Harris Membrane Clean Technology Inc.
Add.: 769 CTC Boulevard, Denver, CO, US

Manufactory

MEY Membrane Technology Co.,Ltd
Add.: Fuyang，Hangzhou，Zhejiang

Sales office

Harris Membrane Environment Technology Co.,Ltd
Add.: : 5/F, Tower 3 (East), No.29 Suhong Road
Minhang District, Shanghai, 201100, P.R.China

Dairy Solutions

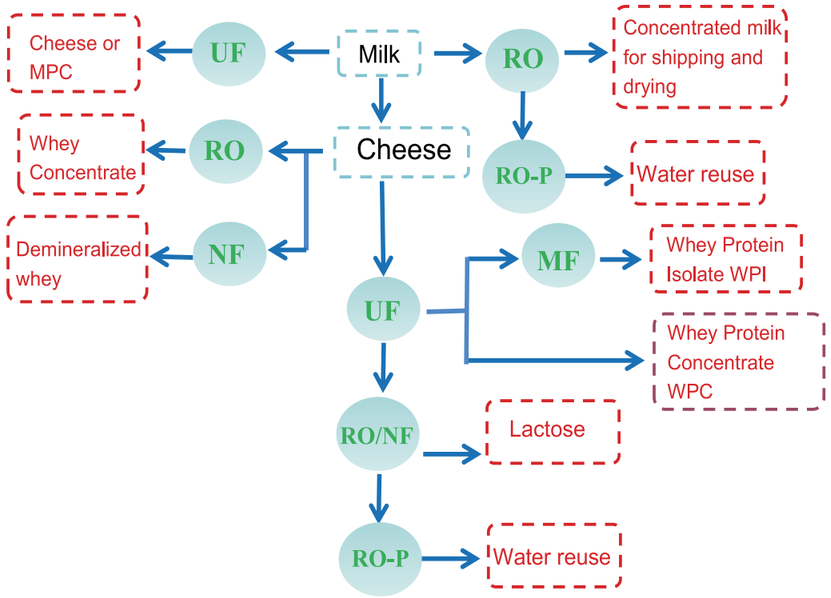
Membrane Separation & Concentration Technologies
for Milk, Whey and Cheese Processing

Harris Membrane Clean Technology Co.,Ltd

The HMCT Advantage

Harris membrane cleaning technology Co., Ltd. (hereinafter referred to as "Harris"),headquartered in California, USA, is based on special membrane materials, with membrane combination technology and membrane chelation technology as the core, through advanced and economical process solutions and leading global commercial products and process devices; Advanced standards have been established in the field of technological production process and industrial hazardous waste and heavy metal treatment.

Harris has established a technical service center in Shanghai, China, formed a strategic partnership with Zhejiang Mey Membrane Technology Co., Ltd., and has its own project management companies in many cities in China.



Major Applications

Concentration, Clarification, and Demineralization

Harris Membrane Cleaning can provide membrane process solutions for dairy customers. We can provide a complete range of membrane products, including ultrafiltration membranes (UF), reverse osmosis membranes (RO), nanofiltration membranes (NF), etc.

Applications

- **Milk Ingredients:** Dry milk protein concentrate (MPC), native whey, and extraction of higher valued fractions
- **Whey Protein:** Whey protein concentrate (WPC), whey protein isolate (WPI), hydrolyzed whey protein
- **Lactose & Permeate:** Dry lactose, delactosed permeate (DLP), dry whey permeate

Membrane Filtration

Our Dairy sanitary spiral membranes are exceptional at standardizing milk and concentrating and purifying proteins, lactose, and permeate.

Available in a variety of pore sizes, our membranes provide a cleaner protein separation and increased throughput. These advanced crossflow filtration membranes combine innovative construction and optimized subcomponents to improve energy efficiencies, reduce operating costs, increase productivity, and decrease contamination risk

In the dairy processing industry, membrane separation technology is used to separate, and in some cases, purify an essential constituent of milk like fat, protein, lactose, minerals, etc. As each of these components have specific nutritional properties,fractionation of these components will enable pure ingredients to be produced that have the advantage of constant quality.

Application & Membrane

Membrane	Applications	Membrane Type
MF	• Brine Clarification	0.3 um
UF	• Whey Protein Concentrate • Whey Protein Isolate • Milk Protein Concentrate	5K 10K
NF	• Whey Concentration • Whey Demineralization • Whey and Milk Protein Concentrate	NF1 NF2
RO	Milk, Whey, and UF Permeate Concentration • NF or RO Permeate Polishing • Evaporator Condensate Polishing	RO-P RO2 RO4

Applications of continuous UF membrane technology

Whey: whey is a by-product of cheese production

Typical components of whey: about 0.6% protein, about 5.0% lactose, a small amount of salt, total solids, 5.0-6.0%.

Whey protein concentrate(WPC): It can be divided into 35, 500, 65 and 80% (protein content)

WPC%	35	50	65	80
Moisture %	4.6	4.3	4.2	4.0
Crude protein %	36.2	52.1	63.0	81.0
True protein %	29.7	40.9	59.4	75.0
Lactose %	46.5	30.9	21.1	3.5
Fat	2.1	3.7	5.6	7.2
Ash	7.8	6.4	3.9	3.1
Lactic acid	2.8	2.6	2.2	1.2

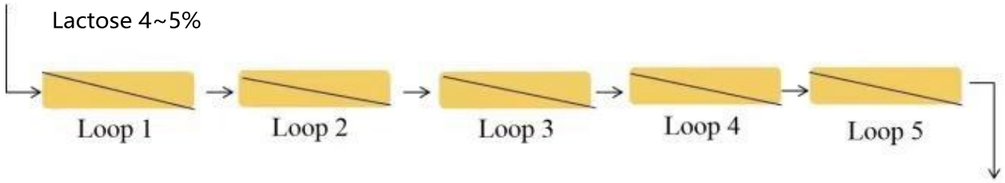
Continuous UF membrane concentration technology

Feed:

Total solids 5.0~6.0%

Total protein 0.8~1.0%

Lactose 4~5%



Concentrate:

Total solids 20~25%

Total protein 16~20%

Lactose 4~5%

1. Continuous membrane concentration is adopted, whey protein is concentrated in 4 ~ 5 stages, and the content is concentrated from 0.8 ~ 1.0% to 16 ~ 20%,

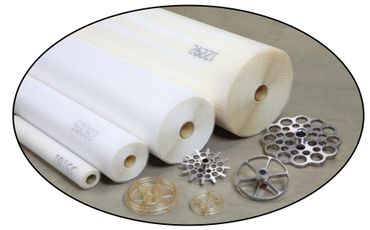
2. Lactose and inorganic salts can be reused after further treatment through the membrane;

3. Selective separation and concentration through polymer permeable membrane is a physical process without phase change.

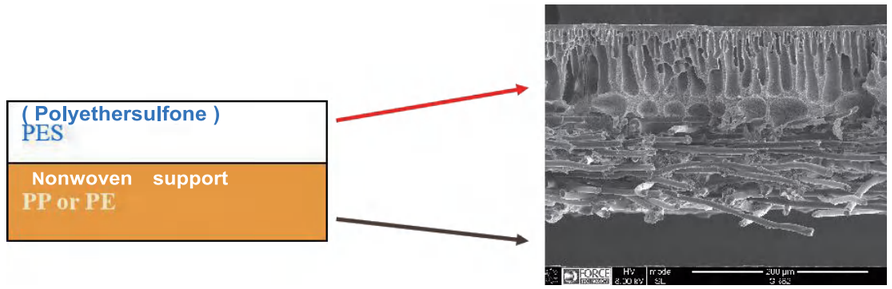
Applications of continuous UF membrane technology

Mey UF Membrane:

- Including two membrane products：5K、10K
- Double layer structure:PES,PP/PE Non-woven fabric
- The membrane surface, pore structure and chemical properties were optimized



membrane structure



UF membrane：

UF-5K/10K-PES

Materials: PES

MWCO: 5K/10K

Advantages:High temperature resistance

Type	Operating pressure	Operating Temperature	pH	Pressure Drop	Model
UF-5K/10K-PES	30-100 psi Max: 150 psi	Continuous operation: < 50℃ cleaning: < 60℃ (70℃for pHT) Hot water disinfection:85℃	Operate:2-10 CIP:2-12 (1-13 for pHT, < 50℃)	31 mil:12-15 psi 46 mil:15-20 psi 65 mil:15-25 psi *above 60℃ the maximum pressure drop is 10 psi	3838 6338 8038 8338

Application of continuous RO membrane technology

Components of raw milk :

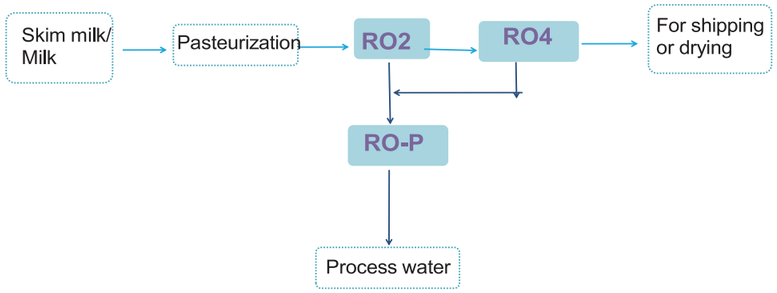
Including fat, protein, lactose and mineral salt, as shown in the right table

Component	Content
Total solids	8~12%
Fat	3~4%
Protein	2~4%
Lactose	4~5%
Ash	0.5~1.0%

The purpose of milk concentration:

Is to remove moisture, reduce the cost of packaging, storage and

Continuous RO membrane technology



- 1.Continuous membrane concentration is adopted. Skimmed milk is concentrated from 6 ~ 8% to 35 ~ 40% (whole milk can be concentrated to 20 ~ 25%) through three-stage RO membrane concentration process;;
- 2.Selective separation and concentration through polymer permeable membrane is a physical process without phase change;
- 3. The operating temperature is 5 ~ 10 ℃, so as to avoid damaging the active substances and protein components in milk;
- 4. Compared with evaporation, the operation cost and investment cost are lower.

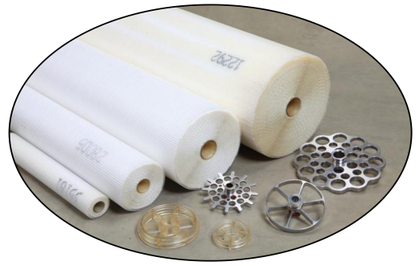
Application of continuous RO membrane technology

RO2\RO4:

It mainly includes two membrane products:

- Preconcentration membrane products：RO2;
- High concentration membrane：RO4;

RO2 Rejection：98.5%(NaCl)
RO4 Rejection：99.5%(NaCl)
Materials:PA,
Net Outerwrap：Sanitary



Type	Operating pressure	Operating Temperature	pH	Pressure Drop	Residual chlorine range
RO2	Typical:150-500 psi Max:600 psi	Continuous operation: < 50℃	Operation: 3-10	Per element:15 psi	Dechlorination recommended
RO4	Typical:600-800 psi Max:1200 psi	Hot water disinfection: 85℃	CIP: 2-11	Per vessel:60 psi	

RO-P

RO-P Rejection：99.5%(NaCl)
Materials:PA,
Net Outerwrap：Sanitary

Type	Operating pressure	Operating Temperature	pH	Pressure Drop	Residual chlorine range
RO-P	Max:600 psi	Continuous operation: < 50℃ Hot water disinfection: 85℃	Operate:3-10 CIP: 2-11	Per element:15 psi Per vessel:60 psi	Dechlorination recommended