

WE ARE SCIENTISTS,
MANUFACTURERS & VISIONARIES

ELECTROMEMBRANE TECHNOLOGIES IN WATER TREATMENT



TREAT WATER, SAVE THE FUTURE

Electrodialysis and electrodeionization

30+ years of experience

100+ references all over the world

Water recovery of up to 99%



www.mega.cz/water

mega

WATER TREATMENT BY MEGA

MEGA'S TECHNOLOGIES AND SOLUTIONS ARE DESIGNED WITH MAXIMUM RESPECT FOR THE ENVIRONMENT BASED ON 30 YEARS OF EXPERIENCE TO MAKE OUR PLANET A CLEANER PLACE. MEGA CAN HELP YOUR BUSINESS GROW, MINIMIZE YOUR DEPENDENCE ON EXTERNAL WATER SOURCES, AND SOLVE YOUR TROUBLES WITH WASTEWATER WHICH IS PROBLEMATIC TO DISCHARGE.

THE THREE MAIN TARGETS IN WATER TREATMENT THAT MEGA PROVIDES:

DESALINATION

Desalination is considered to be the process of removal of dissolved solids. Depending on the required desalination cut and final water purity, MEGA chooses an appropriate technology. There are several different modules and combinations in the MEGA portfolio which bring the required results. Two basic electromembrane technologies are produced by MEGA:

ELECTRODIALYSIS – ED

Electrodialysis (ED) and Electrodialysis Reversal (EDR) are primarily utilized in desalination applications where Total Dissolved Solids (TDS) average between 0.5–3 g/l. In this range, the power consumption of the technology can be as low as 0.3 kWh/m³ of product water. Compared to Reverse Osmosis (RO), ED and EDR allow for higher Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), and Turbidity limits, which can significantly reduce the need for pre-treatment. The high water recovery rates, combined with low power and chemical consumption and a membrane lifespan exceeding 10 years, make these technologies particularly suitable where the complete life-cycle cost is a priority over immediate capital investments.

MEGA offers a range of high-capacity ED(R)-30 electrodialysis stacks with operating flow rates up to 60 m³/hour per stack. The company also provides complete industrial technologies, ranging from small laboratory systems to large-scale industrial systems with capacities in the thousands of m³/h.

ELECTRODEIONIZATION – EDI

EDI represents the modern standard for producing high-purity and ultra-pure water, replacing the older ion-exchange columns. Today's applications of ultra-pure water include boiler feed water for the power and chemical industries, feedwater for electrolyzers in green hydrogen production, various pharmaceutical processes, and the production of semiconductors, LCD displays, and solar panels. MEGA offers the MPure line of modules, with flow rates ranging from 0.8 m³/h to 15 m³/h per single module. The product quality can reach as high as 18 MΩ.cm in resistivity, achieving complete desalination and water recovery rates up to 97.5%. MEGA provides a full portfolio of necessary equipment, including MPure modules, DC rectifiers, various accessories, or complete systems.

CONCENTRATION

The increasing need for water recovery results in higher salt concentrations. MEGA utilizes the inherent functionality of ED technology to concentrate salts to very high levels, up to 200 g/l TDS. Such concentrations are achieved using MEGA's specialty product, the EDR-IF stack, which has been specifically developed as a membrane concentrator module for various scenarios in Zero Liquid Discharge (ZLD), Minimal Liquid Discharge (MLD), or salt reuse.

A rule of thumb for these applications is that the last 5% percent of concentration can be as costly as the initial 95% of water treatment. However, with MEGA's products, you can change this rule and provide an economically feasible solution.

SALT RECOVERY & RE-USE

MEGA introduces an innovative approach to recycling waste streams from various sources, including mining tailing ponds, chemical and petrochemical plants, IEX column effluents, and more.

Our advanced technology features a combination of bipolar and monopolar ion exchange membranes, known as Electrodialysis with Bipolar Membranes (EDBM) or sometimes referred to as Bipolar Electrodialysis (BPED). The EDBM process is used for the production of acids and caustics from corresponding salts, such as HCl and NaOH from NaCl, or H₂SO₄ and NaOH from Na₂SO₄. This is achieved through the unique property of the bipolar membrane, which is capable of splitting water into H⁺ and OH⁻ ions. In combination with monopolar membranes, this results in the production of salt and acid in a three-compartment arrangement or solely caustic/acid in two compartments.

This unique concept represents a future for water recycling as it not only brings desalinated water back into the process, or reduces salts for discharge, but also enables the reuse of salts. It is highly suitable for local applications, such as various pH adjustments (precipitation processes, food & beverage applications, biological treatment, different production applications), regeneration of ion-exchange columns or NaOH production for the textile dyeing industry.

DON'T BUY CHEMICALS, REUSE THEM!



ADVANTAGES OF MEGA ED IN WATER TREATMENT

- » High water recovery of up to 95% per single system
- » High concentration of brine TDS at up to 200 g/l
- » Less susceptibility to organic fouling
- » Highly resistant to chemical cleaning
- » Tolerance to free residual chlorine
- » Silica does not affect water recovery
- » Compact solutions for large volume
- » Robust solution
- » Production of acid/caustic for reuse
- » Elimination of thermal treatment
- » Reduction of wastewater.

ADVANTAGES OF MEGA EDI IN WATER TREATMENT

- » Stack interconnection capability for a low-cost system
- » High efficiency rectifiers
- » Systems with flow rates from 0.8 m³/h to 180 m³/h
- » High deionization with recovery up to 97.5%
- » Robust design: No internal or external leaks
- » Small footprint: ideal for operation inside containers
- » Easy maintenance
- » Modularity and redundancy – cube-shaped modules offer different interconnecting options
- » Silica removal



ABOUT MEGA

MEGA, A COMPANY HEADQUARTERED IN THE CZECH REPUBLIC, SPECIALIZES IN ELECTROMEMBRANE. IT IS ONE OF THE FEW COMPANIES THAT CAN BE PROUD OF ITS WIDE SCOPE ACROSS INDUSTRIAL SECTORS. OUR EXPERTISE LIES IN DEVELOPING AND IMPLEMENTING ADVANCED TECHNOLOGIES THAT USE THESE PROCESSES TO ADDRESS VARIOUS CHALLENGES.

MEGA MEMBRANES APPLICATION MATRIX

	RALEX® membranes	FUMASEP membranes
ED/EDR	All types of wastewater streams, Brackish water, High-COD ZLD, Food & beverages, Pharmaceuticals	Water treatment, Brackish water, Low-COD ZLD, Low energy demands, Higher concentrations
EDBM/BPED	Production of acid or hydroxide in lower concentrations and purities, CO ₂ capture, Water treatment, Food & beverages, Bottled water	Production of acid or hydroxide in higher concentrations and purities, CO ₂ capture, Water treatment, Pharmaceuticals, Mining, Lower energy demands
EDI	All EDI applications, Industrial, Pharmaceutical, Semiconductors, Green hydrogen	Not suitable
Electrophoresis	All applications	Not suitable

MEGA MEMBRANES HIGHLIGHTS

Composition	Resin + binder, textile-like support PES, PP, PPS	Chemically bonded, textile-like support PET, PK
Achievable concentration	High (NaCl up to 180 g/l)	Very high (NaCl up to 220 g/l)
Mechanical properties	Excellent	Very good (thinner membranes may require special sealing)
Chemical properties	Excellent, highest resistance to chemicals on the market	Good to excellent
Thermal Resistance	Lower thermal resistance – up to 60 °C, higher temperature reduces membrane lifetime	Higher thermal resistance – even over 60 °C, temperature has moderate influence on membrane lifetime
Resistivity	Higher resistivity (Ra 4–8 Ω×cm ²)	Lower resistivity (Ra 1.2–7.5 Ω×cm ²)

IN-HOUSE DEVELOPMENT

Thanks to over **30 years of experience**, the manufacturing process has been optimized to produce the highest quality and performance. Our custom solutions are tailored using RALEX® membranes, stacks, and units that are manufactured in-house. Our team of qualified membrane process experts and engineers are dedicated to the continuous development of our electrodialysis technology.

REFERENCES FROM AROUND THE WORLD

With a remarkable portfolio of **over 120 successful projects**, MEGA-installed equipment has processed millions of tons of water. Our extensive experience and knowledge in the water treatment industry have enabled us to handle large-scale operations and deliver efficient solutions for our clients' diverse needs.

EXPERIENCE AND FLEXIBILITY

Using experience from projects from around the world, MEGA can advise customers on the most convenient desalination process design. Compared to common methods, electrodialysis developed by MEGA can be adjusted for various levels of purification to comply with the customer's needs. This can remove unnecessary further process steps and make treatment faster and more economical.

All our activities are supported by the R&D center, where we focus on keeping MEGA on the verge of trends in membrane processes. The total experience gained from industrial projects brings feedback for research and generates new applications. Thanks to outstanding operation properties, custom membranes, and units, electromembrane processes can be used in more and more industries. Together, we are bringing process innovations as well as complete technological solutions to the market.

Our technical solutions are assembled in highly equipped halls according to protocols followed by a Factory Acceptance Test carried out by our service department specialists.

WE ARE CLOSE TO OUR CUSTOMERS

To provide personalized care to each customer and keep the technology in the best shape, we have established a global network of regional offices, sales representatives, and service partners. This network ensures that customers receive tailored support and assistance wherever they are in the world. With MEGA, you get a warranty and post-warranty service with hotline support from customer care service 24/7 and remote diagnostics.

THE WIDEST PORTFOLIO OF ION-EXCHANGE MEMBRANES

KEY COMPONENTS FOR SUCCESS

Like all membrane technologies, the effectiveness of both ED and EDI relies on the use of superior-quality membranes, which the success of the entire technology depends on.

Through it's own manufacturing and a strategic joint venture, MEGA has the widest portfolio of ion-exchange membranes in the market offering both mechanically and chemically produced options for different applications.

MEMBRANES FOR EVERY INDUSTRIAL APPLICATION

Our ion-exchange membranes, whether mechanically or chemically produced, deliver exceptional performance in a range of industrial applications. Both types achieve high concentrations, offer excellent durability, and ensure efficient separation processes. The choice between them depends on subtle differences – mechanically produced membranes excel in chemical stability and long-term resilience, while chemically produced membranes provide higher permselectivity, temperature resistance and can achieve higher concentrations. With our deep expertise, we assess your specific needs and recommend the optimal solution for maximum efficiency and cost-effectiveness.



FUMEGA is a Fumatech BWT – MEGA joint venture focused on providing the market with FUMASEP membranes and MPure™ electrodeionization modules for advanced electroseparation solutions.



SOLUTIONS FOR DIFFERENT INDUSTRIES

WASTEWATER TREATMENT

Reducing the concentration of sulphate in wastewater (EDR)

We focused on industrial wastewater with a high concentration of CaSO_4 , which often causes serious operational problems and higher costs. These issues include scaling on the inner surfaces of pipes and equipment in wastewater treatment (WWT) plants. EDR is a new and efficient technology for removing gypsum.

POWER & HEAT

Ultrapure water production (EDI)

EDI plays a crucial role in the water treatment processes that support power and heat energy systems. Ultrapure water by MEGA EDI systems can achieve a conductivity of up to $0.055\,\mu\text{S}/\text{cm}$ at 25°C , also expressed as a resistivity of $18.2\,\text{M}\Omega\cdot\text{cm}$. MEGA EDI systems help prevent scaling and fouling in power generation equipment, such as boilers and heat exchangers, which can decrease efficiency and cause operational issues.

Water and wastewater treatment (ED, EDR)

Thanks to the perfect mechanical and chemical properties of our membranes and higher feed water limits, ED technology is also a great solution for further treatment of process water or wastewater in the power and heat industry.

Flue gas desulfurization (ED)

ED presents alternative/supplement to traditional evaporation in FGD process. Due to achievable high concentrations, our technology can minimise evaporation to make process more economically viable or avoid evaporation completely.

Tailing ponds treatment (ED, EDR, EDBM)

In many mining industries water is essential part of mining process. These mines usually collect all the water in tailing ponds with high level of reuse. This leads into increasing salinity in these tailing ponds that over time has to be treated. Electrodialysis presents ideal technology for treatment of tailing ponds due to its capability of high concentration. We can provide our experience from aluminium, gold and uranium mining for high water recovery, low cost systems as well as for salt reuse.

LITHIUM

Lithium purification process from extraction (EDR, EDS, EDBM):

MEGA offers a diverse range of technologies for lithium extraction, from the established use of ED for concentrating Li_2SO_4 , LiCl , LiKSO_4 , LiHCO_3 salts and EDBM for LiOH concentration, to our own patented technology for a special type of double replacement electrodialysis for $\text{LiHCO}_3/\text{Li}_2\text{CO}_3$ production. Our patented process significantly reduces the major issues associated with lithium extraction—namely, the

environmental impact and the substantial costs of purification. Contact our specialists to learn how to obtain high purity Li_2CO_3 , as well as Rb_2CO_3 and K_2SO_4 .

Lithium battery recycling (EDBM):

The processing of black mass during battery recycling generates a large amount of Na_2SO_4 waste. EDBM is the solution for the production of acid and caustic from this waste stream.

OIL & GAS

Ultrapure water for petrochemical/chemical plants (EDI)

UPW has many uses in the petrochemical industry, including in cooling systems, as boiler feed water, and for various process waters, as well as for cleaning and rinsing. MEGA's MPure EDI technology is particularly suitable for the higher flow rates used in the Oil & Gas industry, and MEGA is a proud supplier to some of the largest plants in existence.

Enhanced oil recovery (ED, EDR)

Key technology for the desalination of highly polluted produced water from oil fields. Development in MEGA's high-temperature membranes has provided an unrivaled solution for Enhanced Oil Recovery (EOR) water treatment.

Wastewater treatment and ZLD (ED, EDR)

High water recovery, feedwater limits, and the robustness of ED technology make it an ideal candidate for oil and gas wastewater treatment. MEGA's EDR is featured in a number of MBR-EDR installations as well as in ZLD concepts.

Glycol recycling (ED, EDR)

ED is well-suited for spent MEG recovery. This glycol can be reinjected into the system and reused. MEGA can offer both onshore and offshore solutions for our clients.

CHEMICALS

CaSO_4 saturated wastewater (ED, EDR)

Many chemicals producing industries faces an issue with CaSO_4 oversaturation. Typically, where waste sulphuric acid is neutralized with lime, gypsum content in the wastewater is about $3\,\text{g}/\text{l}$. If it is too high (water disposal limits, problems with scaling in pipes, need for water recycling), ED can be used to remove the gypsum from water and concentrate it above its saturation limits before its crystallization. ED can be also used for increasing H_2SO_4 concentration prior to neutralization with lime, which affects the neutralization rate, crystal size and formation rate.

Fertilizer production (ED, EDR)

MEGA offers a unique solution for Ammonium Nitrate producers, mitigating any wastewater from condensation. Our solution is based

on Zero Liquid Discharge (ZLD), where NH_4NO_3 is not discharged but concentrated up to $220\,\text{g}/\text{l}$ and reused in production. In this way, neither water nor valuable product is released outside of the plant, ensuring that every part is reused. This solution can be applied in any NPK fertilizer production process.

AGRICULTURE

Municipal wastewater used for irrigation (EDR)

In dry areas, where such treatment is beneficial, EDR presents a unique solution for pretreated municipal wastewater. With high water recovery, robustness, and flexibility, it offers a tempting solution for municipalities where the full lifecycle cost of the system is more important than the immediate investment cost.

PHARMA

Ultrapure water production (EDI)

In the pharmaceutical industry, ultrapure water is essential for use as a cleaning agent and ingredient in pharmacy operations. Meeting the stringent standards required in this industry is crucial, and MEGA's MPure modules are designed to fulfill these high standards.

POTABLE AND BOTTLED WATER

High SiO_2 wells (ED, EDR)

Silica is known to be very difficult to treat in potable water. It easily creates scaling and significantly reduces RO water recovery rates. The use of antiscalants in drinking water is not advised, and technologies for removing SiO_2 are expensive. EDR does not share the same issues as RO and presents a very tempting alternative in such cases, even achieving 95% water recovery. As a bonus, it can provide the highly sought-after mineral composition of drinking water, enhanced with health benefits provided by the presence of silica.

pH adjustment for bottling (EDI)

It is a longstanding practice to use RO before remineralization in bottling plants. However, the issue with RO is that it does not always produce a stable pH in the permeate, which affects the chemical consumption during remineralization step and complicates operations. Using EDI after RO can easily stabilize the pH, reduce the need for chemicals, and provide significant savings for bottlers.

High-class specialty drinking water (EDS)

Dive into our specialty product, which we offer not only to bottling plants but also for use in your own home. Our special EDS provides benefits that were previously available only to the affluent. Enjoy water enhanced with SiO_2 and Li , and all their enormous health benefits!

Nitrate removal (ED, EDR)

It is well known fact that agriculture activities have an influence on NO_3 levels in potable water sources. While we can't stop agricultural activities, we can treat the potable water into required levels. EDR provides tempting solution for cases asking for very high water recovery (90%+) with ground water temperatures around 20°C .

PULP & PAPER

Paper machine feed water (EDR)

Feed water limits for modern paper machines are very strict, and this becomes even more challenging when reusing wastewater due

to the presence of organic matter like lignin, which is very difficult to remove. Even specialized UF-RO systems, which are often in place, frequently malfunction and operate with increased OPEX. Due to its robustness and the ability to use strong cleaning chemicals, EDR provides a stable solution for the paper production industry.

ZLD for paper industry (ED, EDR)

Water recovery is crucial for water-intensive processes, especially in arid regions like the Middle East. When one EDR unit is already installed in the treatment process for a paper machine, a second stage can be added for high concentration, offering significant cost benefits for a Zero Liquid Discharge (ZLD) plant. Such a combination can reduce costs substantially compared to any other solutions.

TEXTILE

NaOH recovery in dyeing (EDBM)

NaOH is a major chemical in the dyeing process, resulting in high levels of Na^+ ions in wastewater, along with ions like SO_4^- , Cl^- , and others. Instead of using an open-cycle method, where customers buy new industrially produced chemicals and pay extensive amounts for wastewater discharge, MEGA offers a solution where clients are provided with concentrated Na_2SO_4 and NaOH. This approach has a significant environmental impact for customers and, with the correct setup, also offers economic benefits.

Salt recovery and ZLD (ED, EDR)

ED and EDR can provide a very effective solution for salt concentration in clients' ZLD plants, especially when combined with other technologies where salts can be selectively separated. This approach allows ED discharges to be directly dried, omitting evaporation and providing pure NaCl or Na_2SO_4 .

FOOD & BEVERAGES, BREWERIES, DAIRY PLANTS

Food and beverage processing, water treatment, and wastewater treatment (ED, EDR, EDBM)

Used in various industries, starting from dairy, wine, sugar, starch, beer, and fruit juice processing to water and wastewater treatment.

Water recovery in the Dairy industry

Improve water recovery in the entire production process by treating saline streams after demineralization.

SEMICONDUCTORS

UPW for rinsing, cleaning and etching (EDI)

Deionized water plays an important role in the semiconductor industry. It is used extensively for various purposes, including cleaning, rinsing, and etching processes in semiconductor fabrication and electronics assembly. Special emphasis is given to Boron levels, which are easily removed by EDI technology.

GREEN HYDROGEN

Feed water for electrolyser (EDI)

Hydrogen production is carried out by a process called electrolysis, which requires ultra-pure water as a source. EDI, not requiring any chemicals for operation, is the only option for producing environmentally safe hydrogen, making it truly green. MPure EDI is uniquely suited for this task with its high flow rates and incredible lifespan of modules.



ELECTRODIALYSIS PROCESS

ELECTRODIALYSIS IS A SEPARATION PROCESS USED TO EXTRACT IONS FROM INLET SOLUTIONS. THROUGH THE APPLICATION OF AN ELECTRIC FIELD, IONS ARE TRANSPORTED ACROSS ION-SELECTIVE MEMBRANES, LEADING TO THE SEPARATION OF DIFFERENT COMPONENTS.

The application of an electric field induces a distinct separation process in electrodesialysis. In this method, negatively charged anions can pass through anionic membranes, but they cannot permeate cationic membranes. As a result, the anions accumulate in a concentrated chamber. Conversely, cations can pass through cationic membranes and become trapped in the concentrate channel on the opposite side. This creates a separation effect, forming concentrated and diluted solutions. This selective ion transport allows for efficient purification and concentration of solutions in electrodesialysis applications.

This eco-friendly technique excels due to its low power consumption, low chemical usage, and long lifespan of membranes, combined with high water recovery and the ability to achieve high salt concentrations

FEATURES

- » High water recovery
- » High concentration of brine up to TDS 200 g/l
- » Less susceptibility to organic fouling
- » Higher resistivity against risk of scaling
- » RALEX® membranes CIP pH range 1–14
- » Silica does not affect performance of electrodesialysis
- » Scaling prevention by polarity reversal (EDR)

BASIC ELECTRODIALYSIS OPERATING MODES

One-Pass (Single)

- » Input solution goes through the ED system just once.
- » Feed water TDS is up to 4 g/l
- » Applied in large-scale projects.

Feed & Bleed

- » The system is partially fed and discharged.
- » Feed water TDS is 20–60 g/l
- » High brine salinity up to 200 g/l

Batch

- » The feed is circulated until the required product quality is achieved.
- » Feed water TDS is 15–40 g/l
- » For the food and pharmaceutical industries

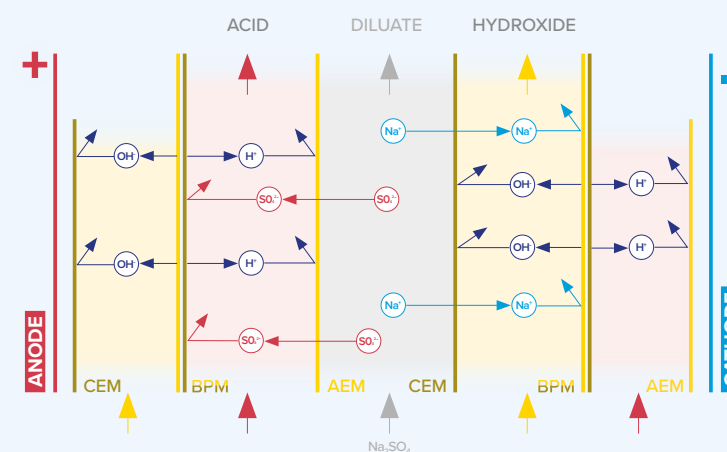
WHAT IS ELECTRODIALYSIS REVERSAL?

Electrodesialysis reversal (EDR) is a continuous self-cleaning using a periodic reversal of the DC polarity and alternation of concentrating and diluting flow streams. Thanks to this process, the membranes have a much longer lifetime in the EDR stacks.

WHAT IS BIPOLAR MEMBRANE?

Bipolar membrane (BPM) is membrane that consists of two layers: one that is a cation exchange layer and the other an anion exchange layer. These layers are joined together such that the interface between them forms a junction that is capable of facilitating unique ion transfer and water dissociation reactions.

The unique property of bipolar membranes is their ability to enable the generation of protons (H^+) and hydroxide ions (OH^-) directly from water molecules when an electric voltage is applied.



BIPOLAR ELECTRODIALYSIS – EDBM

Electrodesialysis with bipolar membranes (EDBM) is type of the electrodesialysis where the stacks consists of alternating cation exchange membranes (CEM) and anion exchange membranes (AEM) with bipolar membranes (BPM) placed at regular intervals. Considering the different possibilities for cell arrangements with a bipolar membrane in an electrodesialysis module, we distinguish three types. One of these types is a three-chamber cell arrangement equipped with CEM, AEM and BPM which forms acid, base and dilute streams at the same time. Then, there is a two-chamber cell arrangement with a CEM and BPM to produce base, while a two-chamber cell arrangement with AEM and BPM is used to produce acid.

ED VERSUS RO

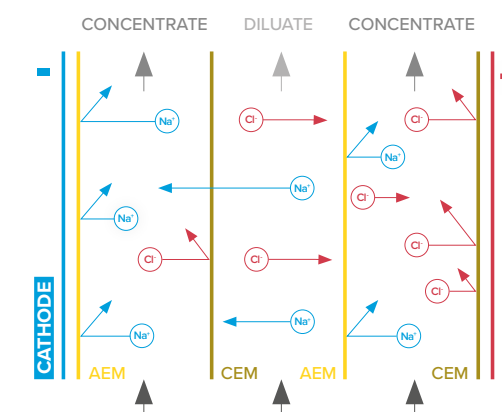
ELECTRODIALYSIS (ED) AND REVERSE OSMOSIS (RO) ARE BOTH WATER TREATMENT TECHNOLOGIES, BUT THEY WORK IN DIFFERENT WAYS:

ELECTRODIALYSIS

Is an electrically driven method of removing dissolved ionic/charged compounds.

ED is suitable technology for the following cases:

- » Treatment of water with a higher tendency for fouling or variable quality of feed
- » High recovery is required
- » A high concentration is required
- » High silica water, high boron water, higher COD
- » Partial desalination cut is required

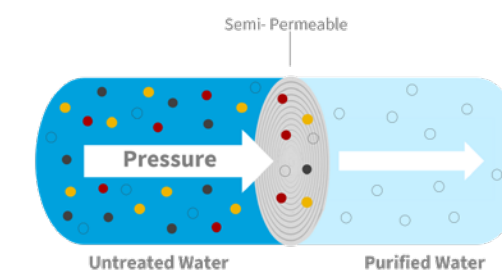


REVERSE OSMOSIS

Is a pressure driven method of removing dissolved solids.

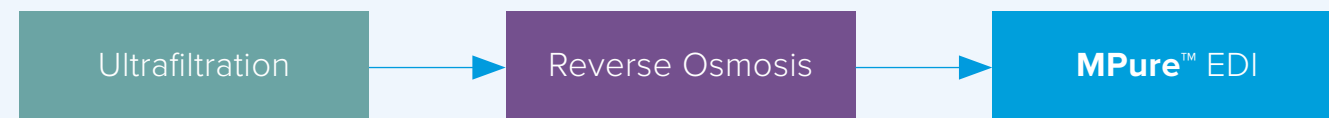
RO is suitable technology for the following cases:

- » Treatment of water with a low tendency for fouling and constant quality of feed
- » High recovery is not strictly required
- » A high concentration of brine is not strictly required
- » High rejection required, i.e. a high degree of desalination

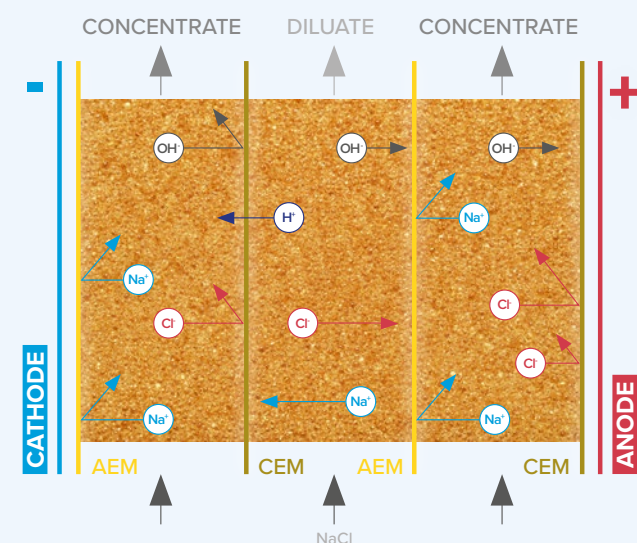


ELECTRODEIONIZATION PROCESS

ELECTRODEIONIZATION (EDI) IS AN ADVANCED WATER TREATMENT TECHNOLOGY THAT COMBINES ION EXCHANGE AND ELECTRODIALYSIS PROCESSES TO REMOVE IMPURITIES FROM WATER. THIS PROCESS USES AN ELECTRIC FIELD TO DRIVE IONS THROUGH ION EXCHANGE MEMBRANES, EFFECTIVELY REMOVING DISSOLVED SOLIDS AND CONTAMINANTS.



A unique aspect of electrodeionization is that it operates without chemicals or regeneration, making it a cost-effective and environmentally friendly solution for water purification. Unlike traditional ion exchange systems, which require periodic regeneration with chemicals, EDI continuously purifies water without interruptions.



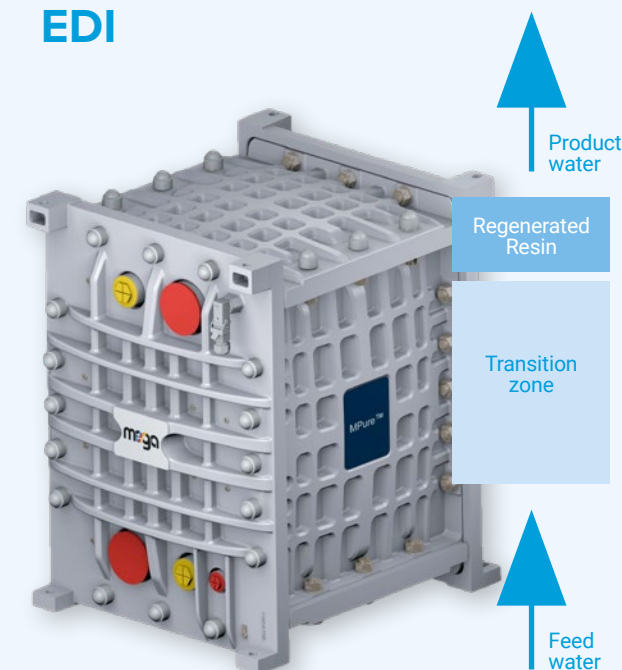
One of the main advantages of EDI is its ability to produce high-purity water consistently. It removes a high level of various contaminants, including dissolved salts, organic compounds, and silica. This makes EDI a popular choice for industries that require ultrapure water, such as power generation, pharmaceuticals, electronics, and semiconductor manufacturing.

EDI systems are also simple to operate and reliable. They are designed for easy integration into existing water treatment processes, and their automated operation requires minimal action by an operator. The continuous removal of impurities ensures stable water quality, reducing the risk of scaling, fouling, or corrosion in downstream equipment.

- » Exchange of ions with resin beads
- » Ions in the resin migrate toward the electrodes, through IX membranes and into C-chambers
- » Water splitting produces H^+ and OH^- ions resulting in continuous regeneration
- » Impurity ions trapped in C-chambers by membranes, H^+ and OH^- recombine to give H_2O

ADVANTAGES OF EDI OVER CONVENTIONAL MIXED BED TECHNOLOGY

EDI



Mixed Bed



FEATURES

- Product resistivity up to 18.2 $M\Omega \cdot cm$ ($0.055 \mu S \cdot cm^{-1}$)
- Simple interconnection
- No frames
- Modularity and redundancy

ELECTRODEIONIZATION (EDI) SURPASSES CONVENTIONAL MIXED BED (MB) TECHNOLOGY IN WATER TREATMENT WITH VARIOUS ADVANTAGES:

CONTINUOUS OPERATION

EDI operates non-stop, avoiding downtime caused by periodic regeneration required in MB systems.

CHEMICAL-FREE

EDI does not rely on chemicals, reducing costs and environmental impact.

REDUCED MAINTENANCE

EDI's simpler design leads to lower maintenance and operating costs.

CONSISTENT WATER QUALITY

EDI consistently produces high-quality water with low impurities, providing a stable source of ultrapure water, unlike MB systems that may show variations in water quality.

SPACE EFFICIENCY

EDI systems have a smaller footprint, making them ideal for space-limited applications.

PROCESS INTEGRATION

EDI can easily integrate with other water treatment methods, like reverse osmosis, allowing for flexibility and scalability.

MEGA'S MPURE™ RECTIFIERS

have been created for a dependable and efficient power solution, maximizing EDI module performance and reliability. MPure™ modules, efficiently convert AC to DC without the need for isolation transformers.

With a remarkable 94% efficiency, these rectifiers employ switching mode technology to deliver stable DC with less than 3% ripple, ensuring optimal EDI module performance. MPure™ Rectifiers designed for industrial applications are modular plug-in units in metal casing which provide reliable and consistent power to each EDI module.

KEY FEATURES

- » High-efficiency rectifier
- » Low ripple
- » No need for an isolation transformer
- » Supplied with an interface card for various communication options (analog, digital, Can Bus, or RS485 interface)
- » Low EMC and harmonic current emissions



MPure™ Rectifier

MEGA STACKS PORTFOLIO

A KEY PART OF ELECTRO MEMBRANE TECHNOLOGIES IS A MODULE WHICH IS ALSO CALLED A STACK.

ED(R)-30

Standard industrial electrodialyser ED(R)-30 for water treatment contains up to seven hundred cell pairs and is equipped with titanium/platinum electrodes on each side for polarity reversal. The standard application for such a type of module is treatment of low-salinity waters (avg. < 3 g/l).

The robust horizontal high-capacity ED(R)-30 electrodialyser has an operational flow rate of up to 60 m³/h.

ED(R)-30 (LOW TDS)

- » Flow rate of up to 60 m³/h
- » Large membrane area
- » Modular sizes from 100 to 700 cps
- » Long-life electrodes
- » Minimized internal and external leaks
- » Transparent or semitransparent covers
- » Adjustable connectors



ED(R)-IF

The ED(R)-IF electrodialyser is the latest generation of ED and EDR stacks. It has been developed with the aim of processing water with high salinity (> 30 g/l). It increases the overall performance of the previous generation of electrodialysis stacks together with higher operational safety.

The ED(R)-IF/250 and 400 electrodialysis stacks developed by MEGA focus mainly on increasing the concentration of dissolved salts in wastewater for ZLD or MLD plants.

ED(R)-IF (HIGH TDS)

- » Minimized leakages
- » No burning
- » Lower CAPEX for systems
- » Lower OPEX
- » Reduction of maintenance
- » Reduced system lay-out
- » Potential for new applications
- » Human safety



EDBM-IF & EDBM-HO

Bipolar Versions of the EDR-IF and HO Stack Families

We offer two-compartment configurations for the production of either acid or caustic, and three-compartment configurations for simultaneous acid and caustic production.

EDBM-IF is an electrodialyser designed for the production of lower-concentration, lower-purity acids and caustics. It features an unparalleled membrane lifespan, ensuring the best operating expenditures.

Compared to other electrodialyzers on the market, it is less sensitive to feedwater pre-treatment and can tolerate higher levels of Ca²⁺ and Mg²⁺.

HO Electrodialyser integrates FuMega membranes and also allows for a combination of FuMega and Ralex membranes within a single stack. It delivers higher acid and caustic concentrations while maintaining exceptional energy efficiency. Designed for applications with

lower impurity levels, it requires proper pre-treatment for optimal performance.

EDBM-IF & EDBM-HO

- » Production of acid & base
- » High purities and concentrations
- » Easy maintenance
- » Low power consumption
- » Cost effective membranes
- » Long lifetime of membranes

ED(R)-20

Equipped with 200 or 250 cps this electrodialyser is an ideal choice for applications where the ED(R)-IF may not be suitable due to higher impurity levels in the water. Positioned between the ED(R)-30 and ED(R)-IF, it offers a practical solution when ease of maintenance is more critical than sheer power.

While not as powerful as the ED(R)-IF, the ED(R)-20/250 delivers high performance with superior serviceability. It features an optional

automatic showering system to remove external deposits, making cleaning effortless.

ED(R)-20 (MEDIUM TO HIGH TDS)

- » Automatic rinsing
- » Modular membrane area from 200 to 250 cps
- » Long-life electrodes
- » Superior serviceability
- » Prolonged maintenance periods
- » High temperatures



ED(R)-HO

This electrodialyser is designed for maximum energy efficiency, integrating advanced low-resistivity membranes while maintaining excellent serviceability. As part of the vertical electrodialyser family, it ensures stable performance per cell pair by eliminating the risk of chamber deformation caused by gravity in horizontal designs, which can lead to uneven electrode spacing, increased resistivity, and a higher risk of scaling.

Optimized for applications with lower impurity levels and higher salinity, it leverages high-transfer, low-resistivity

membranes to deliver unmatched efficiency and performance. This makes it the ideal choice for operations prioritizing energy savings without compromising reliability.

ED(R)-HO (MEDIUM TO HIGH TDS)

- » Combinations of different membranes
- » High effective area
- » High temperatures
- » Low power consumption
- » Easy maintenance
- » Compact footprint



MPURE™ 36/12/6

Introducing MPure, a premium electrodeionization module crafted for high-purity water production. Our MPure module comes in three standard variants, offering 6, 12, and 36 cell pairs. This provides you with the flexibility to process varying daily flowrates ranging from 0.83 m³/h to 15 m³/h per module.

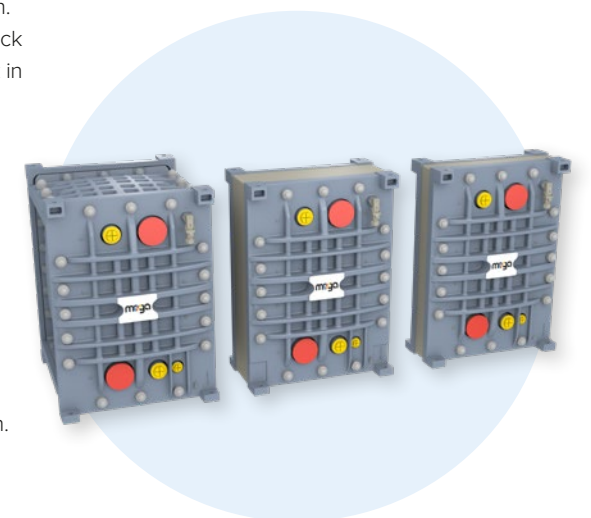
With MPure, you can achieve exceptional water quality, as the resistivity of the produced water reaches up to an impressive 18.2 MΩ·cm. Experience the reliability and performance of MPure for your high-purity water production needs.

Modules can be interconnected to provide high flow rates, reducing the number of connections to the skid, saving money for the customer, and reducing potential failure points. The

modules are self-supporting and do not require any frame for construction. Exhaustive factory testing of each stack guarantees you will receive the stack in optimal condition, ready to plug in.

MPURE™ (UPW)

- » Small footprint – suitable for operation inside containers.
- » Easy and safe maintenance.
- » Continuous operation with no regeneration needs.
- » Modularity and redundancy – cube-shaped modules offer different options of interconnection.
- » Option for direct discharge of electrode stream.
- » Compact, durable, long-lifetime patented design.





MEGA SYSTEMS PORTFOLIO

MEGA PROVIDES CUSTOMERS WITH A WIDE RANGE OF SYSTEMS TAILORED TO MEET THE NEEDS OF ALL TYPES OF COMPANIES. OUR ENGINEERS COMPETENTLY DESIGN ALL SYSTEMS, CONSIDERING THE ADVANTAGES OF MEGA'S MEMBRANES AND MODULES TO SATISFY THE DEMANDS OF OUR CUSTOMERS

MEGA offers off-the-shelf systems designed for plug-and-play functionality, as well as tailor-made, large-scale solutions across various supply ranges. All equipment is pre-assembled at our facility and comprehensively tested. Each unit is fully automated and designed for easy integration.



MEGA pilot system

EWTU SYSTEMS

LABORATORY AND PILOT SYSTEMS

Serve to validate the behavior of the processed media in the environment of electrodialysis. This allows our customers to proceed step by step in their project and to receive accurate knowledge about the product and ED performance parameters. Multiple rental scenarios are offered including complete services from our highly experienced process engineers and scientists.

SMALL CAPACITY SYSTEMS

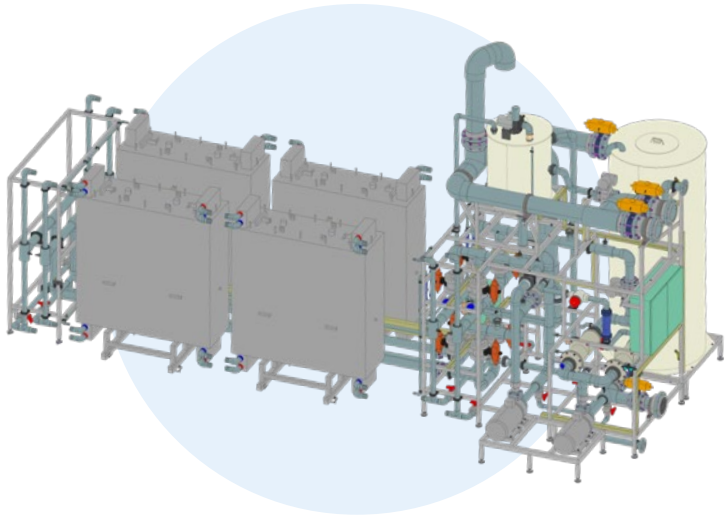
P10 and P20 are systems designed for nominal flowrates (low TDS) ranging from 10–20 m³/h with implementation of EDR-30 stacks up to 300 cps. Systems can accommodate maximum four stages. For high TDS applications systems can be used up to 3 EDR-IF/250 modules.

MEDIUM CAPACITY SYSTEMS

M45 and M90 systems designed for up to 90 m³/h in low TDS applications. Equipped for EDR-30 with maximum of 600 cps and four stage operations. For high TDS applications it can be equipped with maximum six EDR-IF/400.

LARGE CAPACITY SYSTEMS

The Twinline90 is MEGA's solution for very high flow rates. It can be tailor-made to any necessary flow rate and equipped with EDR-30 stacks up to 700 cps (for low TDS) and the largest sizes of EDR-IF (for high TDS).



WHY BUY FROM MEGA?

Experience: Proven track record with industrial installations over the last three decades.

Customization: Tailor-made systems designed to meet specific customer needs.

Quality: Full control over the production process from start to finish, with all equipment factory tested.

Automation: High level of automation for smooth operation.

Services: 24/7 support with maintenance teams ready to assist and remote support available via the internet.

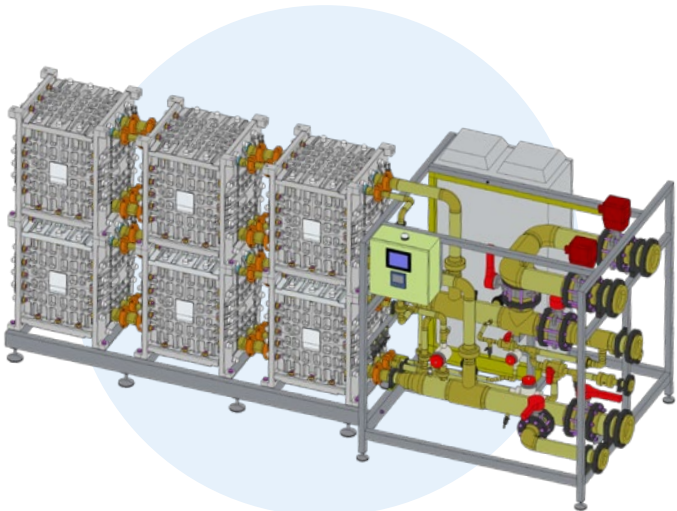
Compatibility: High-quality international sub-suppliers (valves, pumps, instrumentation, etc.) available in the local market.

HPWU SYSTEMS

MEGA's electrodeionization system HPWU is a simple and cost-effective solution based on the range of pre-engineered HPWU systems with MPure™ EDI. Stacks cover flow rates from 0.8 m³/h to 180 m³/h and more.

BENEFITS OF MEGA HIGH-PURITY WATER SYSTEMS:

- » Low-cost HPWU building – ports on both sides for simple interconnection, no frames for modules.
- » Each unit is factory assembled and tested to shorten installation time and minimize start-up costs.
- » Modularity and redundancy – cube-shaped modules offer different options of interconnection.
- » Easy maintenance – only one electrical connection, hydraulic connection with Victaulic couplings.
- » Low capital and operating costs (low stack costs and long lifetime, low replacement costs, cleaning frequency and energy consumption).





Authorized partner



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