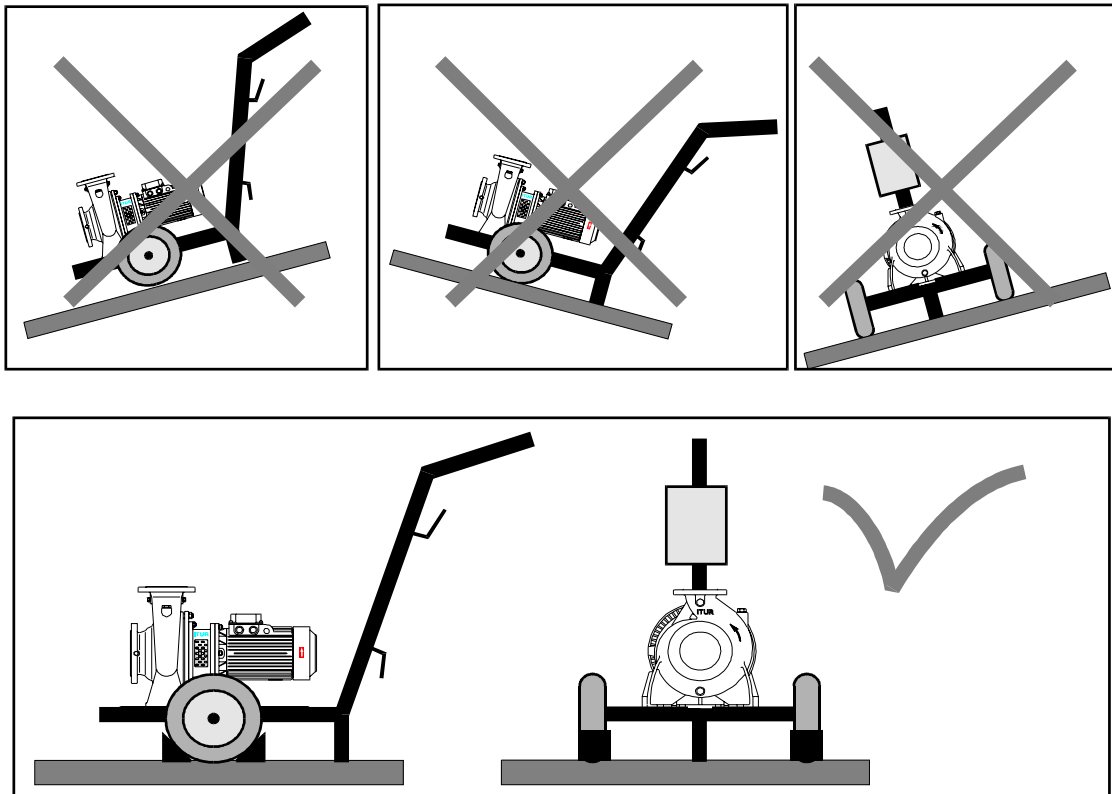
**NORMABLOC**  
**Sectional C-1187**



| Ref. | Denomination            |
|------|-------------------------|
| 102  | Volute casing           |
| 161  | Pump cover              |
| 210  | Shaft                   |
| 230  | Impeller                |
| 344  | Bearing housing lantern |
| 400  | Gasket                  |
| 412  | O-ring                  |
| 433  | Mechanical seal         |
| 502  | Wear ring               |
| 504  | Spacer ring             |

| Ref. | Denomination         |
|------|----------------------|
| 523  | Shaft wearing sleeve |
| 800  | Motor                |
| 869  | Coupling fastener    |
| 902  | Bolt                 |
| 903  | Plug                 |
| 914  | Allen screw          |
| 920  | Nut                  |
| 922  | Impeller nut         |
| 940  | Key                  |

## 9.2 Trolley-mounted pumps



### 9.2.1 Warnings

The instructions in this annex must be used along with the corresponding pump instructions.

All the instructions in this manual should be followed, especially those regarding operation safety and handling of the equipment.

We reserve the right to make technological innovation modifications.

### 9.2.2 Start-up

Before starting up the equipment, check that it is completely stable and that the wheels are locked in place using locking wedges. These locking wedges are not supplied by KSB ITUR and should therefore be provided by the customer.

The surface upon which the wheels are placed must be flat, non-sloping and clean in order to prevent any displacement.

If operation is by way of an electric motor with a pluggable connection, check that the circuit breaker or operation selector is in shutdown position before connecting to the grid.

The start-up instructions in the pump and motor manuals must be followed.

### 9.2.3 Maintenance

Apart from the particular instructions on maintenance of the pump and motor, it is only necessary to regularly check the lubrication, and the state and correct attachment of the wheels to the shaft.

### 9.2.4 Safety



All the instructions in the pump instructions manual on safe operation and handling of the equipment must be followed.

In particular, in order to prevent the equipment from moving and creating a hazard, it should ALWAYS be positioned on a flat, non-sloping surface, with locking wedges preventing any movement.

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# WARRANTY

KSB ITUR Spain, S.A. 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 service pumps.

KSB ITUR Spain, S.A. shall not be liable for any direct or indirect damage which the product suffers as a result of defective installation, lack of maintenance, negligent handling, handling by unauthorised personnel, overloading or deficient functions.

The responsibility of KSB ITUR Spain, S.A. 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: NORMABLOC**  
**S/N: 7432024-9200000**

*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*

*Low voltage electrical equipment (if applicable): 2006/95/EC*

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

*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



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