APV
AN SPX BRAND

Multipurpose UHT Pilot Plant

SPX®

APV multipurpose pilot UHT plant

Within the last decade the global dairy industry has been undergoing major changes. Latest challenges include the need for top quality products, flexibility, safely and competitive prices. To meet these challenges, constant product and process development is crucial.

With its easy operation and wide range of capacities, APV's latest technology UHT pilot plant provides an excellent solution to meet varying operational requirements.

The control system is in principal manually based, offering maximum operational flexibility.

Pilot UHT plants are suitable for use in the dairy, liquid foods and functional ingredients industries, and for research purposes in universities and other educational institutions.

Facts and features

- Nominal capacity: 80 – 150 l/h
- Indirect tubular heating with three stages of heating and three stages of cooling. Pressures up to 60 bar
- Indirect plate heating system with three stages of heating and three stages of cooling.
- Pressure up to 25 bar
- Direct infusion heating: Standard infusion, ESL, high heat infusion™
- Direct injection heating
- Two-stage homogeniser up to 350 bar
- Instrumentation (temperatures, pressures, flows)
- Sophisticated data logging system
- Temperatures up to 150°C
- Skid mounted, fast and easy installation and commissioning

Benefits

- Very reliable system for product trials before scale up to commercial production
- Highly flexible
- Easy to operate
- Suitable for almost all commercial UHT applications
- Tailor made systems to meet specific requirements
- On line, automatic registration of all process data
- Customisation available as required
- Quick and easy installation
- Numerous successful installations

APV control panel

APV central flow connection plate

APV homogeniser

Central flow connection plate
All individual sections of the plant are connected to the centrally positioned flow plate, which allows for an extensive range of configurations. Switching from one configuration to another is a simple procedure that takes a matter of minutes.

Homogeniser
The homogeniser is aseptically designed, which allows for both upstream and downstream homogenisation. It is usually equipped with a two-stage homogenisation arrangement, capable of up to 5000 psi.

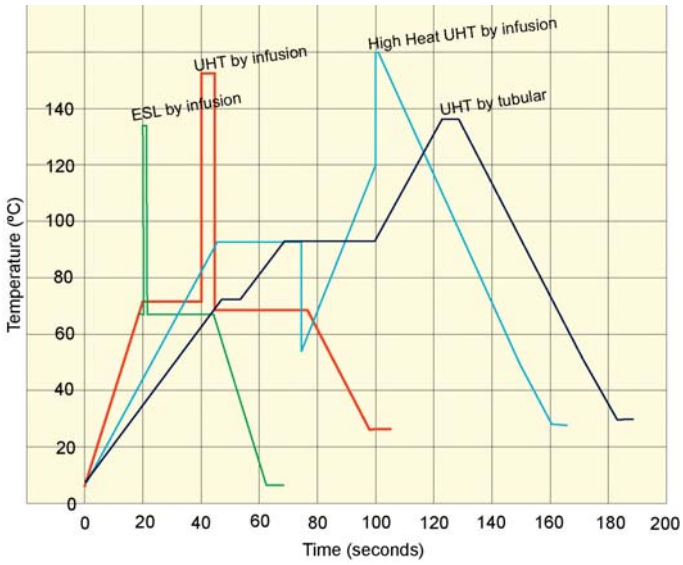
Control panel
Manual operation ensures maximum flexibility. Push buttons are used to start/stop the motors, and the heating temperatures are automatically controlled via PID controllers. Process data (temperatures, flows, pressures) is automatically logged in an advanced data-logging system, type Eurotherm. The data can be interfaced directly into an office PC.

Further available options
The pilot UHT system can be tailored to customer requirements and is supplied with the following options:

- Holding cell module with the following standard holding times : 15, 30, 60, 120 and 180 seconds
- Deaerator
- Evaporator used typically to increase total solids from 12% to 14.5%
- Fully automatic regulation of homogenisation pressure
- Scraped Surface Heat Exchanger (SSHE) for heating and cooling of high viscosity products
- Sterile tank, 250 or 500 litre
- Laminar flow cabinet for manual aseptic filling
- Bag-in-Box filler for 100% safe aseptic filling

Any of the above systems can be integrated into a single multi-flexible process unit for product trials. For example, a product can be tested using tubular preheating, infusion heating, flash cooling, first step cooling on plate coolers (low pressure drop) and final cooling using a SSHE.

If you would like to discuss the options available in greater detail, please contact your nearest APV office.



Time/temperature combinations on APV multipurpose UHT

Injection UHT

The direct steam injection system injects steam directly into the product through a specially designed nozzle.

Although this system provides very fast heating, it is less rapid than the infusion system.

In both cases the product is in direct contact with steam; however, the injection system causes greater chemical degradation due to the higher Delta temperature between steam and product.

The injection system is suitable for low to medium viscosity products.

There are a large number of injection UHT installations world-wide, APV offers a pilot injection UHT plant for use in product development trials.

On the pilot plant the selection between either infusion or injection system is very user-friendly and can be carried out fast.

The injection UHT system is supplied with a standard sterilisation holding tube with a holding time of 4 seconds.

Equipment

Skid mounted design
The unit is based on a self-contained, skid mounted design with the control panel positioned at the rear.
The homogeniser is mounted outside the frame.
All stainless steel in direct product contact is of Grade AISI 316L. The unit is pre-tested at APV's factory, to ensure fast efficient installation and commissioning

Feed system
The plant is equipped with two balance tanks, each holding 25 litres of product. One and in some cases both tanks are fitted with a small agitator, providing an efficient change over between product/product or product/water.

A screw pump ensures high pressure capability and reliable/stable flow for both high and low viscosity products.

Hot water circulation system
Three individual service water units supply water to the three heating sections. The temperatures are automatically controlled by PID controllers to

APV multipurpose UHT pilot plant with holding tube

provide maximum flexibility. Cooling is by means of three independent cooling sections, using either chilled water or a combination of tap water, tower water and chilled water.

Tubular processing plants
are the most commonly used indirect UHT systems. Some of the obvious advantages include: lower maintenance costs, the option of higher pressure drops and design flexibility.

Modern tubular plants provide approximately the same heat recovery and have similar investment costs as plate UHT systems.
The design of the pilot tubular model is identical to the industrial size system, allowing for reliable progression to commercial scale production.
The tubular modules are two meters long with an inner tube diameter of 10 mm.
The standard design plant comprises 32 tubes for heating and cooling and three individual heating and cooling sections.

The final design will be tailored to specific customer requirements.

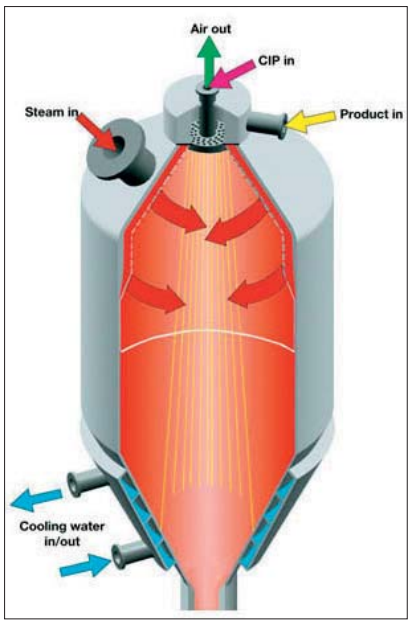
The system is supplied with two standard sterilisation holding tubes, with a holding time of 3 and 6 seconds.

Plate UHT
The majority of milk and dessert production lines installed between 1975 and 1985 was plate UHT.

Many of these installations are still in operation today, and it is naturally crucial that manufacturers using a plate UHT system can trial new products on a pilot UHT plant.

APV provides a highly flexible pilot plate UHT arrangement that can be set up in any configuration to allow for precise and reliable test results.

The plant is designed with three individual heating and cooling sections and two standard steri-lisation holding tubes with a holding time of 3 and 6 seconds.



APV Steam Infusion Chamber

Infusion UHT

Standard Infusion
APV's well-known, unique infusion technology offers gentle and precise heating with an accurate holding time. The system is suitable for the sterilisation of high value products with an absolute minimum of chemical degradations.

Product enters the infusion chamber, which lies at the heart of the process, at approximately 75°C.

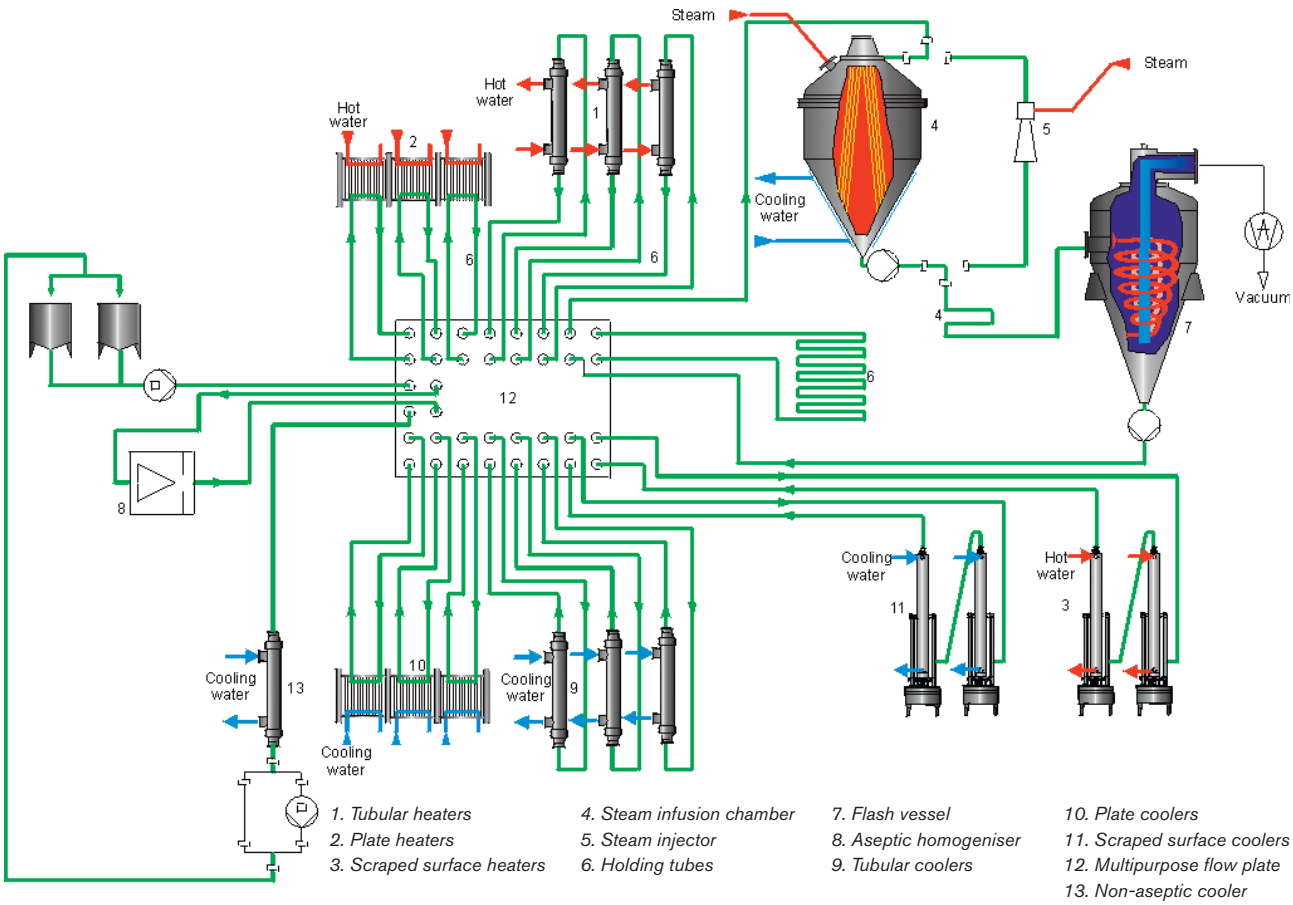
The patented nozzle system in the infusion chamber distributes the product in strings across the centre of the chamber. From the sides, steam is distributed at low velocity towards the product centre, which heats the product both gently and quickly to a sterilisation temperature of typically 143°C.

However, sterilisation up to 150°C is possible.

With a heating rate up to 600°C per second the infusion principle has proved to be a more gentle heat treatment process than injection UHT.

The direct steam infusion process offers flexibility in terms of sterilisation of a wide range of products, such as: milk, cream, custards, soft ice mix, baby food, and sauces.

It is supplied with a standard sterilisation holding tube with a holding time of 4 seconds.



1. Tubular heaters
2. Plate heaters
3. Scraped surface heaters
4. Steam infusion chamber
5. Steam injector
6. Holding tubes
7. Flash vessel
8. Aseptic homogeniser
9. Tubular coolers
10. Plate coolers
11. Scraped surface coolers
12. Multipurpose flow plate
13. Non-aseptic cooler

Flow diagram for APV multipurpose UHT pilot plant

The Pure-Lac™ Concept

The objective of the Pure-Lac™ concept is to produce a product capable of withstanding bacteriological spoilage for a longer period of up to 45 days or more at storage temperatures up to 10°C.

The new design of the holding cell system makes it possible to obtain reliable holding times down to 0.5 second, which is crucially important for extended shelf life (ESL) prod-ucts, requiring a sensory quality equal to or better than normal pasteurised milk.

The APV ESL system is patented under the trade name Pure-Lac™, and several commercial scale production sites around the world have proven the concept to be superior compared with other means of extending shelf life.

The Pure-Lac™ concept covers production of a complete milk product range, including milk, flavoured milks, creams, desserts and ice-cream mix.

High Heat Infusion (patent pending)

The requirements for processing shelf-stable desserts or neutralising High Resistant Spores (HRS) are very similar. Both require a solution which involves a higher sterilising effect without impacting the product quality and running time.

A new combination of tubular and infusion heating has been introduced, with the vacuum chamber located prior to the infusion chamber. The system uses infusion technology, as this provides a number of advantages, including:

- Minimum chemical change
- Maximum energy recovery
- High sterilising effect (elimination of heat resistant spores)
- Optimum running time

Your local contact:

APV, An SPX Brand
Pasteursvej, DK-8600 Silkeborg, Denmark
Phone: +45 70 278 278 Fax: +45 70 278 330

For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.apv.com.

Issued:03/2009 6752-01-03-2009-GB