



EEC DIR 73/23  
EEC DIR 89/336  
EEC DIR 89/392



DIN EN ISO 9001  
Cert. N° 71 100 D 284

# INSTRUCTION MANUAL FOR USE AND MAINTENANCE

## OF MACHINE

Type:	Electrolytic solution aspirator
Model:	SW/91 12V, 24V, 230V
Year of manufacture:	2005
Matriculation number:	



Manual revision<sup>1</sup>:

Version 1.0 / February '05

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## **CE DECLARATION OF CONFORMITY**

Manufacturer

Address:

### **HEREBY DECLARES ITS LIABILITY FOR THE NEW MACHINE**

*Type: Aspirator of electrolytic solution from accumulators and battery holder boxes*

*Models: SW/91 (12, 24 and 230 V)*

*Year of manufacture: 2005*

*Matriculation number*

***This machine conforms to the provisions of law that transpose the following directives:***

- ***EEC 73/23;***
- ***EEC 89/336;***
- ***EEC 89/392, EEC 91/368, EEC 93/44, EEC 93/68 (EEC DIR 98/37).***

**The manufacturer prohibits:**

- Using and performing maintenance on the machine referred to by this declaration in any way that is not in keeping with the instructions in this manual for use and maintenance.

**APPLICABLE LAWS****EC DIRECTIVES**

<b>EEC DIRECTIVE 73/23</b>	Concerning the convergence of the laws of the member States regarding electrical material destined to be used within certain voltages.
<b>EEC DIRECTIVE 89/336</b>	Concerning the convergence of the laws of the member States relative to electro-magnetic compatibility modified and integrated by EEC Directives 92/31, 93/68, 93/97.
<b>EEC DIRECTIVES 89/392, 91/368, 93/44, 93/68 EEC DIRECTIVE 98/37</b>	Concerning the convergence of laws of the member States relative to machinery.

**RULES OF GOOD TECHNOLOGY**

<b>UNI EN 292-1</b>	Machine safety - Basic concepts: general design principles– Terminology and basic methodology
<b>UNI EN 292-2</b>	Machine safety - Basic concepts: general design principles– Technical specifications and principles
<b>UNI EN 1050</b>	Machine safety – Risk evaluation
<b>UNI EN 414</b>	Machine safety – Rules for writing safety regulations
<b>EN 294</b>	Machine safety – Safety distances to prevent upper limbs from accessing dangerous areas
<b>UNI EN 349</b>	Machine safety – Minimum spaces for preventing body parts from being crushed
<b>CEI EN 60204-1</b>	Machine safety – Electrical equipment of the machinery
<b>EN 953</b>	Machine safety – General requisites for fixed and mobile guards

**WARRANTY AND SERVICE****INSPECTION**

An expert individually inspects every aspirator on the test bench. If, notwithstanding the attentive tests and inspections to which the machine is subjected, it does not work properly after assembly, we suggest you check there have not been accidental damages done to it during transportation and storage.

**WARRANTY**

The machine is protected by warranty for three years.

Managing the warranty: the reference date for calculating the warranty period corresponds to the date of purchase of the machine by the final user.

After sale, the serial number is registered in a database on which the date, machine number and name of purchaser are entered.

**WARNING!**

The performance of interventions that do not conform with the indications of the Manufacturer will nullify the warranty and the “CE” mark.

**WARNING!**

The use of non-original spare parts can cause the malfunction or break of important parts of the machine, jeopardizing its soundness and the safety of the employees who operate it.

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>5</b>
1.1. GENERAL CONSIDERATIONS.....	5
1.2. SYMBOLS.....	5
<b>2. DESCRIPTION OF THE MACHINE.....</b>	<b>5</b>
2.1. COMPOSITION OF THE MACHINE.....	5
2.1.1. <i>Figure No 1: design of the SW/91</i> .....	5
2.2. DESCRIPTION OF MACHINE'S MAIN COMPONENTS .....	6
2.2.1. <i>Components of the SW/91 aspirator</i> .....	6
2.3. NOISE .....	8
<b>3. TECHNICAL CHARACTERISTICS.....</b>	<b>8</b>
3.1. SW/91 ASPIRATOR .....	8
3.1.1. <i>Materials</i> .....	8
<b>4. TRANSPORTATION AND INSTALLATION.....</b>	<b>9</b>
4.1. TRANSPORTATION.....	9
4.2. INSTALLATION OF THE POWER SUPPLY BATTERY .....	9
4.3. MACHINE DOWN DUE TO DISUSE .....	9
<b>5. ASPIRATOR OPERATION .....</b>	<b>9</b>
5.1. PREPARING FOR OPERATION.....	9
5.2. OPERATION.....	9
5.3. TROUBLESHOOTING .....	10
<b>6. SAFETY .....</b>	<b>11</b>
6.1. OVERVIEW – USES – AREAS.....	11
6.1.1. <i>General information</i> .....	11
6.2. SPECIFIED, NON-SPECIFIED AND IMPROPER USES .....	11
6.2.1. <i>Particular precautions when using the aspirator in the accumulator recharge room</i> .....	11
6.2.2. <i>Areas of work, control, safety</i> .....	12
6.2.3. <i>Accident prevention gear</i> .....	12
6.3. RISKS, PROTECTIONS, WARNINGS AND PRECAUTIONS.....	12
6.3.1. <i>General safety</i> .....	12
6.4. ACCIDENT-PREVENTION GEAR .....	13
6.5. ACCIDENT-PREVENTION GEAR .....	13
6.5.1. <i>Warnings and cautions</i> .....	13
<b>7. MAINTENANCE / CALIBRATION.....</b>	<b>13</b>
7.1. PUTTING THE MACHINE IN THE MAINTENANCE MODE.....	13
7.2. MAINTENANCE INTERVENTIONS AND INTERVALS.....	14
7.3. REPLACEMENT OF COMPONENTS.....	14



## 1. INTRODUCTION

### 1.1. General considerations

The purpose of writing this manual is to inform the operators who use it and do maintenance on it about the proper procedures for using it and doing maintenance on it in conditions of safety. Bear in mind that proper use and efficient maintenance provide a high level of machine safety and maintain it in excellent operative conditions throughout time. The user of the machine is obligated to use it exclusively in the normal operating condition for which it has been designed.

Exclusively specialized maintenance personnel adequately instructed on the procedures for operating the machine must perform installation, operating tests, and ordinary and extraordinary maintenance of the machine.

### 1.2. Symbols

 <b>Attention!</b>	<b>MEANS: ATTENTION! YOUR SAFETY IS IN DANGER</b>
	<b>MEANS: READ CAREFULLY</b>

## 2. DESCRIPTION OF THE MACHINE


The aspirators of the SW series were designed to execute maintenance operations on accumulator batteries. In particular they enable emptying by aspiration:

1. Of the excess electrolytic liquid inside the batteries of accumulators;
2. Of any liquid that may have overflowed from the accumulator batteries or leaked through the self-leveling system in the topping up phase and dripped into the battery housing box;
3. Of all the liquid contained inside the accumulator elements when the battery dies so it can be eliminated separate from the electrolytic solution.

The leak of electrolyte from the accumulator elements and the stagnation of the same in the box and in other places may corrode the running parts of the forklift (motor and electrical and hydraulic parts), resulting in damage to the machine and put it out of order.

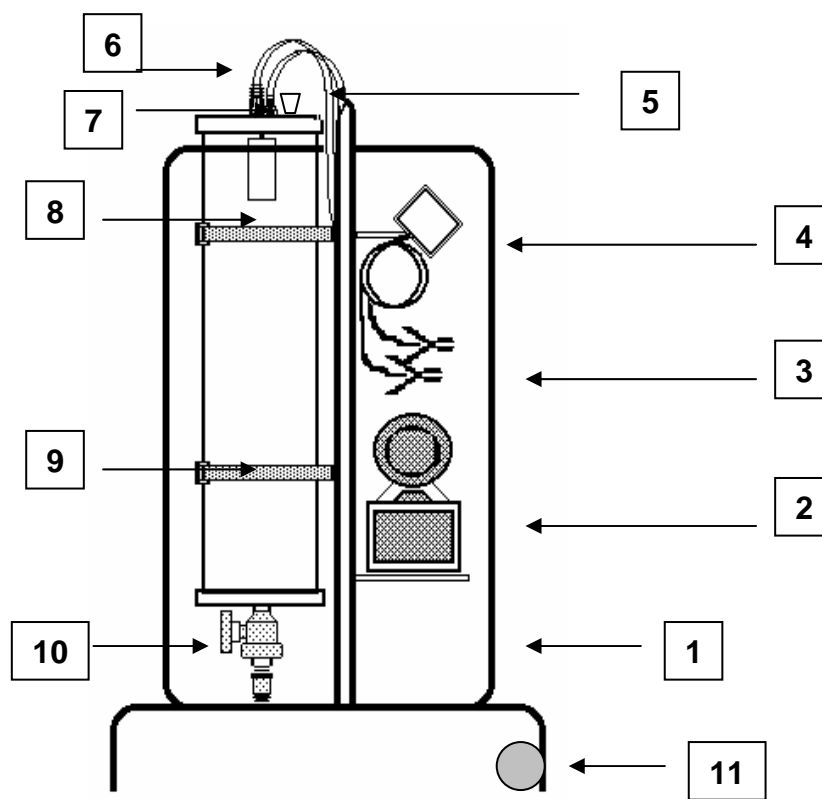
The aspirators are easy to use and make it possible to perform this maintenance operation correctly and safely.

The SW/91, with its ease of use and efficiency, allows a correct and safe operation for optimal maintenance. Its ease of operation and size made it ideal for operators performing maintenance at their customers' facilities.

 <b>Attention!</b>	<p><b><i>The aspirator must be used exclusively to aspirate electrolytic solution from batteries and the caissons of forklifts.</i></b></p> <p><b><i>It must not be used to empty containers of liquids in general in cases of liquids that react or acid or alkaline solutions. In these cases you must use specific products that can be found on the market and are suitable for the type of liquid that you intend to aspirate (transfer pumps).</i></b></p> <p><b><i>It is also prohibited to pour off inflammable liquids or combustible substances because they might create explosive atmospheres in which the electrical parts of the aspirators could act as a trigger and cause serious dangers.</i></b></p>
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### 2.1. Composition of the machine

#### 2.1.1. Figure No 1: design of the SW/91



Rif.	Description	Models		
		SW/91 12V	SW/91 24V	SW/91 220V
		Spare parts code		
1	Steel frame	SW/91 - T	SW/91 - T	SW/91 - T
2	Displacement membrane pump	AM S15 12V	AM S15 24V	MP41DMB 220V
3	Accumulator connection terminals	SW - M	SW - M	---
3a	Connection cable with socket CEI 23-12 (IP67)	---	---	SW/Cable
4	Control pushbutton strip	SW - P	SW - P	SW - P
5	Air valve	SW - S	SW - S	SW - S
6	Acid-proof uptake tube + and adaptor for elements	SW - T	SW - T	SW - T
7	Tube connecting uptake tank to the suction pump	SW/91 - 7	SW/91 - 7	SW/91 - 7
8	Safety cock activated by float	SW - G	SW - G	SW - G
9	Transparent Plexiglas tank for collection of aspirated liquid (V=7l)	S - 7L	S - 7L	S - 7L
10	Drain tap	SW - RS	SW - RS	SW - RS
11	Wheels	SW/91 - 11	SW/91 - 11	SW/91 - 11
*	Kit of spare parts for pump	AM S15 12V kit	AM S15 24V kit	MP41DMB 220V kit

\* The kit of spare parts for the alternative pump includes:

- Aspiration and delivery valves;
- Two upper and lower membranes;
- Retention O-ring;
- Motor brushes (for models supplied with direct current with interchangeable brush motor).

## 2.2. Description of machine's main components

When reading the description of the components making up the SW/91 aspirators, refer to figure 1 because the components are described and indicated with the reference numbers in the cited figures.

### 2.2.1. Components of the SW/91 aspirator

#### 2.2.1.1. Load-bearing frame

The load-bearing frame (part 2 of figure 1), on which all the components of the aspirator are mounted, is made with a welded steel pip frame.

The frame is formed in such a way that the functional components (uptake tank (9), displacement pump (2), control pushbutton strip (4)) are installed on the same. This is done in order to be raised and to be supported on a container for the purpose of emptying the uptake tank once it has been filled.

Finally, the frame has two wheels (11), which make it possible to move the aspirator by hold a handle built into the same part of the frame.

### 2.2.1.2. Tanks

The SW/91 aspirator is equipped with a tank (9), made of transparent Plexiglas, in a cylindrical form, with a capacity of 7 liters, it is arranged inside the housing on the trailer frame shelf.

At the top you will find:

- The uptake tube made of acid-proof PVC (6);
- The breather (5), to be operated to empty the tank.

On the lower part of the tank there is a manually operated cock, which makes it possible to empty the tank when it is full.

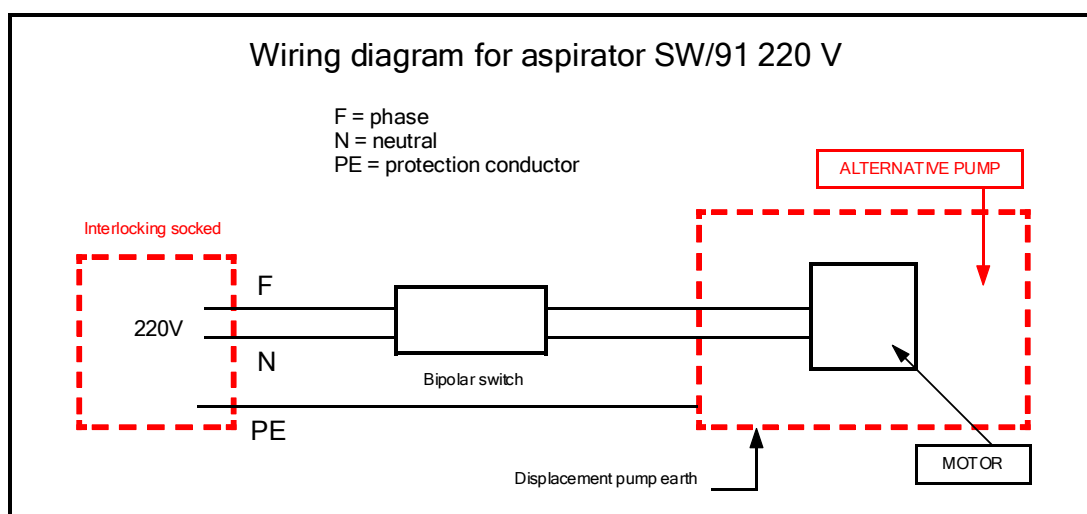
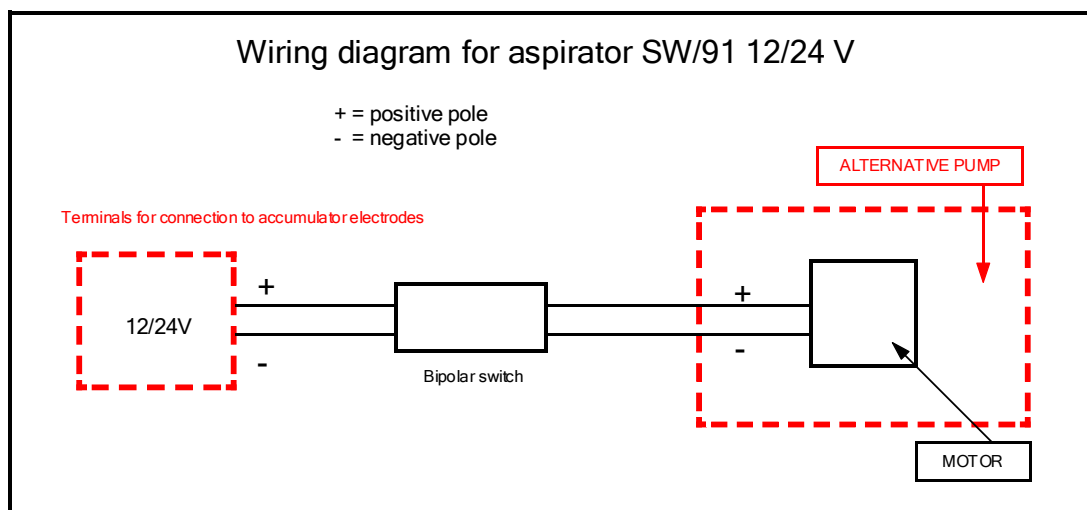
The safety cock (8) ensures that, in case of too much fill up of the tank, the electrolytic solution that would inevitably be aspirated does not reach the displacement pump body because it would damage it.

In fact, the pump is conceived to aspirate air only.

### 2.2.1.3. Electrical equipment

The electrical system on board the machine is simple:

- From an electrical power supply cable with terminals for connection to the battery electrodes, in versions having 12 and 24 V, or an interlocked outlet CEI 23-12 (IP67) in the version supplied at 220V.
- From a bipolar switch to which the electrical power supply cable is connected and from which the electrical power supply cable of the alternative pump motor leaves; the switch is also equipped with a red pilot light that indicates the operation phases of the aspirator.



### 2.2.1.4. Pumping system

The pumps used are self-priming alternative membrane pumps supplied with direct current (12 or 24V, depending on the aspirator models).

Aspirator	Alternative pump
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SW/91 12V	AM S15 12V
SW/91 24V	AM S15 24V
SW/91 220V	MP41DM BOXER 220V

The pump is installed on the shelf of the aspirator frame by inserting special vibratory shock absorbers which prevent the vibrations produced by the alternative pump to cause vibrator phenomena resulting in damage to the equipment making up the aspirator.

### 2.3. Noise

The measurements of the acoustic pressure level were made with a BRUEL & KJAER phonometer type 2236 class 1 calibrated with a BRUEL & KJAER calibrating instrument type 4231.

**The A-pondered continuous equivalent acoustic pressure level measured in the operative position at a distance of approximately one meter from the pump is lower than 70 (dB(A)) on all the models.**

In the design phase, the manufacturer used the best technology possible in order to reduce the sound emissions of the machine.

## 3. TECHNICAL CHARACTERISTICS

### 3.1. SW/91 Aspirator

#### 3.1.1. Materials

Component	Materials
Wheels	Rubber
Frame	Steel pipes
Uptake tubes	Acid-proof PVC
Adaptor for elements	Acid-proof PVC
Drain cock	Acid-proof PVC
Liquid collection tank	Transparent Plexiglas
Cock and float	Acid-proof PVC
Breather	Acid-proof PVC
Tubes for connection (between the two tanks and tank– pump)	Rubber
Control pushbutton strip	Plastic body Copper contacts Steel screws
AMS 15 pumps (12 and 24) For models SW/91 12 and 24 V	Resin body Neoprene membrane Valves made of elastomers reinforced with nylon Stainless steel (AISI 304) screws PVC unions
MP 41 DM BOXER 220V pump For model SW/91 220V	Resin body Neoprene membrane Valves made of elastomers reinforced with nylon Stainless steel (AISI 304) screws PVC unions

#### 3.1.1.1. Mechanical characteristics

Mechanical characteristics	SW/91 12 – 24 – 220
Height	___ 900 mm
Width	___ 380 mm
Length	___ 400 mm
Weight	12 Kg (empty) ÷ 20 Kg (full)
Wheel diameter	___ 50 mm
Uptake tube	Length 2,5 m Internal diameter 8 mm External diameter 12 mm Insert tube PVC ¼ inches
Plexiglas tank	Volume 7 l Height 500 mm Diameter 150 mm

#### 3.1.1.2. Electrical characteristics

Electrical characteristics	Model		
	SW/91 12V	SW/91 24V	SW/91 220V
Nominal power (W)	60	60	40
Minimum absorption (A)	4	2,5	< 0,4
Maximum absorption (A)	8	4	0,4

<b>Power supply cable (minimum section mm<sup>2</sup>)</b>	4	2,5	1
<b>Protection current (A)</b>	10	6	0,5
<b>Characteristics of power supply battery</b>	12 V > 45 A	24 V > 45 A	—

## 4. TRANSPORTATION AND INSTALLATION

### 4.1. Transportation

The aspirator is supplied, already completely assembled with all its parts, packed in a special box of commercial cardboard.

After the packaging is removed:

- The SW/91 model, because it has wheels and a handle built into the load-bearing structure, can be moved easily to the places where it is needed (generally to the accumulator recharge rooms).

### 4.2. Installation of the power supply battery

The aspirator models supplied with dc voltage of 12 and 24V, are predisposed to be powered by means of an external battery which must be connected to the User's electrical system by means of cables with connection clips /terminals. When applying the clips to the accumulator terminals, pay particular attention and avoid polarity errors. Remember that:

- The red clip must be applied to the positive electrode of the accumulator (+);
- The black clip must be applied to the negative electrode of the accumulator (-).

### 4.3. Machine down due to disuse

In cases where it is decided not to use the aspirator for a given period of time, it is advisable to put it away with the following precautionary measures:

- Put the apparatus away in a dry and ventilated place.
- Disconnect the battery (for models supplied with direct current).

## 5. ASPIRATOR OPERATION

### 5.1. Preparing for operation


Before using the aspirator, perform the following operations:

1. Connect it to the power supply accumulator (only for aspirators supplied with a direct current of 12 or 24 V).  
Use a suitable accumulator (see electrical characteristics shown in Chapter 3 "Technical characteristics") which shows an adequate charge; it is recommended to always use accumulators with a maximum charge level in order to avoid having to replace them often during the work phases.
2. Connecting the electrical power supply.
  - Models supplied with dc voltages: connect the power supply cable clips to the accumulator electrodes. Make sure to respect the correct polarity (refer to colors).
  - Models supplied at ac voltage 220 V: place the power supply cable with an interlocking plug of the CEI 23-12 type to an appropriate wall socket.

Before connecting to the electrical power supply, make sure the ON/OFF switch on the pushbutton strip on board the aspirator is in the OFF position (O).

We would like to point out that the aspirator supplied with a dc voltages, having an electrical powers supply on board, is easy to move and therefore suitable for high-mobility activities.

The aspirator supplied with alternating current needs an external type of electrical connection and is therefore more suitable for certain types of work stations.

	<i>If the aspirator is being used with alternating current, it is recommended to conceive a accumulator battery maintenance station in places that have the specified type of sockets (female sockets 220V of the CEI 23-12 type), because it is recommended to avoid using adaptors, extension cords and floor cables that might be subject to dangerous damages (also in consideration of the fact that in the vicinity of these stations there is a passage of fork lifts or other vehicles powered by accumulator batteries).</i>
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At this point the aspirator is ready to be used.







When moving the aspirator, observe the following precautions:

- Do not run.
1. Make sure that along the way there are no corners, holes, steps or other obstacles that might throw the unit or the operator off balance.


### 5.2. Operation

Once the phases described in the previous paragraph are carried out, you can use the aspirator.

For this purpose, follow these steps.

 <p><b>Attention!</b></p>	<p><b>It is obligatory to wear the appropriate accident prevention gear.</b>  <b>Before every phase of using the aspirator, the following gear must be put on:</b></p> <div style="display: flex; justify-content: space-around;">    </div> <ul style="list-style-type: none"> <li>- Acid-proof gloves;</li> <li>- Acid-proof aprons or overalls;</li> <li>- Spray-proof goggles.</li> </ul> <p><b>Use these precautions when using the aspirator:</b></p> <div style="display: flex; justify-content: space-around;">   </div> <ul style="list-style-type: none"> <li>- Do not smoke or use naked flames.</li> <li>- Avoid creating sparks.</li> <li>- Do not eat.</li> </ul>
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1. Start the pump motor by turning the ON/OFF switch on the pushbutton strip on board the machine to (I)
2. Insert the uptake tube into the battery container or element to be aspirated: in the case of aspirating a caisson, where the liquid is particularly dirty and contains suspended particles, avoid laying the small tube located at the end of the uptake tube on the bottom of the caisson in order to avoid clogging.
3. At this point we must wait for the liquid to flow out of the uptake tank until the container is emptied.
4. Do not to exceed the line on the uptake tank in order not to damage the motor.
5. After the emptying operation is finished, turn off the pump motor by turning the switch to (O)

	<p><b>During the emptying operations, be careful to not go above the line on the tank, which indicates that the maximum level of uptake liquid has been reached in the tank.</b></p>
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Once the aspiration from the caissons or accumulator batteries has been completed, you must drain the solution contained in the collection tank.

#### Procedure for emptying the tank on model SW91

- Before every operation, wear suitable accident-prevention gear, such as:

		
Acid-proof gloves	Acid-proof apron or overall	Spray-proof goggles

- Put the acid-resistant plastic tube on the tube holder of the cock located under the collection tank.
- Place an appropriate container under the tank, under the aspirator frame, that is acid-resistant and has an adequate capacity in relation to the tank volume (7 liters) and equipped with a sealed cap.
- Place the drain tube inside the container and open the drain cock (10) and the breather (5) to empty the entire contents of the tank inside the appropriate container.
- Then discharge the remaining liquid from the aspirator tube into the container and rewind the latter around the frame structure.
- Once the transfer operation has been completed, be careful to put the cap on the collection container in order to avoid accidental dispersion of the liquid in case the container spills or drops.

	<p><b>In the transfer and emptying phase of the tanks on board the aspirator, you must use proper transfer containers that are:</b></p> <ul style="list-style-type: none"> <li>- Made of acid-proof material;</li> <li>- Equipped with special handles for carrying them correctly;</li> <li>- Equipped with a sealed cap so that once the transfer has been performed the container is closed again tight to avoid leaks, splashes and spills.</li> </ul>
	<p><b>The liquid taken up must be sent for eliminating as waste. In fact it must be considered a special hazardous waste (CER code 160606).</b>  <b>It is strictly forbidden to pollute the soil or drain water with the liquid taken from the battery-holder caissons or accumulator batteries.</b>  <b>Therefore do not discharge the liquid into sinks or sewer systems. Always carry out the transfer operations in areas provided with impermeable flooring or containment basins.</b></p>

### 5.3. Troubleshooting


PROBLEM	CAUSE	REMEDY
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<p>- <i>Only for models supplied by direct current.</i></p> <p>The pump motor does not start when connecting the electrical power supply.</p>	There may have been an error in the connection of the cable clips to the battery terminals.	Invert the polarity of the electrical power supply (invert the position of the cable clips to the accumulator terminals) and supply voltage.
	Terminals not adequately applied to accumulator poles.	- Make sure the terminals are properly fixed to battery poles. - Make sure battery poles are clean.
	Power supply battery is flat.	Replace flat battery with an adequately charged one.
<p>Insufficient pressure and therefore problems in performing the emptying operations (the pipe has difficulty injecting the water).</p>	Clogging of the uptake pipe.	Make sure there is no clogging in the uptake pipe. If there is, unclog it.
	Clogging of aspiration tube between tank and pump.	Make sure the uptake tube is not clogged. If necessary, clean it or replace it.
	Leaks in the tubes.	Make sure there are not leaks in the joints or tubes.
	Failures of or damages to membranes inside pump body.	Replace damaged membranes.
	Accidental crushing of fluidic pipes	Make sure there are no tubes being crushed by poorly placed machines or equipment.
	Presence of sludge or oily residues inside liquid circuit (uptake tube, tank).	Clean the uptake tube and tank.

## 6. SAFETY

### 6.1. Overview – uses – areas


#### 6.1.1. General information

	<p><i>The purpose of this Chapter is to provide safety conditions for the operator and therefore must be read with special attention by the persons in charge of machine maintenance.</i></p> <p><i>The employees who run the machine and perform maintenance on it must operate exclusively according to the instructions in this Manual, particularly this Chapter.</i></p>
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### 6.2. Specified, non-specified and improper uses

The aspirators of the SW/91 series (12, 24 and 220V) have been designed and built for servicing the caissons on accumulator batteries, specifically to empty them by aspirating:


1. the electrolytic liquid in excess inside the accumulator batteries;
2. the liquid that has overflowed from the accumulator batteries or leaked through the self-leveling system during the topping up operation and dripped into the battery housing caisson;
3. all the liquid contained in the elements of the accumulators at the end of the battery's life so it can be eliminated separately from the electrolytic solution.

	<p><b><i>Any use of the machine other than that specified above is to be considered improper and incorrect.</i></b></p> <p><b><i>The manufacturer therefore declines all liability for events that might derive from using the machine in a way that is considered improper.</i></b></p>
<b>Attention!</b>	<b><i>It is also prohibited to transfer inflammable liquids or combustible materials.</i></b>

The User of the machine is held responsible to assign its use exclusively to trained personnel, trained according to the instructions in this manual, completed by the technical knowledge of the User.

#### 6.2.1. Particular precautions when using the aspirator in the accumulator recharge room

**In cases where the aspirator is used in the lead accumulator battery recharge room it is obligatory to observe the precautions and procedures given below.**

	<p><b>1</b> The aspirator can be used only in rooms with artificial or natural aeration in order to prevent the formation of explosive atmospheres (areas in the external environment or areas that are artificially non-"AD"):</p> <ol style="list-style-type: none"> <li>a. In cases of recharge rooms with natural aeration, the rooms must be situated in open or outdoor environments;</li> <li>b. If the recharge room is in a closed environment, it must be equipped with mechanized systems that provide aeration, as uniform as possible throughout the room, not lower than that calculated with the following formula:</li> </ol>
<b>Attention!</b>	

	$\text{Capacity (m}^3/\text{min)} = \frac{I \cdot n \cdot 5}{5000}$ <p>Where:  I = charge current in amperes referring to the maximum value that, in relation to the characteristics of the charging system, the recharge room can assume during the period of gaseous development in the accumulators;  n = number of elements being charged.</p> <p>Attention: the air must be changed for at least one hour after the end of each recharge. The continuity of operation during each recharge must be ensured; recharge must be performed only if the ventilation system is working properly (Points 3.14.02. - 3.14.04 CEI 11-1; Point 5.1.05 CEI 21-6). Technically, the fumes suction system must be built with specific hoods, installed in proximity to each battery recharge, equipped with interlock systems designed to allow the recharge operation only with the hood positioned on the battery of accumulators with the fan turned on.</p>
2.	<p>The aspirator must never be used on an accumulator battery that is being recharged. It should be utilized exclusively to aspirate elements of accumulators belonging to a battery disconnected from all electrical connections.</p> <p>In cases in which a disconnected battery of accumulators is aspirated, but a battery is being charged in the immediate vicinity, it necessary that the latter be equipped with a specific suction hood operating according to the specifications indicated under point 1).</p>

### 6.2.2. Areas of work, control, safety

One employee only, who must oversee its proper operation, must run the machine.

In cases of malfunction or damages to the aspirator, the operator is the only one who should disconnect the machine and, after it is repaired or serviced, start it up again.


### 6.2.3. Accident prevention gear

The type of activity performed with the aspirator requires wearing appropriate accident prevention gear.

During emptying operations workers must wear the following accident prevention gear:

		
Acid-proof gloves	Acid-proof apron or overall	Spray-proof goggles

- Spray-proof goggles or an appropriate protective visor;
- Acid-proof gloves;
- Acid-proof fabric overall closed at the neck and wrists.

	<p><b>Electrolytic solutions normally used in lead accumulators have a high concentration of sulfuric acid (approx. 30%) and therefore they are extremely dangerous if they come into contact with the eyes or skin.</b></p> <p><b>It is therefore recommended to make it obligatory to use the above-mentioned accident prevention gear.</b></p>
Attention!	

In addition we would like to point out that all the accident prevention gear must have the CE mark.

## 6.3. Risks, protections, warnings and precautions

### 6.3.1. General safety

Below are some general precautions we adopted in the machine design and construction phase based on an evaluation conducted with reference to the list of dangers indicated by UNI EN Standard 1050.

#### Mechanical dangers:

- All the moving parts on the working parts or transmission parts are suitably segregated or made inaccessible.
  - a. The alternative pump is completely isolated inside a protective metal casing.
  - b. The electrical motor of the pump has its operative moving parts completely isolated.

#### Electrical dangers:

- These dangers are evaluated for SW/91 models supplied at a voltage of 220V in single-phase alternating current.
  - a. All the dangerous electrical components are located in protective casings that have a minimum protection of IP 55 (protection against the intrusion of dust and water jets).
  - b. The cutout box has a suitable closure system that does not allow the access of unauthorized personnel (access door closed by means of screws that require the use of a tool to be removed).

- c. All casings containing parts with live voltage have the suitable safety signs on them (live voltage, voltage value, use prohibited to unauthorized persons).
- d. The power supply cable of the machine is of the type that does not propagate flames (CEI 20-24) and the power supply socket located on the terminal of the cable is the CEI 23-12 type with protection degree IP 67.

**Dangers caused by not observing ergonomic principles:**

- a. All the devices (start pushbutton, tank, etc.) are placed in such a way that (as regards overall dimensions and height) they facilitate carrying out the machine control functions.
- b. The SW/91 aspirator is installed on a support frame with two wheels and an ergonomic handle for transportation that makes it easy to move the machine to the places where it needs to be used.

**Dangers caused by the absence of measures that condition safety:**

- a. In correspondence to the protective casing of the pump motor there are signs in compliance with D. Lgs 493/96 that indicate the obligation to wear the accident prevention gear (goggles and gloves).

**6.4. Accident-prevention gear****Dangers caused by not observing ergonomic principles:**

- c. All the devices (start pushbutton, tank, etc.) are placed in such a way that (as regards overall dimensions and height) they facilitate carrying out the machine control functions.
- d. The machine is installed on a support frame with two wheels (stationary wheels) and an ergonomic handle for transportation that makes it easy to move the machine to the places where it needs to be used.

**Dangers caused by the absence of measures that condition safety:**


- b. In correspondence to the protective casing of the pump motor there are signs in compliance with D. Lgs 493/96 that indicate the obligation to wear the accident prevention gear (goggles and gloves).

**6.5. Accident-prevention gear**

In relation to the series of protection measures and predispositions described in the previous paragraphs of this chapter to ensure that the machine in question has the essential safety requisites contemplated by MACHINERY DIRECTIVE 392/89 and later amendments, we would like to point out that:

***It is absolutely prohibited to tamper with or remove safety guards; if such tampering is discovered, the manufacturer declines all liability regarding the safety of the machine.***

**6.5.1. Warnings and cautions**

 <p><b>Attention!</b></p>	<p><b>Connection to the battery</b>  <i>When connecting or disconnecting the terminals from the battery, take the following precautions:</i></p> <ul style="list-style-type: none"> <li>- Do not smoke or use naked flames.</li> <li>- Avoid creating sparks.</li> <li>- Wear gloves and goggles and accident- prevention overalls.</li> </ul> <p><b>Aspirating</b>  <i>When the performing the emptying operation, observe the following precautions:</i></p> <ul style="list-style-type: none"> <li>- Wear gloves, spray-proof goggles and protective aprons or overalls.</li> </ul> <p><i>Do not smoke or use naked flames.</i></p>
<p style="text-align: center;"><b><u>GENERAL WARNINGS</u></b></p> <p><i>The machine must not be used for other purposes except that for which it was built.</i></p> <p><i>The unit must not be exposed to atmospheric agents or used in environments that expose it to sprays, rain, snow, fog, freezes, or other events that might damage it or reduce safety.</i></p> <p><i>Both delivery and suction are under pressure: qualified persons who know exactly how the machine is operated must use the machine.</i></p> <p><i>If the unit accidentally gets wet, turn off the motor, disconnect the battery, dry the unit carefully.</i></p> <p><i>Do not intervene on the machine with the motor running.</i></p> <p><i>If there are malfunctions or the machine does not run, do not tamper with the unit but contact the point of sales or the person qualified for such interventions.</i></p>	

**7. MAINTENANCE / CALIBRATION**

Qualified or specialized maintenance personnel who must be instructed according to the indications in this manual must perform maintenance operations on the machine.

**7.1. Putting the machine in the maintenance mode**

Before performing any maintenance operations, it is necessary to:

- Section the machine electrically →
  - a. Models supplied with dc voltage: it is recommended to open the electrical power supply circuit by opening the switch located on the pump casing and by removing the terminals on the accumulator poles.
  - b. Models supplied with ac voltage 220V: it is recommended to open the electrical power supply circuit by opening the switch located on the pump casing and removing the plug from the wall socket.
- On models supplied with dc voltage: remove the power supply accumulator from its housing.

## 7.2. Maintenance interventions and intervals

NO.	INTERVENTION	PROCEDURES	INTERVALS
1.	Uptake pipe:  Cleaning the pipe. Sight check of soundness and proper state of repair of pipe.	Cleaning must be done with a suitable degreasing solvent. The pipe must then be dried with a compressed air jet. During the use of the compressed air gun, it is recommended to use the safety goggles to protect eyes from shooting of particles. When it is no longer possible to clean properly, replace the pipe.	Weekly
2.	Alternative pump: Grease pump eccentric bearing.	Open pump containment casing. Remove tubes from hose holder (it is necessary to first loosen the bands) Remove bolts that fasten pump to bearing structure. Unscrew the two bolts (with a hexagonal 10 mm wrench) that fasten pump motor to its support. Remove motor and pull out shaft with eccentric from connecting rod. Inside the head of the connecting rod is the roller bearing that must be greased. Use MOLICOTE 3 grease.	Every 500 hours of operation

## 7.3. Replacement of components

In cases where, due to damages or accidental events, there is a need to replace machine components, consult the documentation supplied for finding the components (see paragraph 2.1 "Machine Composition").

It will therefore be to the discretion of the User to decide whether to contact the technical personnel, according to the procedures indicated in this manual (consult the section "Warranty and assistance"), or use internal resources to perform the extraordinary maintenance interventions, which the machine might need during its operation.

*If changes are made that jeopardize these requisites, or fail to comply with the project specifications of the machine given in this manual, the manufacturer reserves the right to nullify the certification of conformity of the machine to the essential requisites for the protection of worker safety and health.*