Thermolyzer Core

Modular system for thermal deactivation of spent brewer's yeast

Application

The Alfa Laval Thermolyzer Core modules are specially designed to thermally deactivate spent brewer's yeast by raising the yeast temperature above a pre-defined treatment threshold, and holding it at that exact temperature for the specified time.

The deactivated yeast can then be used as an ingredient in other products, such as food supplements and animal feed, or disposed of safely.

Design

The pre-configured design of Thermolyzer Core modules means they are available in standardized capacities ranging from 25 to 100 hl/hour. Each configuration is optimized to ensure thermolyzation of spent yeast with exceptional efficiency, based on the following conditions:

- Yeast inlet/outlet temperatures of 15°C and 25°C, respectively
- Yeast inlet/outlet pressures of >50 kPa and 200 kPa, respectively
- Holding temperature of 75°C for 10 seconds at maximum capacity (or up to 30 seconds, using optional equipment)
- Regeneration effect of 85% (or up to 90%, using optional equipment)

Working principle

The module renders spent brewer's yeast inactive by using a plate heat exchanger in tandem with a holding cell to heat the yeast in order to destroy the cell membranes.

The heat treatment at the heart of this process is achieved through a combination of temperature and holding time – normally 75°C for 10 seconds. The heat treatment can be expressed in Pasteurization Units (PU), calculated via the formula:

$$PU = t/60 \times 1.393^{(T-60)}$$

in which t is the holding time (in seconds) and T is the pasteurization temperature (in °C).

The incoming flow of cold yeast is heated to the target temperature for thermolyzation in two steps, using a high-efficiency Alfa Laval plate heat exchanger. The yeast is first heated in the heat recovery section, where it circulates against already thermolyzed yeast, and then in a heating section, in which circulating hot water is used to bring the yeast to the specified temperature.

The yeast is held at this thermolyzation temperature in a holding tube for the prescribed time to achieve the desired PU effect, before being regeneratively cooled in the heat recovery section of the heat exchanger.

Automation

Thermolyzer Core modules are fully automated, with all system operations controlled via a local PLC system.

The operator selects specific functionalities via an easy-to-use colour touch panel that displays a comprehensive array of process data (including current status, actual and set point temperatures, alarm conditions and controller settings).

Cleaning and hygiene

The modules are designed for complete cleaning-in-place (CIP) of all contact surfaces and are therefore equipped with a built-in CIP programme.

The frequency with which cleaning is required depends on yeast quality, holding temperature and fouling level. However, a typical routine would involve CIP with caustic acid once per shift, followed by acid cleaning once a week.

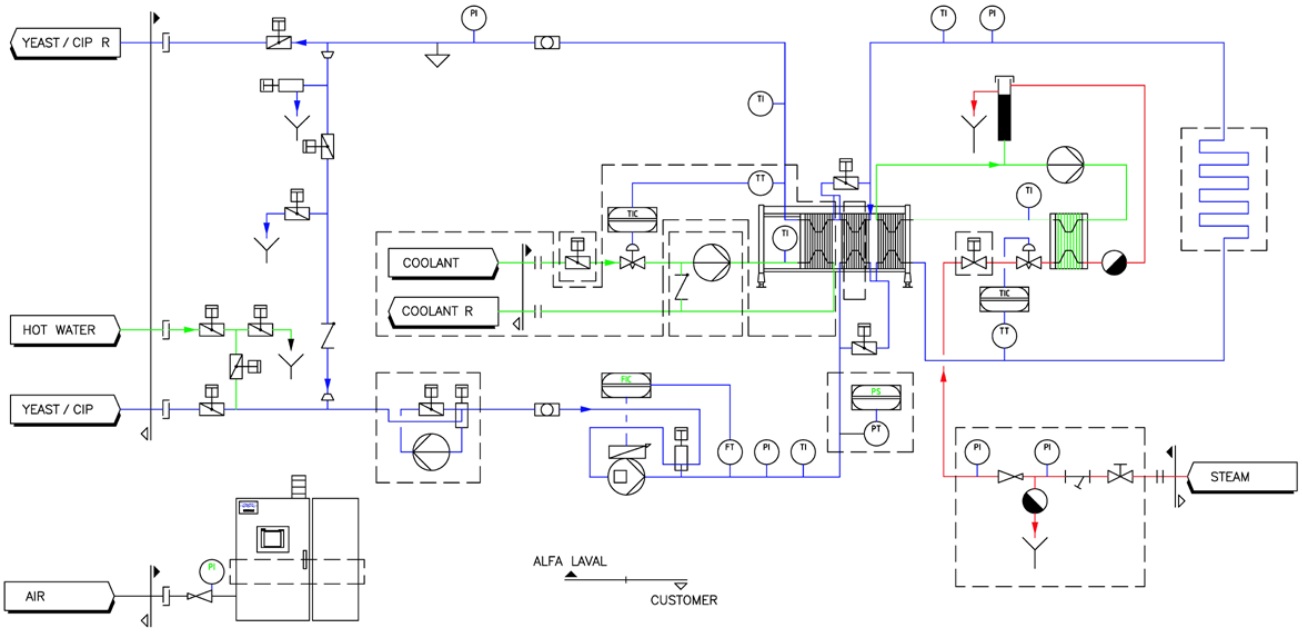
In order to significantly prolong the periods between the required cleaning-in-place (CIP) sequences, during which the production-critical thermolyzation can take place, the module can be regularly flushed with hot water. The hot water connection is placed adjacent to the yeast inlet, to make it as easy as possible to undertake automatic flushing during operation.

Optional equipment and upgrades

The standardized configurations of Thermolyzer Core modules make it easy and cost-effective to add additional equipment to meet specific needs and to integrate these into particular processing set-ups.

Optional equipment includes:

- Enhanced thermolyzation (30 seconds holding time)
- Enhanced energy recovery (up to 90%)
- CIP booster pump
- Thermolyzed yeast cooling
- Cooling media recirculation
- Hot water flush monitor
- Steam pressure regulation
- Automatic media shut-off valves
- Extended data communication
- Valve position feedback



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How to contact Alfa Laval

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