



Tetra Therm[®]Lacta

Dairy pasteurisation unit



Application

Tetra Therm Lacta is a dairy pasteurisation unit designed for continuous processing and pasteurisation of market milk, cheese milk, yoghurt milk, cream, ice-cream mix and other low acid liquid dairy products.

Working principle

Tetra Therm Lacta is as standard automated to safeguard production. Production is strictly controlled by production recipes with processing parameters.

Main process sequences can be divided into the following main steps:

- Pre-sterilisation
- Filling
- Production / circulation
- Intermediate cleaning
- Emptying
- Cleaning-In-Place

Before production can commence it is necessary to sterilise the unit by circulating hot water for 20 minutes. After pre-sterilisation, the unit is cooled down and stabilised to production temperatures.

If there is a time gap between pre-sterilisation and production, the unit could be set in hibernation mode. This is an energy conservation mode in which the energy consumption is decreased up to 85% compared to the hot water circulation mode by reducing the power, steam and water consumption.

When downstream equipment is ready, production can start.

Production starts by filling the unit with product via the balance tank. The product displaces the water/product mix to drain, white water tank or reject tank. The balance tank includes level control and CIP device, which safeguards the gentle treatment of the product and ensures a high degree of cleanability.

Before being homogenised in a Tetra Alex homogeniser (option), the product is regeneratively pre-heated in a Tetra Plex plate heat exchanger (PHE) by the outgoing pasteurised product. Other matching optional sub-units includes functions like deaeration, separation and fat-standardisation. To ensure even heating on the product, final heating takes place in the PHE by means of an indirect hot water circuit.

The product is held in a continuously climbing holding tube for the required period of time. If the pasteurisation temperature gets too low, an automatic flow diversion valve, placed downstream of the holding tube, diverts the product back to the balance tank.

After the holding tube, the product is cooled by the incoming product in the regenerative section of the PHE. As a safety issue the pressure on the pasteurised side is higher than on the non-pasteurised side.

If required, the product is further cooled by ice water in the final cooling section.

In order to prolong the production period between full CIP (Cleaning-In-Place) procedures, an Intermediate Cleaning (IC) can be performed. When IC is ordered during production the product is displaced by hot water before the cleaning phase starts. During the IC sequences, the holding tube is kept at the sterilisation temperature. The IC is performed with lye followed by hot water

rinse. Production can then continue, by filling the unit with product.

If product supply fails or a failure at the receiving unit occurs, the unit goes to product recirculation.

After each complete production run the unit is cleaned with both acid and lye. These can be supplied by a central CIP system or the chemicals may be dosed directly into the balance tank for internal cleaning

The operator interface is used for process monitoring and selection of required functions. The process controller controls and supervises both the basic process and optional units for deaeration, separation, standardisation and homogenisation.

On the control panel, a paper loose colour screen recorder continuously record: pasteurisation temperature, pre-sterilisation temperature, cooling temperatures, outlet temperature and the position of the flow diversion valve.

A data logging system in the PLC keeps track of date of production, processed volumes, processing times, critical alarms, type of CIP performed etc.

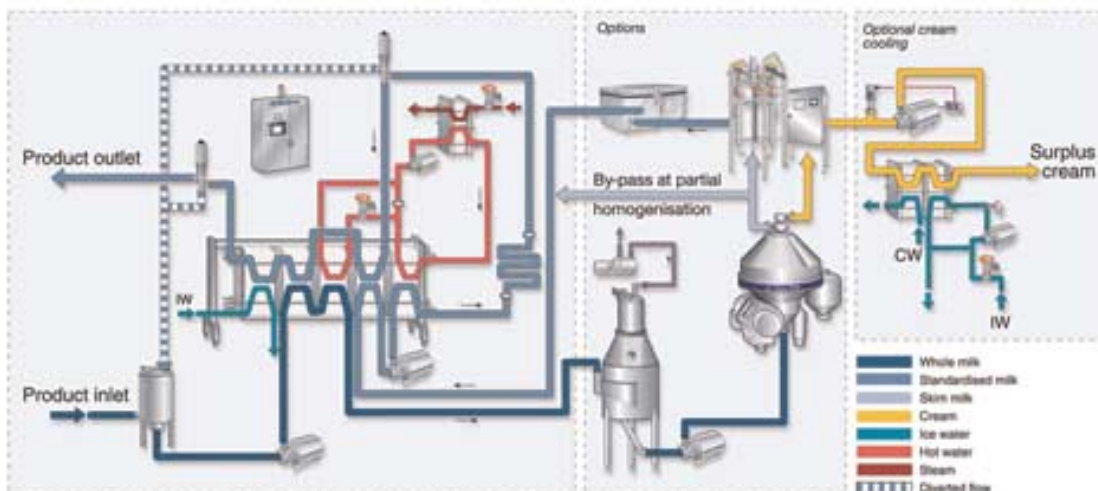
Using the voltage-free contacts or the optional serial protocol, the process controller can communicate with other systems.

Processing parameters

Standard temperature programs

	Market milk	Cheese milk	Yoghurt milk	Cream	Ice-cream mix
Inlet temp., °C	4	4	4	8/60	50
Pasteurisation temp., °C	74	74	95	95	90
Holding time, s	15	15	300	3	30
Separation and homogenisation temp., °C	~60	-	~60	-	75
Outlet temp., °C	4	28 - 32	43	8	4
Deaeration temp., °C	~64	-	~64	-	(70 - 75)
Heat regeneration, %	90	90	90	80	80

Simplified flowchart



Capacities

Standard units with fixed capacities.

Milk pasteurisation: 5 000 up to 35 000 l/h

Cream pasteurisation: 1 000 up to 10 000 l/h

Higher capacities available.

Main unit with

- Product balance tank (BTD) with level positioner, product bowl and automatic CIP
- Centrifugal product feed pump
- Flow control (frequency controlled pump, or homogeniser as timing device)
- Free-standing Tetra Plex plate heat exchanger (PHE) with cooling, regenerative, and heating sections, including protection sheets
- Holding tube, continuously climbing, mounted as a sub-unit at the back of the main unit
- Hot water unit, incl. brazed PHE, pump, steam valve and trap, expansion vessel, shut-off valves, etc.
- Control panel in stainless steel including process controller (PLC), operator interface (HMI), recorder, solenoid valves, and motor starters
- Automatic PLC operated sequences
- Automatic pasteurisation temperature control
- Automatic flow diversion, interlocked with temperature failure before and after the holding tube
- Automatic product circulation when fault occurs
- Automatic process interaction with up- and down stream equipment as tanks and CIP
- Automatic fault supervision and action for pumps, temperatures, and flow diversion valve
- Registration of pasteurisation and outlet temperatures, and position of flow diversion valve
- Pneumatic, remote controlled sanitary valves
- Product piping in AISI 316
- Set of pipes, bends, valves, internal signal wiring, pipes for signal wiring and fittings required for the pre-erection of the system
- Pre-erection and water test in our factory before delivery

Option groups and selection of options

Temperatures and holding time for milk

- Automatic control of high inlet and/or outlet temperature
- Higher pasteurisation temperature
- Constant temperature to separator and/or homogeniser
- Extended holding time

Connections to sub units

- Deaerator, homogeniser, separator, standardisation unit and spiral holding cell

Production safety and convenience

- CE-marking
- Recording of differential pressure
- Recovery of surplus cream
- Flow meters and indicators
- Coarse strainer after product feed pump
- Integrated leakage test
- Closed water loop for cooling of deaerator condenser

Automation and control

- Control system: Compact Logix or Siemens S7
- Outlet temperature controls
- Automatic control of separation and/or homogenisation temperature
- Interface for Ethernet serial communication
- UPS, Uninterrupted Power Supply
- Control panel air cooling

Cleaning

- External CIP from CIP station
- Automatic addition of CIP detergent into the balance tank
- Two plastic containers for CIP detergents with dosing pumps
- CIP header batch
- Call for CIP, requested by high temperature difference

Additional units

The following subunits are possible to connect to the prepared Tetra Therm Lacta

- Tetra Alrox Lacta deaeration unit
- Tetra Centri separation unit
- Tetra Centri bactofugation unit
- Tetra Alfast automatic standardisation unit
- Tetra Alex homogeniser for full or partial homogenisation
- Spiral holding cell for increased holding time

Technical Data

Approx. consumption data for Tetra Therm Lacta 10, 5 000 - 35 000 l/h and per 1 000 l of market milk

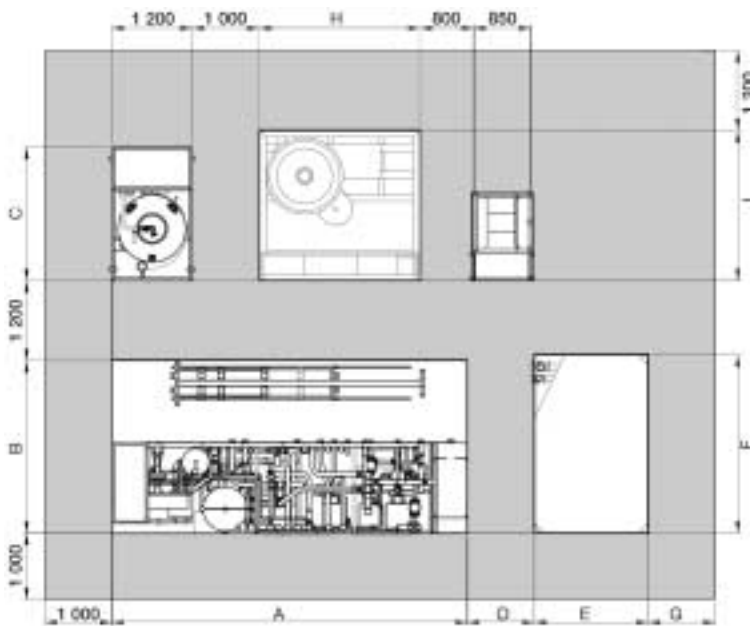
Steam, 3 bar:	13 kg/h, 50 kg/h (peak during sterilisation)
Ice water, 3 bar, 2°C (outlet 7°C):	1 300 l/h during production No water consumption during pre-sterilisation
Rinsing water during CIP, 3 bar:	1 100 l/h
Instrument air:	50 NI/m, total not depending of capacity
Electricity:	7 - 15 kW, at 5 000 l/h and depending on options excl. homogeniser

Dimensions

Approx. measurements including required service are in mm.
Dimensional drawing shows additional sub-units such as Tetra Alex homogeniser, Tetra Alrox Lacta deaerator, Tetra Alfast standardisation unit and Tetra Centri separator.

Environment

- Tetra Therm Lacta pasteurisers are built in a modular design, which makes them easy to rebuild and adopt for new duties
- Tetra Therm Lacta pasteurisers consist of parts that can be separated for recycling purposes



Capacity	A	B	C	D	E	F	G	H	I
5 000	5 300	2 360	1 800	1 000	1 250	1 300	1 000	1 850	1 450
10 000	5 300	2 585	1 800	1 000	1 400	2 240	1 000	1 850	1 600
20 000	5 300	2 585	1 800	1 000	1 700	2 670	1 000	2 400	2 250
35 000	6 840	3 175	2 000	1 500	1 942	2 090	1 000	2 400	2 250