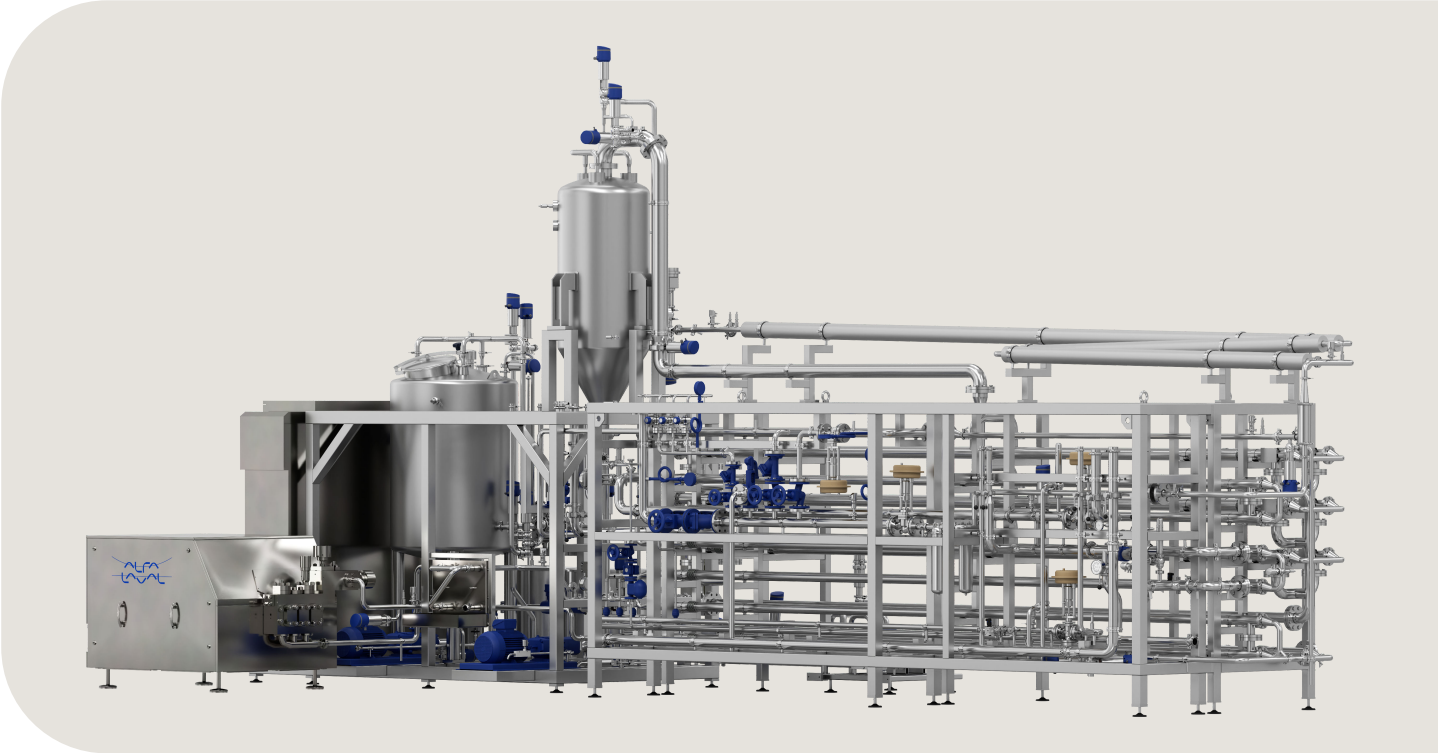
Alfa Laval Steritherm DSI process module

Direct steam injection module for UHT treatment of food, dairy and beverage products



Introduction

The Steritherm DSI module uses direct steam injection for continuous UHT treatment in aseptic applications.

Application

Steritherm DSI module is mainly used for processing heat-sensitive low-acid products and/or products with high fouling behaviour. These include coconut milk/cream and water, baby food, sauces and puddings, dairy and non-dairy formulated products such as ice cream mix, milkshake, desserts and vegetable cream.

Benefits

The main advantage of the module is to deliver a UHT treatment that has a very fast heating and cooling rate in the range of temperatures that are most critical for the product's quality. This fast heating and cooling minimizes product browning, cooked taste and protein denaturation. It preserves the natural micronutrients and organoleptic properties of the products while minimizing fouling. Starch and other hydrocolloid rheological activities are enhanced.

Design

The unit is fully automated to safeguard the aseptic status. Accurate temperature control throughout the entire operating range saves energy and assures product quality. Due to the fully automatic control of the Steritherm DSI module a constant level of water content in the product is maintained. Variations in the differential temperature more than +/- 1°C (+/- 1.8°F) set off an alarm. An auto diagnostics supervision system can enable simple trouble shooting and consequent data recording for full traceability.

Capacity: Standard sizes for 2000, 4000, 6000, 8000 kg/h (4409, 8818, 13222, 17636 lb/h). Possibility for variable production capacity (max. downturn 50% of nominal flow rate upon product).

Thermal duty, standard temperature programme: Inlet temperature = <8°C (46°F); Sterilization temperature = 142°C (287°F); Filling temperature = 20/25°C (68/77°F).

Standard holding time: 4 seconds.

Steam injector

Standard configuration

- Product balance tank with level control
- Centrifugal pump with frequency inverter
- Preheating section based on Viscoline tubular heat exchanger
- Heating module with steam injector for direct heating of the product
- Expansion vessel for flash cooling, complete with aseptic product pump
- Vapour condenser
- Insulated holding tube
- Precooling and final cooling sections based on Viscoline tubular heat exchanger
- Set of hygienic and aseptic valves, pipes, fittings
- Set of product instruments (temperature, pressure and flow)
- Set of media flow control valves and instruments
- Vacuum pump
- Set of pipes, bends, valves,cable and cable trays for pre-assembly of the UHT system
- Stainless steel control panel, IP 55, with Siemens PLC S7 and human-machine interface (HMI) mounted on main module.
- Stainless steel AISI 316 material in contact with the product
- Stainless steel AISI 304 skid frame.

The unit is pre-assembled on a skid, wired and FAT tested before delivery.

Options

- Positive displacement product pump for high viscosity products (including aseptic product pump)
- Design based on gasketed plate heat exchangers GPHE
- Aseptic homogenizer for improved product stability
- “Once through” CIP unit
- Clean steam generator
- Insulated pre-holding tube for stabilization of proteins (to extend the running time)
- Digital paperless recorder with colour screen
- Software based on Allan Bradley
- Hybrid system for direct and indirect UHT treatment
- Extended holding time up to 12 seconds
- Output for hot filling applications
- Output for chilled product (5-10°C) (41-50°F)
- 3A Flow components
- Documentation for FDA validation.

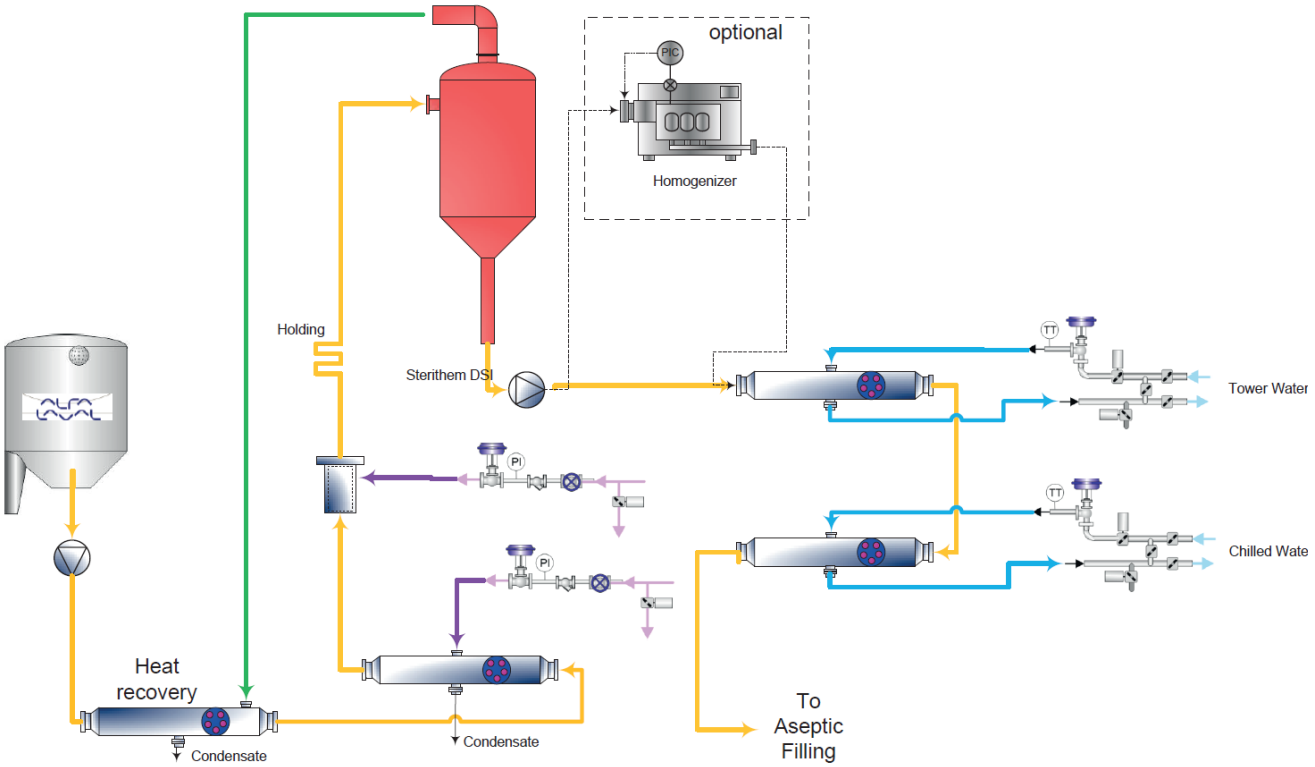
Working principle

Before production starts, the module is sterilized in place (SIP) by culinary steam. After sterilization is complete, the unit remains sterile under aseptic conditions.

Production can start when the aseptic tank and/or filling machine are ready to receive the processed product.

Production starts with the product entering the balance tank of the unit, which is the starting point of the Steritherm DSI module. The raw product is preheated by regeneration in an indirect heat exchanger up to approximately 80°C (176°F). Final heating to sterilization temperature takes place in the steam injector by continuous injection of high-pressure culinary steam into the product.

Sterilization takes place in the holding tube, where product remains for the required period of time at the desired temperature. The product then enters the flash vessel, which is under vacuum. The pressure and temperature drop to 85°C (185°F) almost instantly. The excess water in the form of vapour is flashed off. Product may enter into an aseptic homogenizer (optional) or can be directly introduced into the cooling section of an indirect heater where it reaches the desired filling temperature.



Technical data

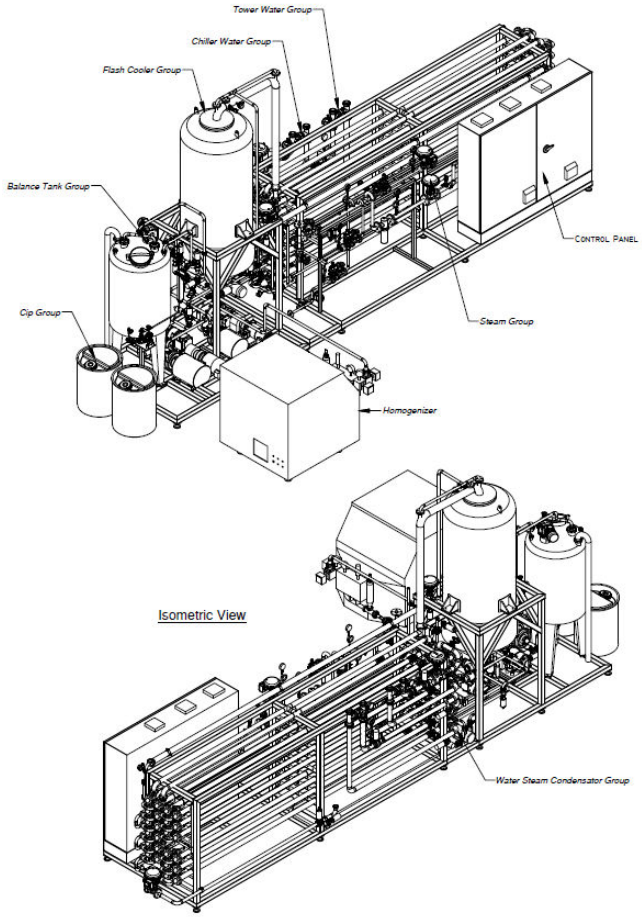
For indication only. Actual consumption figures may vary, depending on the product properties.

Capacity kg/h (lb/h)	Steam kg/h at 8 bar (lb/h at 116 psi)	Electricity KW[1] (HP)	Tower water l/h (GPM) at 30°C inlet (86°F)	Cold water l/h (GPM) at 8°C inlet (46°F)
2,000 (4,409)	300 (661)	15 (20)	8,000 (35)	4,000 (17.5)
4,000 (8,818)	600 (1322)	17.5 (23.5)	16,000 (70)	8,000 (35)
6,000 (13,222)	900 (1984)	20 (26.8)	24,000 (105)	12,000 (52.5)
8,000 (17,636)	1,200 (2645)	25 (33.5)	32,000 (140)	16,000 (70)

[1] Not including the homogenizer.

Dimensional drawing

Note: dimensions are indicative.
Length: 11m (433 in)
Width: 4.3m (169 in)
Height: 4.5m (177 in)



How to contact Alfa Laval

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