

# IONEX A (500-042)

## Operating Instructions

### Waste Water Treatment Unit

#### PRINCIPLES OF OPERATION

The unit is made up of a storage tank with a level monitor, a peristaltic pump and three treatment stages, as there are a filter element, two ion exchange columns and one neutralization column.

**IONEX** will absorb any type of heavy metal. The main field of application for this unit though, is cleaning rinse water from etching with ferric chloride and from galvanic PTH.

The rinse water from the etching process is initially fed into the storage tank. The peristaltic pump in the unit will then feed it through the filter and the two ion exchange columns into the neutralization column. There is a floating solenoid switch in the storage tank. The solenoid switch automatically switches off the pump when the tank is empty. To prevent overflow, the solenoid valve on the rinse unit of the etching machine is to be closed when the maximum filling level of **IONEX** has been reached. The unit offers a relay switch contact for that purpose. If there is no solenoid valve in the existing etching machine, such valve should be installed to the rinse water inlet. The filter is used to retain suspended matter. Such matter will appear mostly if the pH value of the liquid is higher than 2, since the metal ions will then collimate in the form of hydroxides. The filter may have to be replaced or cleaned periodically.

The waste water passes through the ion exchange columns from top to bottom. The two columns are connected in series. The second column ensures that the drain water limit for iron and copper is not exceeded and that the complete load can be applied to the first column. After the first column has been entirely charged, the second column shall be installed in place of the first and a regenerated column will go in the second position. We offer a regeneration service for charged columns.

In the third phase of the treatment the waste water is automatically neutralized to the required pH value of 6.5 - 9.0. The air supply to the neutralization column may be adjusted approximately. With a high air rate the pH at the outlet will rise. The adjustment screw is positioned on the rear panel. The neutralization agent is a product which is also used in drinking water treatment. It needs simply to be refilled. Depending on the pH value of the feed solution, consumption will be around 50 - 100 ml per 100 litres of feed water.

Assuming that some 2 ml of etching solution are carried into the rinse unit for each board of 100 x 160 mm, and the rinse water consumption is 1 litre, the column has a capacity of about 100 of such boards. If the boards pass one extra closed-loop rinse unit before going in the final rinse and if only the water from the final rinse will be treated by **IONEX**, the capacity of one column will increase to approx. 1000 of such boards.

#### INSTALLATION

Initially, you may want to establish the electrical connection to the etching machine or rinsing unit so that the **IONEX** level switch can inhibit any excessive water input. See Chapter 7 for further reference.

The unit must be levelled horizontally to achieve an optimum flow through the unit. The hose for the rinse water outlet from the etching system is then connected to the storage tank on the **IONEX**. A water outlet hose will connect the neutralization column to the drain.

The unit is switched "ON" by the left button. This will also activate the fluid level system. The peristaltic and air pumps are activated by pressing the "PUMP" switch.

Fill the storage tank with approx. 30 litres of rinse water. Set the pH value to 1.5 - 2. To reduce the pH value of 100 litres, approx. 0.5 to 1 litre of hydrochloric acid (approx. 10% conc.) is required.

The chemical is to be added whilst stirring the solution. If the pH value falls below 1.0, it may be corrected with diluted caustic soda (approx. 5%). The pH value may be measured with indicator paper or a pH meter.

Open the ventilation screw on the head of the ion exchanger columns. Turn on the main switch. Switch on the pump.

While the first column is being filled, waste water will escape through the ventilation overflow hose and will return into the storage tank. Close the ventilation screw as soon as the column is entirely filled. Repeat this operation for the second column. The ventilation screws must not be removed completely in order to avoid the liquid spraying out.

Have the pump fill the neutralization column until the liquid has mounted to the drain outlet. The unit is now ready for use.

#### OPERATION

With water from the etching machine or rinse module flowing into the storage tank, the level will rise and the level switch will turn on the peristaltic pump. This will continue cleaning the water from the storage tank until the level is low. You will have to turn off the entire unit only while it is not in use. Further intervention is only required to **a)** check the column load **b)** check the amount of neutralizing agent and **c)** occasionally check the pH in the storage tank so that no formation of residues can take place that would block the filter unintentionally.

#### REPLACING THE COLUMNS

**The unit must be switched off prior to any maintenance operation!** Always wear protective gloves, clothing and goggles!

The load of the **IONEX** change columns is determined by a change of colour to brown (from ferric ions) or blue (from copper ions).

The first ion exchange column is to be replaced when it is loaded to 100% and when the second column shows about 30% of load.

The content of iron and copper in the drain outlet may be tested using test sets which are optionally available. Indicator paper or a pH meter are to be used to measure the pH value of the drain outlet.

The pH of the drain water must be between 6.5 and 9 whilst the copper concentration must be less than 0.5 mg per litre and the iron content less than 3 mg per litre. These limits correspond to German waste water regulations and may be different in your country.

Open the ventilation screws on both columns. Open the small valve beneath the column so that the liquid can drain out. Unscrew the big grey flange screws and remove the column from the unit. Use the enclosed cover screws (63mm dia.) to seal the column for transport.

Replace the first column with the second and place a third regenerated column in the second position. Close the little drain valve and do the ventilation like indicated above.

Depending on the distance to us and on the intensity of use, you may choose to either send the columns for regeneration or to do this regeneration by yourself. For the latter purpose, we enclose a diagram in the next column.

Although it is somehow contrary to the intention of an active recycling of heavy metals, a third way of handling would be to discharge the loaded resin as a special waste, equivalent to the used ferric chloride from the etching process. This procedure can even be considered environmental friendly if you count the consumption of energy for sending the columns back and forth.

### REPLACING THE FILTER

The extent of load to the filter becomes visible in the filter housing and will decrease the flow volume of the pump. Prior to removing the filter, the ventilation screw on the filter and on the ion exchange columns must be opened. Undo the screw union and insert a new or cleaned filter. The sealing ring must be clean and undamaged.

### REPLACING THE PUMP HOSE

The cover on the pump must be removed by undoing the two PVC screws. The hose bed can then be removed. To do this remove the two countersunk Allan screws. First pull in axial direction so that the pins that position the hose bed become loose. The hose passage with the hose can now be removed. The hose is secured with short sections of tube. Insert a new hose and assemble the pump in reverse order.

The hose has been selected to meet the chemical resistance requirements. The manufacturer indicates a MTBF of 1000 hours, but this value may vary considerably depending on the actual conditions of operation.

### CLEANING AND OTHER MAINTENANCE

The unit is made of PVC. Tap water can be used to rinse it. Residues that will not dilute in water can mostly be removed by assistance of diluted hydrochloric or sulphuric acid. The level of the neutralization agent must be kept between the minimum and maximum marks. If heavy metals get into this column inadvertently, the product will be badly discoloured and will most certainly have to be replaced.

### SAFETY PRECAUTIONS

The following safety precautions should always be observed when handling chemicals (etching agent, acid, lye, etc.).

- Wear goggles and protective gloves for all work.
- Assure good ventilation to the working place
- Strictly avoid contact with the skin, eyes and mucous membranes.
- Immediately take off any clothing that was contaminated by caustic substances.
- Rinse splashes on skin immediately with plenty of water.
- In the event of accident or feeling unwell, seek medical advice.

### TECHNICAL DATA

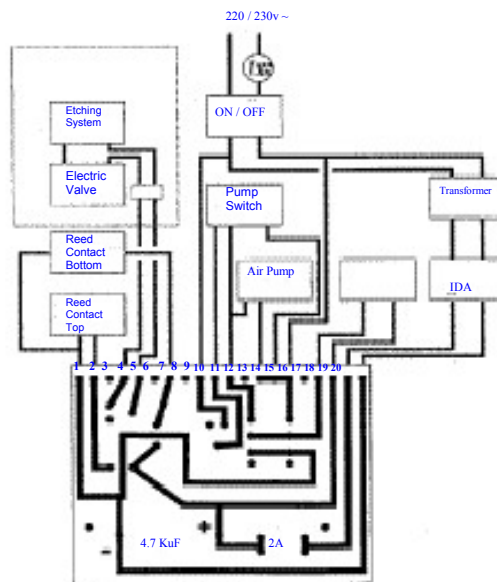
Dimensions: (H x D x W) 1400 x 425 x 600 mm  
 Weight 45 kg Tank capacity 110 litres.  
 Supply 230V, 50 Hz, 50W Flow rate 10 l/h  
 Filter PE cartridge

### ELECTRICAL CIRCUIT DIAGRAM

To prevent the storage tank from over -flow, the electric valve on the rinse unit can be connected as shown on the circuit diagram.

A relay contact will open when the storage tank is filled. The electrical connection is done to the cable coming from the side of the control section.

To open the control section, the cover on the rear must be removed. Insert a screwdriver into the groove on the lower end of the cover plate. Lift the plate over the edge of the box and then push it downwards.

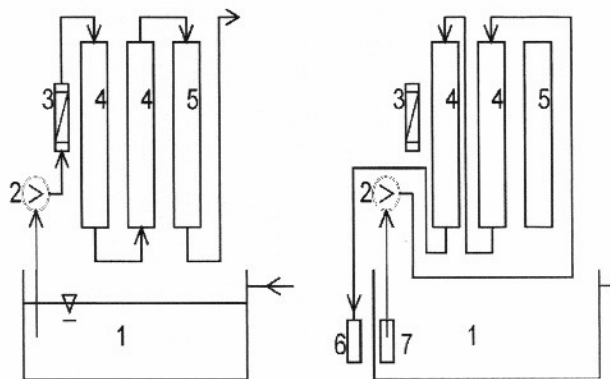


### REGENERATION OF THE COLUMNS

Regeneration Agent: HCL, 4-8%, approx. 3.5l. Speed:286 ml/min  
 Washing Agent: Water, approx. 15 litres . Speed 286 ml /min

#### Loading

#### Regeneration



- 1 Tank      3 Filter      5 Neutralization
- 2 Pump      4 Ion exchange column

### CONNECTION DETAILS

Water In and Outlet are meant to be done by flexible plastic or rubber hose, no rigid tubes (acid liquids: no metal), so planning the room, you should consider a back - bone PVC hose with T connection(s) to plate the line rinse and etching machine rinse, so that the liquid can flow. The input to the **IONEX** is approximately 50cm above the floor level.



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