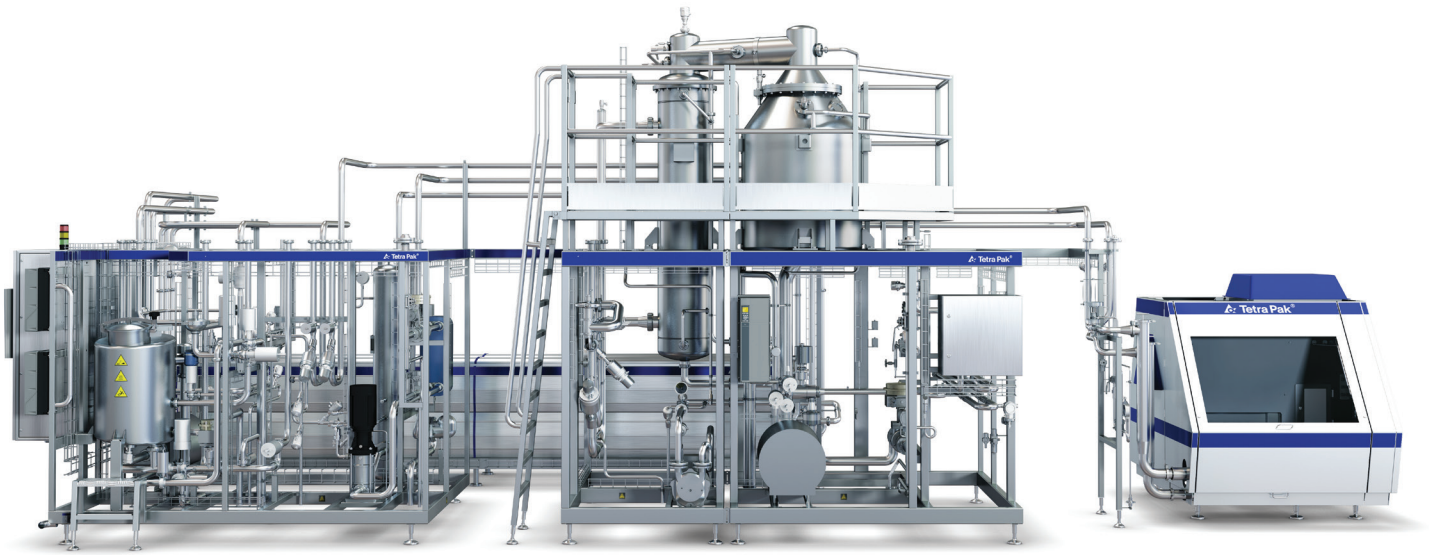
Tetra Pak® Direct UHT Unit

The ultra-flexible solution for premium UHT products.



Application

Tetra Pak® Direct UHT unit is a processing unit for highly efficient, continuous ultra-high temperature treatment of a wide variety of products. The direct heating solutions are based on direct contact with clean steam, either via injection or infusion. They offer state-of-the-art continuous aseptic processing for heat-sensitive products like milk, enriched milk, cream and formulated dairy products. They can also be used for plant-based beverages and smooth products like soups, sauces, ice cream mix, dairy desserts, and ESL products.

Tetra Pak® Direct UHT unit is available as a stand-alone unit or as part of a complete line solution.

Highlights

- Rapid heating and cooling
- Minimum heat load on product
- Minimized product losses thanks to low-loss balance tank function
- Premium product quality
- Possible to run a wide range of products
- Efficient operation with full production overview and control of the heating unit from the operator interface
- Guaranteed performance

Working principle

The module is fully automated to safeguard aseptic status while in production. The operation is divided into four steps:

- Pre-sterilization
- Production
- Aseptic Intermediate Cleaning (AIC)
- Cleaning-in-place (CIP)

Before production can start, it is necessary to sterilize the aseptic area by circulating pressurized hot water. In the tubular version, the balance tank is bypassed by a pressurized pre-sterilization loop, minimizing energy consumption and start-up time.

When an aseptic tank or filling machine is ready, production can start. The product is regeneratively pre-heated to about 80°C (application dependent) in a Tetra Pak® Tubular Heat Exchanger or, as an alternative, in a Tetra Pak® Plate Heat Exchanger. Instant heating to sterilization temperature takes place in the steam injector or steam infusion vessel by continuous addition of high pressure steam into the product.

The product enters a holding tube where it is held at sterilization temperature for the required period of time. The product then enters the flash vessel where the pressure and temperature drop instantly. The excess water in the form of steam is flashed off.

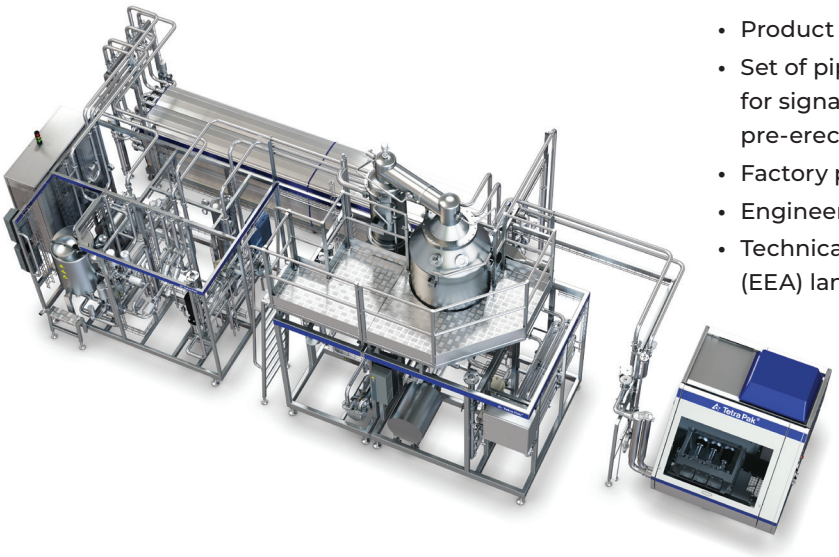
For optimal product stability, the product passes through an aseptic homogenizer before final cooling in the heat exchanger.

Aseptic Intermediate Cleaning (AIC) can be performed to extend the production period between cleaning-in-place (CIP) cycles. When AIC is selected, the product is displaced by sterile water before cleaning starts.
During AIC sequences, the holding tube is kept at sterilization temperature, keeping the aseptic parts of the unit sterile. AIC can be performed with lye or with lye and acid flush.

After each production run, the unit undergoes CIP with both lye and acid. A central CIP system can supply these or the chemicals can be automatically dosed directly into the balance tank by an internal cleaning system. The CIP sequences can be configured for optimized cleaning results. In the event of a product supply failure, the unit goes into sterile water circulation mode.

The operator interface is used for process monitoring and selecting required functions. The process controller controls and supervises both the basic process and the optional unit for homogenization.

A data logging system in the unit keeps track of the date of production, processed volumes, processing times, type of CIP performed, etc. Using a serial protocol or optional I/O connections, the process controller can communicate with objects like aseptic tanks and filling machines.



Basic unit

Main module

- Product balance tank (BT) with level control
- Frequency-controlled centrifugal product feed pump
- Frequency-controlled centrifugal pump for water
- Centrifugal booster pump
- Hot water circuit, incl. brazed PHE, pump, steam valve and trap, expansion vessel, shut-off valves, etc.
- Pre-wired, signal/power cables
- Frequency converter mounted on the frame
- Flow transmitters in the water circuits
- Flow controlled by electronic flow meter
- Valves, pipes, fittings
- 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

Direct heating module

- Steam injector for direct heating of the product
- Centrifugal pump with frequency converter as product pump after expansion vessel
- Vacuum pump
- Expansion vessel for flash cooling with external condenser
- A platform and ladder for easy access to the flash vessel
- Valves, pipes, fittings
- Free-standing Tetra Pak® Tubular Heat Exchanger (THE) with floating connections; or Tetra Pak® Plate Heat Exchanger (PHE), including protection panels/sheets
- Pneumatic, remote-controlled sanitary valves
- Product piping in AISI 316 stainless steel
- Set of pipes, bends, valves, internal signal wiring, pipes for signal wiring and fittings required for the pre-erection of the UHT system
- Factory pre-assembled and tested before delivery
- Engineering and programming
- Technical documentation in European Economic Area (EEA) languages

Optional features

Automation and control

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

Production control

- Protein denaturation holding tube for controlled fouling
- Additional heating area
- Hibernation mode
- Insulation of Tetra Pak® Tubular Heat Exchanger
- Turbidity meter for fine-tuning mix-phases

Production flexibility

- Variable capacity of 1:3 maximum
- Automatic control of F0 value
- Extra holding time in additional tubes

Reduced outlet temperature

- Extra cooling section in tube or plate heat exchanger with automatic ON/OFF valves
- Extra cooling section in (free-standing) plate heat exchanger with automatic ON/OFF valves
- Automatic temperature control on extra cooling section

Production safety

- Supervision of differential pressure
- Coarse strainer after product feed pump
- Valve feedback

Special product treatment

- Direct heating by steam infusion
- Automatically controlled holding tube pressure
- Automatically controlled homogenizer inlet pressure

Homogenizer

- Aseptic homogenization
- Aseptic or non-aseptic homogenization, changeable by swingbends
- Automatic air refill and cleaning of homogenizer dampers for increasing overall equipment effectiveness

Filter equipment

- Particle steam filter in stainless steel
- Steam separator

Extended shelf life

- Holding tube for improved enzymatic stability

Cleaning

- CIP from a 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 the possibility to design unique cleaning recipes
- Conductivity transmitter

Technical documentation

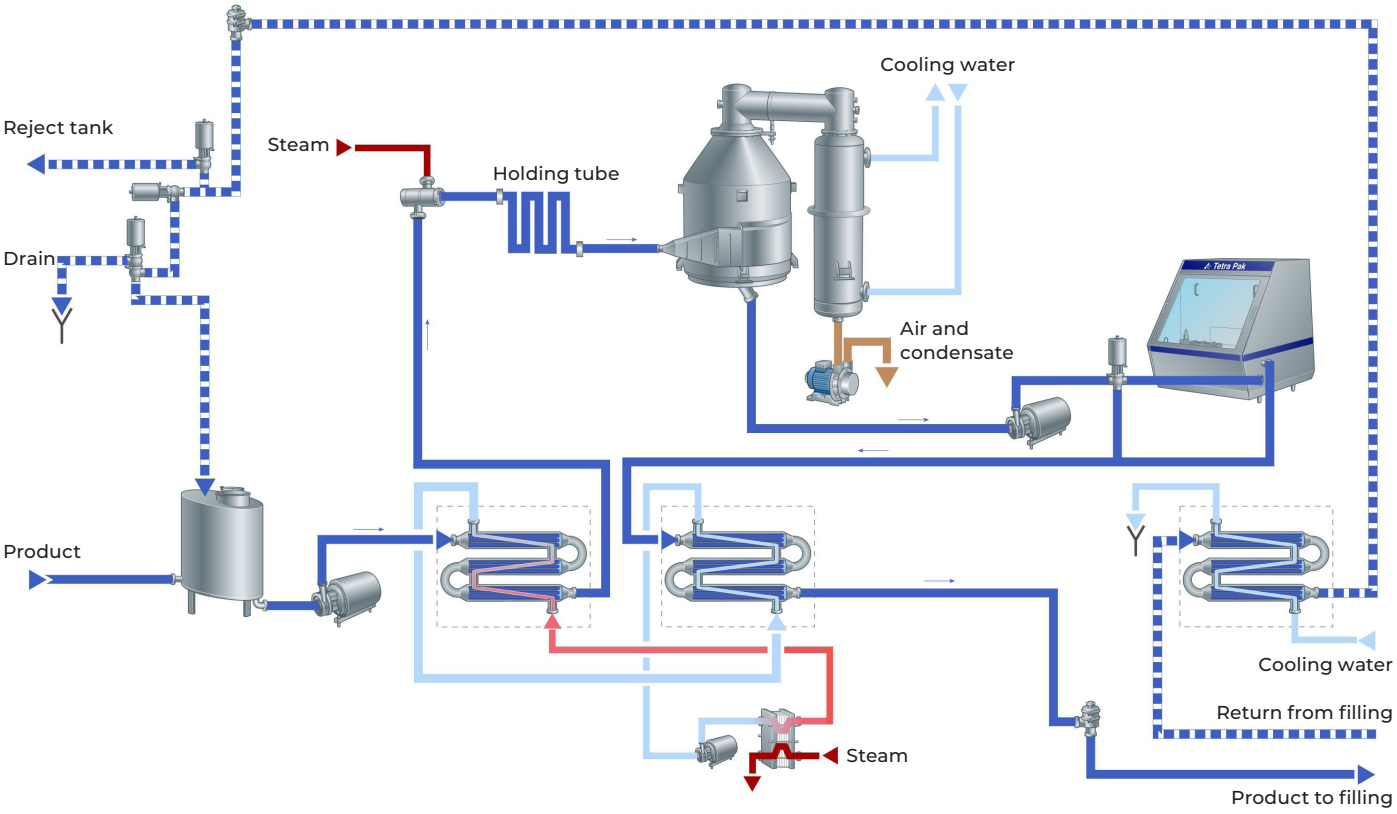
- Other languages than EEA languages
- CE marking for countries outside of the European Economic Area (EEA)

Capacity

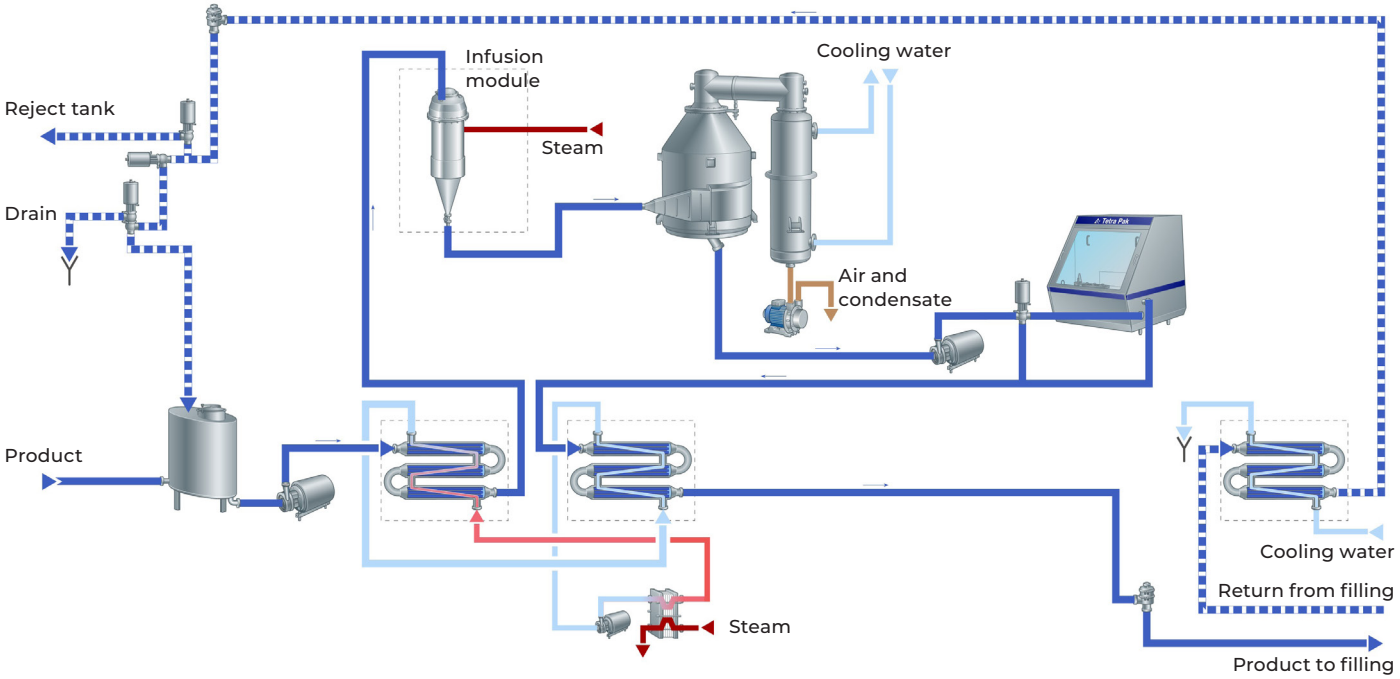
Tetra Pak® Direct UHT unit is available with variable capacity and can run capacities from 2 000 l/h up to 45 000 l/h.

Examples of flow charts

Tetra Pak® Direct UHT unit with Tetra Pak® Tubular Heat Exchanger with product-to-water heat regeneration.



Tetra Pak® Direct UHT unit with infusion and Tetra Pak® Tubular Heat Exchanger with product-to-water heat regeneration.



Consumption data

The consumption data (to the right) is per 1 000 litres of product processed – at a capacity of 2 000 - 45 000 litres per hour in either tubular or plate heat exchanger units. The figures can vary depending on capacity, options and the processed product.

Standard

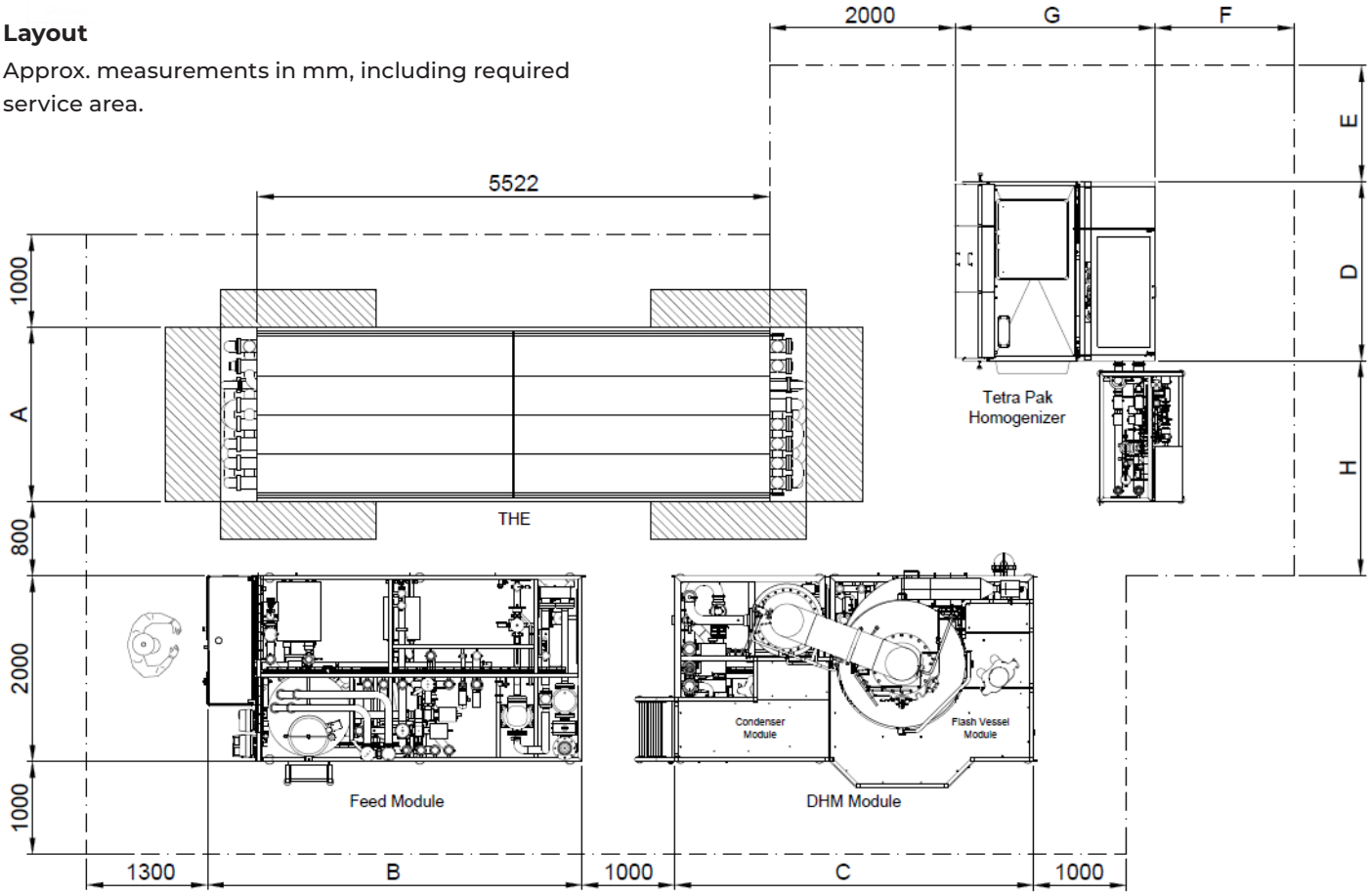
5 °C - 80 °C - 140 °C/4 s - 81 °C - Homogenization - 25 °C

Steam consumption	
Steam	7 bar, 125 kg/h
Water consumption	
Cooling water	
Production	1 500 l/h
Pre-sterilization & cooling	1 000 l/h
Rinsing water	
CIP (depending on size and type of heat exchanger)	1 000 - 1 500 l/h of heat
Air consumption	
Instrument air (regardless of capacity)	6 bar, 100 Nl/min
Electricity consumption	
Electricity (excl. homogenizer)	380/400 V AC 50 Hz, 36 - 75 kW

Tetra Pak® Direct UHT unit with injection

Layout

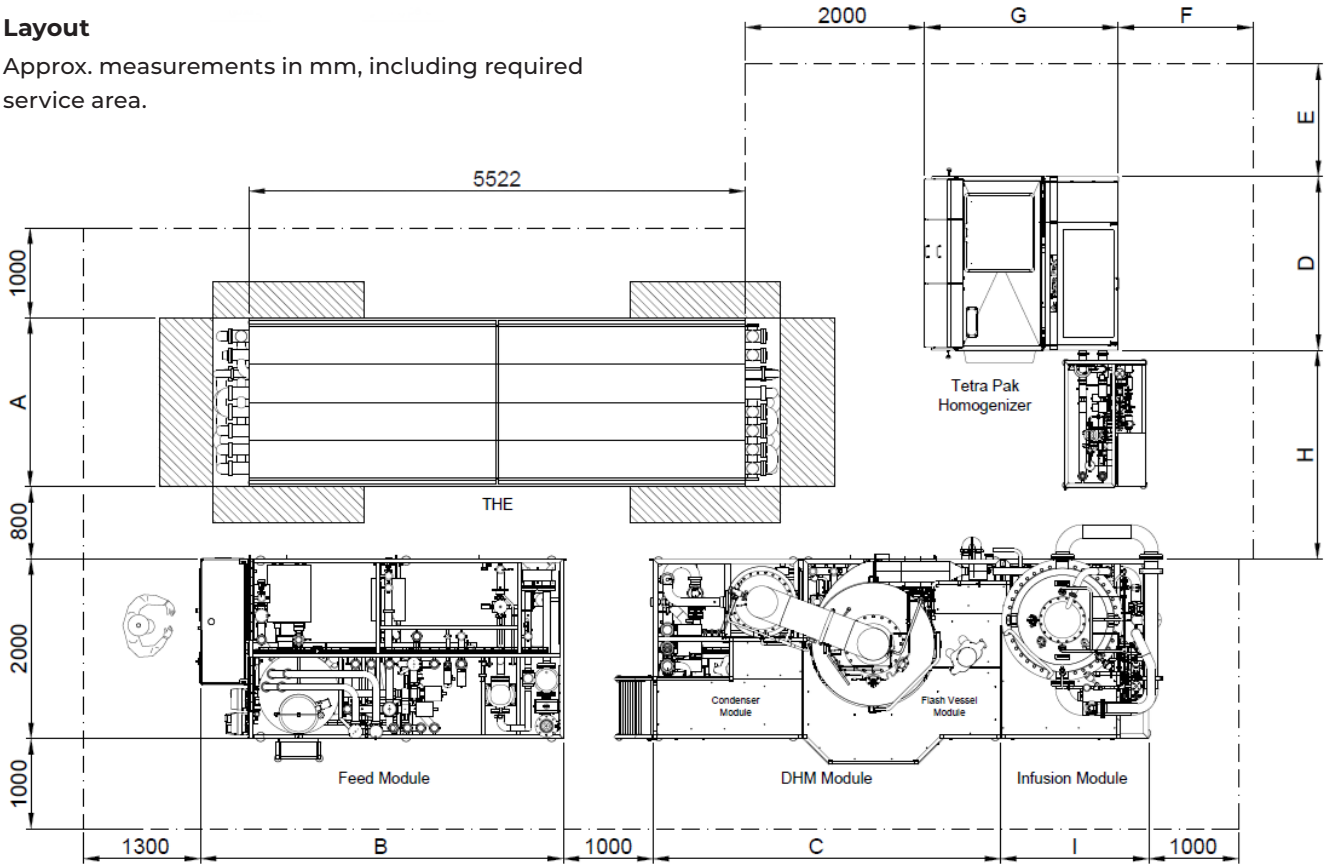
Approx. measurements in mm, including required service area.



Tetra Pak® Direct UHT unit with injection and infusion

Layout

Approx. measurements in mm, including required service area.



Tetra Pak®
PROTECTS WHAT'S GOOD