Diversey

F&B

Divos ACP

Accelerated Cleaning Protocol for Dairy Processing Membranes

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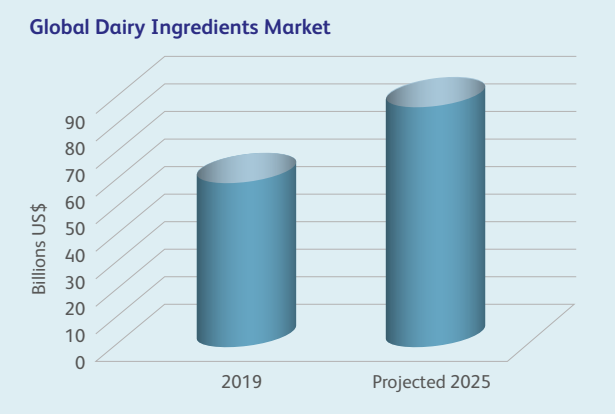
Whey Market Adding Value

A filtration membrane is fundamental to the dairy production process and key in creating additional value. Recovering and up-concentrating milk components with high nutritional value, such as separating whey protein, is important in creating new products and in response to increasing consumer demands for functional and healthy food.

This is reflected in the global dairy ingredients market which was valued at US$ 53.8 billion in 2019 and is projected to reach a value of US$ 81.4 billion by 2025, growing at a CAGR of 7.1%.



Rich Source of Nutrients and High Quality Foods

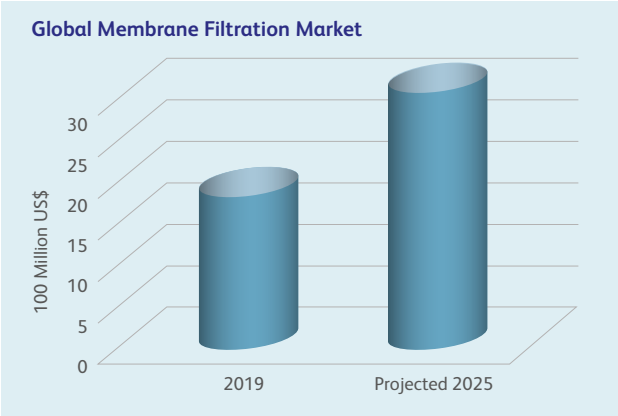
Whey is one of two proteins in cow's milk. It's the liquid remaining after cheese production or the removal of casein from milk. Whey is a rich source of essential amino acids needed daily by the body and its purest form contains little to no fat, or lactose. Its beneficial properties mean it's used in many high quality foods, including: infant formula, sports protein nutrition, specialised and medical nutrition, and pharmaceuticals.

The EU is the biggest global producer of cheese and therefore the largest producer of whey - which represents 46% of total dairy products in Europe. In 2018, from cheese production of 9,414,000 tonnes the resulting whey production totalled 4,150,000 tonnes.

Innovation Crucial to Market Growth

Dairy companies are constantly seeking to innovate and leverage profitability from whey. Growth in the sector is driven by current market conditions. The increasing impact from new consumer behaviours is creating a growing market niche, which in turn is increasing industry capacity. The need for extra capacity is driving the growing demand for membrane systems.

In 2019, dairy product applications dominated the global membrane filtration market for F&B, with sales of US$ 1,889.6 million. Growth is projected at a CAGR of 6.3% during the forecast period, to reach a value of US$ 2,901.9 million by 2025.



Market trends

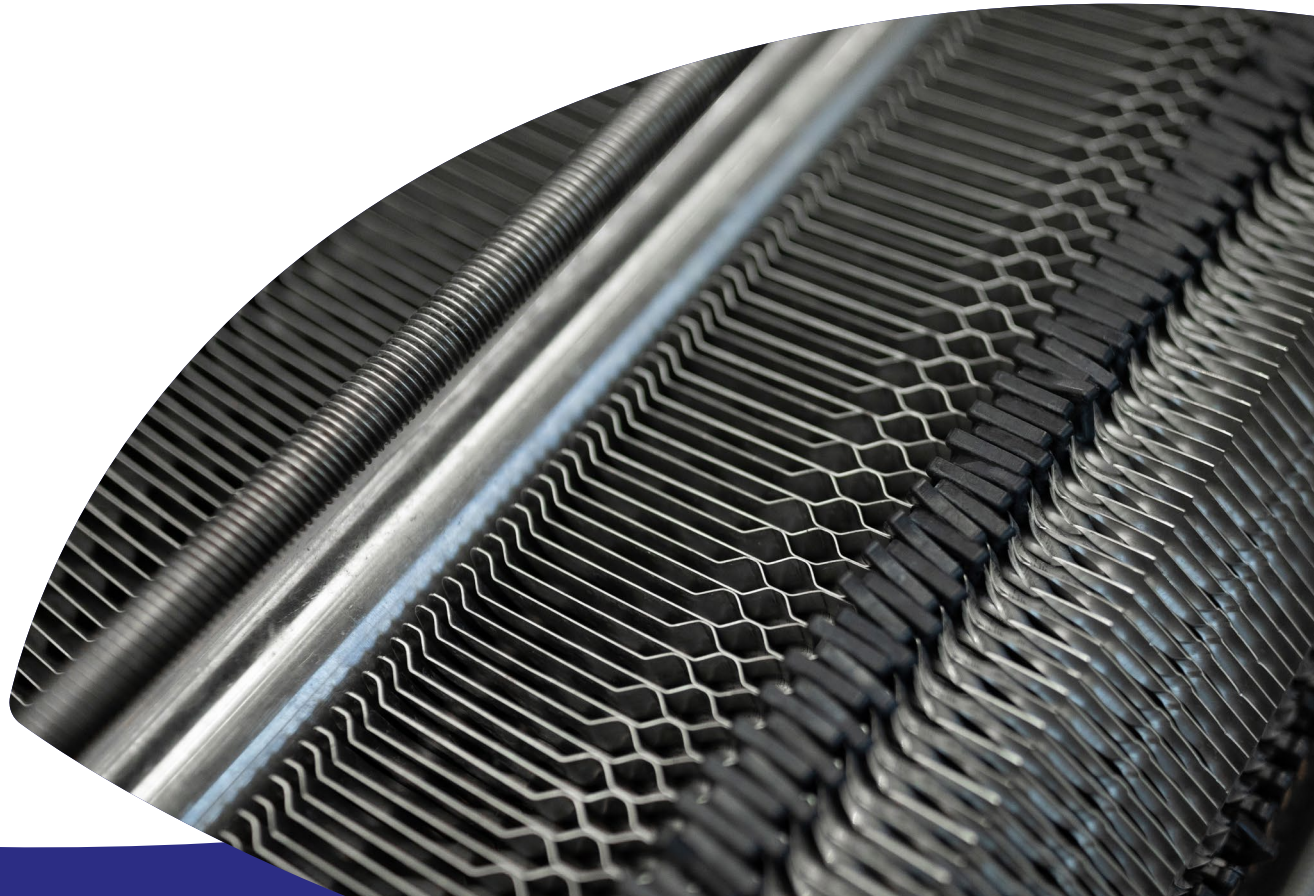
Current trends are increasing concerns about the total cost of ownership (TCO) of membrane filtration systems - with emphasis on operational CIP time, membrane lifetime and productivity. While the focus on up-concentration requires new membranes at different tolerances. Larger installations, reuse systems and a large scale preponderance of the problem of bio-fouling are also high on the agenda. Any downtime in the production cycle can quickly impact on yield to eventually negatively affect competitiveness in the sector.

Finding the balance

A membrane is a considerable investment for any processor and must provide a good return. There's both expectation and a requirement that the membrane is operational most of the time, often leading to disrespect of the OEM's essential operation and cleaning protocols. Such bad practice can result in serious or unrecoverable membrane damage.

A drive for more production by increasing the pressure and postponing the cleaning step can compromise membrane efficiency and essential hygiene requirements. A balance is required. With substantial replacement costs, a consistently efficient and long-life membrane is a high priority.

Cleaning porous membranes is very different from cleaning a hard surface, and for this reason a high level of expertise is required.



Diversey's New Divos ACP Technology

Optimising membrane efficiencies requires an acute awareness of Total cost of ownership (TCO), balancing the lowest possible downtime with maximum cleaning speed and quality. A solution needs to protect existing business, while delivering competitive advantage to ensure sales growth at maximum profitability.

By reducing cleaning time, water and energy usage for operational efficiency, sustainability and improved TCO, Diversey's patented Divos ACP technology generates significant productivity and efficiency improvements. It enables customers to get maximum production capacity out of a membrane installation via a sustainable solution.

It is known that the CIP of membranes represent the most aggressive environment for the membrane integrity and controlling the level of stress over membranes is another key characteristic of Divos ACP.

A Unique Chemical Solution

Divos ACP is bringing a completely new approach for the effective cleaning of membranes used for the cold production of skimmed milk, acid and sweet whey while reducing up to 50% utility usage and up to 40% of cleaning time. Diversey's unique chemical technology is compatible and safe for all membrane types with the exception of Cellulose Acetate.

Major global OEM's: DSS Tetra Pak, SPX Flow, GEA, SD Filtration and Alpma/ LTH support the use of the newly developed Diversey products and the Divos ACP concept.

Divos ACP provides new more flexible cleaning protocols for in-use dilution ranges and an innovative detergent to ensure environmental and safety regulation compliance.

Its clever combination of chemistry removes proteins and calcium phosphate in one go, while reducing the cleaning steps. Divos ACP will improve efficiency and output by reducing CIP-downtime and can improve water flux by more efficient cleaning and increase the expected membrane lifetime by safer pH control.

A Proven Technology

Rigorous development trials, including using a pre-clean for RO+PO mozzarella whey and RO+NF sweet whey, reveal a 25% reduction of total cleaning time; combined with between 40-50% water and energy savings, respectively. Without a pre-clean, for UF sweet whey an equally impressive cleaning time reduction of 40%, and 50% water and energy savings were achieved.

DIVOS ACP = + 100%

PRODUCTIVITY:
Output, preventative maintenance, flexibility and compliance.

EFFICIENCY:
Time, resources, sustainability and membrane operation.

Divos ACP Targets Four Key Areas of Improvement

Food Safety – Ensures membranes are free from microbiological contamination and incorporates the use of bio-based surfactants.

Operational Efficiency – Reduces membrane CIP time and increases production output, for a 25-40% reduction in cleaning time; 30-50% savings in utilities and up to 11% increased productivity.

Sustainability – Saves 30-50% in water and energy and enhances chemical compliance with regulations with P-free application and use of bio-based surfactants.

Shelf Life Extension – Reduces changeover of membrane elements, avoiding the use of oxidizers and large pH changes.

Reduced chemical stress.

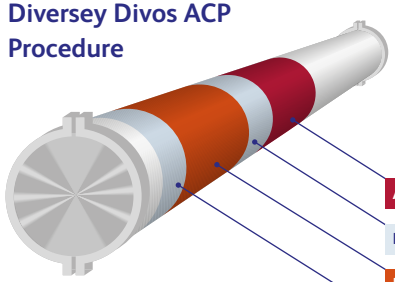
ACP for Acid Whey / Sweet Whey

Standard Cleaning Procedure

Pre-Rinse	10-15 min
Acid Step	30 min
Rinse 2	10-15 min
Enzyme Step	45 min
Rinse 3	10-15 min
Alkaline Step	30 min
Final Rinse	10-15 min

Total time 145-165 min

Diversey Divos ACP Procedure

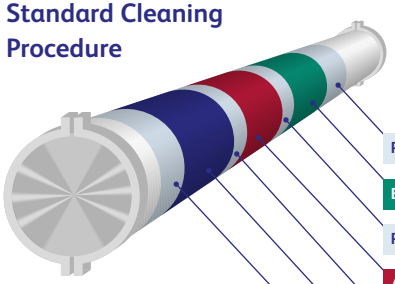


Acid pre-clean	10 min
Rinse	10-15 min
Divos ACP	60 min
Final Rinse	15 min

Total time 105-110 min
Time saving ~25-40%

ACP for Skim Milk / Sweet Whey

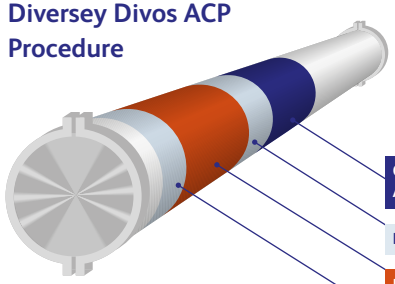
Standard Cleaning Procedure



Pre-Rinse	10-15 min
Enzyme Step	45 min
Rinse 2	10-15 min
Acid Step	30 min
Rinse 3	10-15 min
Alkaline Step	30 min
Final Rinse	10-15 min

Total time 145-165 min

Diversey Divos ACP Procedure



Optional Alkaline Step	20 min
Pre-Rinse	10-15 min
Divos ACP	60 min
Final Rinse	15 min

Total time 85 - 110 min
Time saving ~25-50%

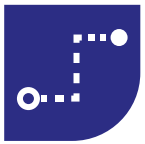
Divos ACP eliminates traditional membrane cleaning protocols for cold processing of skim milk, acid and sweet whey. Its typical accelerated cleaning protocol includes an acid pre-clean and a combined enzyme and inventive step to drastically reduce cleaning times.

The ACP inventive step accelerates protein removal. The cleaning procedure for acid whey / sweet whey achieves 25-40% time savings, while for skimmed milk / sweet whey – 25-50% savings are achieved.

Divos ACP Sustainability and Quality Improvements

Divos ACP presents unique contributions to reduce chemical stress on membranes:

Reduces chemical handling complexity and enables membrane cleaning through shortened cycles to reduce chemical exposure.



FREE from: Phosphorous, NPE (Nonyl Phenol Ethoxylates), Chlorine, or other oxidizers.

Lowers emissions to wastewater treatment plants. Working with a Phosphorous-free chemistry provides higher quality effluent emissions to avoid fees on phosphorous discharge. Less water consumption is required overall.

Reduces pH variances. Reduces the time in which membranes are submitted to extreme pHs.

Contains special blend of renewable surfactants and highly-efficient enzyme on dairy proteins.

Reduces plastic usage and transportation footprint due to reduced chemical requirement.

Less aggressive to membranes with pH buffered chemicals protection.

Recovers ideal water flow in a reduced time.

DIVOS ACP
TOTAL VALUE

Assignment

OPERATIONAL EFFICIENCY

Assess current cleaning procedure from competitor and reduce total cleaning time.

Ensure consistent cleaning results measured by the water flux.

Deliver savings and improve cleaning footprint.

Project

Type of Production	Sweet Whey
Area	RO/NF Membrane
Year	2019-2020

Description

1. Optimize cleaning time so additional production time could be achieved.
2. Partnering with Diversey enabled our customer to gain a new perspective in Membrane Cleaning.
3. Diversey's membrane experts deeply assessed our customer's installations and procedures and recommended the introduction of Divos ACP protocol.
4. When compared to actual, competitor's protocol, the Divos ACP protocol reduced significantly all cleaning parameters.

Outcome

Divos ACP - TVO

-90

Cleaning Time Reduction

296 hrs/yr

26% reduction

$$$

COST REDUCTION

Total Savings of

46%

Water & Utilities

OPERATIONAL EFFICIENCY

$74k

Value of the additional production time

Effluent Emission REDUCTION

Assignment

OPERATIONAL EFFICIENCY

Promote further optimization of current Diversey protocol and reduce total cleaning time.

Ensure consistent cleaning results measured by the water flux.

Ensure reduction of chemicals streams to the effluent.

Project

Type of Production	Whey
Area	RO + PO Membranes
Year	2019-2020

Description

1. Optimize actual cleaning time.
2. Currently running traditional Diversey's Divos program, already optimized to the limit of the standard range.
3. Diversey's membrane experts investigated opportunities and introduced Divos ACP protocol.
4. Production and water flux stability achieved.
5. Reduced cleaning protocol from 7 to 4 steps.

Outcome

Divos ACP - TVO

-90

Cleaning Time Reduction

45 minutes per clean

27% reduction

$$$

COST REDUCTION

Total Savings of

40%

Water & Utilities

WASTE WATER REDUCTION

Cost Avoidance due to limited capacity of the Waste Water Ttreatment

Unique Chemical Technology and the Right Support

To take advantage of current market conditions, it's crucial for dairy producers to partner with the right C&S suppliers with the most innovative chemical range, solid relationship with membrane OEMs and a track record of knowledge, global expertise support and service.

The products, cleaning procedures, application expertise, monitoring and control systems Diversey provide deliver superior performance up to three times more efficient than existing solutions. Customers can confidently expect Divos ACP total value to equate to reductions of up to: 25-40% reduction in cleaning time; 30-50% savings in utilities and up to 11% increased productivity.

Diversey™

Diversey's purpose is to protect and care for people every day. Diversey has been, and always will be, a pioneer and facilitator for life. We constantly deliver revolutionary cleaning and hygiene technologies that provide total confidence to our customers across all of our global sectors, including: cleaning products, systems and services that efficiently integrate chemicals, machines and sustainability programs. This makes us unique among leading global hygiene and cleaning companies. Everything we do has our customers' needs at its heart and is based on the belief that cleaning and hygiene are life essentials. With over 95 years of expertise, we safeguard our customers' businesses, contributing to productivity improvements, lower total operating costs and brand protection.

Diversey is headquartered in Fort Mill, SC, USA.
For more information, visit www.diversey.com or follow us on social media.

www.diversey.com