

water treatment

by electrodialysis



Manufacturer of membranes,
stacks and systems

mega



ABOUT OUR COMPANY

MEGA is a czech based company focused on electromembrane processes such as electrodialysis (ED), electrodialysis reversal (EDR), bipolar electrodialysis (EDBM) and and electrodeionization (EDI). Membrane technologies and related products offered by MEGA are better known under the trademark RALEX®, the official brand of MEGA for the Membrane business unit.

MEGA develops, designs and delivers membrane technologies for water treatment and desalination which may represent solutions for industry as well as well as for public water utilities in areas suffering from a lack of suitable water sources or which may treat and recycle industrial wastewater.



Hundreds of Installed Applications Worldwide

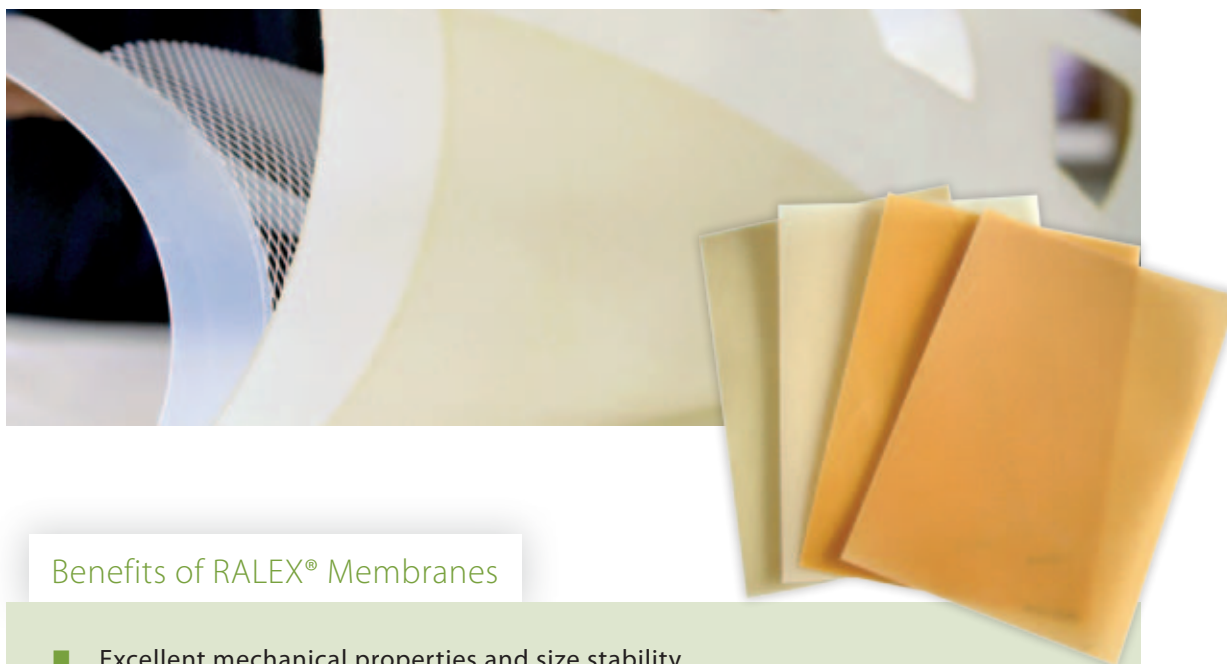
Selected references

- GEAM, Czech Republic – Concentration Before Evaporation, Mining – 1 440 m³/d
- ARAK, Iran – Cooling Tower Make-up, Petrochemical Industry – 2 800 m³/d
- Sant Boi-Depurbaix, Spain – Municipal Wastewater Treatment – 44 000 m³/d
- Minudobreniya, Russia – Condensate Treatment in Fertilizer Production – 1 440 m³/d
- PALS, India – RO Brine Treatment in Brewery – 240 m³/d
- Achinsk, Russia – Wastewater from Petrochemical Industry – 12 800 m³/d
- KASRA Paper, Iran – Wastewater Treatment in Paper Factory – 2 400 m³/d

HETEROGENEOUS ION-EXCHANGE RALEX® MEMBRANES

THE SUCCESS OF THE COMPANY MEGA IN THE FIELD OF ELECTROMEMBRANE PROCESSES IS BASED ON ITS OWN DEVELOPMENT AND PRODUCTION OF ALL BASIC PARTS OF ELECTRODIALYSERS AND ELECTRODEIONIZERS. A FUNDAMENTAL COMPONENT, RALEX® MEMBRANES, ARE HETEROGENEOUS ION-EXCHANGE MEMBRANES.

Proudly produced by MEGA in the Czech Republic since 1985.



Benefits of RALEX® Membranes

- Excellent mechanical properties and size stability
- Mono-, bi-, trivalent ion removal
- High permselectivity P [%]>90
- Chemical resistance in pH range 1–14 allows for the use of strong lyes and acids for CIP
- Tolerance to free residual chlorine up to 1 mg/l as well as to chloramines and chlorine dioxide
- Low electric resistance
- Simple handling and transport
- Long lifetime

RALEX® Membranes are produced in the form of foils composed of fine polymer particles with an ion-exchange groups anchoring polymer matrix and reinforced by fitting fabrics, which improve the mechanical properties of the membranes.



ELECTRODIALYSIS PROCESS

ELECTRODIALYSIS IS AN ELECTRIC FIELD GRADIENT-DRIVEN PROCESS ENABLING THE SEPARATION OF MINERAL MATTER FROM FEED WATER SOLUTION WHILE MOVING DISSOCIATED IONS THROUGH ION SELECTIVE MEMBRANES AND FORMING TWO DIFFERENT FLOWS – DESALTED FLOW **DILUATE** AND CONCENTRATED FLOW **CONCENTRATE (BRINE)**.

Under the influence of the electric field, the negatively-charged anions pass through the anionic membranes but cannot pass through cationic membranes and hence the anions are concentrated in a concentrate channel. Similarly cations pass through cationic membrane and are trapped in the concentrate channel on the other side. This results in concentrated and diluted solutions being created in the channels between the alternating membranes.

What is Electrodialysis Reversal?

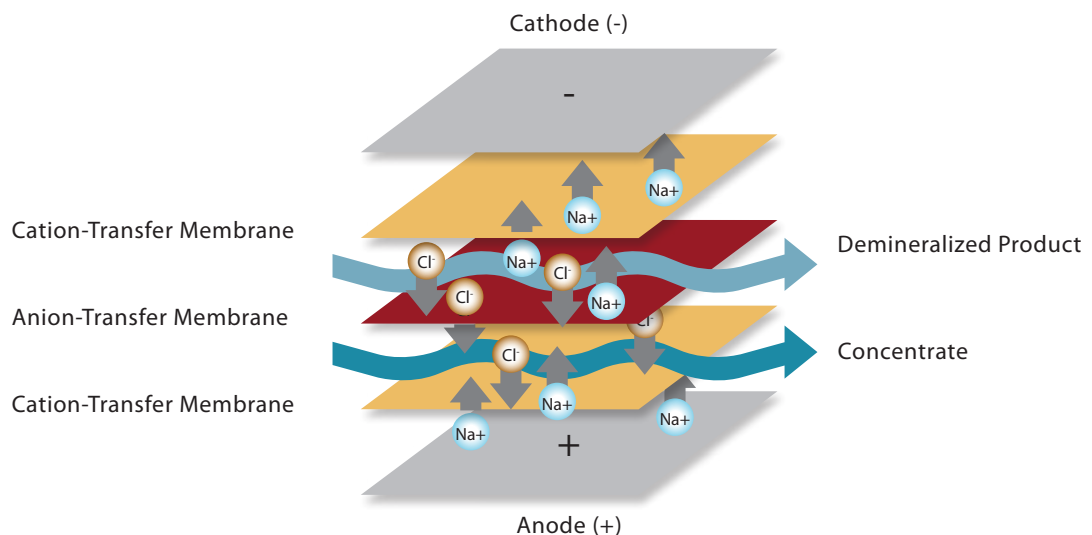
A continuous self-cleaning electrodialysis process by means of periodic reversal of the DC polarity and switching concentrating and diluting flow streams.

Basic modes of electrodialysis in water treatment:

BATCH: for low capacity projects where a high degree of desalination and high concentrated brine is required. Usually two feed tanks for batch switching are used. Typically feed water salinity approx. 15–40 g/l.

FEED & BLEED: specific for industrial waste water processing, typical feed salinity 15–40 g/l. High concentrated brine can be achieved.

ONE-PASS (SINGLE): for large scale application in water desalination and water reuse. Usual feed salinity up to 4 g/l. Feed water goes through stacks only one time.



ELECTRODIALYSERS

RALEX®

THE BASIC BUILDING BLOCK IN WHICH THE ELECTRODIALYSIS PROCESS RUNS IS REFERRED TO AS AN **ELECTRODIALYSER**. A STANDARD INDUSTRIAL RALEX® ELECTRODIALYSER FOR WATER TREATMENT CONTAINS UP TO SIX HUNDRED CELL PAIRS AND IS BOUND TOGETHER WITH TITANIUM / PLATINUM ELECTRODES ON THE OUTSIDE FOR POLARITY REVERSAL.

The robust horizontal high capacity ED(R)-III electrolysers is designated for one-pass systems. Operational flow-rate up to 45 m³/h, by default fitted with 500–600 membrane pairs. Electrolysers for pilot units and small-capacity units begin at 100 membrane pairs. Standardly equipped with TiPt electrodes for polarity reversal.

The new ED(R)-IF electrolysers is the latest generation of ED and EDR stacks. It has been developed with the aim of processing of water with higher salinity in batch or feed&bleed modes of operation. It increases the overall performance of the previous generation of electrolysers stacks together with higher safety of operation.

Main parts

- Tightening boards with built-in collectors and electrodes
- Heterogeneous RALEX® Membranes and spacers
- Tie-rods
- Robust stainless steel rack



RALEX® ED(R)-III



RALEX® ED(R)-IF



WATER TREATMENT BY ELECTRODIALYSIS

MEGA SUPPLIES ROBUST ELECTRODIALYSIS SYSTEMS FOCUSED ON DIFFICULT-TO-TREAT WATERS WITH THE AIM OF ACHIEVING A LOW VOLUME OF CONCENTRATE AND THUS MINIMIZING WASTE. OUR ELECTRODIALYSIS IS ALSO PREFERRED IN PROJECTS AIMED AT ACHIEVING HIGHLY CONCENTRATED BRINE AS THE MAIN PRODUCT (CONCENTRATION PROCESSES OF ELECTRODIALYSIS).

Features & benefits

- High water recovery up to 95%
- High concentration of brine up to TDS 200 g/l
- Less susceptibility to organic fouling
- Higher resistivity against risk of scaling
- RALEX® Membranes can be CIPed in pH range 1–14
- Tolerance of RALEX® Membranes to free residual chlorine
- Silica does not affect performance of electrodialysis
- Membrane regeneration by polarity reversal (EDR)
- 10+ years of membrane lifetime

We offer solutions for the Paper, Petrochemical, Brewery & Liquor, Fertilizer, Textile, Power, Mining and Municipal Industry.

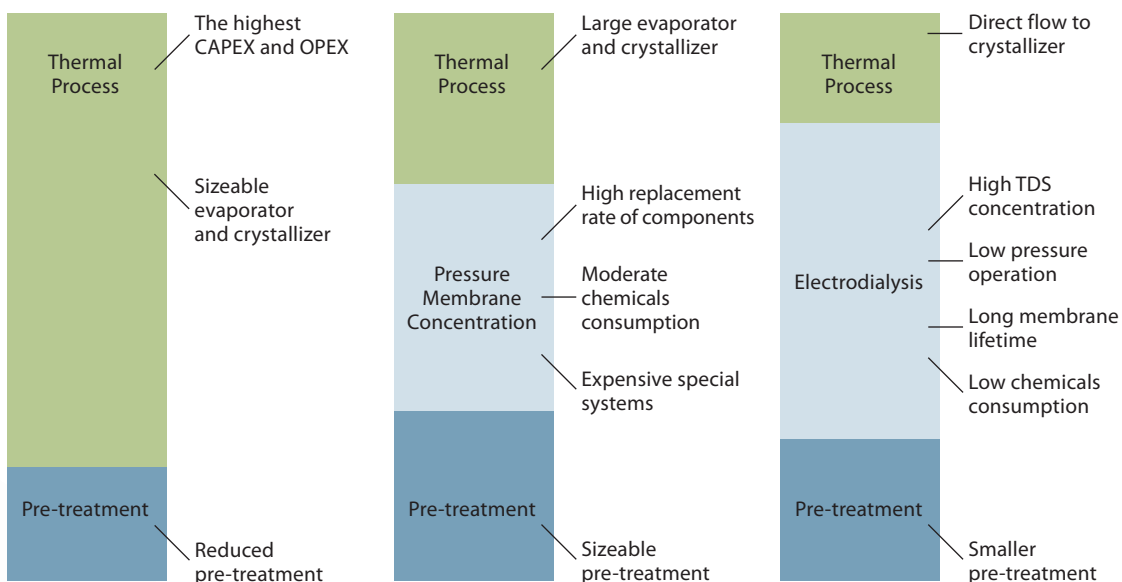
Typical ED/EDR applications

- Reuse of pretreated municipal wastewaters to produce water for irrigation
- Recycling of industrial effluents to reuse it back in a process – recycling of cooling tower blowdown, preparing cooling tower make up...
- Waste water from paper machine
- Treatment of surface waters with variable feed quality as river waters
- Desalination of well waters in aim of reducing dissolved solids such as nitrates, fluorides, sulphates...
- Desalination of tailing ponds after mining
- Desalination of high silica waters
- Further treatment of RO retentate
- Membrane concentration before evaporation (ZLD projects)

ZERO LIQUID DISCHARGE SOLUTION

MEGA OFFERS ELECTRODIALYSERS FOR VARIOUS ZLD PLANTS ALL OVER THE WORLD. MAINLY THE PAPER, PETROCHEMICAL, BREWERY, LIQUOR AND TEXTILE INDUSTRIES. THE CAPABILITY OF EDR FOR HIGH CONCENTRATION MAKES IT IDEAL AS A MEMBRANE CONCENTRATOR WITH THE GOAL OF MINIMIZING THERMAL TREATMENT.

Comparison of ZLD approaches



ED(R)-IF/250 – The world's most capable electrodesiser

Being a manufacturer of electrodesis technology for decades, we have used our first-hand experience from the field to develop a new generation of electrodesisers. The ED(R)-IF stack is the world's most effective membrane concentrator used in ZLD plants.

ZLD: Advantages of electrodesis solution

- Reduction of pre-treatment
- High concentration of salts (up to 200 g/l)
- Avoid evaporator, direct use of crystallizer
- Silica does not influence water recovery/concentration capabilities
- High reduction of capital and operating expenditure
- Low chemical demand
- Operation under low pressure
- Standard frequency of replacement of parts

ELECTRODIALYSIS P R O C E S S

- INDUSTRIAL WASTE WATER
- COOLING MAKE UP & BLOW DOWN WATER
- RO BRINE CONCENTRATION
- IRRIGATION
- DRINKING WATER

ELECTRODIALYSIS COULD BE

**THE
RIGHT
SOLUTION!**



ralex[®]

OFFICIAL TRADEMARK OF COMPANY MEGA FOR MEMBRANE PROCESSES

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