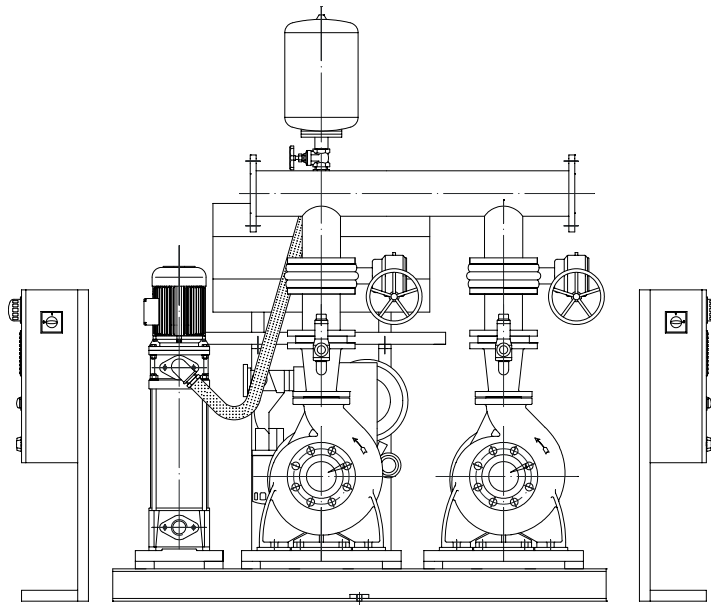


Fire fighting set



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 set.



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

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## 1 General items

### Note

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

It contains important instructions to operate the set 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 set. 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.



In order to prevent and avoid any possible risks which may affect the safety of people, facilities and the environment, pay special attention to the information contained in the manuals for the pumps which make up this set.



All regulations in the country of use must be borne in mind and complied with.



Unauthorised changes are forbidden. Always check with KSB ITUR before modifying the set.

### 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.

Safety instructions which may affect the set 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 contact protections of moving parts (e.g. couplings) must not be removed whilst the machine is in service.
- 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.
- Electrical hazard must be avoided (see details in the specific legislation of the country and/or the electricity 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.

The pump frame must have returned to environmental temperature. It must then be depressurised and emptied of liquid.

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 set shutdown procedure described in the instructions manual.

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

All safety and protection devices must be installed and put into operation as soon as work concludes.

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

## 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 components may terminate any liability for consequences deriving from their use.

## 2.8 Unauthorised operation modes

The safe service of the supplied set 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



The transport and handling of the set 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 set cannot be handled safely, please contact KSB ITUR.

Remember that the set should never be lifted using the ring bolts of each of the elements, e.g. the motor and pump ring bolts, 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 set is to be lifted using straps, these must always be run underneath the motor and pump support.



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

### 3.2 Provisional storage/conservation

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

The set shall be deposited in a dry site where the relative humidity is as constant as possible.

When stored outside, it is necessary to keep the set 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.



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.

### 3.3 Battery storage

The Diesel motor start-up batteries are normally supplied loaded, save for express request in the orders. The following should be carried out in all cases:

#### Batteries full:

If they are to be stored for a period of more than 1 month, they should be regularly connected to a suitable charger to prevent them dropping below the load threshold, in which case they will be unusable.

#### Batteries empty:

These batteries are supplied with the acid in independent packages. During storage, these packages should be duly signalled and identified.

After storage, the batteries should be filled with the acid and left to rest for at least 1 hour. The batteries will then have sufficient load to proceed with the starting up of the Diesel motor.



The acid of the packages may create serious hazards in the event of contact, and so special precautions should be taken (e.g. use of gloves, suitable clothing and goggles) when handling.

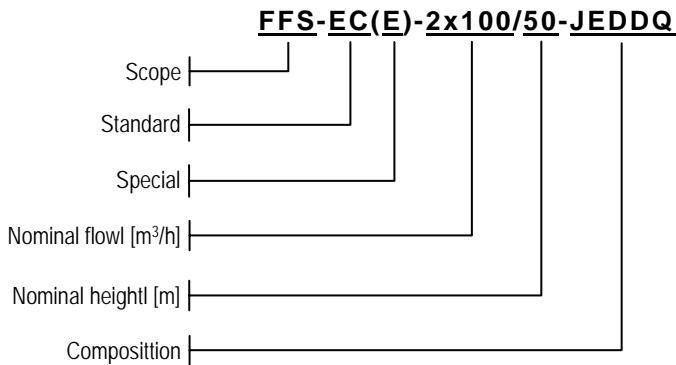
## 4 Set description

### 4.1 General description

The firefighting set supplied by KSB ITUR may contain one or several pumps with their motors and control panels, and another series of elements, in line with the set requested.

## 4.2 Denomination

Example of denomination of firefighting set:



### Scope:

FFS: Fire Fighting Set. Normally on a single base frame, including valves, collectors, etc, all connected.

Standards complied with:

|                         | UN | EN | EU | UC | EC | NF | FM |
|-------------------------|----|----|----|----|----|----|----|
| <b>UNE 23500</b>        | X  |    | X  | X  | X  |    |    |
| <b>EN 12845</b>         |    | X  | X  |    | X  |    |    |
| <b>CEPREVEN RT2-ABA</b> |    |    |    | X  | X  |    |    |
| <b>CEPREVEN RT1-ROC</b> |    |    |    |    | X  |    |    |
| <b>NFPA 20</b>          |    |    |    |    |    | X  |    |
| <b>NFPA 20 FM</b>       |    |    |    |    |    |    | X  |

### Composition:

The nomenclature for the composition is:

- **J:** Jockey pump
- **E:** Main pump driven by electric motor
- **A:** Main pump driven by air-cooled diesel motor.
- **D:** Main pump driven by water-cooled diesel motor.
- **Q:** Testing items

## 4.3 Pumps

### 4.3.1 Jockey pump

Pump of reduced flow, the goal of which is to maintain the pressure in the facility. Supplied with an electric motor.

### 4.3.2 Main pump(s)

Pump or pumps destined to cover the nominal flow of the firefighting set. These are normally driven by an electric or diesel motor.

#### Note

Remember that there are individual instructions manuals for each type of pump.

## 4.4 Main motors

### 4.4.1 Electric

The motors have minimum protection IP-44 and isolation class F.

### 4.4.2 Diesel

Of industrial type for stationary service, four-stroke, injection, cooled by air, radiator, or exchanger.

#### Note

Remember that there are individual instructions manuals for each type of motor.

## 4.5 Hydropneumatic accumulator

The hydropneumatic accumulator, the function of which is to maintain the pressure in the circuit, is connected to the impulsion collector by way of a gate valve.

## 4.6 Impulsion collector

Pipe to join the impulsion of all the pumps. This is manufactured either using fitted pieces or metalwork.

## 4.7 Valves

Cut-off valves. All the pumps have a gate or butterfly valve for impulsion.

Check valves. All the pumps have a check valve for impulsion.

Safety valves. The main pumps may have (in line with the applicable standard) a safety valve in impulsion, calibrated at factory, in order to guarantee a minimum flow when working with a closed cut-off valve in impulsion.



The output must lead to a suitable drainage system in order to prevent damage to people or things. Do not insert any other valve.

There are also other minor valves, such as for the isolation of the accumulator, the regulation of the refrigeration circuit (reducer valve), etc.

## 4.8 Pressure switches and pressure gauges

Each piece of set is supplied with necessary pressure gauges and switches for correct operation, such as:

- \* A start-up and stop pressure switch for the Jockey pump.
- \* One or two start-up pressure switches for each main pump.
- \* A pressure switch to provide pressure signal in the control panel. positioned in the branches of the diffuser cones of the main pumps (where appropriate).
- \* Pressure gauge(s) to indicate the pressure in impulsion.
- \* A pressure gauge to know the pressure of the water going to the heat exchanger in order to cool the diesel motor, positioned in the diesel motor refrigeration circuit (where appropriate).

## 4.9 Control panels

These include a copy of the electrical layout with the numeration inside. The cabling of the different elements is also numbered in line with the diagrams.

All the panels are supplied on a steel support, and are normally connected to the different elements of the set.

#### Note

Remember that there are individual instructions manuals for each control panel.

### 4.9.1 Electric motor panel

The electric control panel will depend on the type of firefighting set used. When there is no main electrical pump, the electrical motors panel is that of the Jockey pump.

### 4.9.2 Diesel motor panel

The diesel panel is unique and independent, with one panel being supplied for each diesel motor.

The panel includes chargers (one for each set of batteries) capable of maintaining the full load, supplying a constant intensity until the nominal service voltage is reached, and then supplying a lower maintenance current.

## 4.10 Base frame or common base

The set with surface pumps is generally supplied with a common base frame which contains all the pumps. When the pumps are of considerable size, or with submerged vertical pumps, the base frames are independent for each of them.

In all cases, these base frames have lifting bolts to facilitate handling, along with the perforations necessary for the attachment bolts.

NOTE: Normally (except for specific request) the attachment bolts are NOT supplied with the set.

## 4.11 Accessories

### 4.11.1 Testing items

KSB ITUR can supply set test accessories, normally involving:

- Branch
- Cut-off valve
- Flowmeter

### 4.11.2 Heat exchanger (when required)

Along with the diesel motor, a heat exchanger is incorporated to cool the motor by way of pumped water (raw water).

KSB ITUR supplies the set with the exchanger in place but set still requires the raw water output to be connected; this must be carried out by the installer in line with the conditions in which the set is to operate.

## 4.12 Noise. Permitted levels

The acoustic pressure level of these sets varies in line with the exhaust silencers of the diesel motors. In case of the sets just with electric motors the noise is less than 100 dB(A) at 1m in any operation point within the operation range without cavitation. The acoustic power is less than 110 dB (A).

## 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



The installation enclosure of the set must be well ventilated to prevent vapours from the battery, combustion gases from the motor and excessive temperature increases.

Connect the earth to the base frame, switchboard and the electric motor (where available).

Position the diesel motors away from the electrical material.

Prepare for proper discharge of the diesel motor exhaust gases. The conduction pipes must be seal tight.

Separate the control panel and its connection cables from hot areas influenced by the diesel motor.

Follow the cabling instructions in line with the layouts included with the switchboards.

The grid impulsion collector joints must be completed in line with the plans provided.

The diesel tank and the diesel motor supply pipes must be firmly and solidly positioned on a pedestal or along the wall, thus ensuring they are not affected by any source of heat.

When the set is installed in an enclosed site, at least the following is necessary:

- An outflow in the ground to discharge the drainage liquids and leaks from the pump seal area.
- Suitable ventilation to prevent the overheating of the motors.

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

The slab upon which the set 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 set.

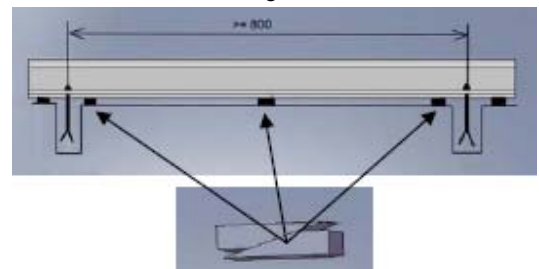
Do not connect the suction and impulsion nozzles until the set is completely installed on its base and the cement has completely set.

## 5.2 Group positioning

### 5.2.1 Groups with horizontal base frame

#### Levelling

Place wedges on both sides of the anchor pins if the base frame does not include levelling screws.



When the distance between anchor pins is over 800 mm, use levelling wedges in the middle, both on the sides and at the front.

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

The separation between the two coupling halves must be maintained.

Pour an initial layer of mortar cement into the orifices of the bolts, contacting throughout the periphery with the base of the base frame. Once the mortar cement has set, tighten the anchor pins in a balanced manner.

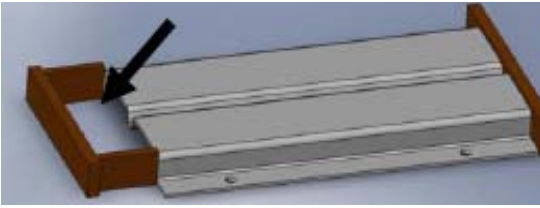
Connect the suction and impulsion nozzles to the installation and proceed with an initial alignment of the set.

Proceed to fill the lower part, or the cavities between the base frame profiles, with concrete.

### Note

In some cases, it is possible that the underside of the diesel motor is located below the concrete level. We should therefore either not place concrete in the area underneath the motor or place protection just below the underside of the motor using a mould.

When using folded steel base frames, make a small mould in the front and rear part.



The concrete must be of minimum contraction, normal granulometry, with a water/cement ratio (W/C Ratio) of  $\leq 0.5$ . It is necessary to use additives which improve fluidity for correct filling.

We recommend treating the concrete in line with DIN-1045.

In order to carry out the final alignment, wait until the installation is ready and at operation temperature.

#### Pump-motor alignment

When the supply includes the complete group (pump – motor), the set has been aligned at factory, although, due to transport and to the anchoring to the casting, the set should be realigned before proceeding with start-up.

**Note** In order to make the alignment, see the instructions in the corresponding manual for each pump.

#### 5.3 Pipe joint

The position of the flanges must be totally parallel in order to minimise strain in the pump necks, which may lead to deformation or misalignment. The screws or bolts must pass easily through the holes of the flanges. Do not forget to place seals at the joints.

**Note** Do not use the set as a support point for the installation. Use independent reinforcements to support the weight and strain of the pipes.

We recommend using anti-vibration sleeves between the output of the general collector and the fire grid.

##### 5.3.1 Auxiliary connections

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

**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. leaning on them, etc).

#### 5.4 Control panels


The control panels which are usually supplied attached to the base frame are only for transport. They should therefore be properly secured.


Should the set have a diesel motor, the control panels should be separated from the base frame where the motor is fitted, in order to ensure it is not affected by its vibrations.

**Note** The control panels must be levelled once installed in their final location.

##### 5.4.1 Panel connection

The control panels are normally supplied connected to the different elements they govern. Nevertheless, all the input terminals are numbered, as are the connection cables, in line with the layouts available inside the control panels.

 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 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.

When connecting electric motor control panels to the grid, the phase detector must not show error. Should this occur, invert any two phases L1, L2 or L3 of the panel supply cable.

##### 5.4.2 Rotation direction. Check

**Note** Check the rotation direction of the electric motors by starting up and immediately shutting down each of the pumps, including the Jockey pump. 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.

#### 5.5 Heat exchanger (when required)

The diesel motor heat exchanger is installed and ready for operation. All that is required is to connect the exterior refrigeration water output, by way of a suitable waste water system.

When the pumps are loaded, we recommend returning the exchanger water to the main tank through the upper section, whenever possible (closeness). When it is not possible to return the water to the tank, connect to a controlled drainage point.

For pumps which are not loaded, always return the exchanger water through the upper part of the suction tank.

**Note** In any case, the exterior water output must be free, without any pressure.

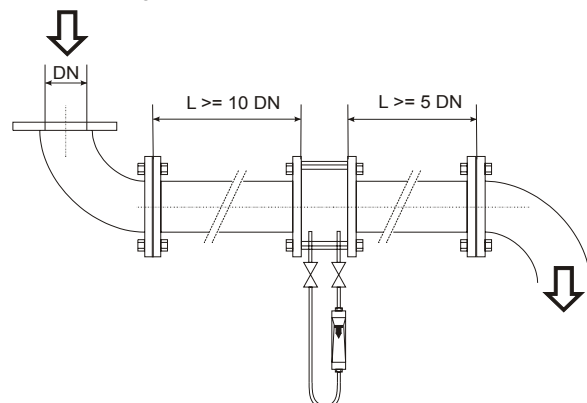
The installation will be completed with a final regulation to be carried out during the first start-up (see section - of this manual).

Once the refrigeration circuit installation is regulated, seal the valve located in the circuit to prevent uncontrolled manipulation.

#### 5.6 Testing items (optional)

The testing items are located after the impulsion collector or each of the main pumps. This normally comprises a branch, a cut-off valve and a flow meter (which is supplied separate from the set).

For the correct operation of the flow meter, install as shown in the attached diagram (DN= nominal flow meter diameter).



The pressure points must be positioned at the same level, and must therefore be horizontal. These pipe sections are NOT supplied by KSB ITUR, unless expressly requested.

**Note** The cut-off valve must always be positioned upwater from the flow meter (which must not be pressurised).

## 6 Start-up

Start-up shall be carried out when all the necessary mechanical, hydraulic, electrical and pneumatic connections are complete.

### Checks in pumps

**Note** See the pump instructions manual in order to carry out the checks.

### 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.

Anticipate the separation necessary between the motor and the walls for there to be suitable refrigeration.

**Note** Follow the indications described in the motor manual.

### Checks in diesel motor

Check that the motor tank is connected and full of fuel.



In an enclosed area, connect the exhaust pipe to a fumes output to prevent the hazard of intoxication.



In an enclosed area, when the tank has a vent point, lead this to the outside.

Check that the batteries are loaded and connected (see point 3.2). If they are not fully loaded, charge them for at least a day before starting up.

**Note** Follow the indications described in the motor manual.

### Checks in control panels



When making the electrical connection, it is essential to 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.

### Checks in electric motor panel

Before making any connection to the line, check the following points:

- Check that the input and output connections correspond to that shown in the diagram.
- Reset all the interior relays in case they have been triggered.
- Check the correct attachment of all the elements, especially the fuses and the connections, which may have become loose during transport.
- Place all the selectors in position 0 or STOP.

Once the panel is connected to the line:

1. Check that the line pilot light is lit up.
2. Press the button to silence the acoustic alarm, since this will be activated by having the pump selectors in pos. 0.
3. Press the "Lamp Test" button (when fitted) and check that all the pilot lights come on.

### Checks in diesel motor panel:

WITHOUT BATTERY VOLTAGE:

1. Check that the internal connections of the panel have not come loose in transit.
2. Place all the selectors in Pos.0.

WITH BATTERY AND GRID VOLTAGE:



1. Check that the voltage in the plate terminals is correct.

### General checks

- Ensure that the pressure value of the air chamber of the hydropneumatic accumulator is as shown in the accumulator or 0.2 kg/cm<sup>2</sup> less than the start-up pressure of the lower regulation main pump.
- If there is a flow meter, ensure proper readings can be made by checking that it is installed as indicated in point 4.8 of this manual.
- If there is a suction and/or primer tank, check that they have the necessary water level.
- Check the connection of the pressure switches, buoys and sensors to the control panels.

## 6.1 First start-up

### 6.1.1 Lubricant

**Note** The pumps which make up the firefighting set do not normally require lubrication. See the manual corresponding to each pump for confirmation.

### 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:

#### SET 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. Fully open the discharge valve.

#### SET 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. Fully open the discharge valve.

The priming should be checked in subsequent start-ups.

### Shaft sealing

**Packing:** The gland nuts must be gently tightened (by hand). The gland must form a right angle to the shaft. There should be a larger leak after filling the pump and before starting up.

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

### 6.1.3 Regulation of pressure switches

Every pressure switch provides the information of what pump is commanding and its connection and disconnection pressure. Nevertheless, if for any given reason a new regulation would be required, please proceed as follows:

The setting of the pressure switch is done using its connection and disconnection nuts or screws.

#### Jockey pump :

- Set the disconnection at the design pressure plus 0,5 bar
- Set the connection at the disconnection pressure minus 1 bar or, the lowest adjustable differential in the pressure switch, provided this is over 1 bar.

#### Main pumps:

- Set the successive pressure switches: 0, 5 bar less than previous values for connection as well as for disconnection.
- Pressure switches in the discharge (if fitted). Set the connection at the 50% of design pressure. Set the disconnection with the lowest adjustable differential in the pressure switch.

Example: If we have a fire fighting set formed by two main pumps with a design pressure of 8 bar the regulation of the different pressure switches is as follows:

| PRESSURE SWITCH       | Disconnection | Connection |
|-----------------------|---------------|------------|
| Jockey                | 8,5 bar       | 7,3 bar    |
| 1st main pump         | 8 bar         | 6,8 bar    |
| 2nd main pump         | 7.5 bar       | 6,3 bar    |
| Discharge (if fitted) | 5,2 bar       | 4 bar      |


\* Note. Case done for a pressure switch with lowest adjustable differential of 1,2 bar


### 6.1.4 Final check

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 and main connections are correct and functioning.

 According to the **rules on the prevention of accidents at work**, set 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.

 All protection items must be in place, and the control panels closed and secured.

### 6.1.5 Start-up

- The start-up must be carried out with the impulsion and suction valves completely open, except for the Jockey pump impulsion valve, which should be slightly open.
- Move the Jockey pump selector to position "AUT" (Automatic), leaving the main pumps in "0". If the grid is empty at this moment, the Jockey pressure switch will order filling, with the "Jockey ON" pilot light coming on.
- The hydropneumatic accumulator and all the fire grid begin to fill. Should the jockey pump motor protection trigger, partially close the valve located in impulsion.
- As the grid fills, the pilot pump (Jockey pump) will automatically shutdown slowly. At this moment the water grid is at maximum pressure.

#### Note

- Control the possible leaks which may come about in the grid.

- Once the grid is full and the Jockey pump shutdown, open the Jockey valve and place the main pump selectors of their respective control panels in automatic operation position, in order to leave the set in normal state of alert.

#### Regulation of the refrigeration circuit of the diesel motor with the water/water heat exchanger (when fitted):

- If there is a test collector, use this to start up the diesel motorpump automatically, partially opening its gate valve.
- If there is no test collector, place the diesel pump control panel in MANUAL position and start up the pump by pressing one of the start-up buttons. When possible, open a water output point in impulsion.



The motor must not work for a prolonged period of time only with the output to the exchanger, meaning these instructions should be executed in the shortest time possible. We recommend not exceeding 5 minutes.



- The set is normally supplied with the exchanger circuit pressure regulator valve set between 1 and 2 kg/cm<sup>2</sup>. Check that water circulates around the exchanger with this pressure. If it does not, use the pressure regulator valve to increase the pressure (as shown on the supplied pressure gauge) until the minimum flow necessary, as shown in the motor manual, or, failing this, sufficient flow for the temperature at the exchanger output to not exceed 45°C, is reached. In this case the circuit pressure must not exceed 4 kg/cm<sup>2</sup>.

- Shutdown the diesel pump by pressing the shutdown button.
- Place the main pump selectors in "AUTOMATIC" alert position, passing first through "0" position.

#### Note

Whenever a selector is to be placed in "AUTOMATIC" position, it is necessary to pass first through "0" position.

### 6.2 Shutdown

The main firefighting set pumps are always shutdown manually.



The way in which manual shutting down is carried out depends on the type of firefighting set, to which end it is necessary to carefully read the instructions manuals of the control panels.

Before carrying out the manual shutdown, check that the external signal which orders the pump start-up has ceased.

### 6.3 Service limits

#### 6.3.1 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                   |

### 6.3.2 Temperature of the liquid to be pumped

**Note**

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

### 6.3.3 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.

### 6.4 Starting up after storage

If the storage and/or shutting down of the set 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.
- Check that there has been no condensation inside the control panel.
- Check the battery load.

After a short storage period, simply turn the pump shaft manually to unlock the rotor set and visually check the state of the electrical elements.

- Follow the specific post-short storage instructions in the motor manuals and other items.
- Connect the set and the panels in line with the attached diagrams.
- Observe all the steps shown in the "Start-up" section.

**Note**

If the set 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 set 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...).

Check the set in accordance with the pump manuals and the motors, along with the spare parts they need.

Regularly check the regulation of the pressure switches and the air pressure in the hydropneumatic accumulator.

If any accessory is dismantled for maintenance (pressure switch, etc.), it must be correctly mounted again in the original position.



The diesel motor contains hot parts, meaning precaution is necessary not to touch them by accident. Use suitable gloves.

Checking of set must be carried out while it is shutdown.

## 7.2 Maintenance/inspection

### 7.2.1 Checking instructions

Since the normal set state is of alert, with the pumps shutdown, check the following before proceeding with the regular start-up indicated in the rules and regulations, or at least once a month, for about 5 minutes:

1. The suction and impulsion valves must be completely open.
2. In Electric motor control panels:
  - General circuit breaker in position 1.
  - Operation selectors in AUT position (automatic)
  - Voltage presence pilot lights lit up.
  - Voltage in the voltmeter correct in the three phases.
  - Heating resistance pilot light lit up (when fitted)
  - Absence of activated alarms indications.
3. In Diesel motor control panels:
  - Operation selector in automatic position.
  - Absence of activated alarms indications.
  - Correct indication of voltage in the battery voltmeter. (Switch the selector to check both batteries).
4. There is pressure in the grid by way of the pressure gauge positioned after the Jockey pump impulsion.
5. Absence of leaks through pipe and pump joints.
6. All the set protection devices are in place (e.g. the coupling guards of the pumps).

### 7.2.2 Lubrication

**Note**

The pumps which make up the pressure set do not normally require lubrication. See the manual corresponding to each pump for confirmation.

### 7.3 Emptying/Drainage



The emptying and drainage of set used to impel 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

Before dismantling a pump, this should be isolated from the rest of the set, both hydraulically and electrically.

**Note**

See the pump instructions manual in order to dismantle.

### 7.5 Recommended spare parts

See the manual corresponding to each pump, motor or control panel.

**7.6 Preventative maintenance**

| Nº | DESCRIPTION OF THE OPERATION TO BE CARRIED OUT | PROCEDURE  | REGULARITY                  | CONSEQUENCE               |
|----|--|--|-----------------------------|---------------------------|
| 1  | Check leaks                                    | Visual inspection                                      | Monthly                     | 3, 4                      |
| 2  | Check the air pressure/level in the tank       | Visual inspection                                      | Monthly                     |                           |
| 3  | Check the number of start-ups                  | Visual inspection                                      | Monthly                     |                           |
| 4  | Check for tightness of joints                  | Manually   | Twice a year                |                           |
| 5  | Complete check                                 | Checking and dismantling the pump. See the pump manual | Yearly                      | 1, 2, 3, 4, 6             |
| 6  | Check functional characteristics loss          | Instrument reading                                     | In accordance with use      | Check the installation, 5 |
| 7  | Change the joints or sealing elements          | Manually   | Every time they are removed |                           |

**8 Trouble-shooting**

**Note** See the individual manuals for any pump or motor anomalies.

The control panels in the firefighting set have a series of alarms which detect and warn of possible anomalies which may come about during operation. In each case, see the alarm type specified in the electrical layout diagram or control panel manual.

Nevertheless, below are listed a series of anomalies which, despite having an alarm in the panel, their causes are not always obvious:

In the Jockey:

Pump overload

|   | Cause   |
|---|---|
| X | Circuit pressure too low during filling. Partially close the impulsion valve.   |
| X | Check protection devices (guard motor) of the Jockey pump   |
| X | The Jockey pump shuts down and starts up suddenly due to breakage of the hydropneumatic tank or due to a leak in the impulsion circuit. |

In the main Electric pumps:

Start-up failure / no pressure

- | Low water reserve level
- | | Protection trigger
- | | | Voltage failure / non-automatic

|   |   |   |  | Cause                              |
|---|---|---|--|------------------------------------|
| X |   |   |  | The pump is deprived               |
| X |   |   |  | The drive is broken                |
| X | X |   |  | There is no water in suction       |
| X |   |   |  | Start-up pressure switch failure   |
|   | X |   |  | The cut-outs are triggered         |
|   | X |   |  | The main pump fuses have blown     |
|   | X |   |  | RST line sequence incorrect        |
|   |   | X |  | There is no supply voltage         |
|   |   | X |  | Selector in non-automatic position |

In the main Diesel pumps:

- Start-up failure Diesel cycles
- | Voltage failure / supply failure
  - | | Excess motor speed
  - | | | There is no pressure in
  - | | | | impulsion
  - | | | | Low motor oil pressure
  - | | | | High motor temperature
  - | | | | Low water reserve level
  - | | | | Low fuel level

|   |   |   |   |   |   |   |   |  | Cause  |
|---|---|---|---|---|---|---|---|--|--|
| X |   |   |   |   |   |   |   |  | The start-up motor is broken                                   |
| X |   |   |   |   |   |   | X |  | There is no fuel   |
| X |   |   |   |   |   |   |   |  | Diesel filters obstructed                                      |
| X |   |   |   |   |   |   |   |  | Batteries empty  |
|   | X |   |   |   |   |   |   |  | Defective connections  |
|   | X |   |   |   |   |   |   |  | Supply voltage failure   |
|   |   | X | X |   |   |   |   |  | Drive breakage (shaft, coupling, etc).                         |
|   |   | X |   |   |   |   |   |  | Empty whilst operating   |
|   |   | X | X |   |   |   |   |  | Deprimed pump  |
|   |   |   | X |   |   |   | X |  | There is no water in suction                                   |
|   |   |   | X |   |   |   |   |  | Impulsion pressure switch failure                              |
|   |   |   |   | X |   |   |   |  | There is no oil  |
|   |   |   |   | X |   |   |   |  | Oil transmitter broken   |
|   |   |   |   |   | X |   |   |  | There is no refrigeration water                                |
|   |   |   |   |   |   | X |   |  | External refrigeration circuit obstruction                     |
|   |   |   |   |   |   |   | X |  | Internal refrigeration circuit leak. Check the expansion glass |

# 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. shall be limited to the replacement of the defective piece at the earliest opportunity, without this giving any entitlement to claims for liability or compensation.

## CERTIFICATE OF COMPLIANCE WITH EC MACHINERY DIRECTIVE

**KSB ITUR**

**P.O. Box 41 – 20800 ZARAUTZ (Gipuzkoa) Spain**

**PRODUCT UNDER CERTIFICATION. FIRE FIGHTING SET**

### "EC" DECLARATION OF CONFORMITY

*KSB ITUR hereby declares, under its responsibility, that its aforementioned products (when supplied with a motor), to which this Declaration refers, are in line with European Directive 98/37/EC on the approximation laws of the Member States on machinery.*

*Applied harmonised standards:*

*EN 292 Part 1, EN 292 Part 2 and EN 809*

### MANUFACTURER'S DECLARATION

*KSB ITUR hereby declares that its aforementioned products (when supplied without a motor) are proposed for incorporation in machinery or assembled with other machines to form machinery covered by Directive 98/37/EC.*

*Warning is hereby given that the aforementioned products cannot be started up until the machinery in which they are to be incorporated has been declared to conform to the dispositions of the aforementioned Directive.*

*Applied harmonised standards:*

*EN 292 Part 1, EN 292 Part 2 and EN 809*

Zarautz, September 2008

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