Heat exchangers
Efficient product heating
Heat even exacting products

Efficient product heating based on heat exchanger systems with heat exchanger surfaces exactly adjusted to suit the characteristics of the product. KRONES systems gently heat your products, ensuring microbiological safety and, above all, with substantially reduced energy consumption.

At a glance
− Are suitable for a wide variety of products with different flow characteristics (even for products containing particles/fibres)
− Reduce the thermal impact acting on the product due to low dwell times
− Are available as complete system or individually designed to suit your line
− Field of application in the KRONES product portfolio
  ▪ Pasteurisation: VarioFlash J and VarioAsept J
  ▪ Ultra-high heating: VarioAsept M
  ▪ Hotfill: VarioFlash H
**Thermal product treatment**

Optimal planning of the thermal product treatment will result in a reduced

- thermal impact acting on the product due to the short dwell times.
- requirement for thermal and pump energy.
- product loss due to reduced line volumes.
- oxidation rate if a VarioSpin product deaerator is used.

The heating temperatures and periods are defined by the killing kinetic of the various micro-organisms. An optimum design of the heat exchanger surfaces can reduce the dwell time in the heating and cooling zones. It is essential to find the correct balance between the least possible number of tubular modules (optimisation of the heat exchanger surface) and gentle product heating.
Verification of your product data as basis for calculating the heat exchanger

KRONES wants to make sure that you get the heat exchanger ideally suited for your product. In the KRONES technical centre, we first check your products for typical characteristics:

- Viscosity (depending on temperature and shearing rate)
- Heat conductivity
- Flow properties
- Heating requirements
- Oxygen and nitrogen content
- Portion of and size of solids (e.g., fibres, pulp or fruit pieces)
- Foaming tendency

If no product samples are available, a reference product from our considerable product database (more than 2000 product data from all over the world) can be selected.
Plate and tubular heat exchangers in comparison

**Plate heat exchangers**
- Low investment costs
- Low line volume
- High energy recovery rates
- Low space requirements
- Wide variety of plate sections
  - Higher maintenance costs (e.g., for seals)
  - Reduced service life of the plates (susceptible to damage due to pressure peaks)
  - Limited application for products with particles and/or fibres

**Tubular heat exchanger**
- Less susceptible to damage due to pressure peaks
- Wide range of tube sheets available
- Suitable for a wide variety of products with different flow characteristics (even for products containing particles/fibres)
- No seals in the product area
- Almost unlimited service life of the modules
- Low maintenance costs
  - Low energy recovery rates
  - Higher investment costs
  - More space required
**Thermal product treatment with cross-corrugated tubes**

The use of cross-corrugated tubes increases the flexibility of product treatment with regard to output range and product variety. Due to their surface structure, cross-corrugated tubes can break up the laminar boundary layer which results in a high turbulence and positively affects the further output and/or viscosity. This can reduce the required surface of the heat exchanger by up to 30%.

**Benefits to you**

- Low thermal load
- Short heating and cooling phases
- Compact dimensions of the heating system (reduced footprint)
- Low loss of flavour and vitamins
- Minimum colour change (e.g., for tea)
- Preservation of the natural product quality
Cross-corrugated tubes
Treatment of products containing particles

- Highly concentrated suspensions of fruit pieces and juice (for instance fruit mixtures which are treated in twin-flow mode) tend to laminar flow behaviour. Main feature are the comparatively fast core flow and the overheated outer zones.
- The cross-type swirl gently rotates the particles. The structure of the cross-corrugated tubes
  - breaks open the laminar boundary layer.
  - ensures even distribution of the fruit pieces in the tube.
  - prevents partial underpasteurisation in the core flow.

Your benefits from a more efficient and, at the same time, reliable heating:
- Reduced flow speed
- Reduced pressure level
- Reduced damage rate of the fruit pieces
Tube connection with bellows

**Design according to EHEDG regulations**
- Fixed connections are preferable to detachable connections.
- Therefore, welded joints are the optimum pipe connections, followed by bellows and dynamic seals.

**KRONES: pipe connection using a stainless steel bellows**
- Flexibly compensates for thermal extensions of the three or six metre long tube module
- No dynamic seals are required: no leakage in cold operating condition
- Low operating costs
- Proven long service life of the bellows (tested for more than 30,000 cycles)

**The challenges for dynamic seals**

Safety thanks to the length compensation provided by the stainless steel bellows which is also easy to clean
Two variants for heat recovery

**Variant: product against water**
- Is ideally suited for a large variety of products and a wide output range
- Processes also highly viscous products or products with fruit pieces
- Flexible configuration thanks to the variable mass flow on the secondary side

**Variant: product against product**
- Is ideally suited for low-viscous products and at the same time a maximum available heat recovery rate
- Processes also fibrous products (< 4 mm)
- High production reliability with the sterile product being fed on the primary side
- Removable inner tubes for simple inspection

### Juice
- 20 mPas, output: 30 m³/hours
- 84% product vs. water
- 79% product vs. Product

### Milk
- 1 mPas, output: 30 m³/hours
- 90% product vs. water
- 92% product vs. Product
Benefits to you

Specific configuration of the product treatment system
Thanks to special KRONES measuring and configuration programs, you will be provided with customised heating systems which are based on precise data and exactly adjusted to suit the characteristics of your products.

Modular design
Thanks to its flexible design, the KRONES heat exchanger is available in two sizes: one compact variant for low outputs and one high-end design for medium to high output ranges.

Gentle product treatment
Our special tube modules with cross-corrugated section enable a quick heat transfer and, at the same time, high recovery efficiency. As the mixture phase quantities are reduced to a minimum, the required heat exchanger surface and thereby the thermal stress, as well as the pressure and product loss are reduced as well.

Reliable cleaning
Thanks to a design with reduced dead space, all product contacting surfaces can easily be cleaned.

Comprehensive concepts for process technology
In addition to heat exchangers, KRONES also offers compact and space-saving units for product deaeration, heating and product mixing, as well as process water sterilisation and CIP/SIP systems.
We do more.

Digitalisation

Process technology

Bottling and packaging equipment

Intralogistics

Lifecycle Service