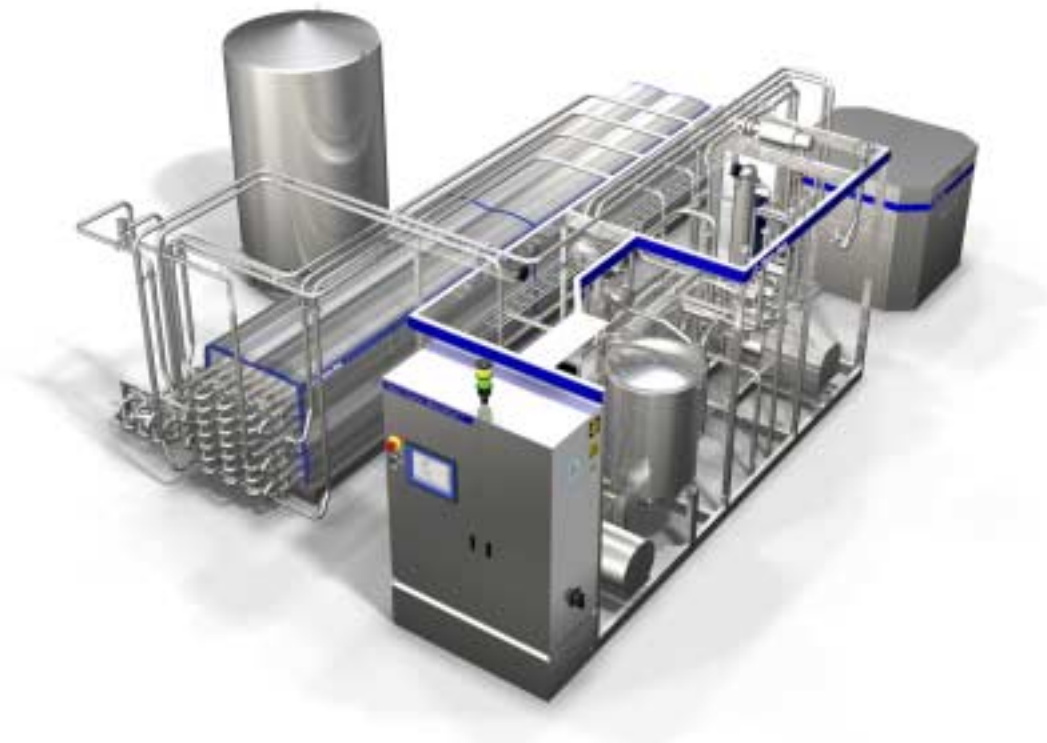




Tetra Therm MicroPart™

Unit for microparticulation of whey proteins



Highlights

Benefits of the microparticulation process

- Improved product quality
- Increased yield of the cheese line
- Product innovation

Specific Tetra Therm MicroPart benefits

- High heat inactivation of starter bacteriophages
- Well defined and adjustable process
- High heat recovery rate (80-85%)

Application

Tetra Therm MicroPart is an industrial unit for microparticulation of heat denaturable whey proteins. A heat and hold process is used to denature, particulate and aggregate the proteins. Hereafter the aggregates are

mechanically split into particulates, which have a size similar to that of fat globules. The Tetra Therm MicroPart product (MicroPart) can be added to milk before the mix is pasteurised.

Working Principle

The Tetra Therm MicroPart unit is based on the specific microparticulation process patented by Tetra Laval.

The feed product to the unit is Whey Protein Concentrate (WPC) with 5-10% total protein.

The feed product is typically made by UF concentration of whey. Fresh WPC can be sourced from either sweet or acid whey. Alternatively the WPC can be recombined from dairy powders. The feed can be from a continuous or batch process.

Tetra Therm MicroPart™

The feed product is pumped from the balance tank through a Tetra Plex plate heat exchanger where it is heated to above 60°C. After the pre-heating the product is pumped by a Tetra Alex high pressure pump through a Tetra Spiraflo tubular heat exchanger where the final heating takes place.

The heated product is held for several minutes in order to complete protein denaturation and to inactivate as many micro organisms and bacteriophages as possible.

The heating rate, the maximum temperature and the holding time can be varied to give different properties of the MicroPart.

The initial cooling of the product after heat treatment takes place in the Tetra Spiraflo tubular heat exchanger. After the pre-cooling the product passes a homogenisation device where the protein aggregates are split into particulates with the right size. The final cooling to storage temperature takes place in the Tetra Plex heat exchanger.

The pressure drop in the Tetra Therm MicroPart unit depends mainly on the protein content of the feed, the holding time and the pressure drop of the homogenisation device.

Continuous reuse of whey proteins as microparticulate can create a recirculation loop. We recommend therefore that production planning includes intervals where no addition takes place.

We recommend short holding times for high protein contents and long holding times for low protein contents to prevent too high pressure drops caused by protein fouling.

The process is controlled and monitored from the operator interface. Automated solutions will have pre-programmed process phases like start-up, production, purge and Cleaning-In-Place (CIP) programs.

Design

The Tetra Therm MicroPart units are standard available in following nominal capacity ranges; 1.000-2.500 ltr/h and 2.500-5.000 ltr/h.

The unit consists of the main processing units mounted in a stainless steel frame and free standing units Tetra Alex, Tetra Spiraflo and integrated holding cell.

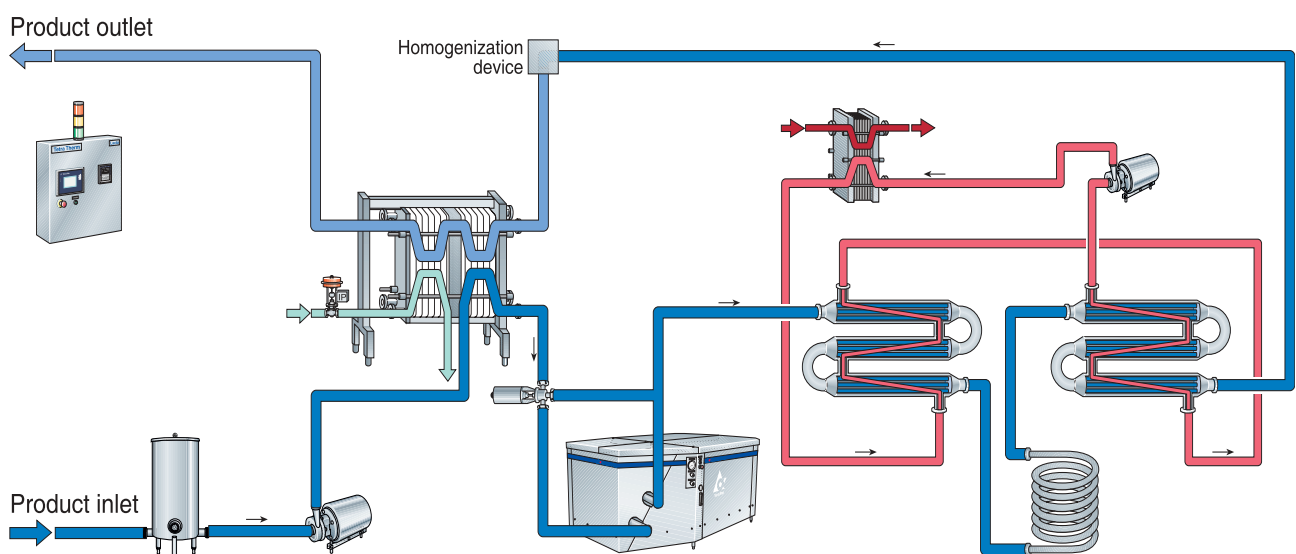
The holding cell is created by one or more free standing spiralwound holding cells.

The units are easy to install and to service.

Product contact parts are made of stainless steel AISI 304 where applicable.

The entire unit is cleaned by the use of a central CIP unit.

Flowchart



Technical Data

Nominal Capacity range ltr/h	1.000-2.500	2.500-5.000
Min.-max. capacity ltr/h *)	620-2.500	1.550-5.000
Capacity at CIP ltr/h	3.200	6.800
Type homogeniser	Tetra Alex S15	Tetra Alex S20
Max. pressure homogeniser bar	80	80
Steam supply	DN40, 360 kg/h	DN40, 360 kg/h
Condensate return	D=38	D=38
Product inlet (also CIP inlet)	SMS 25	SMS 38
Product Outlet (also CIP return)	SMS 25	SMS 38
Water inlet	SMS 25, 3.000 ltr/h	SMS 38, 6.000 ltr/h
Ice water inlet	SMS 51	SMS 51, 1.010 ltr/h 2>19°C
Ice water return	SMS 51	SMS 51
Water to fill up HW circuit	SMS 25	SMS 25
Water to Tetra Alex	D=12, 70 ltr/h	D=12, 70 ltr/h
Electric power to main module	400 V - 11,5 kW	400 V - 11,5 kW
Electric power to Tetra Alex	400 V - 7,5 kW	400 V - 15 kW
Compressed air to main module	300 Nltr/h 6 bar	300 Nltr/h 6 bar

*) Technical capacity borders, typical product properties may restrict the capacity range.

Shipping Data

The module is shipped in maximum seven crates. Approximate shipping data are based on 2.500 ltr/h unit with 1* 10 minutes holding cells.

Part	Length cm	Width cm	Height cm	Weight kg
Main Processing Unit	480	230	250	3.500
Tetra Spiraflo	660	135	200	4.000
Tetra Alex	180	160	173	1.700
Holding cell 1	160	165	260	1.300
Holding cell 2	160	165	260	1.300
Holding cell 3	160	165	260	1.300

Environmental Profile

The unit is designed for heat recovery (basic unit 80-85% heat recovery rate) and low power consumption.

Approximate consumption data of the 5.000 ltr/h unit.

	Average consumption Production (incl. run in/run-out)	Average consumption Cleaning	Average consumption per production run (run of 10 h including CIP)
Electric power kWh	18,5	9,5	19,5
Ice water ltr/h	6.050 (2>12°C)	0	6.050 (2>12°C)
Steam kg/h	133	0	133
Seal/run-in water ltr/h	164	70	171

In our environmental work we focus on the performance of our products in use, identified as our most significant environmental impact. In developing our products we use a process called Design for Environment, to ensure that the products environmental impact is minimised. The process aims at reduced energy and water consumption, minimal loss of food product, control of substances in the product and that the product is prepared for

dismantling and reuse of materials when taken out of production. The manufacturing of our products, in house and at our suppliers', is also subject to our continuous environmental work, in order to minimise the environmental impacts. The work is performed with the support of our environmental management system, certified according to ISO 14001.