Tetra Pak® Indirect UHT unit PF with tubular heat exchanger

Efficient UHT unit for flexible production of ambient or hot-filled prepared food products

Application

Tetra Pak® Indirect UHT unit PF is a processing unit for highly efficient, continuous ultra-high temperature treatment of prepared food products. The unit is of aseptic design, and uses a Tetra Pak® Tubular Heat Exchanger for indirect heating to obtain a product that can be stored at ambient temperatures. Tetra Pak Indirect UHT unit PF is suitable for prepared food products such as desserts, fruit preparations, soups, sauces, tomato preparations and baby food, as well as other low- or high-acid viscous products with or without particles. Combinations with other applications such as juice, tea and coffee are possible. Tetra Pak Indirect UHT unit PF is available as a stand-alone unit or as part of a complete line solution.

Highlights

- High and consistent product quality
- Optimised flexibility due to an extensive variety of product- and processing-specific options
- Low-loss balance tank function for minimized mix phases
- Ensures uncompromising food safety, due to high hygienic design and adaptable cleaning program
- Optimizes operational efficiency through long running time and minimized energy consumption

Working principle

The module is fully automated using PLC control for safe operation and production.

The operation can be divided into four steps:

- **Pre-sterilization**
- **Production**
- **Intermediate cleaning**
- **Cleaning-in-place (CIP)**

Before production can start, it is necessary to sterilise the aseptic area of the unit by circulating pressurised hot water. An internal sterilising loop can be chosen as an option to minimise energy consumption and start-up time. After sterilisation, the unit is cooled step by step to production temperature. Lastly, sterile water is circulated through the unit.

When the receiving equipment is ready, production starts by filling the unit with product, displacing the water to drain. The water/product mix phase can be sent to drain or a reject tank. Thereafter, production is continuous.

When there is an unexpected change in product supply or the receiving equipment, sterile water displaces the product and the UHT unit goes into sterile circulation.

The product is heated in a heat exchanger by an indirect hot water circuit and passes through a holding tube for the required period of time. Cooling to filling temperature is also done in the heat exchanger.

To prolong the production period between CIP, intermediate cleaning can be performed. When intermediate cleaning is selected, sterile water displaces the product before cleaning starts. During the intermediate cleaning sequences, the holding tube is kept at the sterilization temperature, meaning that aseptic parts of the UHT unit remain sterile. Intermediate cleaning can be performed either with lye only or lye and acid flush. This enables longer available production time in the UHT unit before full CIP is required.

After each production run, the UHT unit undergoes CIP with both lye and acid. The CIP sequences can be configured for optimal cleaning results.

Maximising versatility and efficiency

Tetra Pak Indirect UHT unit PF makes it possible to produce high-quality products with low operating costs. Using product-to water heat regeneration design, when applicable, it offers optimised energy consumption. Tetra Pak Tubular Heat Exchanger with a floating end protection system minimises maintenance and eliminates tube cracks.

For corrosive products, such as ketchup, a corrosion-resistant material like SMO254 is used. Straight tubes enable visual inspection if needed. The unit offers optimal versatility and the possibility to produce a wide range of products with different viscosities, as well as products that are smooth or contain particles of up to 9 mm in diameter. An optional aseptic hibernation function reduces energy use by up to 75% during sterile water circulation. An optional pressurised internal sterilisation loop minimises energy consumption during start-up and water circulation. Advanced automation reduces human error and maintains product quality. Process parameter logging enables traceability for food safety.

Processing parameters

Temperature program and capacities are specific for each application.

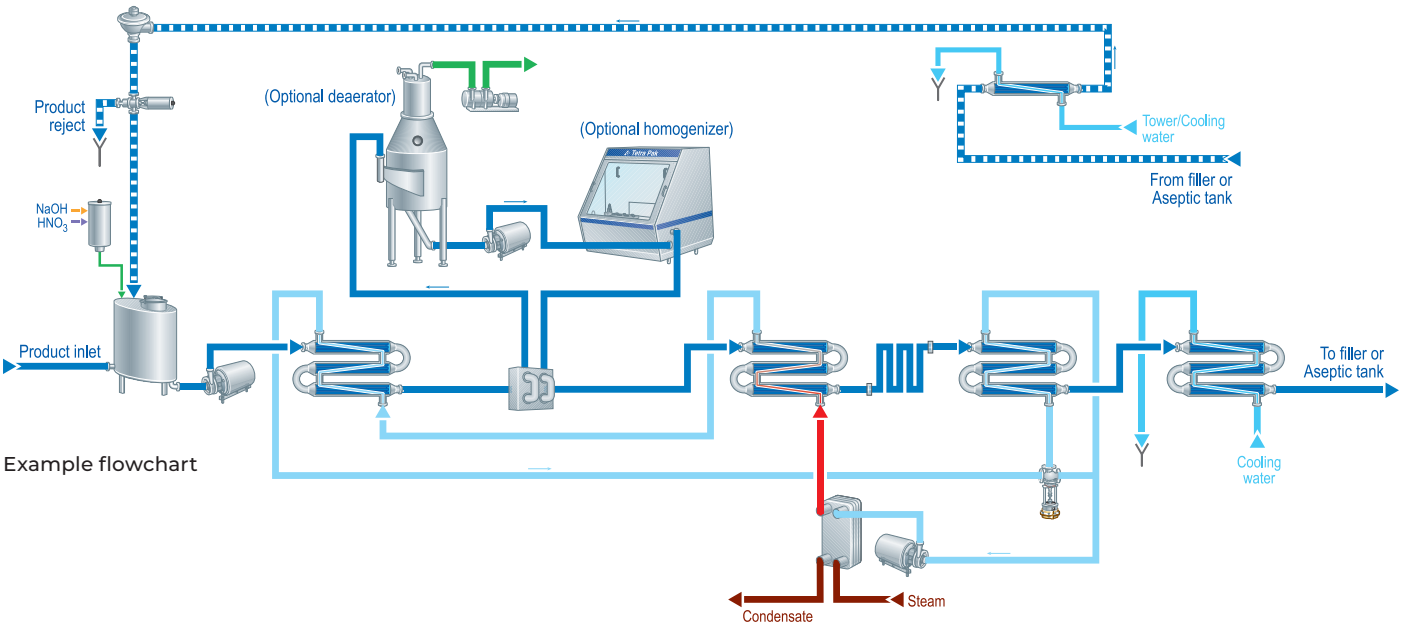
Capacity

The capacity range depends on the application. Typical capacities ranges from 2 000 l/h to 20 000 l/h. For detailed information, please contact your Tetra Pak representative.

Scope of supply

- Product balance tank with level control
- Frequency controlled product pump
- Centrifugal water pump
- Product flow meter
- Water flow meter
- Centrifugal CIP booster pump
- Free-standing Tetra Pak Tubular Heat Exchanger (THE) with floating end connections
- Hot water circuit, including brazed PHE, pump, steam valve and trap, expansion vessel, shut-off valves, etc.
- Control panel in stainless steel including process controller (PLC), solenoid valves and motor starters
- Automated PLC operated sequences
- Automated process interaction with downstream equipment
- Automated fault supervision and action for pumps, temperatures
- Frequency converters, mounted on the frame
- Pre-wired signal/power cables
- Pneumatic, remote-controlled sanitary valves
- Product piping in AISI 316
- Set of pipes, bends, valves, internal signal wiring and fittings required for pre-erection of the system
- Factory pre-assembled and tested before delivery
- Technical documentation in European Economic Area (EEA) official languages

Optional features



Example flowchart

Automation and control

- PLC control system: Siemens and Rockwell
- 21” industrial PC operator panel mounted in control cabinet
- Free-standing PC as operator interface (GUI)
- Tetra Pak® PlantMaster integration
- Uninterrupted power supply (UPS)
- Control panel air cooling
- Digital paperless recorder

Production

- Automatic CIP of balance tank
- Temperature control to various heating section
- Insulation of heat exchangers

Sustainability

- Energy hibernation (EH) for reduced energy consumption
- Different levels of heat recovery
- Hibernation mode

Special food treatment

- Alternative product feed for particulated products
- Protein denaturation holding tube for controlled fouling
- Deaerator for product quality and long running time
- Multiple holding tubes
- TetraPak® Homogenizer for product quality

Food safety

- SMO254 material in tubular heat exchanger for corrosive products
- Positive product pressure and pressure supervision

Deaerator

- Deaerator on separate skid
- Closed water loop for cooling of deaerator condenser
- Closed water loop on deaerator vacuum pump

Homogeniser

- Aseptic homogenisation
- Aseptic or non-aseptic, changeable by swing-bends
- Split homogenisation

Cleaning-in-place (CIP)

- CIP from CIP station or internal CIP system
- Internal CIP system with automated addition of CIP detergent into the balance tank via ratio dosing or header batch system
- CIP recipe editor with possibility to design unique cleaning recipes
- Ratio dosing of CIP detergents
- Conductivity switch for supervision of CIP media change
- Back-flush cleaning of heat exchanger for products containing fibres

Technical documentation

- Non-EEA languages
- CE marking for countries outside the EEA

Technical data

Approx. consumption data for a heat exchanger without regeneration, with a temperature program (per 1000 l of product) of 40°C – 138°C – holding time – 30°C

Steam (700 kPa)

- 170 kg/h

Cooling water (300 kPa, 20°C):

- 2000 L/h during production
- No consumption during pre-sterilisation or hibernation mode
- 2000 l/h after sterilisation

Environment

- Tetra Pak® Indirect UHT unit is built in a modular design, which makes it easy to rebuild and adapt for new duties
- The unit consists of parts that can be separated for recycling purposes
- Regeneration is used and offered when it is applicable

Rinsing water CIP (300 kPa):

- 1,000–2,000 L during one CIP rinsing cycle (depending on heat exchanger size and configuration)
- Connection point capacity 10-20 m^3/h

Instrument air (600 kPa):

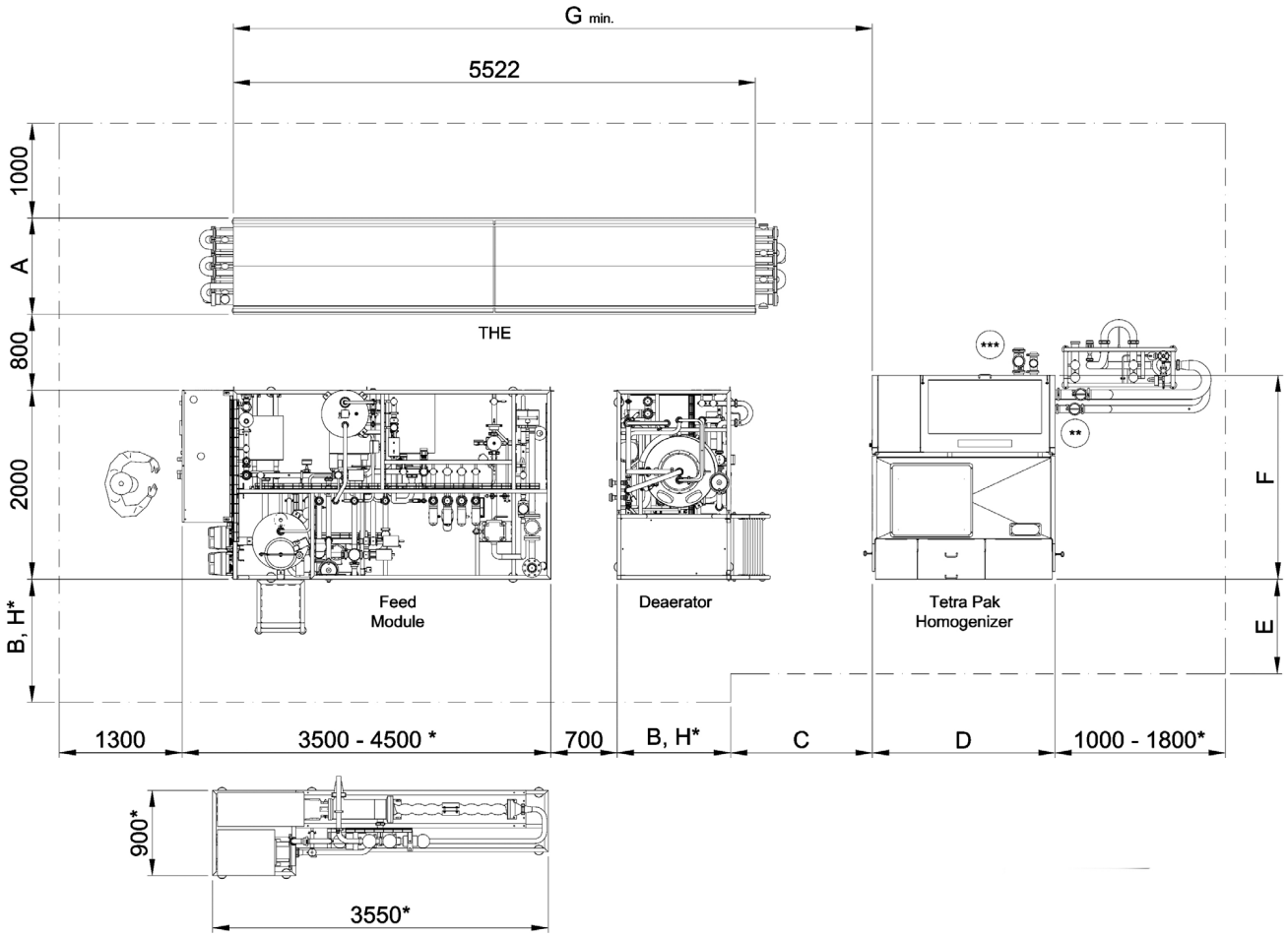
- 50 Nl/min, total, regardless of capacity

Electricity (380V/50HZ):

- 9-22 kW, excluding homogeniser

Dimensions

- Approximate measurements including required service are in mm.
- Dimensional drawing shows optional sub-units
- Specific measurements will vary depending on capacity and configuration

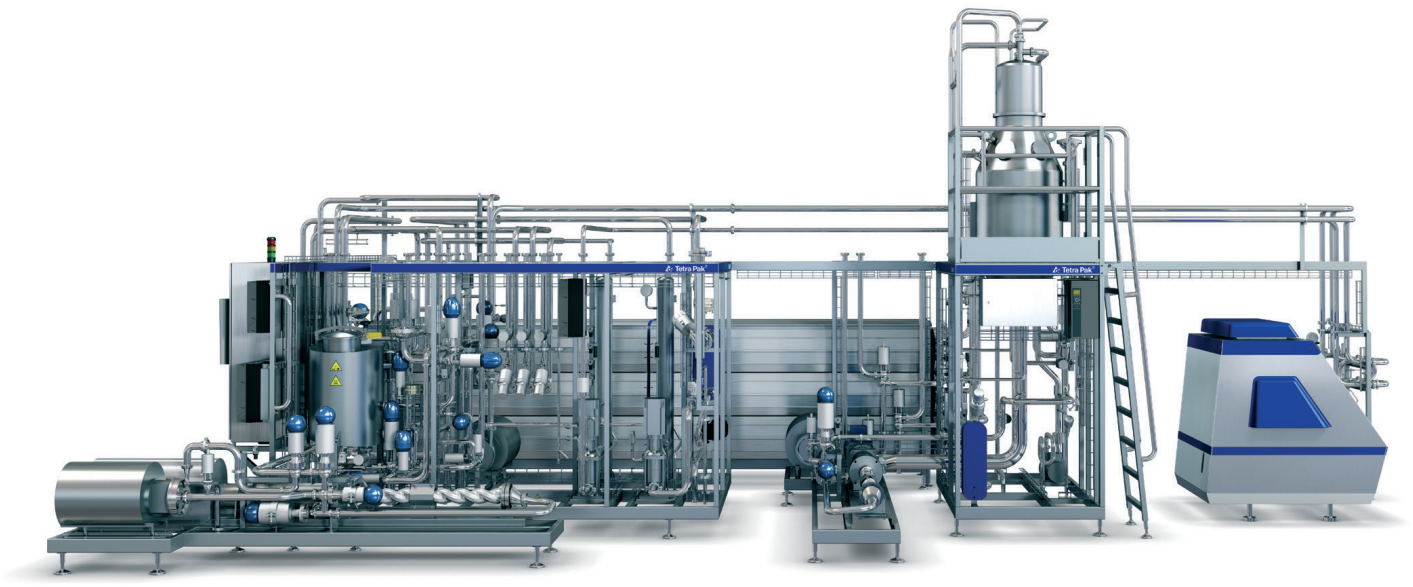


Steam consumption can be increased during start-up, pre-sterilisation and cleaning. Steam supply lines should be dimensioned for two times the nominal consumption.

Cooling water is used to cool the product in the production phase as well as for cooling in the pre-sterilisation of the module during start-up. These two consumptions do not occur simultaneously and the figure indicated corresponds to the higher of these loads.

Chilled water is used for product cooling in the production phase. Chilled water consumption can be increased during start-up. Chilled supply lines should be dimensioned for 1.25-1.5 times the nominal consumption and load.

The potable water specified indicates the consumption during the cleaning phase as well as water used for water-flushed seals, etc. Potable water used for product mixing and preparation is not included in the figure stated.



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PROTECTS WHAT'S GOOD