The APV SepStream System is a flexible membrane application solution enabling customers to benefit from high quality cost effective systems with high performance and flexible application opportunities. The SepStream RO range comprises of four pre-engineered Reverse Osmosis (RO) systems. The pre-engineered standard skidded systems are based on proven components, membranes and control instrumentation and uncompromised quality material like Stainless Steel in AISI 316 whilst meeting the highest hygienic standards.

APPLICATION

The APV SepStream RO system is designed primarily for sweet whey concentration but can also be used for other product types. The APV SepStream RO system is based on proven reverse osmosis (RO) technology, which enables effective concentration of solids before evaporation or road transport to cut costs and produce CIP water.

With the RO process whey or e.g. UF permeate is divided in two streams: retentate with concentrated solids (main product) and a permeate which is almost pure water. The water component (permeate) can be used for CIP purposes. If a very low level of COD is needed the water permeate can be passed through the plant once more after primary production.

With the APV SepStream RO system it is also possible to concentrate milk and white water (water/white milk mix phase).

CAPACITY

Four standard nominal capacities are available: 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. The pre-treated feed is led from a storage by an external feed pump to the RO balance tank and pumped via the base line pipe into the RO loop system.

Here the feed is separated into two phases – a retentate phase (concentrate) and a permeate phase (water phase). The retentate is led to external storage 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.

If collected the RO permeate can be polished (reduction of COD by a factor of approximately 10).

The plant can be changed into a NF (Nanofiltration) plant. NF combines concentration and partial demineralization. After final processing the plant is cleaned according to the recommended CIP procedure. Detergents are dosed manually. An automatic CIP dosing system is available as an option.
**STANDARD DESIGN**
- Continuous processing at 8-10°C
- Operating time: 10 hours between CIP (can be extended up to 20 hours depending on application and process parameters)
- Skid mounted Plug and Produce solution
- All stainless steel 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 and permeate
- Stainless steel safety strainer
- 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 shaft seal flush
- All pumps controlled via skid mounted frequency converters (IP66)
- Skid mounted stainless steel control
- Semi-automatic self-contained control system with Siemens (HMI) MP277 10” operating panel and defined signal interface – tried and tested
- 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 in process interface points
- Bag filters unit for removal of small volumes of cheese fines and raw milk impurities
- Automatic CIP chemicals dosing system
- Communication port for bus communication connection to external control system
- Remote on-line
- Allen-Bradley PLC and PanelView Touch HMI Panel
- NF concentration instead of RO concentration
- pH adjustment for sweet whey and UF permeate

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>SEPSTREAM-RO5</th>
<th>SEPSTREAM-RO10</th>
<th>SEPSTREAM-RO15</th>
<th>SEPSTREAM-RO20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal Feed Capacity (approx.)</strong></td>
<td>L/H</td>
<td>5.000</td>
<td>10.000</td>
<td>15.000</td>
<td>20.000</td>
</tr>
<tr>
<td><strong>Production Temperature</strong></td>
<td>°C</td>
<td>8-10</td>
<td>8-10</td>
<td>8-10</td>
<td>8-10</td>
</tr>
<tr>
<td><strong>CIP Temperature</strong></td>
<td>°C</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Installed Power</strong></td>
<td>KW</td>
<td>67</td>
<td>78</td>
<td>91</td>
<td>109</td>
</tr>
<tr>
<td><strong>Permeate Outlet Pressure, max.</strong></td>
<td>BAR</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Feed Pressure at Unit Inlet, min.</strong></td>
<td>BAR</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>External Feed Pump Capacity, min.</strong></td>
<td>L/H</td>
<td>7.000</td>
<td>13.000</td>
<td>18.000</td>
<td>23.000</td>
</tr>
<tr>
<td><strong>Flushed Seal Water Capacity (3 Bar)</strong></td>
<td>L/H</td>
<td>200</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td><strong>Steam Consumption - CIP (3 Bar)</strong></td>
<td>KG/H</td>
<td>380</td>
<td>400</td>
<td>600</td>
<td>800</td>
</tr>
<tr>
<td><strong>CIP Process Water Capacity - Flush (3 Bar)</strong></td>
<td>L/H</td>
<td>33.000</td>
<td>38.000</td>
<td>52.000</td>
<td>63.000</td>
</tr>
<tr>
<td><strong>Ice Water Capacity – Production (3 Bar, 2°C)</strong></td>
<td>L/H</td>
<td>10.000</td>
<td>10.000</td>
<td>15.000</td>
<td>18.000</td>
</tr>
</tbody>
</table>

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