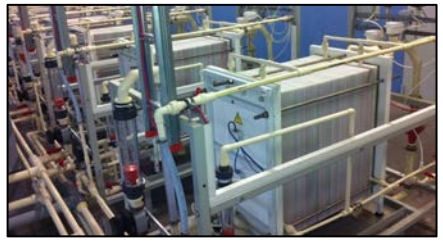
JSC “Membranines Technologijos LT“

The company with focus on development and manufacturing of state-of-the-art electrodialysis equipment and technologies based on own know-how and commercially available membranes




Membraninės Technologijos LT

Company introduction

- Founded in 1996
- Shareholders: private capital 100%
- Location: Lithuania, European Union
- High skilled team of 15 employees
- Company mission: We are changing limits of electro-membrane processes and penetrate new applications where previously electrodialysis either couldn't be used at all or hasn’t been used yet due to certain limitations
- Main activities:
  - Development of new technological processes based on the principles of classical and bipolar electrodialysis, as well as electromembrane diffusion-dialysis extraction
  - Design, production and supply of state-of-the-art electromembrane equipment
  - Upgrading of existing ED plants supplied by another vendors
- We use commercially available ion-exchange membranes which are suitable for desired application, all other ED components like spacers, electrodes are developed and manufactured based on own know-how

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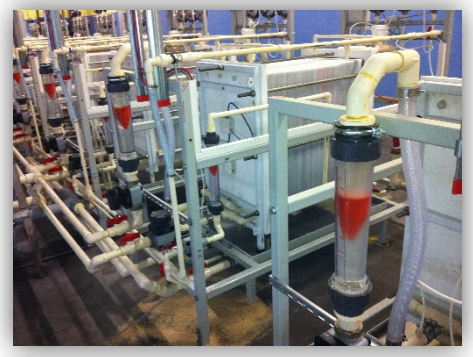
Our technological solutions based on electrodialysis

- Demineralization of solutions with high viscosity and temperature
  - All types of whey at high concentration of dry matters
  - Concentrated delactosed whey, WPC
  - Sugar molasses and semi-products of sugar production
  - Chicory solution, inulin
  - Gelatin, protein hydrolysates, amino acids
  - Crude bio-glycerin
- Desalination/demineralization and concentration of aqueous salt solutions
  - natural mineralized water
  - industrial effluents of various origins, MLD & ZLD
- Technology of reagent-free alkali recovery from alkali-containing solutions for produce pure alkali for reuse
- Electrochemical synthesis of new substances
  - effective alkaline hydrolysis
  - continuous reactions of double decomposition of two electrolytes of different salts
  - electro-membrane separation using bipolar electrodialysis, etc.



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Electro-membrane stacks

- We design, manufacture and deliver electrodialysis modules with unique characteristics, various capacity and for various applications.
- Each type of electromembrane module can be designed with 2-, 3- or 4- independent flow channels depending on application.
- Our stacks are used for process demonstration, research & development of new applications, experimental lab and pilot testing as well as for industrial manufacturing.
- Stacks have EU origin and are delivered along with necessary documentation, certification, warranty and post-warranty service, technical support and spare parts.

Lab modules
LEMA

Pilot modules
EMA

Low-tonnage
modules EMA

Industrial heat-resistant
modules EMA-TM & EMAC-T

Electromembrane Diffusion-
Dialysis Extractor DDE

Bipolar module EDBM

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Main technological features and advantages

- **OPERATION AT HIGH TEMPERATURE.** Our stacks can process solutions in wide range of temperature from +10°C up to +70°C. Traditional electrodialysis systems operate at temperature in range 15-40°C;
- **PROCESSING OF FEED WITH HIGH DRY MATTER.** Demineralization of viscous solutions with 40-45%TS directly without water dilution. Traditional electrodialysis systems needs in dilution of raw materials up to 18-20% TS;
- **LOW PRESSURE.** Low operating pressures of feed solutions 0,5–0,7 bar in one stage. In most of electrodialysis systems operation pressure can reach to 3,5-4 bar;
- **NO INTERNAL LEAKING.** Due to our unique spacer and stack design we do not have physical internal leakages between product and concentrate chambers. In most of electrodialysis systems the loss of products have substantial amount, and this is the real problem;
- **NO EXTERNAL LEAKING.** No external smudges and "sweating" on the surface of membrane stacks (stacks with "dry surface"). In most of electrodialysis modules external surface of membrane stacks usually wet. As a result, under the modules arises spills of solutions, and in some cases on the surface even mold is formed;
- **DIRECT COUNTER-CURRENT OF FLOWS.** Direct ("true") counter-current flows of the working solutions inside the membrane stack allows higher level of demineralization.
- **UP TO 4 STACKS IN SERIES.** Possibility to install 2, 3 and 4 modules in the technological production line in series, without intermediate tanks and additional pumps to provide one-flow ("single-pass") deep demineralization scheme.

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Electromembrane plants

- Apart from single stacks, we also supply complete electrodialysis plants on the "turn-key" basis.
- Our equipment has been installed at more than 60 enterprises in various industries of the EU, CIS, South America - metallurgical, energy, pharmaceutical, chemical, food, etc.
- Pictures of typical ED units and real industrial projects are shown below.








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Some references

- Special EDAM technology for the efficient process of alkaline hydrolysis in the industrial production of pharmaceutical substances.
  - 1998, 2000, 2002: JSC "Grindex", Latvia
  - 2008, 2009, 2013: JSC Pharmaceutical Company "Salutaris", Ukraine
  - 2005 -2014: commissioning 10 objects in Ukraine and Russia (customers are confidential)
- Reagent-free EDK technology for wastewater treatment after processing of chemically modificated of poly-acrylic fiber. Date of commissioning - 2009, AQUAFOR Ltd, Saint Petersburg, Russia.
- Energy-efficient DDE technology for reagent-free alkali recovery from mixed wastewater after ion-exchange units with subsequent alkali concentration for reuse in water pre-treatment unit. Date of commissioning - 2011, 2016 (modernization). Kazan Power Station-3, Tatarstan, Russia.
- Reagent-free low-waste EDR technology for treatment of cyanide-containing wastewater in metallurgical industry. Date of commissioning - 2014, Kosogorsky metallurgical Plant, Tula, Russia.
- Low-waste reagent-free complex technology for bio-glycerin processing (decolorization and demineralization). Date of commissioning - 2013, 2014, 2016. Latvia, Ukraine, Russia (customers are confidential).
- Effective complex EMU technology for additional extraction of sugar from waste sugar production and semi-products. Date of commissioning - 2017. JSC Gorodeisky Sugar Plant, Belorussia.

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New technologies developed during last 3 years

1. ED-EDBM technology. Reagent-free technology for acid milk whey processing.
2. ED-C technology for demineralization of concentrated acid and sweet whey (26-28%TS) without dilution in "one-pass" mode with applying the “warm process".
3. Contactless ED-EDCA technology for the processing of acid whey.
4. ED-T technology for demineralization of whey protein concentrates (delactosed whey) without additional dilution, in continuous mode, at higher temperature of solution.
5. ED-T technology for removal inorganic salts from gelatin in a continuous mode, without additional dilution, with higher temperature of solution.
6. ED-T technology for demineralization of chicory extract by reagent-free method in production of inulin.
7. DDE technology. Reagent-free alkali recovery from solutions with high content of alkali and salts.

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New generation of ED stack

Recently we introduced our new ED stack optimized for dairy and food processing with following features:

- Feed at high total solids, viscosity and temperature up to 55 °C can be processed in one-pass mode.
- Configuration with one or two hydraulic stages. Number of cell pairs per stage can vary from 150 to 300. Max. 600 cell pairs per stack.
- Available in both version with polarity reversal or without.
- Heterogenous ion-exchange membranes with better desalination rate and lifetime.
- Excellent hydraulic properties (low pressure drop per stack).
- Low energy consumption.
- Compact design, easy handling and maintenance.
- All medium contacting materials are food proof.

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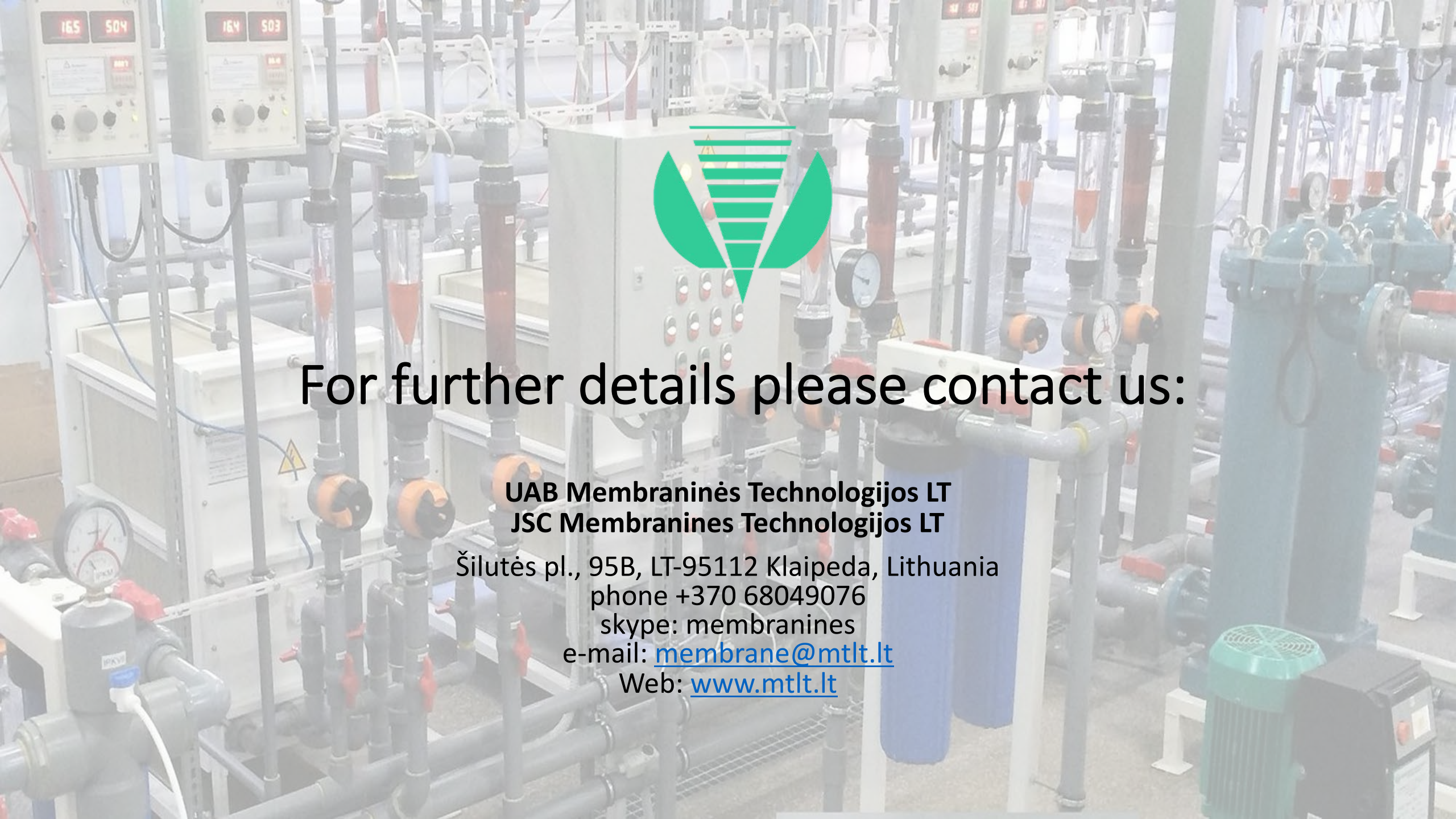
First successful applications of new generation ED stacks in dairy industry.

ED Plant EMU-3 for demineralization of acid whey, 24-26% TS (product quality D50, D70, D90). Poland

ED Plant EMU-2 for demineralization of acid whey, 20% TS (product quality D70). Ukraine



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