



APV SepStream System RO System

The APV SepStream System is a flexible membrane application solution enabling customers to benefit from cost effective systems with high quality, high performance and flexible application opportunities. The SepStream RO systems comprise of four pre-engineered Reverse Osmosis (RO) systems. This enables Nanofiltration (NF) simply by choosing the NF membranes instead of RO membranes and adjusting the system to a lower pressure level. The pre-engineered standard skidded systems are based on proven components, membranes and control instruments and uncompromised quality material like Stainless Steel in AISI 316 whilst meeting the highest hygienic standard.

Application

SepStream RO is designed primarily for sweet whey but also for UF permeate and lactic acid whey concentration. The APV SepStream RO system is based on the proven reverse osmosis (RO) technology which enables effective concentration of solids before evaporation and drying or removal of water to make whey/UF permeate transport more economical.

In the RO process whey or UF permeate feeding the plant is divided in two streams: retentate with concentrated solids (main product) and almost pure water (by-product). The water component (permeate) can be used immediately for CIP or polished using the same RO system to produce high quality soft water at very low COD level for use as process, boiler or cooling water and to top up CIP systems.

The SepSystem RO System also enables concentration of milk and white water, and further NF by choosing NF membranes.

Capacity

Four standard sizes with nominal capacities of: 5, 10, 15 and 20 m³/h, based on sweet whey concentration from 6 to 18% Total Solid (TS) and 10 to 20 hours production time at 8-10°C.

Process description

The APV SepStream RO system concept employs continuous RO concentration of whey or UF permeate. The pre-treated feed is led from a storage tank by an external feed pump to the RO balance tank and pumped via the base line into the RO loop system. Here the feed is separated into two phases – a retentate phase (concentrate) and a permeate phase (watery phase). The retentate is led to the external storage tank at the final TS level. The permeate is led to the RO balance tank and pumped to an external permeate storage tank or alternatively led to drain.

The collected RO permeate can be polished (reduction of COD by a factor approximately 10) using the same RO system.

The RO plant enables NF by choosing NF membranes instead of RO membrane and adjust to a lower feed pressure. NF combines concentration and partial demineralization. After final processing the RO/NF plant is cleaned according to the pre-defined CIP program and the recommended CIP procedure. Detergents are dosed manually. An automatic CIP dosing system is available as an option.



Standard design

- Continuous processing at 8-12°C
- Operating time: 10 hours between CIP (can be extended up to 20 hours depend on application and process parameters)
- Skid mounted system for Plug and Produce solution
- All parts in contact with product made of stainless steel AISI 316L / DIN1.4404
- Hygienic dairy processing standard based on 8" Spiral Wound RO membranes
- EHEDG APV Brand Process Equipment (Valves, Pumps & Fittings)
- EHEDG Sanitary Endress & Hauser Instrumentation (Temperature, Pressure, Level & Flow)
- Indicators for process monitoring
- Integrated closed, double-compartment balance tank for feed product and permeate
- Stainless steel safety filter introduced to protect membranes against small mechanical impurities
- Grundfos high pressure pumps
- Integrated Tubular Heat Exchangers for product cooling and CIP heating
- Stainless steel utilities control valves
- Manual service shut-off valves included
- Automatic system for pump seals flush
- All pumps controlled via skid mounted frequency converters by Danfoss 300 series (IP66)
- Skid mounted stainless steel control and MCC panel
- Semi-automatic self-contained control system with Siemens MP277 10" operating panel and defined signal interface – tried and tested system
- PLC controlled CIP program for both manual (standard) and automatic (optional) CIP chemicals dosing
- Cabled and tested, ready for Plug and Produce

Design options

- Sanitary, APV Double Seat Leak-Proof Valves
- Bag filters unit for removal of fine cheese dust from whey
- Automatic CIP chemicals dosing system
- Communication link to an external control system for data collection from the plant
- Communication link for remote control of the plant from an external control system
- Additional operator SCADA system consisting of a Wonderware Intouch PC for operator room placement. This enables remote operation, easy plant overview, surveillance and plant data collection including trend curve screens for easy production optimization and trouble shooting
- Allen-Bradley CompactLogix PLC and Rockwell PanelView 600 Touch HMI Panel



APV SepStream RO Skid

Technical Data – SepStream-RO system (refer to sweet whey concentration from 6 to 18% TS and production at 8°C)

	Units	SepStream-RO5	SepStream-RO10	SepStream-RO15	SepStream-RO20
Nominal feed capacity (approx.)	l/h	5.000	10.000	15.000	20.000
Production temperature	°C	8-10	8-10	8-10	8-10
CIP temperature	°C	50	50	50	50
Installed power	kW	67	78	91	109
Permeate outlet pressure, max.	bar	3	3	3	3
Feed pressure at unit inlet, min.	bar	2.5	2.5	2.5	2.5
External feed pump capacity, min.	l/h	7.000	13.000	18.000	23.000
Flushed seal water capacity (3 bar)	l/h	200	400	400	400
Steam consumption - CIP (3 bar)	kg/h	380	400	600	800
CIP Process water capacity - flush (3 bar)	l/h	33.000	38.000	52.000	63.000
Ice water capacity – production (3 bar, 2°C)	l/h	10.000	10.000	15.000	18.000

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