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HISAKA WORKS, LTD., Process Engineering Division is both ISO9001 and ISO14001 certified.
HISAKA WORKS, LTD., Ikoma Plant is ISO45001 certified.

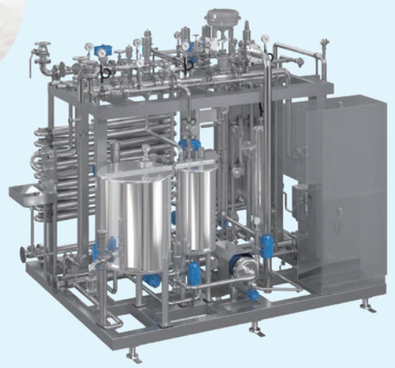
FO-CE001100
25.9.500 ITP

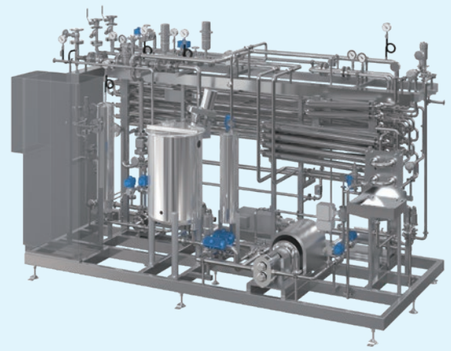
with hopeful technology

HISAKA

Safe Thermal Sterilization System for Liquids

Continuous Liquid Sterilizer





Ikoma Plant (Ikoma, Nara)

Solid track record in fluid heat and pressure control technologies, combined with total plant engineering.

Since launching Japan's first plate heat exchanger in 1953, Hisaka has been at the forefront of the industry, providing compact and highly efficient plate heat exchangers widely adopted across many sectors.
Our plate heat exchangers deliver outstanding performance — from maximizing yield and extending continuous operation to ensuring superior cleanability.

Konoike Plant(Higashi-Osaka, Osaka)

Ome Plant (Ome, Tokyo)

Units Installed

*As of the end of March 2025 (including test units)

Food industry	3,000units

Industries Supplied

Brewing	Sake / Soy Sauce / Vinegar, etc.	*Over 80% share of the Japanese domestic market
Beverages	Mineral Water / Tea-based Beverages / Coffee Beverages / Fruit Juice Beverages etc.	
Dairy Industry	Milk / Dairy Beverages / Yogurt, etc.	
Extracts	Seafood / Meat / Grains, etc.	
Seasonings	Tsuyu (Japanese soy sauce–based soup base), dressings, sauces, mayonnaise, etc.	

Certifications

- ISO 14001
- ISO 45001
- ISO 9001
- ASME
- China Special Equipment License
- Manufacture of Class-1 Pressure Vessels (in accordance with Japanese regulations)

Continuous Liquid Sterilizer

*Equipment selection varies depending on conditions.

Plate-Type

- Reduced installation space
- Minimized thermal history
- Suitable for small-lot, multi-product production
- Energy saving through heat recovery

Tubular-Type

- Reliable operation with high-viscosity liquids
- Excellent performance with solid-containing products
- Minimized risk of odor transfer
- Reduced maintenance work

Typical liquid food applications

Comparison of Heat Exchanger Types

Types of Heat Exchangers	Plate-Type	Tubular-Type		
		Double-Tube Type	Multi-Tube Type	Triple-Tube Type
Applicable Flow Range	50 - 100,000 L/h	50 - 2,000L/h	500 - 50,000L/h	500 - 3,000L/h
Heat Transfer Performance	Excellent/Recommended (★★★)	Limited (★)	Acceptable (★★)	Acceptable (★★)
Installation Space	Excellent/Recommended (★★★)	Limited (★)	Acceptable (★★)	Acceptable (★★)
Solids Handling (Pulp)	Limited (★)	Excellent/Recommended (★★★)	Acceptable (★★)	Acceptable (★★)
Solids Handling (10 mm)	Unsuitable (–)	Excellent/Recommended (★★★)	Acceptable (★★)	Limited (★)
High Viscosity Capability	Limited (★)	Acceptable (★★)	Acceptable (★★)	Excellent/Recommended (★★★)
Initial Cost	Excellent/Recommended (★★★)	Limited (★)	Limited (★)	Acceptable (★★)
Running Cost (Heat Recovery)	Excellent/Recommended (★★★)	Limited (★)	Limited (★)	Limited (★)
Running Cost (Gasket)	Limited (★)	Excellent/Recommended (★★★)	Excellent/Recommended (★★★)	Excellent/Recommended (★★★)

Plate-Type Sterilizer

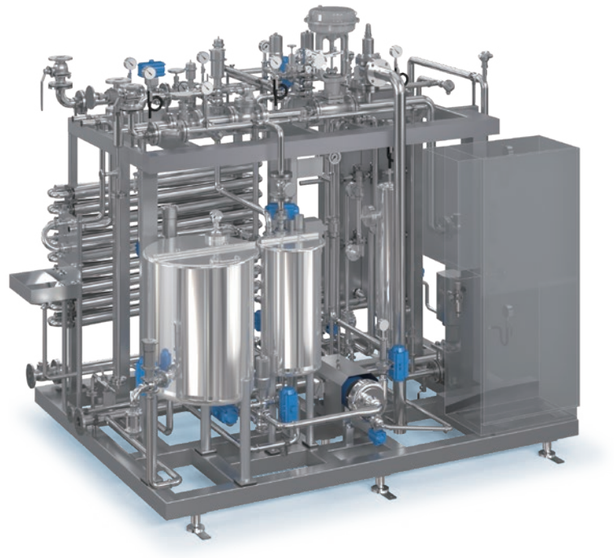


Plate-Type Sterilizer Features

Reduced installation space

With superior heat transfer performance, PHEs achieve maximum efficiency in minimal space.
Compared with shell-and-tube heat exchangers, the installation footprint is about one-third and the weight about one-tenth.
Including maintenance space, the required area is reduced to only one-sixth.

Minimized thermal history

Rapid heating to the set temperature reduces thermal history and maintains product quality. By minimizing the temperature difference between hot water and product (within 2 °C, based on HISAKA's experience and proven performance record), the risk of scorching due to temperature gradients is significantly reduced.

Suitable for small-lot, multi-product production

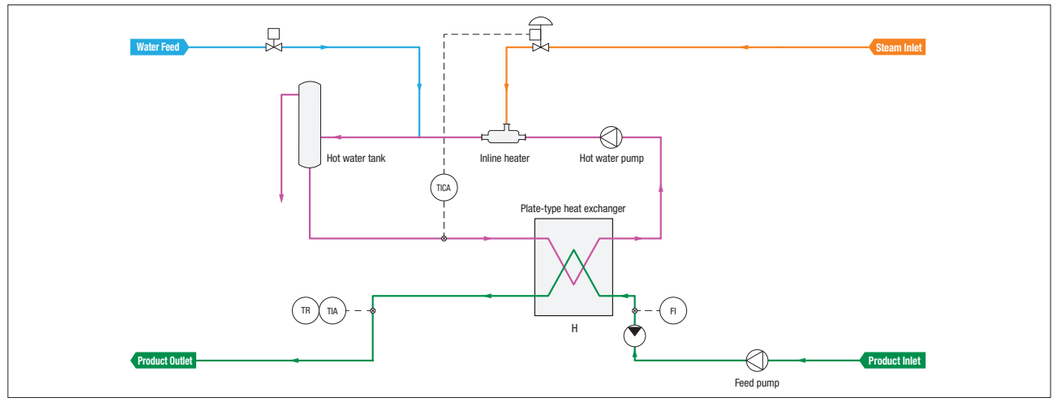
With a small hold-up volume, the system minimizes the amount of preparation liquid required.
The FX series plates, designed specifically for food applications, provide superior liquid replacement performance—reducing product loss during changeover and shortening cleaning time.
In addition, the use of fluoropolymer cushion gaskets (TCG) helps prevent odor transfer during product switching, supporting flexible production across a wide range of applications.

Energy saving through heat recovery

By exchanging heat between the product liquid before and after heating, the system achieves efficient heat recovery and significantly reduces the consumption of steam and cooling water.

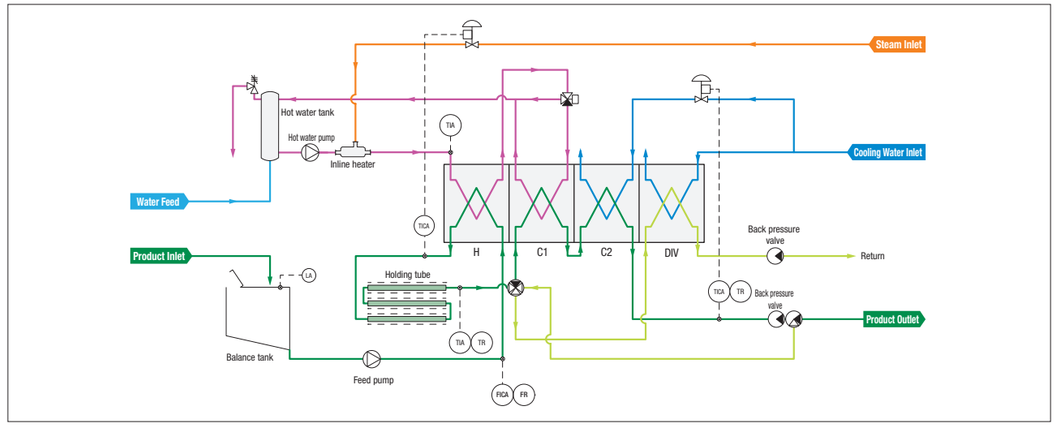
Hot Water Heating (Low-Temperature Sterilization/Pasteurization)

Performs heating sterilization below 100 °C and intermittent operation.



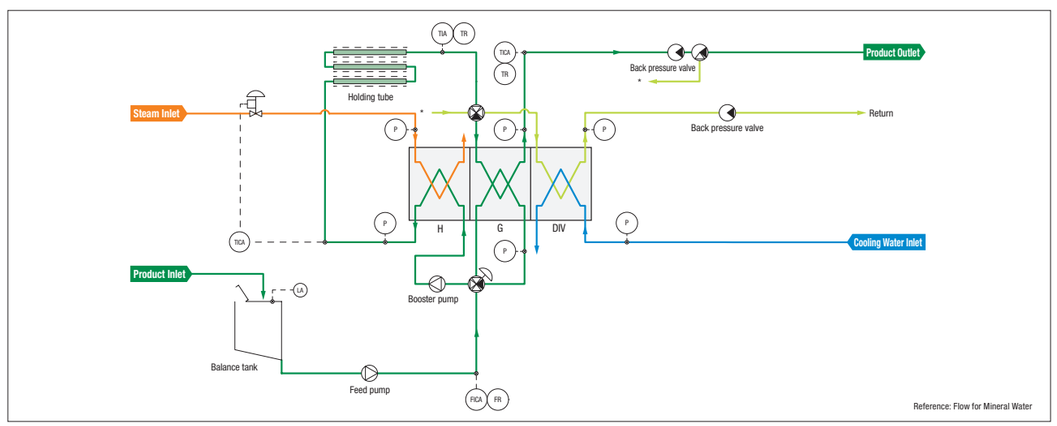
Hot Water Circulation Heat Recovery System

Even without adopting a booster pump, differential pressure can be effectively controlled.



Liquid-to-Liquid Heat Recovery System

By using the product liquid for cooling instead of cooling water, the system enables highly efficient heat recovery.



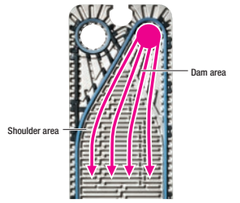
Reference: Flow for Mineral Water

FX Plate

FX Plate Ideal for Food Production

Compared with conventional heat exchangers, all liquid in the flow channel is quickly discharged, enabling rapid liquid replacement. In addition, the electrolytically polished plate surface provides significantly higher cleaning performance with chemical washing than conventional plates.

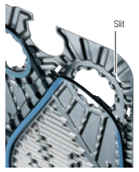
Reduction of Liquid Hold-Up

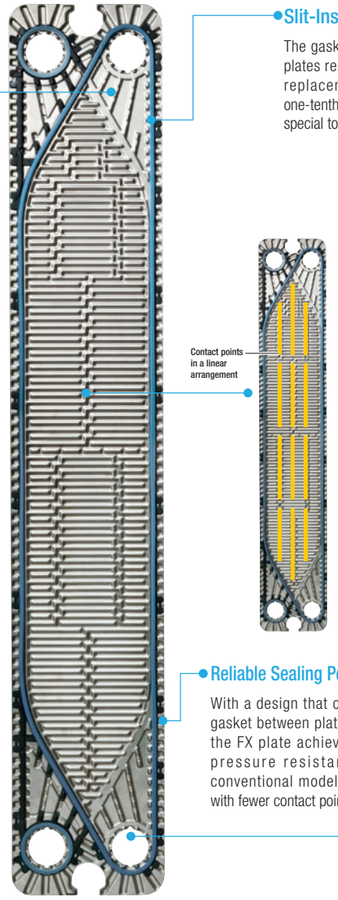


A forced distribution mechanism in the dam area, combined with a smooth shoulder design, ensures a more uniform liquid flow within the plate and minimizes liquid retention.

Slit-Insert Gasket

The gaskets can be replaced while the plates remain suspended, reducing the replacement time to approximately one-tenth of the conventional process. No special tools are required.





Fewer contact points

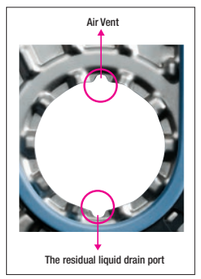
By reducing the number of contact points and adopting a linear arrangement with a self-cleaning effect, the contact surface area is only one-fourth of that in conventional designs. This greatly suppresses scale adhesion and helps prevent clogging.

Reduced product loss

The FX plate, which achieves piston flow in the plate channels, shortens liquid replacement time to one-fourth that of conventional plates. As a result, product loss during this process is reduced by as much as 75%.

Notch at the Plate Flow Port

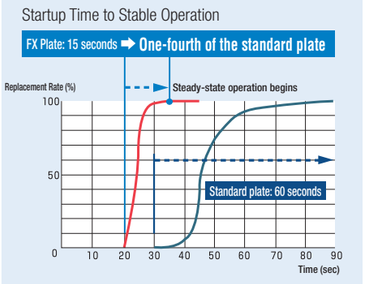
The liquid channel port air vents on the plates prevent air accumulation, avoiding bubbles, oxidation, and scorching of the product. In addition, the residual liquid drain port allows complete discharge of both product and cleaning solution, ensuring product safety.



Reliable Sealing Performance

With a design that clamps the gasket between plate grooves, the FX plate achieves higher pressure resistance than conventional models — even with fewer contact points.

Reduced liquid changeover time



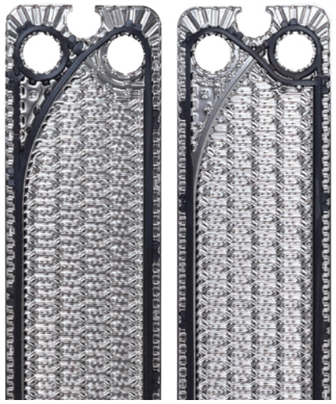
Minimization of chemical usage and cleaning time

Example of Reduced Required Production Time

When operated with standard plates, three intermediate cleanings were necessary, resulting in a total production time of 18 hours.
With FX plates, intermediate cleaning is unnecessary, enabling continuous production for 15 hours—a reduction of 3 hours.
This improvement stabilizes product quality, enhances production efficiency, and significantly reduces cleaning costs.

Plate for Solid-Containing Liquids (Model FX-30)

Retains the same tall vertical design and gently sloped shoulder shape as the previous models.

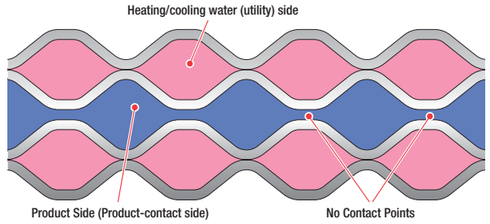


Features

- No contact points on the product-side heat transfer surface of the heat exchanger
- Inherits the excellent liquid replacement and cleanability of the FX-03 model
- Productivity improvement
  - The small liquid hold-up enables small-lot, multi-product production.
  - High liquid replacement improves yield.
- Reduced running costs
  - High heat recovery rate achieves energy savings.
  - Reduces CIP chemical consumption.
- Can be installed in limited spaces
  - When replacing an existing plate-type sterilizer, installation is possible within the same space.
  - Minimizes the space required for maintenance.

Structural Diagram (Cross-Sectional View)

- By eliminating the contact points on the product-side heat transfer surface, improved cleanability and reduced cleaning time are achieved.



- Minimizes solid accumulation at the contact points (suitable for citrus beverages, vegetable juices, tomato juice, ketchup, etc.).
- Minimizes viscosity loss caused by liquid shear forces (e.g., cream, liquid egg, etc.).

Plate Surface Residue Verification

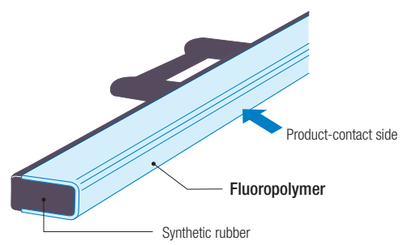
Test Liquid	CIP	Residue Distribution on Plate Surface	Residual Status
Grapefruit beverage with pulp	Before	Residue across the whole surface	Remaining in flow channels, contact points, and heat transfer surfaces
	After	**Almost no residue visible**	**Almost none in channels and on heat transfer surfaces**

- Conventional plates require disassembly and cleaning when switching products after processing liquids containing fibers or solids.
  With the FX-30 plate, the need for such cleaning is greatly reduced.
- Fewer cleaning cycles and easier operation mean shorter maintenance time and higher productivity.
- Handles liquids containing solids up to 1 mm *Details will be determined based on the results of the liquid transfer test.

Fluoropolymer Cushion Gaskets

Features

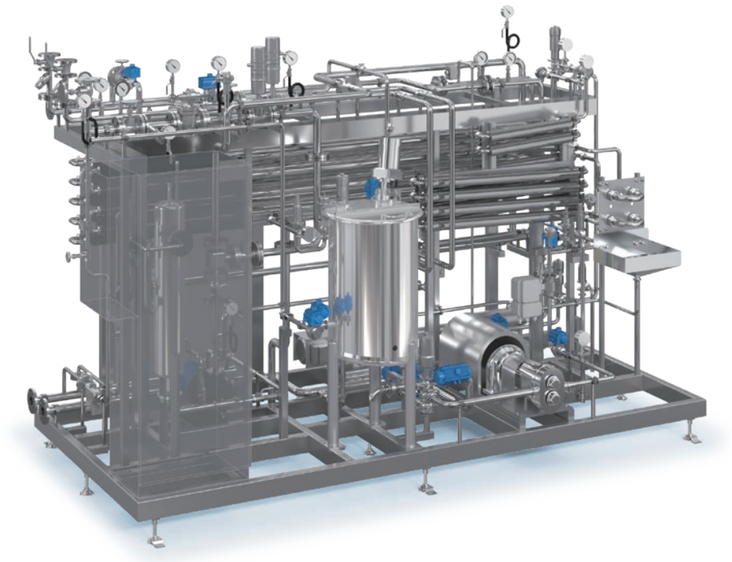
- Minimizes the risk of odor/flavor carryover during product changeover
- Prevents foreign matter contamination caused by gasket deterioration
- Significantly improves chemical and oil resistance, suppressing gasket degradation



FX Series Lineup

Model	FX–01	FX–10	FX–03	FX–30	FX–05
Heat Transfer Area	0.03 m²/plate	0.11m²/plate	0.2 m²/plate	0.22 m²/plate	0.44 m²/plate
Applicable Flow Rate	50 - 1,000L/h	400 - 5,000L/h	800 - 25,000L/h	800 - 25,000 L/h	5,000 - 60,000 L/h
Nozzle Size	15A	1.5S	2S	Nozzle Size: 2S	3S
Frame Dimensions	W160 × H585 mm	W290 × H1,220 mm	W540 × H1,735 mm	W540 × H1,735 mm	W840 × H2,500 mm

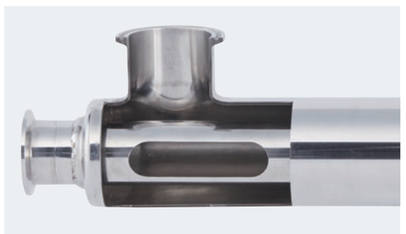
Tubular-Type Sterilizer



Tubular-Type Sterilizer Features

- Capable of processing high-viscosity liquids and beverages or seasonings containing solids, with reliable cleaning through CIP.
- Reduces the risk of flavor contamination due to fewer gaskets.
- Reduces running costs by minimizing maintenance work.
- Choose the suitable element according to the liquid type from the list below.

Double tube (straight pipe)

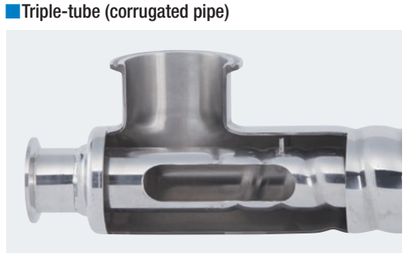


- Ideal for small-capacity sterilizers
- Excellent liquid exchange performance

Multi-tube type (shell and tube)

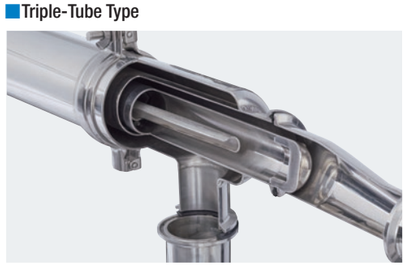
- Ideal for large-capacity sterilizers
- Space-saving design

Triple-tube (corrugated pipe)



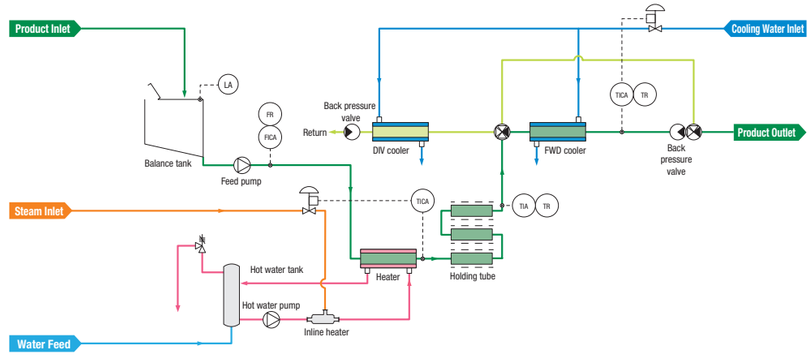
- Ideal for small-capacity sterilizers
- Excellent liquid exchange performance
- Corrugated structure increases turbulence effect, increasing heat transfer performance

Triple-Tube Type



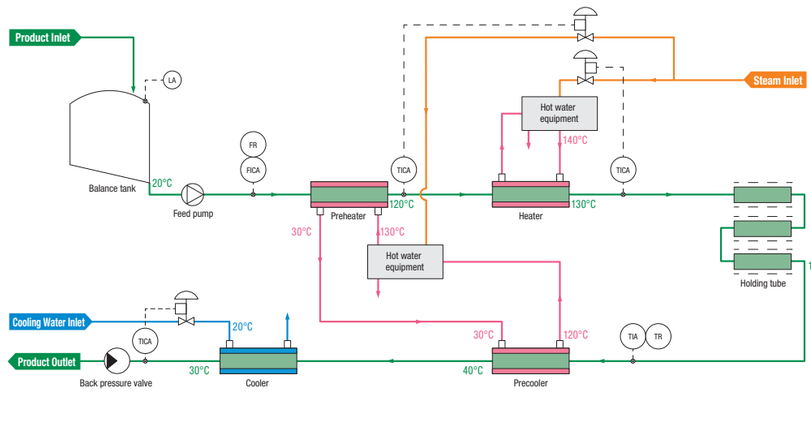
- Eliminates temperature unevenness by heating from both the inner and outer sides.

Standard System



Hot Water Heat Recovery

Hot water used during the heating process can be used as coolant during the precooling process in order to recover heat.



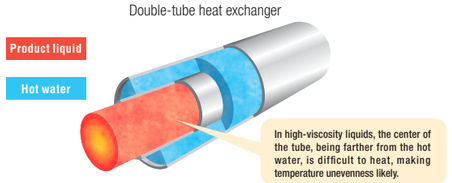
Triple-Tube Heat Exchanger

Main features of triple-tube heat exchanger

- Improved quality through uniform heating
- Reduced liquid loss
- Reduced chemical liquid used for cleaning

Comparison of double-tube heat exchanger and triple-tube heat exchanger features

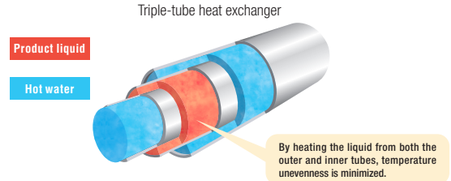
Double-tube heat exchanger



Double-tube heat exchanger

- There is a long distance from the heat transfer surface to the center of the heat transfer tube, causing temperature unevenness in high-viscosity liquids.
- To compensate for heat transfer performance, the number of heat exchangers is increased.
- High hold-up volume results in increased liquid loss
- Long heating time makes the product prone to quality deterioration.

Triple-tube heat exchanger

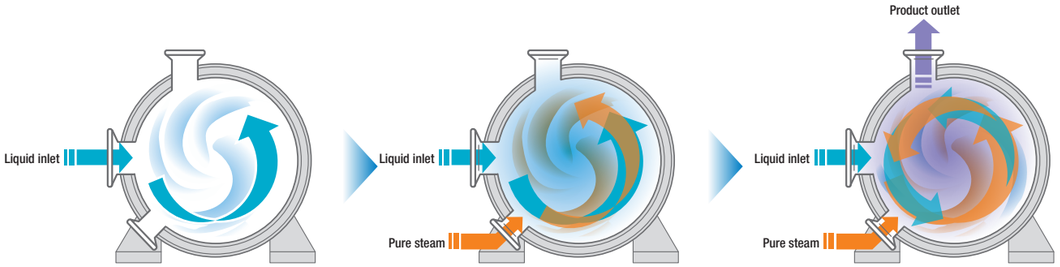


Triple-tube heat exchanger

- Heats the liquid from both the outer and inner tubes, achieving highly efficient heat transfer.
- By designing the flow path in a donut shape, temperature unevenness is minimized, enabling uniform heating.
- High heat transfer performance reduces the hold-up volume.
- Minimizes liquid loss, ideal for small-lot, multi-product production.

Spin Injection Sterilization System

Spinjection (Spin-injection) is a direct steam heating element uniquely developed by Hisaka. At the steam injection point, the product liquid and steam are intensively agitated, enabling instantaneous mixing. Spinjection is an innovative sterilization system that resolves the limitations of conventional methods such as injection and infusion.



▶Instant uniform heating

By forcibly agitating the steam injection section, the liquid and steam mix instantaneously, enabling uniform and stable heating.

▶Operable with low-pressure steam

Spinjection features a self-pressurizing function, enabling operation with low-pressure (low-temperature) steam and preventing overheating by reducing the temperature difference between liquid and steam.

▶Supports multi-product production

Spinjection allows rotational speed control via an inverter, enabling control of operating pressure such as back pressure.
Operating conditions can be set on the control panel for each product, making it easy to handle multi-product production.

Example applications

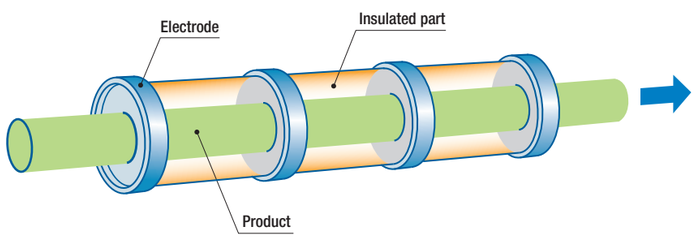
- **Direct steam heating sterilization** Desserts, soy milk, green vegetable juice, cream, collagen, gelatin, fruit juice, tea beverages, vegetable juice, liquid foods, sesame sauce, etc.
- **Direct steam heating (cookers)** Soy beans mixed with water, cheese, etc.
- **Others** Gas mixing, flavor improvement, etc.

▶Structure designed for excellent cleanability and easy maintenance

CIP allows cleaning of all wetted parts, including the steam injection section.
The equipment can be easily disassembled, enabling quick visual inspection.

Joule-Type Sterilization (Electrical Heating)

This heating system performs self heating by applying electricity directly to the process liquid.



Example applications

Wakame seaweed fronds, jams, vegetable pastes, lemon juice, and other products containing solids or high-viscosity fluid

- ▶Also suitable for products containing flowable solids
- ▶Self-heating minimizes thermal history, preserving flavor.
- ▶Allows rapid heating throughout the solids
- ▶No external heat medium, no burning and sticking
- ▶Can also be applied only to high-temperature heating sections that are prone to quality deterioration when used in combination with an indirect heating system.
- ▶Capable of processing liquids from low to high viscosity (up to 10,000 mPa·s)

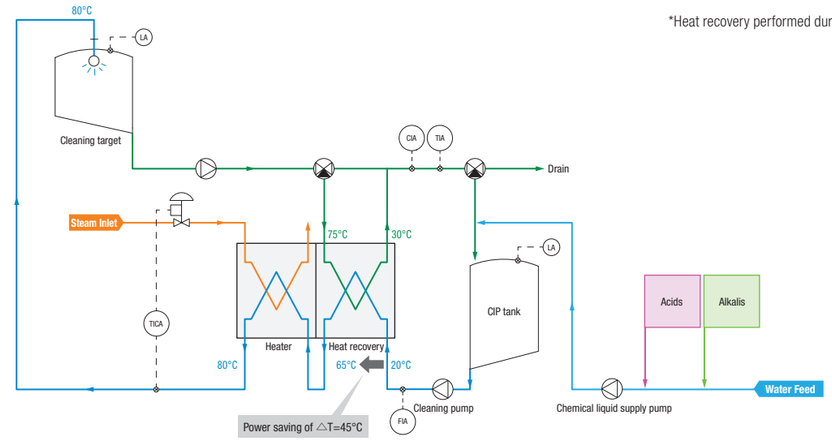
Related Equipment

CIP Equipment

Our CIP equipment automatically cleans everything from formulation equipment and surge tanks to filling machines, while precisely controlling concentration and temperature.
Depending on the application, we can offer single-use or multi-use CIP systems, including energy-saving options.

Energy-saving CIP equipment (single-use)

*Heat recovery performed during rinsing

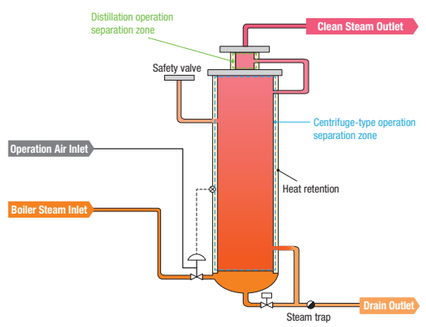


Clean Steam Generator, Pure Steam Generator

This equipment purifies and saturates steam that comes into direct contact with food to a level higher than sintered filters, generating stable, continuous steam. Depending on the required steam quality and application, you can choose either the direct evaporation method or the indirect evaporation method.

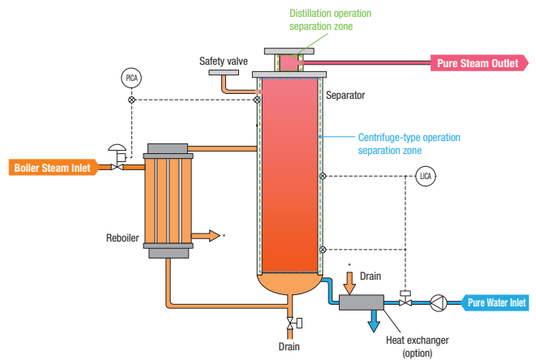
Clean steam (Direct evaporation method)

■REB-F



Pure steam (Indirect evaporation method)

■REB-1

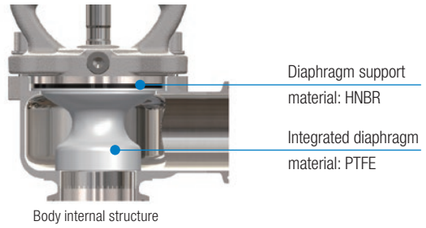


SHV Diaphragm Valves

Features of the SHV Diaphragm Valve

With its unique one-piece PTFE diaphragm, the valve enables reliable use in aseptic lines while offering outstanding ease of maintenance.

- Rubber products have been eliminated from the wetted part, eliminating potential sources of contamination
- The sliding part (shaft) does not enter/exit the wetted part, maintaining sterility
- The PTFE material used for the diaphragm provides chemical resistance, heat resistance, low flavor carryover and excellent cleanability
- Durability has been verified over 1 million open/close tests conducted internally on a steam line



Body internal structure

Lineup of Body Types Developed for Cleaning Efficiency

By adopting the SHV series, which offers high durability and maintainability, the equipment helps address various customer challenges, including reducing the risk of foreign matter contamination and lowering maintenance burden.

L-type valve, T-type valve (micro-neck body)

Uses a micro-neck body with piping dimensions reduced to the thickness of the clamp band, minimizing face-to-face distance (Elbow face-to-face distances are also available.)


Micro-neck body

Valve manifold (zero-neck body)

By using a zero-neck body that minimizes the face-to-face distance of the T-type valve, a 0 mm distance between the upper and lower ports has been achieved.


Zero-neck body

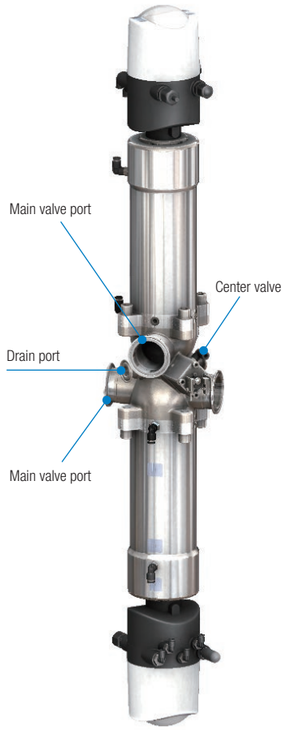
Diaphragm F-type valve New product

We offer F-type valves featuring the PTFE-integrated diaphragm, a hallmark of the SHV series. Reliable sealing performance ensures safe flow path switching.

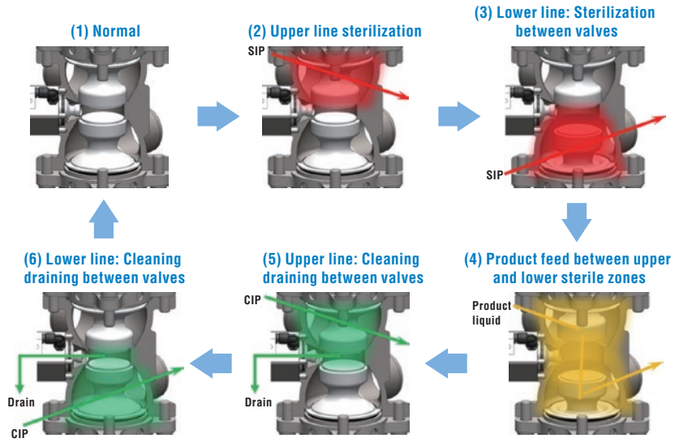
3-Head Valve

Features of the 3-Head Valve

A double-seal valve constructed only from stainless steel and PTFE in all wetted parts. Ideal for applications requiring strict line isolation.

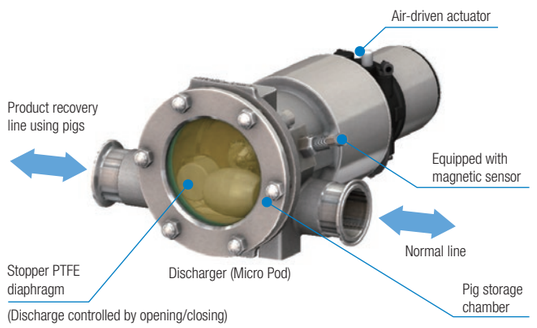


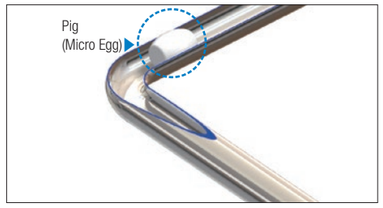
- With no rubber components in the wetted part, the system eliminates potential sources of contamination and ensures outstanding resistance to flavor carryover.
- A center valve is located in the middle area to completely close it to outside air, allowing the product to be supplied while retaining sterilization after SIP (refer to illustration below)
- Maintenance requires only a diaphragm set and hexagon wrench, as with SHV series products



Inline Pig Systems (Micro Pod and Micro Egg)

This technology pushes the product through the piping and recovers residual liquid by launching a PTFE pig (Micro Egg) from the launching device (Micro Pod).





- Safely discharges and catches pigs
- Pigs contain magnets and can be detected
- Supports automated operation inline

Laboratory Equipment

Plate-Type Sterilizer

Tests can be conducted with consideration for compatibility with production equipment, including scalability evaluation.

- Processing capacity: 30 to 60 L/h, CIP: 500 L/h
- Temperature conditions: Sterilization 95 to 140°C, Cooling 85 to 30°C
- Preparation liquid: 2 L sampling at 3 L

Tubular-Type Sterilizer

It minimizes product loss and suppresses odor/flavor carryover, enabling tests with a sample volume of only 3 liters.

- Processing capacity: 30 to 60 L/h, CIP: 500 L/h
- Temperature conditions: Sterilization 95 to 140°C, Cooling 85 to 30°C
- Preparation liquid: 2 L sampling at 3 L

Direct Steam Heating-Type Testing Machine

Spin injection testing available

- Processing capacity: 30 to 60 L/h, CIP: 500 L/h
- Temperature conditions: Sterilization 95 to 155°C, Flash cooling 85 to 60°C
- Preparation liquid: 1 L sampling at 2 L

*Injection-equipped, enabling comparison tests with spinjection.

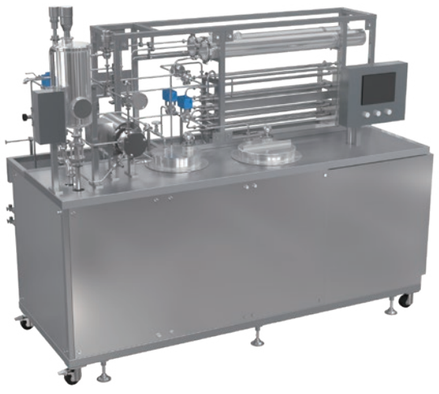


Plate-Type Testing Machine for Extremely Small Amounts

Allows simple UHT testing with very small sample volumes

- Processing capacity: 5 L/h
- Temperature conditions: Sterilization 95 to 140°C, Cooling 30°C (manual operation)

Options

- Two-stage heating and two-stage cooling (including chilled)
- Homogenizer
- Pure steam unit
- Clean bench unit
- Data management system

etc.

Test Laboratory Services

At Hisaka Works, we provide product testing services for customers considering the introduction of our equipment, as well as for those developing new products.
Leveraging our extensive know-how gained from handling a wide variety of products, we identify the optimal processing conditions and support our customers in solving their challenges.

Process leading to equipment installation

Inquiry ▶▶▶ Sterilization test ▶▶▶ Equipment selection/proposal ▶▶▶ Quotation ▶▶▶ Order placement

Testing services

We can test from small amounts of liquid, and then scale up from test results to using actual equipment.

- Quality verification test depending on heating method (plate / tube / spinjection)
- Quality verification test depending on difference in heating temperature and holding time
- Verification test of scaling tendency due to differences in physical properties (continuous operation time), etc.

Development test laboratory