

Noritake

SM Engineering Equipment Introduction

System Products Line up SM Engineering Equipment Introduction

NORITAKE CO., LIMITED

Nippon Toki Gomei Kaisha established in 1904.
Since perfecting Japanese first porcelain dinnerware set in 1914,
we have challenged to developing new business.
Now, we apply the process of ceramic production to
grinding wheels (Industrial Products Business), vacuum fluorescent
and industrial ceramic (Ceramic & Material Business) etc.,
and develop many kinds of products from consumer goods to technical materials.
We are determined to keep trying to new possibility.

Look into the Future

Chemical Equipment Business of Noritake

We have studied the Static Mixer which is a unique static type mixing unit with no actuator since the 1970s, and propose new mixing technology as inline type mixing. Noritake, as a total engineering company in mixing field, develops many usages and systems. Noritake innovates production process and its application.

Engineering Business of Noritake

We produce a wide variety of industrial systems corresponding to your needs based on rich experience in the process using the static mixer and know-how cultivated in the field. We introduce main examples in this catalogue.



CONTENTS

Mixing Systems **P.3~6**

- Coating Liquid Continuous Mixing System
- Color Liquid Continuation Supply System
- Caustic Soda Dilution System
- Sulfuric Acid Dilution System
- Seasoning Liquid Mixing System For Miso
- Yoghourt Preparation System

Heating and Cooling Systems **P.7 ~14**

- PVA Continuous Dissolution System
- Coating Liquid Precision Temperature (viscosity) Adjusting System
- Adhesive Temperature Adjusting System
- Water Heating System
- Condiment Miso Heat Sterilization System
- Aseptic Sterilization System
- Scrambled Eggs Continuation Manufacturing System
- Flour Paste Manufacturing System
- Heating Sterilization Cooling System For Miso
- Seasoning Liquid Heating Sterilization Cooling System
- In-line Starch Saccharification System
- Automated Oxidized Starch Production System
- Starch Gelatinization System for Paper Manufacturing
Fully Automatic Model
Semi-Automatic Model

Reaction System **P.15~16**

- Continuous Polymerization Reaction System
- Nox Gas-Recovery System
- pH Adjusting System

Laboratory Test Systems **P.17 ~18**

- Noritake Mini Cooker
- Inline Mixing Test System
- Box Blender (Small Chemical-Mixing System)

Other Systems **P.19**

- In-line Powder Dissolution System
- Consecutive Degassing Deaeration System

Ceramic Roll Mill **P.20**

- Ceramic Double Roll Mill
- Ceramic Triple Roll Mill



Industrial Products
Business



Ceramics & Materials
Business



Engineering Business



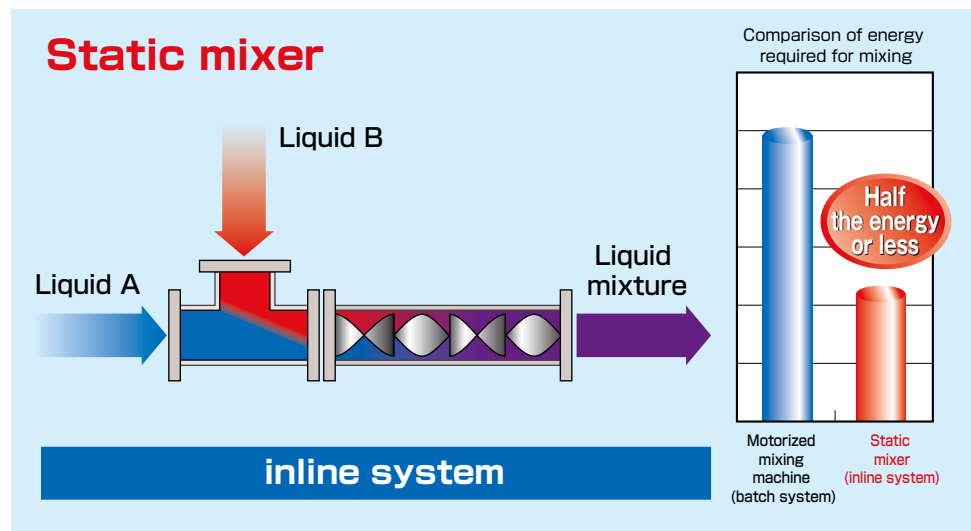
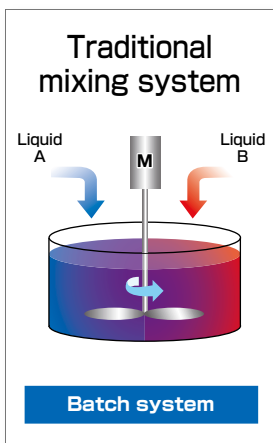
Tabletop Business

Mixing Systems

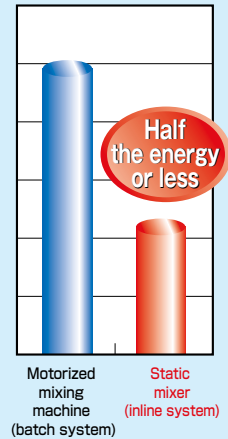
Mixture system

Noritake can handle a diverse array of needs through its reliable expertise developed as a leading manufacturer of inline mixers.

The mixing process involves mixing, dilution, and dispersion. Due to the principles of mixing, our static mixer is ideal for all kinds of mixing processes, regardless of the type of fluid. At Noritake, we design and manufacture completely automated inline mixing systems based on our static mixers and equipped with set-volume pumps and flow meters.



Comparison of energy required for mixing



Noritake offers better reproducibility and more accurate, homogeneous mixes than traditional batch systems.

Our systems also offer the following features:

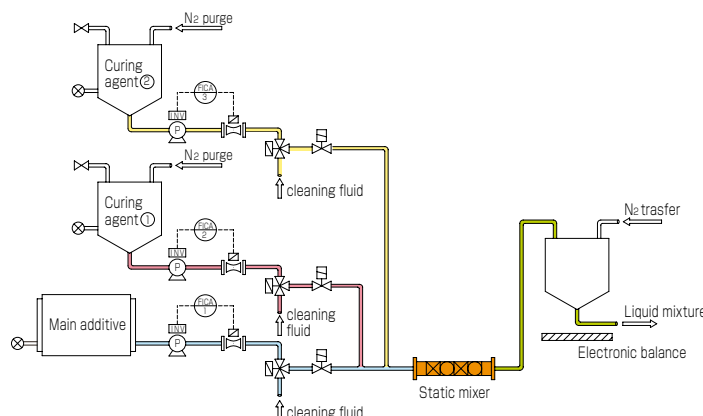
- Maintenance-free operation with no actuators
- Minimal energy requirements for mixing compared to batch systems
- Space-saving designs with no need for mixing tanks



Coating Liquid Continuous Mixing System



The system continuously mixes two or more raw ingredients for resin. This new system replaces tradition batch systems which use a tank for mixing.



Advantages

- Productivity is greatly improved by going from a batch system to a continuous system.
- Products no longer have to be produced in separate batches, which enables better quality, the elimination of air bubbles, and consistent product supply.
- Because it's an inline process, you can significantly improve the work environment.
- The system monitors the balance between coating liquid production volume and consumption using an electronic balance, and automatically controls coating liquid production speed. It also prevents inconsistent mixture ratios in spite of adjustments to the production speed.
- It is equipped with an automatic cleaning mode, and cleaning can be performed by pushing just one button.

● Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Main additive : 41.3 - 124.0 g/min Curing agent (1) : 7.02 - 21.07 g/min Curing agent (2) : 1.65 - 4.96 g/min |
| Utilities | Electricity : 200 V three-phase Air : 0.49 MpaG |
| Dimensions and Weight | 1700L×1085W×2000H (mm) Approx. 800 kg |

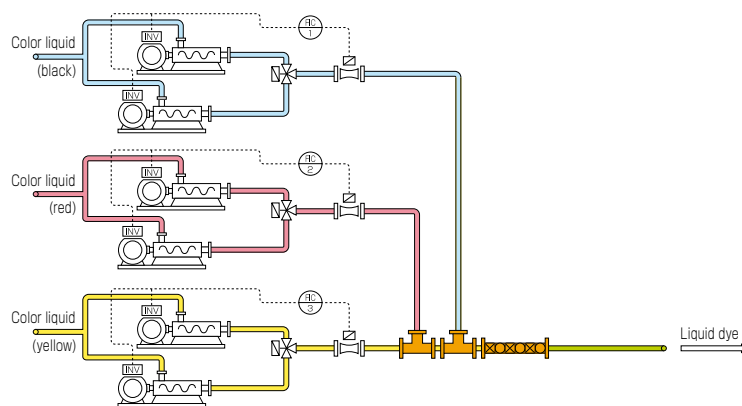
Applications

- Film coating liquid mixing
- Mixing epoxy and acrylic resins
- Mixing liquid ingredients for urethane

Color Liquid Continuation Supply System



The supply system uses an automated variable control system, and features a wide range of capabilities that enable rapid tracking of fluctuations in a flow rate setting.



Advantages

- Three cardboard dye colors (black, red, and yellow) are mixed in preset volumes and fed to the machine chest.
- Each dye has a backup pump, so that if a pump malfunctions, it can be replaced while the machine remains in operation.
- If set up in series with a color meter and CCM system installed on the paper-making machine, the flow rate can be automatically controlled (via remote operation).
- Highly concentrated dye can be reliably regulated even at low flow rates through a pipe design that minimizes air pockets and contact with air.

● Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Black : 25 - 240 cc/min Red : 25 - 240 cc/min Yellow : 220 - 640 cc/min |
| Utilities | Air : 0.49 MPaG, 50 NL/min Electricity : 200 V three-phase 0.8kW |
| Dimensions and Weight | 1400L×950W×1800H (mm) Approx. 800 kg |

Caustic Soda Dilution System

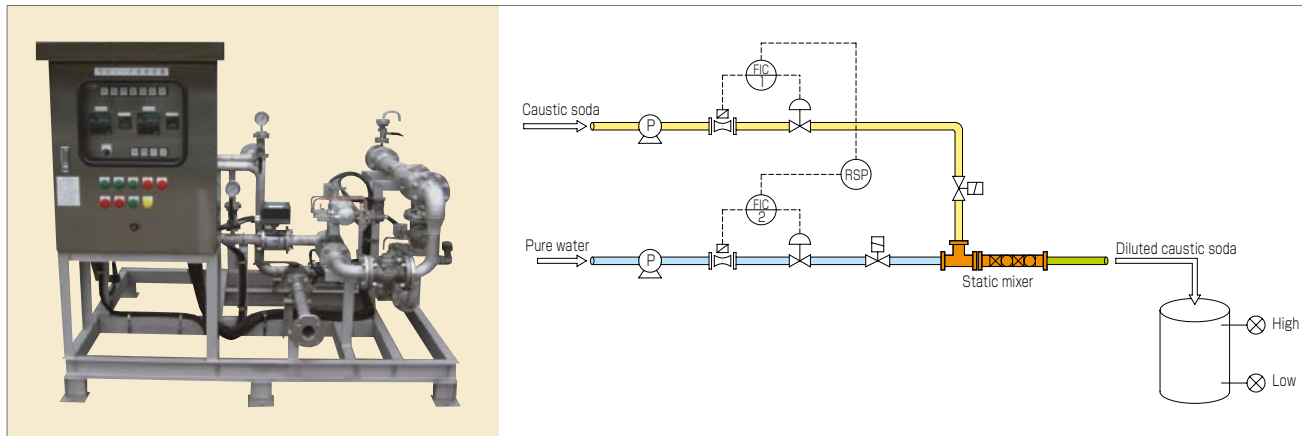


Chemistry



Paper pulp

The dilution system allows the continuous production of caustic soda at consistent concentrations through inline dilution of highly concentrated caustic soda. Like the sulfuric acid dilution system, this system performs pre-production of basic liquid chemicals for manufacturing.



Advantages

- It can accept highly concentrated liquids from tank trucks and dilute them to the required concentration.
- Concentration regulation is automatic, so operation is easy and safe.
- No intermediate tank is necessary, so the system is compact and requires little installation space.

Applications

- All kinds of liquid chemical dilution

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Input — 48% caustic soda : 1,950 kg/h Pure water : 1,950 kg/h Output — 24% caustic soda : 3,900 kg/h |
| Utilities | Air : 50 NL/min (0.5 MPaG) Electricity : 200 V three-phase 6 kW |
| Dimensions and Weight | 1800L×1300W×1600H (mm) Approx. 800 kg |

Sulfuric Acid Dilution System

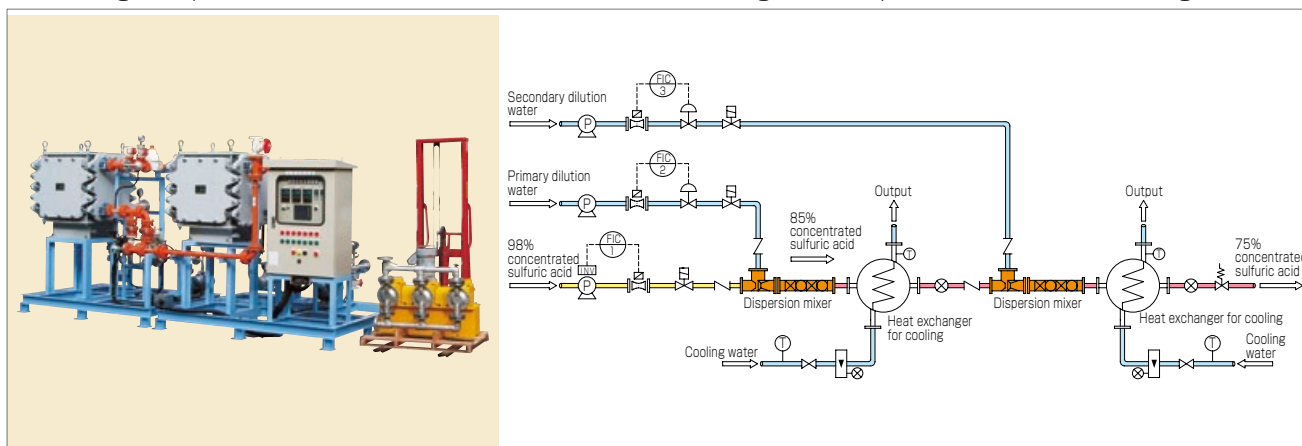


Chemistry



Paper pulp

The dilution system continuously produces sulfuric acid at a consistent concentration through inline dilution of concentrated sulfuric acid. Dilution to the designated strength is performed in the dispersion mixer, and sulfuric acid that reaches high temperatures due to heat of dilution is cooled to the designated temperature with a heat exchanger.



Advantages

- The system can continuously produce sulfuric acid diluted to a designated concentration by diluting concentrated sulfuric acid with a dispersion mixer.
- It's safe because it's inline.
- Heat produced from dilution is removed by a heat exchanger, and the diluted sulfuric acid can be cooled to the designated temperature rapidly.
- The system maintains pressurized pipes and comes equipped with a backpressure valve to eliminate vaporization of diluted sulfuric acid that gets heated past its boiling point due to heat of dilution. (Patented.)
- There are no actuators other than the pump, so hardly any maintenance is required.
- The device is compact and takes up little installation space.
- It's fully automatic and easy to operate.

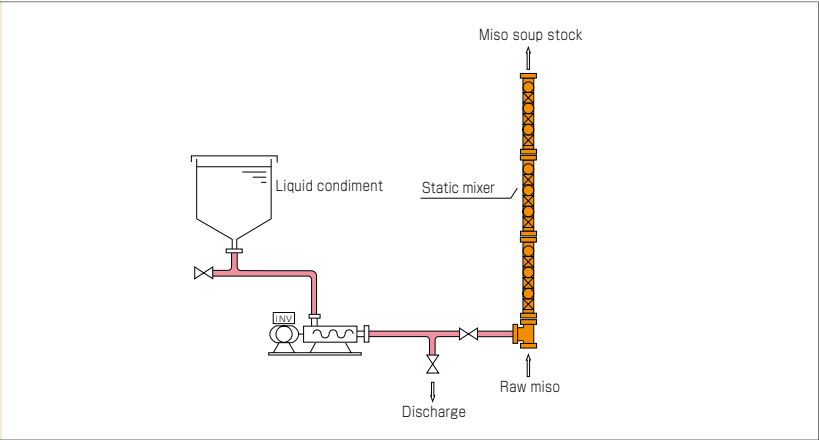
Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Input - 98% concentrated sulfuric acid : 2.74 m ³ /h, 30°C Primary dilution water : 0.77 m ³ /h, 30°C Secondary dilution water : 0.77 m ³ /h, 30°C 75% concentrated sulfuric acid : 4.0 m ³ /h, 50° C or cooler |
| Utilities | Cooling water: 32 m ³ /h, 30°C Electricity: 200 V three-phase |
| Dimensions and Weight | 3800L×1800W×2120H (mm) Approx. 3,800 kg |

Seasoning Liquid Mixing System For Miso



The system mixes the final additives for miso in the transfer pipe.



Advantages

- Additive mixing is easy to accomplish just by attaching a transfer pipe.
- Uniform mixing allows you to reduce the volume of additives used.

Applications

- Mixing chocolate and cacao butter
- Mixing vegetable oil and alkalis (deoxidation process)
- Heating, sterilizing, and cooling miso
- Heating, sterilizing, and cooling sauces and soups

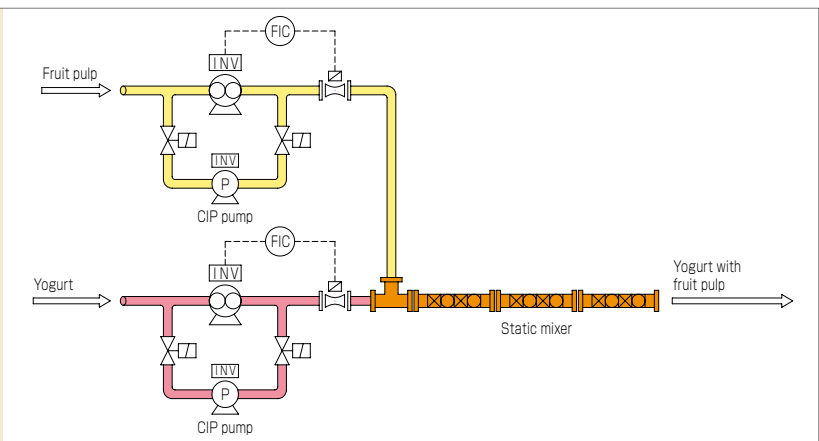
Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Raw miso : 1,200 kg/h Liquid condiment : 24 kg/h (Alcohol) |
| Utilities | Electricity : 200 V three-phase 0.5 kW |
| Dimensions and Weight | 3250L×1600W×2670H (mm) Approx. 1,000 kg |

Yoghourt Preparation System



The Yoghurt Preparation System creates homogeneous mixes of high-viscosity raw ingredients with small amounts of secondary ingredients. This system does away with heterogeneous mixes created using tank-batch systems.



Advantages

- No mixing tank is necessary, so the mixing can be done during transport to the filling machine.
- The mixing ratio can be easily adjusted.
- It uses special convex spacer elements for fruit pulp, eliminating the clogging of solid foods.
- It improves the cleanliness of equipment following operation.

Applications

- Pre-mixing of custard cream and whip cream.
- Pre-mixing of plain yogurt with fruit juice and fruit pulp.
- Making salad dressing
- Pre-mixing of raw soybeans, liquid seasonings, and alcohol.

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Yogurt : 2,000 kg/h Fruit pulp : 220 kg/h |
| Utilities | Electricity : 200V three-phase 8 kW |
| Dimensions and Weight | 2400L×1600W×1850H (mm) Approx. 800 kg |

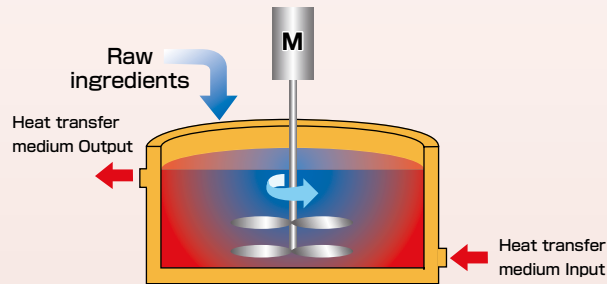
Heating and Cooling Systems

Heating & Cooling system

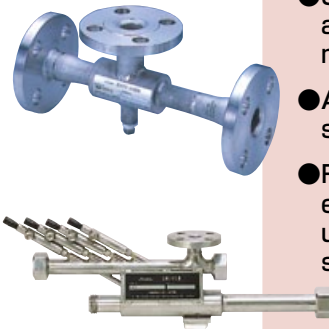
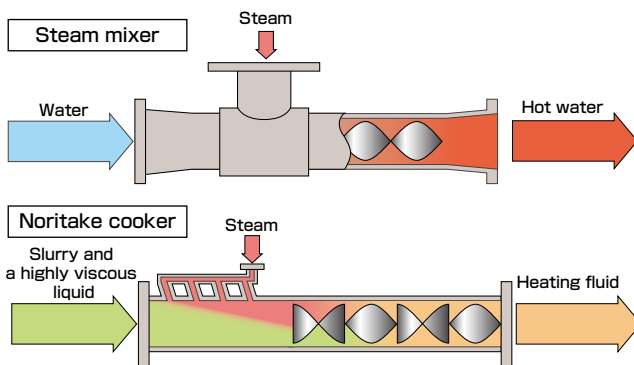
At Noritake, we offer inline heating and cooling systems using Noritake cookers and SM heat exchangers that are applied as static mixers.

● Standard Methods

Standard methods require time for heating, and unevenness or scorching could happen easily.

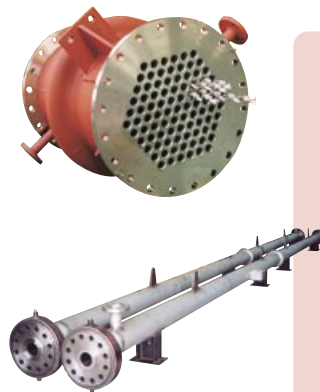
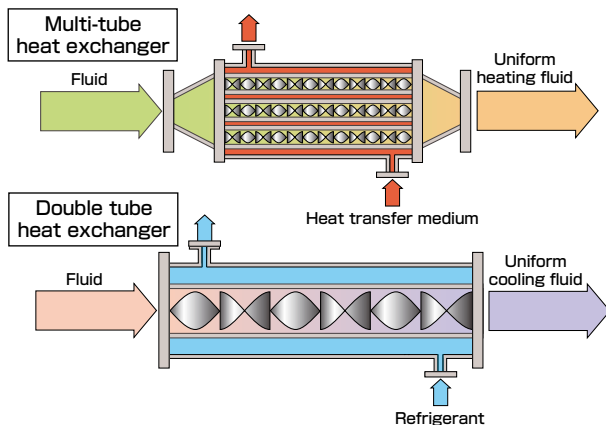


Direct-Heating Method



- Steam is directly applied to the raw material.
- All the heat in the steam is transferred.
- Rapid heating eliminates unevenness and scorching.

Indirect Heating/Cooling Method



- The static mixer is inserted through the heating pipe.
- Homogenization of raw ingredients by mixer stirring.
- Excellent heat-exchange efficiency allows for downsizing and reduced heating times.

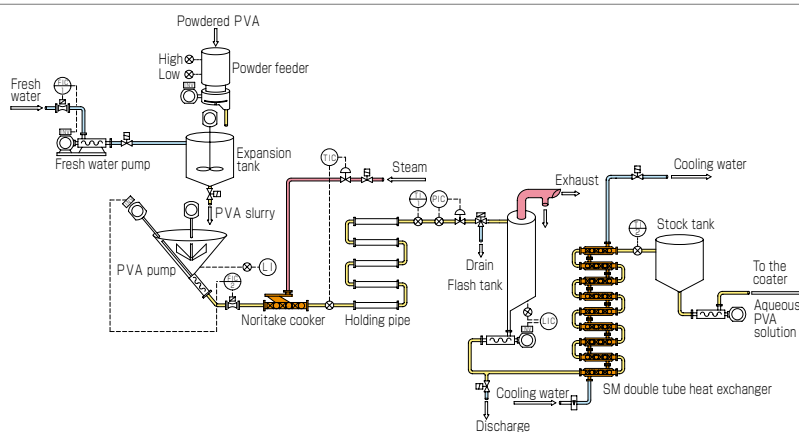
Features

- Installation space reduced by omission of heating and cooling tanks.
- Inline processing maintains a safe and hygienic work environment.
- Uniform heating and cooling is possible through accurate volume and temperature control thereby improving product quality.

PVA Continuous Dissolution System



The PVA system continuously produces an aqueous PVA solution by dissolving and dispersing solid PVA uniformly in water through direct heating applied using steam.



Advantages

- Aqueous uniformly concentrated PVA solutions can be continuously produced in a short period of time.
- The machinery is compact and takes up little space.
- The system is simple to operate, with dissolution occurring automatically once solid PVA is fed in.
- The parts that come into contact with liquid are sanitary and can automatically be cleaned without disassembly.
- Consecutive preparation liquid processes can be continuously performed by installing second-stage cooling, dilution and injection units.

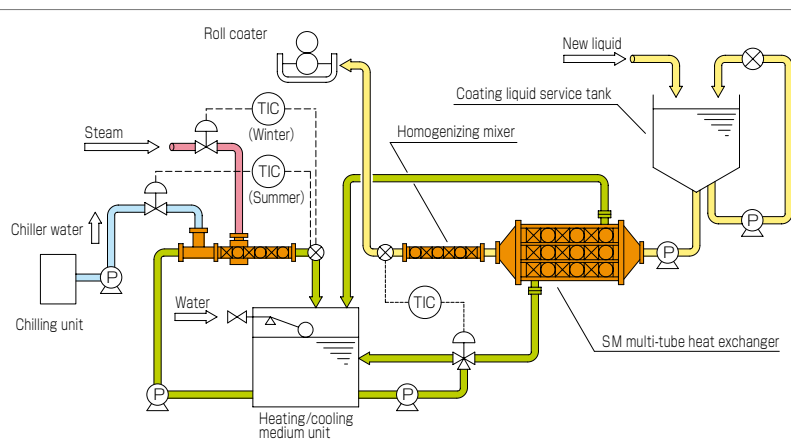
Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | 100 kg/h (solid PVA) PVA slurry concentration: 22% Aqueous PVA solution concentration : 20% |
| Utilities | Steam : 54 kg/h (0.79 MPaG) Fresh water : 900 L/h (0.2 MPaG) Cooling water : 5 m ³ /h (0.3 MPaG) Air : 200 NI/min (0.5 MPaG) Electricity : 200V three-phase 8kW |
| Dimensions and Weight | 2500L×3750W×4900H+ 2000L×1800W×2200H (mm) Approx. 3,500 kg + approx. 1,000 kg |

Coating Liquid Precision Temperature (viscosity) Adjusting System



The system allows you to rapidly apply accurate heating and cooling to fluids for which heat management is important, using a highly efficient SM heat exchanger.



Advantages

- The system measures the original temperature of liquid coatings and automatically determines heating, cooling, and temperature maintenance according to the difference from the set temperature. The temperature of the heating medium (or coolant) is also automatically regulated. (Using a static mixer, the heating medium [hot water] is directly heated using steam, and the coolant is mixed with chiller water.)
- The increased viscosity of the coating liquid due to the reduction in the solvent amount is cancelled out by the decrease in viscosity due to heating, and therefore the quality of coated products can be maintained while reducing the amount of solvent used.
- It improves the work environment through reduced solvent usage, and can reduce the environmental impact of post-process drying machines.
- It ensures consistent viscosity by its ability to maintain stable coating liquid temperatures all year long (operating within $\pm 1^\circ\text{C}$ margins), thus making consistent coat thicknesses possible.

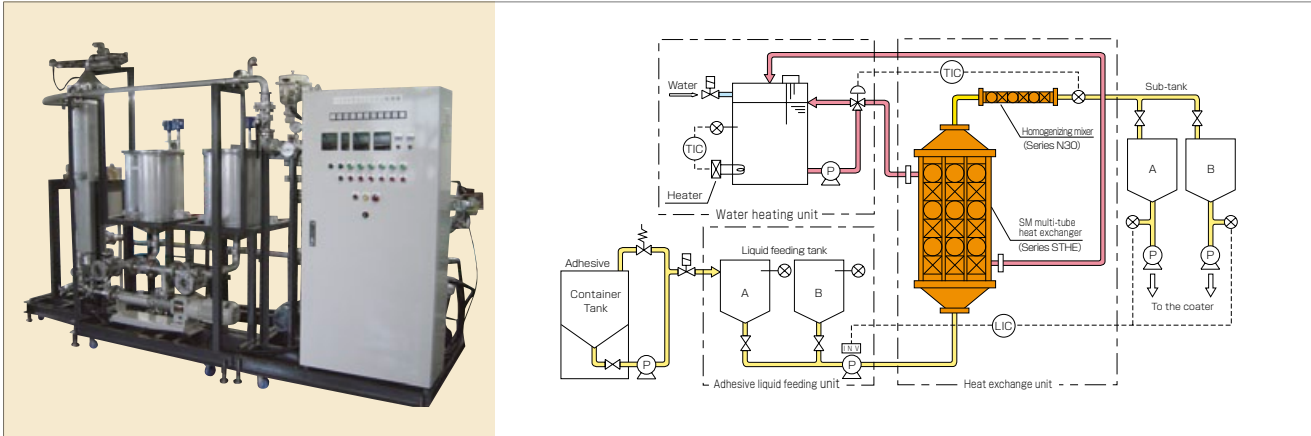
Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Coating liquid processing rate : 28L/min Viscosity : 500 cP Original temperature : 10 - 40°C Regulated temperature : 30 - 45°C |
| Utilities | Air : 0.49 MPaG Steam : 0.2 MPaG Chiller water : 10°C Electricity : 200V three-phase 20 kW |
| Dimensions and Weight | 2200L × 1500W × 2200H (mm) Approx. 1,000 kg |

Adhesive Temperature Adjusting System



The adjustment system applies heat up to a set temperature to homogenize adhesive chemicals using a SM multi tube heat exchanger.



Advantages

- By using an SM heat exchanger, efficient heating of high-viscosity adhesives is possible without requiring much installation space.
- By using a static mixer installed at the heat exchanger output, temperature is stabilized and temperature accuracy improves.
- The water heating unit is attached in an all-in-one design.
- A steam or an electric heater can be selected as a heat source for heating water.
- Adhesive fluid flow rate can be automatically controlled according to the fluid level signal from the sub-tank in front of the coater.
- By using a temperature sensor at the static mixer output, the flow rate of hot water to the SM heat exchanger is controlled automatically, ensuring even greater adhesive temperature uniformity.
- We can also build an all-season model that includes a chiller unit, and can feed adhesive at a uniform temperature all year round by heating the adhesive in winter and cooling it in summer. This model allows the application of an adhesive coating that is always the same thickness.

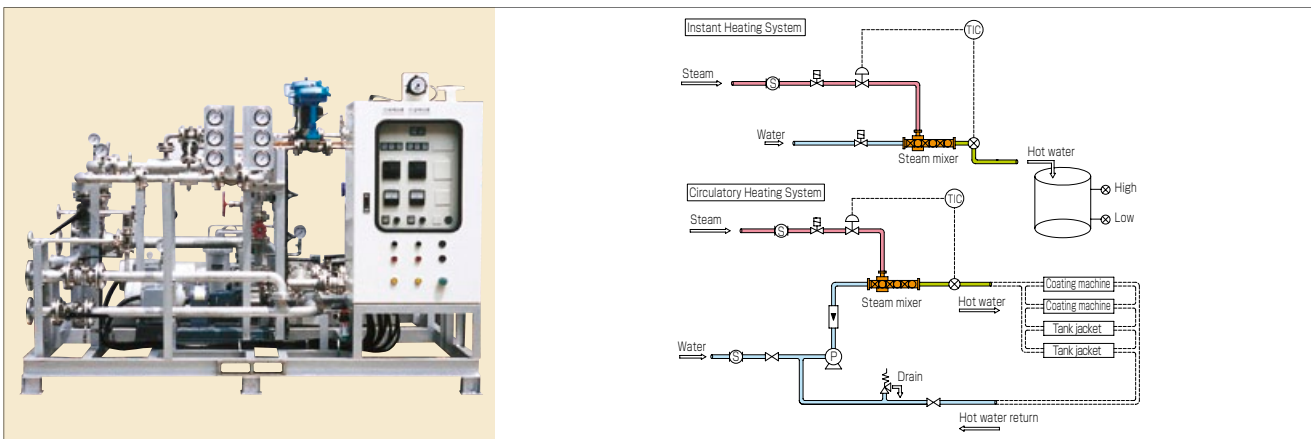
Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Adhesive : 300-1,350 kg/h Temperature : 5-10°C (winter) → 25°C |
| Utilities | Electricity : 200V three-phase Hot water : 11,000 kg/h (30°C: winter) Air : 0.49 MPaG |
| Dimensions and Weight | 3600L × 1200W × 2500H (mm) Approx. 1,500 kg |

Water Heating System



The Water Heating System mounts peripheral control units like temperature sensors, temperature regulators and control valves onto a steam mixer for assembly into a compact unit



Advantages

- It heats liquids through the direct mixing of steam using a steam mixer, allows automated control of steam volume using a temperature control valve, and supplies hot water at a uniform temperature.
- Wide-ranging temperature increase can be easily and accurately controlled.
- The machine operates at maximum thermal efficiency by using all the heat in the steam.

Applications

- Producing hot water for heating calendar rolls
- Producing hot water for showers
- Producing hot water for diluting solutions
- Producing preparatory hot water
- Producing hot water as a heat transfer medium
- Producing hot water for production processes

Sample Specifications (Instant Heating System)

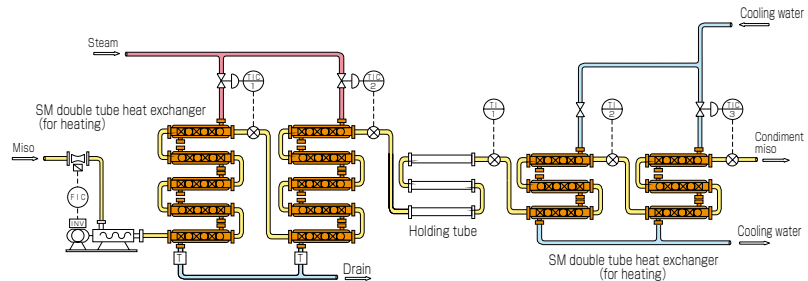
| | |
|------------------------------|---|
| Processing Capacity | Hot water rate : 95.5 m ³ /h (75°C) |
| Utilities | Steam : 5,430 kg/h (0.3 MPaG) Fresh water : 90 m ³ /h (0.2 MPaG, 40 - 60°C) Air : 300 NL/min (0.5 MPaG) Electricity : 200V three-phase 0.8 kW |
| Dimensions and Weight | 3000L × 1200W × 1500H (mm) Approx. 2,000 kg |

Condiment Miso Heat Sterilization System



Food

The sterilization system performs indirect heat sterilization and cooling of miso, sauces, and soups.



Advantages

- The system is equipped with CIP water-purifying functionality.
- Highly efficient heating and cooling is achieved using an SM double tube heat exchanger. It also incorporates an internal stirring mechanism which prevents burning.
- The flow channel is tubular, which allows uniform flow without backing up during operation unlike systems with plate heat exchangers.

Applications

- Heating, sterilizing, and cooling miso
- Heating, sterilizing, and cooling sauces and soups

Sample Specifications

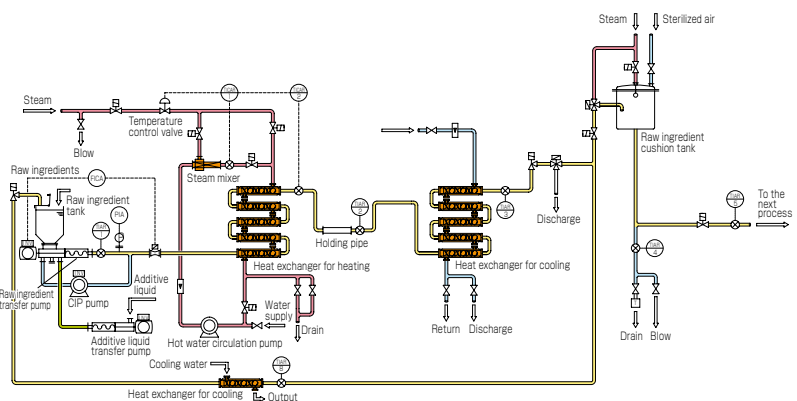
| | |
|------------------------------|---|
| Processing Capacity | Condiment miso : 1,000 kg/h Input temperature : 20°C Heating temperature : 125°C Cooling temperature : 60°C |
| Utilities | Steam : 220 kg/h (0.5 MPaG) Cooling water : 20 m ³ /h (35°C) Air : 700 NL/min (0.5 MPaG) Electricity : 200 V three-phase 2 kW |
| Dimensions and Weight | 3450L×2000W×2150H (mm) Approx. 2,700 kg |

Aseptic Sterilization System



Food

The Aseptic Sterilization System is a new sterilization system for achieving better product quality and safety.



Advantages

- The system performs sterilization treatment by maintaining a positive pressure in the aseptic valve and tank with a steam barrier system to provide insulation against the outside air.
- The system is equipped with automated CIP water-purifying functionality.
- The heat transmission tube is fitted with a static mixer and can handle both low and high-viscosity liquids.

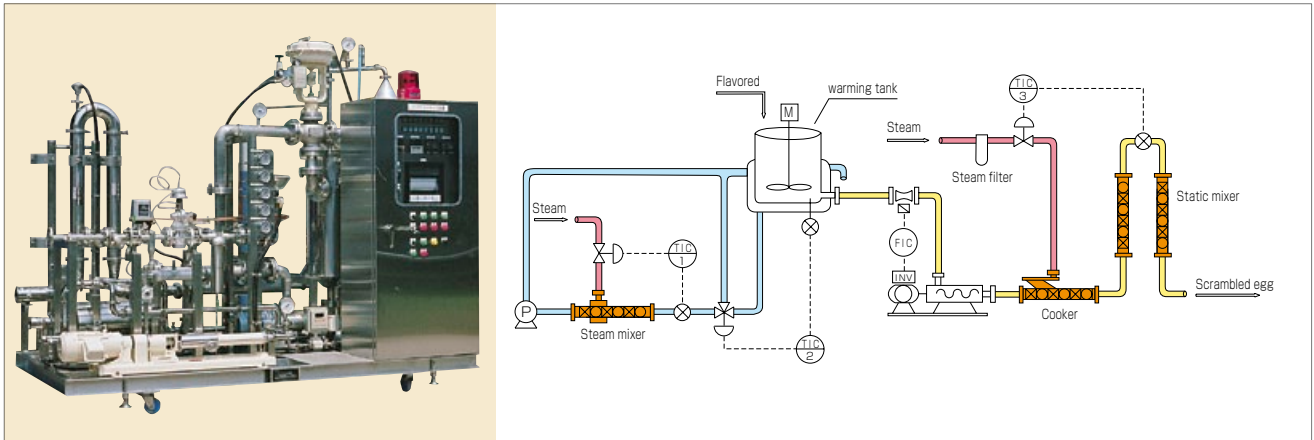
Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Raw ingredient flow rate : 100 kg/h |
| Utilities | Steam : 20 kg/h Cooling water (hot water) : 70°C, 5 t/h Air : 200 NL/min (0.5 MPaG) Electricity : 200 V three-phase 5 kW |
| Dimensions and Weight | 4600L×1800W×2500H (mm) Approx. 2,400 kg |

Scrambled Eggs Continuation Manufacturing System



The Scrambled Eggs Continuation Manufacturing System is a revolutionary system for inline production of scrambled eggs. It can also be configured for mincing or flaking.



Advantages

- The system is equipped with an automated CIP water-purifying functionality.
- It can perform inline processing, which allows for tremendous improvements in product quality.
- It greatly improves the work environment compared to traditional batch boiler systems.

Applications

- Heating mixed raw ingredients for frozen foods (e.g. croquettes)

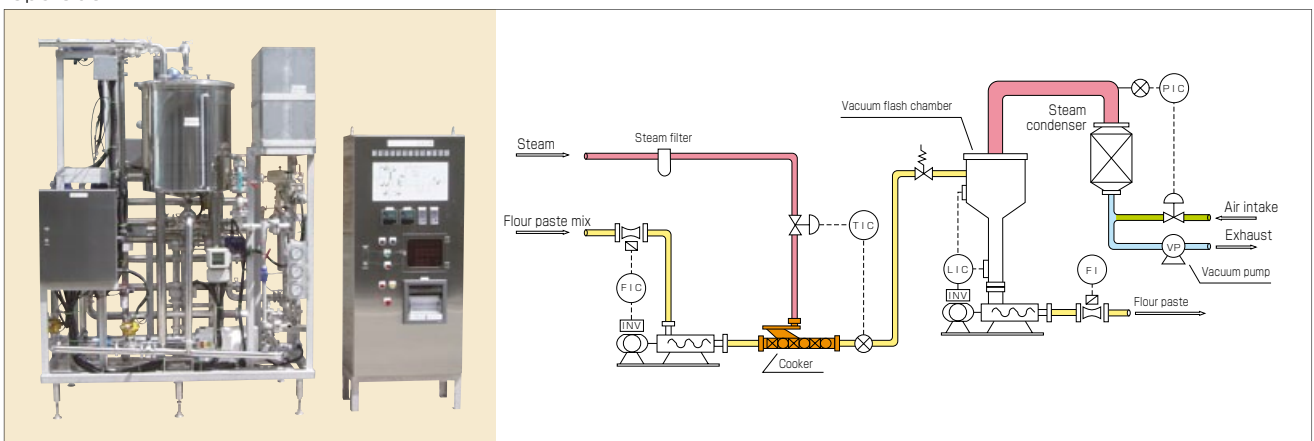
Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | 500kg/h |
| Utilities | Steam : 220 kg/h (0.5 MPaG) Air : 200 NL/min (0.5 MPaG) Electricity : 200 V three-phase 8 kW |
| Dimensions and Weight | 2800L×1500W×2500H (mm) Approx. 1,250 kg |

Flour Paste Manufacturing System



The Flour Paste Manufacturing System heats a flour paste mix through direct steam injection, and then cools through vacuum evaporation. Application is possible to processing of multiple types of ingredients in small amounts and enables high-productivity operation.



Advantages

- The system is equipped with an automated CIP water-purifying functionality.
- It can instantaneously heat raw materials through direct steam injection, eliminating concerns about burning the raw materials.
- It can instantaneously cool through vacuum flash evaporation, making the device compact.
- Very low product residue within the machine means high yield, and numerous types of products can be produced in small amounts.

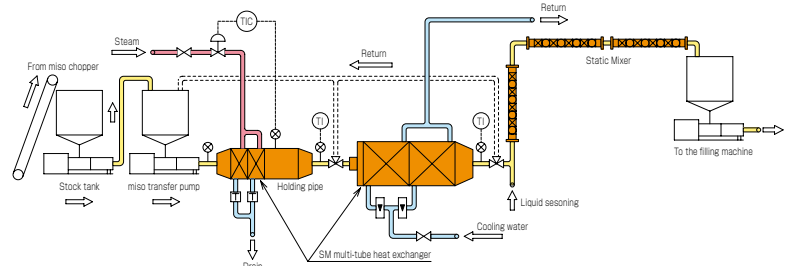
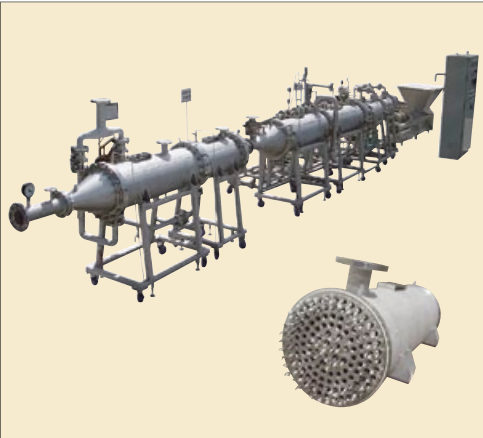
Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | 800kg/h Input temperature : 60°C Heating temperature : 130°C Cooling temperature : 60°C |
| Utilities | Steam : 150 kg/h (0.7 MPaG) Cooling water : 10 m ³ /h (10°C) Air : 200 NL/min (0.5 MPaG) Electricity : 200 V three-phase 14 kW |
| Dimensions and Weight | 2100L×1900W×3200H (mm) Approx. 2,000 kg |

Heating Sterilization Cooling System For Miso



The system heats and sterilizes miso with SM multiple tube type heat exchanger built-in static mixer



Advantages

- SM heat exchanger allows for downsizing of unit and realizes heat sterilization and cooling in a short time and distance.
- Agitation efficiency of static mixer prevents browning of miso and improves its flavor.
- Use of steam instead of hot water as heat source can greatly shorten a start-up time for operation.
- Connecting an addition line of seasoning liquid and static mixer after cooling can simplify a facility at a later stage and dramatically improve production efficiency.

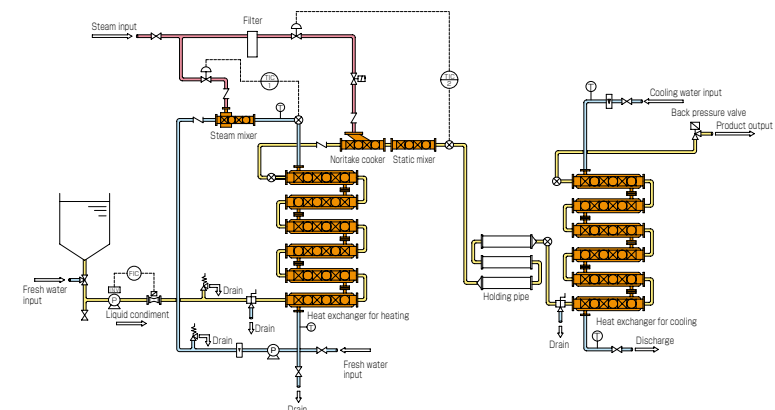
● Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Miso : 1,000kg/h Input temperature : 20°C Heating temperature : 85°C Cooling temperature : 30°C |
| Utilities | Steam : 120 kg/h (0.5MPa) Cooling Water : 20m ³ /h (20°C) Air : 50 NL/min (0.5 MPa) Electricity : 200 V three-phase 9 kW |
| Dimensions and Weight | 9000L×850W×1800H Approx. 1,500kg |

Seasoning Liquid Heating Sterilization Cooling System



The seasoning liquid system lets you select the right heating method for a liquid, and performs optimal sterilization processing.



Advantages

- The system can be designed with a heat exchanger for heating that is regulation-compliant.
- The system reduces accidental burning during heating using an SM heat exchanger and Noritake cooker combination when targeting raw materials prone to burning.

Applications

- Sterilization of all kinds of sauces and condiments

● Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Liquid condiments : 1,000 kg/h Input temperature : 30°C Heating temperature : 130°C Cooling temperature : 60°C |
| Utilities | Steam : 200 kg/h (0.7 MPaG) Cooling water : 10 m ³ /h (25°C) Air : 200 NL/min (0.5 MPaG) Electricity : 200 V three-phase 7 kW |
| Dimensions and Weight | 2650L×2400W×2730H (mm) Approx. 2,000 kg |

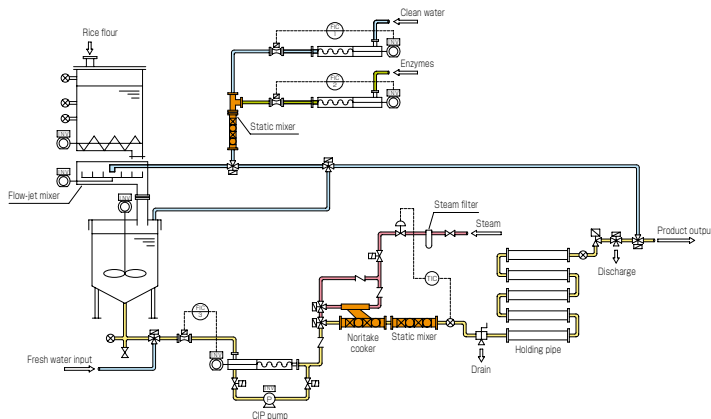
In-line Starch Saccharification System



Food

Chemistry

The inline system adds an enzyme solution to rice bran, rice flour, and starch, and carries out fully automated continuous saccharification.



Advantages

- Because it can perform continuous saccharification at a uniform temperature, it is ideal for the first stage of alcohol production processes.
- Stable saccharification from low to high concentrations is possible regardless of the starch type.
- It uses a simple heating system (a Noritake cooker) that is compact and requires minimal installation space.

Applications

- The first-stage for alcohol production
- Melting white sauce for frozen foods

Sample Specifications

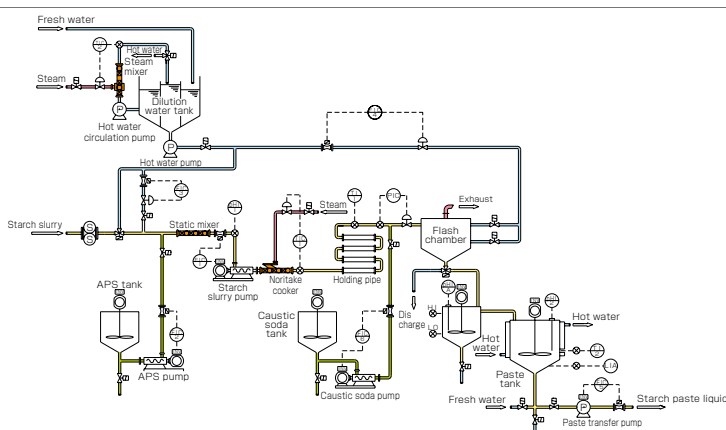
| | |
|------------------------------|---|
| Processing Capacity | Starch slurry : 780 kg/h Starch slurry concentration : 36% Heating temperature : 75°C |
| Utilities | Steam : 175 kg/h (0.7 MPaG) Electricity : 200V three-phase 20 kW |
| Dimensions and Weight | 6000L×2000W×5000H (mm) Approx. 3,700 kg |

Automated Oxidized Starch Production System



Paper pulp

The automated oxidized starch production system adds an oxidizing agent to low-cost starch, and through thermo-chemical denaturation can perform automated continuous production of starch paste liquid equivalent to standard oxidized starch.



Advantages

- The system adds minute amounts of ammonium peroxydisulfate (APS) as an additive and mixes into a homogeneous starch slurry using a static mixer to perform precise denaturation preparation.
- The Noritake cooker provides excellent temperature uniformity even when heating starches like tapioca starch, which undergo sharp changes in viscosity.
- Caustic soda is uniformly supplied and mixed as a neutralizing agent with dilution water for concentration control, to produce starch paste liquid at the desired concentration, temperature, and pH.
- It can be equipped with an assortment of utility tanks, including liquid chemical tanks and water heating units for dilution.

Sample Specifications

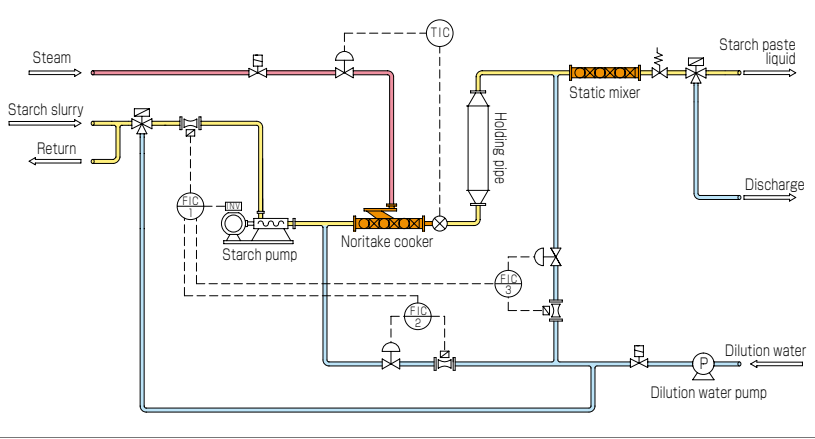
| | |
|------------------------------|---|
| Processing Capacity | Tapioca starch : 2.3 t/day (dry component equivalent) Input concentration : 35% Output concentration : 7 - 15% Gelatinization temperature : 150°C |
| Utilities | Steam: 690 kg/h (1.0 MPaG) Dilution water : 10 m ³ /h (0.2 MPaG) Air: 700 NL/min (0.5 MPaG) Electricity : 440V three-phase 12 kW |
| Dimensions and Weight | Main Unit : 4,900 L × 1,700 W × 1,900 H (mm), approx. 2,000 kg Paste tank : 1,700 L × 1,700 W × 3,000 H (mm), approx. 300 kg NaOH tank : 1,000 L × 1,000 W × 1,200 H (mm), approx. 100 kg |

Starch Gelatinization System for Paper Manufacturing



The paper system performs automated starch paste production with consistent density by using steam to directly heat and gelatinize starch slurry, and then diluting the starch paste liquid.

Fully Automatic Model



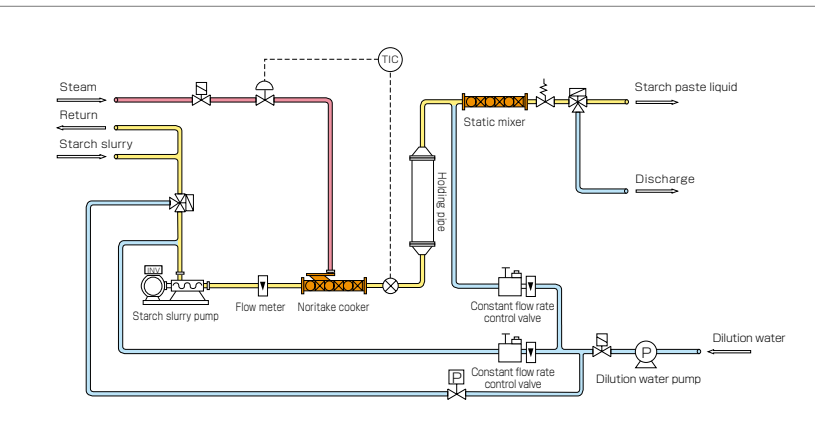
Advantages

- The system enables consistent gelatinization at both low and high concentrations regardless of the starch type, including corn and potato starch.
- The system can accommodate a wide range of load fluctuations and provides a continuous source of starch paste liquid of uniform quality.
- The system operates reliably with little pressure loss from the Noritake cooker in spite of relatively little steam.
- When operation is halted, the system automatically washes its internal components with hot water. (self-cleaning feature)
- Full automation of the system allows for easy operation.
- The system is compact and requires little installation space.
- The flow rates for the starch slurry, primary dilution water and secondary dilution water are digitally controlled. In addition, changes to dilution water flow rate can be done in real-time according to changes in starch slurry flow rate through the cascade control function.
- The system is equipped with a temperature control system that combines a Noritake cooker and its independent mixing functionality with control functions.
- As an option, the system can be linked with DCS.

Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Cationized starch : 12 t/day (solid component equivalent) Input concentration : 30% Output concentration : 1.5 - 2% Gelatinization temperature : 110°C |
| Utilities | Steam : 1,200 kg/h (1.03 MPaG) Dilution water : 35 m³/h (0.2 MPaG) Air : 400 NL/min (0.5 MPaG) Electricity : 200 V three-phase 6 kW |
| Dimensions and Weight | 3000L×1800W×2300H (mm) Approx. 1,600 kg |

Semi-Automatic Model



Advantages

- This model offers excellent cost-performance.
- Its basic functionality, such as automatic operation and self-cleaning, is based directly on the fully automatic model.
- Starch slurry flow rate is controlled via the starch slurry pump inverter, and dilution water flow rate is controlled via a self-control valve.

Sample Specifications

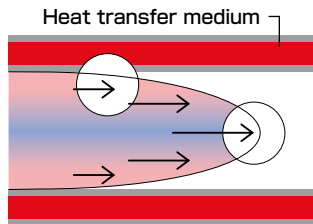
| | |
|------------------------------|--|
| Processing Capacity | Cationized starch : 4.3 t/day (solid component equivalent) Input concentration : 25% Output concentration : 1% Gelatinization temperature : 110°C |
| Utilities | Steam : 560 kg/h (0.5 MPaG) Dilution water : 20 m³/h (0.1 MPaG) Air : 400 NL/min (0.5 MPaG) Electricity : 200 V three-phase 5 kW |
| Dimensions and Weight | 2050L×1300W×1950H (mm) Approx. 1200kg |

Reaction System

Reaction system

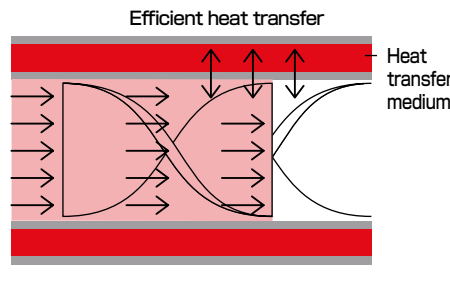
Uniform sustained reactions can be attained through piston flow produced by the mixing effectiveness of the static mixer and heat exchange enabling highly efficient transfer of reaction heat.

● Air pipes



○ The circle indicates differing flow speed.
The arrow indicates differing reaction time.

Static mixer



● Uniform speed distribution throughout the pipe creates a piston flow.

Features

● Consistent reaction times

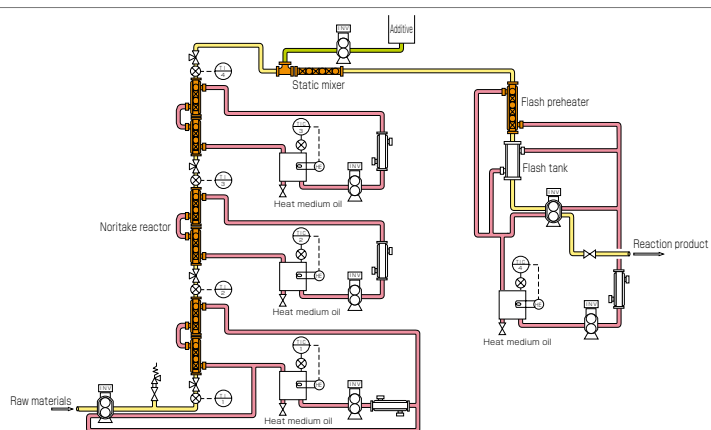
● Accurate temperature control of endothermic and exothermic reactions

Continuous Polymerization Reaction System



Chemistry Adhesives

The Noritake polymerization reaction test machine was designed as a test machine that would allow static continuous block polymerization reactions. It is an ideal system for continuous polymerization reaction testing because the Noritake reactor is used on the cylindrical reaction chamber and the SM double tube heat exchanger is used on the flash preheater.



Advantages

- The polymerization reactor uses a double tube static mixer, allowing for piston flow in the reaction system flow, eliminating uneven pile-ups and obtaining reliable polymers.
- Using our own in-house flash preheater, we have succeeded in avoiding polymer deterioration (burning) of the transfer surface and reducing additives (such as bluing additives for color improvement).
- We've improved production reliability through reduced strand breakage and complete demonomerization.

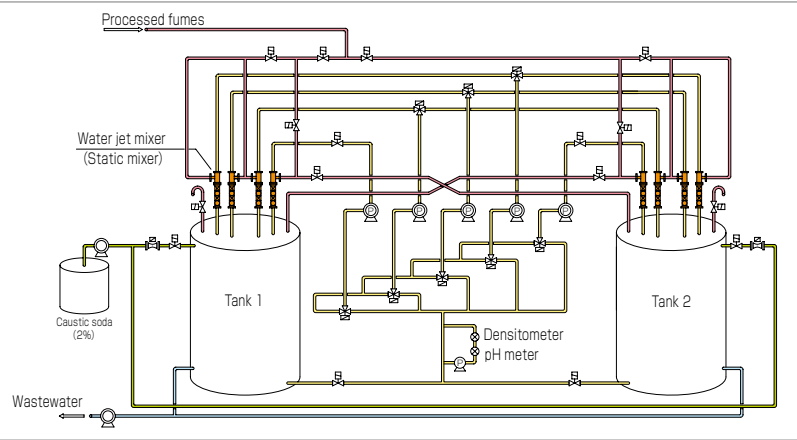
● Sample Specifications

| | |
|-----------------------|---|
| Processing Capacity | Raw material flow volume : 1.0 L/h (100 - 150°C) Reaction product flow volume (intermittent) : 3.5 L/h (100 - 200°C) Additive flow volume : 0.1 L/h (room temperature) Heat medium cycle volume : 100 L/h (50 - 250°C) |
| Utilities | Electricity: 200 V three-phase 4 kW |
| Dimensions and Weight | 2900L×1400W×2000H (mm) Approx. 800 kg |

Nox Gas-Recovery System



The recovery system sucks up corrosive fumes produced by manufacturing processes and causes them to be absorbed and neutralized by caustic soda. It can be combined and used in conjunction with a scrubber.



Advantages

- The system allows highly efficient absorption treatment of corrosive fumes.
- Due to negative-pressure processing, pipe leakage is prevented and it exhibits superior safety performance.
- The system is compact and uses less space than standard scrubber systems.
- The system has the capacity to absorb fumes from fume-producing components.
- By installing it in the stage before scrubbers, the number of scrubbers needed can be reduced. (For example, four scrubbers can be replaced with a Nox Fume Recovery System and one scrubber.)

Applications

- Neutralizing chlorine and ammonia fumes
- Neutralizing hydrogen bromide fumes

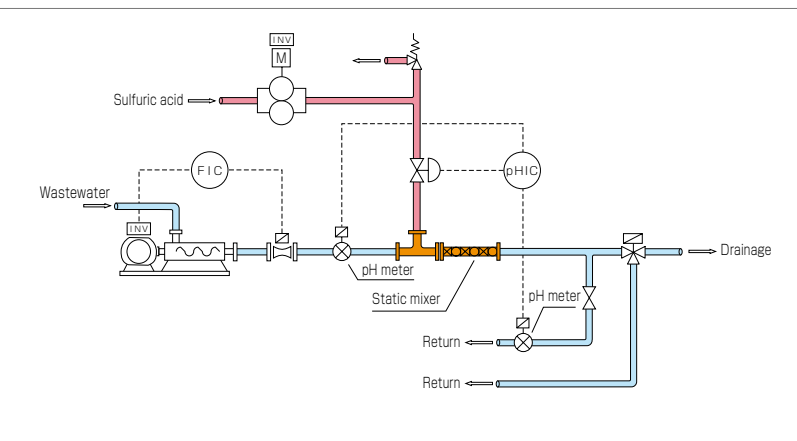
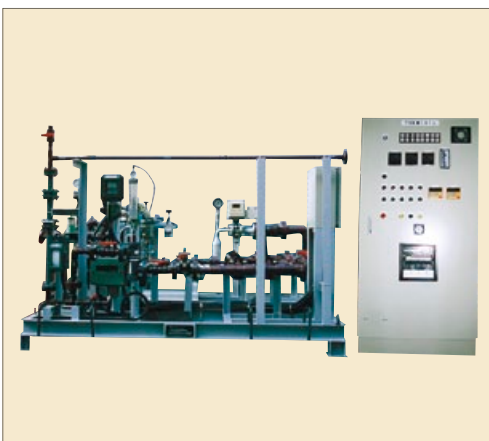
Sample Specifications

| | |
|------------------------------|---|
| Processing Capacity | Corrosive fumes : 200 Nm ³ /h 50°C Circulating caustic soda volume : 156 m ³ /h 25°C |
| Utilities | Air : 0.45 MPaG Electricity : 220 V three-phase 30 kW |
| Dimensions and Weight | 5200L×4200W×3400H (mm) Approx. 2,100 kg |

pH Adjusting System



This system continually controls process liquids and waste water to predetermined pH.



Advantages

- Compared to standard tank-based pH adjusting, this system enables space saving and accurate automatic pH adjusting control.
- The amount of neutralizing chemicals can be accurately managed.

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Wastewater : 5 m ³ /h 65% sulfuric acid : 0.06 - 28.2 L/h Input pH : 10.5 - 12.0 Output pH : 6.5 - 8.0 |
| Utilities | Electricity : 200 V three-phase 5 kW |
| Dimensions and Weight | 2050L×1700W×1700H (mm) Approx. 1,000 kg |

Laboratory Test Systems

A test for lab System

The test systems are for conducting inline admixture and heating tests in laboratories. Small amounts of raw materials can be tested using a small-diameter static mixer.

Static mixer



Features

- Compact installation
- Ability to process small laboratory-level volumes
- Ease of scaling up to actual production machinery

Noritake Mini Cooker



Paper pulp

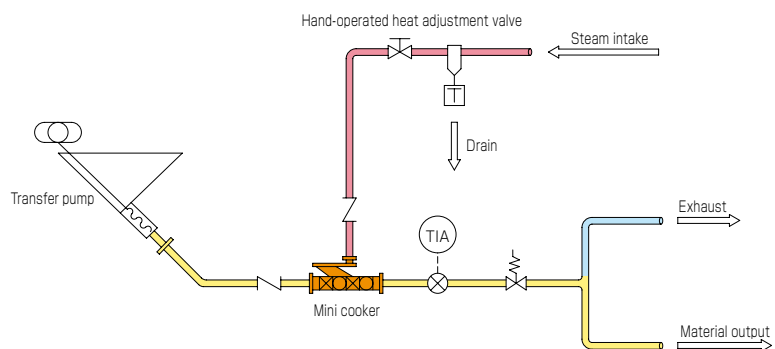


Food



Chemistry

A compact user-friendly device for research facilities is now available.



Advantages

- Table-sized and compact design.
- Adaptable for testing amounts of raw material as low as one liter.
- Simple temperature adjustment using fine-tuning heat adjustment valve (hand-operated).

Applications

- Starch solidification testing (testing the physical properties of starch flour and evaluating liquefied oxygen)
- Gelatinization testing for starch powder used in papermaking

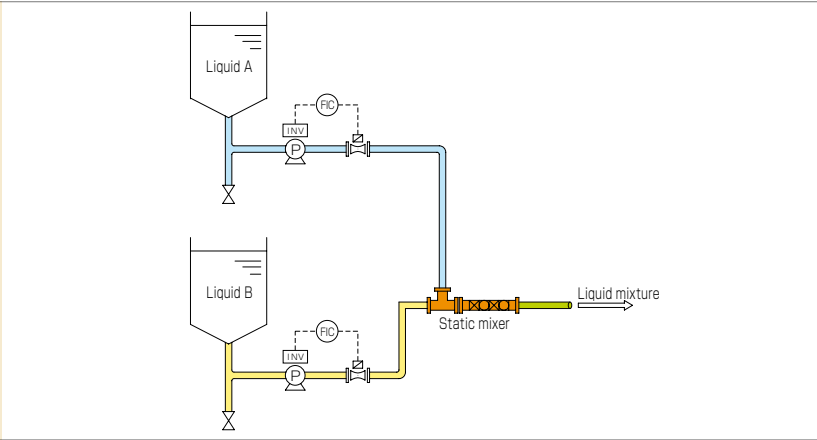
Sample Specifications

| | |
|-----------------------|--|
| Processing Capacity | Input flow rate : 12 - 30 kg/h Input temperature : 20°C Heating temperature : 150°C max. |
| Utilities | Steam : 8 kg/h Electricity : AC 100 V 0.2 kW |
| Dimensions and Weight | 1500L×300W×900H (mm) Approx. 50 kg |

Inline Mixing Test System



The compact testing unit performs laboratory-level inline mixing tests.



Advantages

- The system can perform mixing tests on small amounts of raw material.
- Simple adjustment of the flow rate and mixing ratio.
- Simple scaling up to actual production lines.

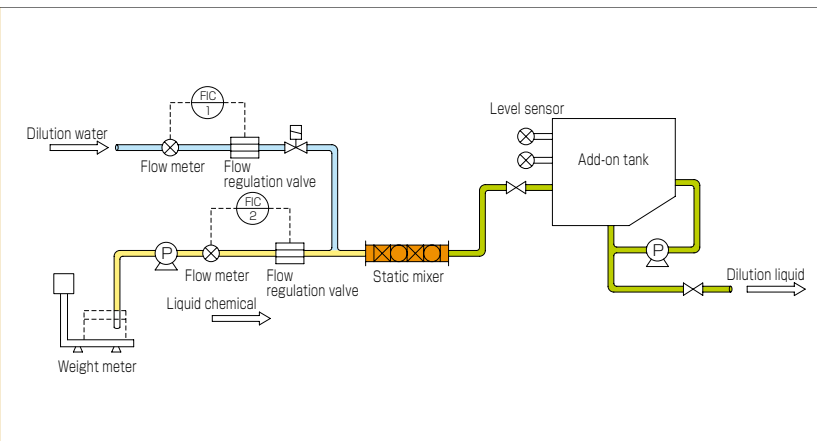
Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Liquid A : 25 - 200 kg/h Liquid B : 25 - 200 kg/h |
| Utilities | Electricity : 200 V three-phase 0.8 kW |
| Dimensions and Weight | 1400L×900W×1700H (mm) Approx. 500 kg |

Box Blender (Small Chemical-Mixing System)



The mixing system continuously mixes two or more types of chemicals and dilution water. This is a small, box-shaped system that incorporates a pump, static mixer, and flow control unit.



Advantages

- A space-efficient design incorporates all the machinery into a single box.
- The system is air-driven, and the instrumentation runs on 100 V AC only. (The flow meters are on the float, so it can be used with air only [for anti-explosion compliance].)
- It is portable via a standardized wagon, so it can be used for dilution at any required location.

Applications

- Controlling isotonic saline solution concentration
- Precipitation reactions for pharmaceutical intermediates
- Diluting developing fluids
- Diluting alcohol
- Mixing and diluting various chemicals

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Liquid chemicals : 30 L/h Dilution water : 120 L/h |
| Utilities | Air : 200 NL/min (0.49 MPaG) Electricity : 100 V AC |
| Dimensions and Weight | 500L×800W×1200H (mm) Approx. 90 kg |

In-line Powder Dissolution System



Paper pulp

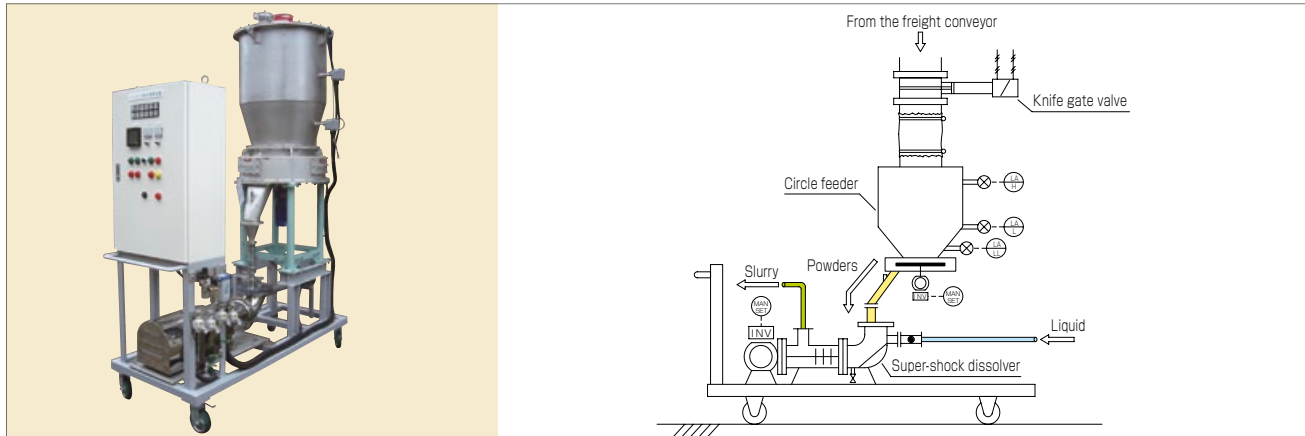


Food



Chemistry

The In-line Powder Dissolution system performs continuous admixture dissolution of powder liquids using a powder dissolution pump (super-shock dissolver).



Advantages

- Dispersion and dissolution is possible from a freight conveyor directly to a circle feeder thereby eliminating the scatter of fine particulate matter and improving the work environment.
- The slurry concentration for any flow rate can be controlled.
- Because of the dissolution pump's high shearing power, no clumps form.
- With continuous dissolution, no dissolution tank is necessary, permitting a space-saving design.

Applications

- Dispersal of filter aids (kaolin, kieselguhr, or activated charcoal) for vegetable oil
- Producing rice flour slurries for beverage alcohol
- Highly concentrated solutions of granular substances for silica coatings in papermaking
- Dispersal and dissolution of other powders: cornstarch, wheat flour, slaked lime, coagulants, calcium carbonate, metal powder, and more

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Liquid flow rate : up to 3,000 kg/h Powder flow rate : up to 150 kg/h |
| Utilities | Electricity : 200 V three-phase 50 A Compressed air : 0.5 MPaG |
| Dimensions and Weight | 1800L×800W×2300H (mm) Approx. 800 kg |

Consecutive Degassing Deaeration System



Food



Chemistry

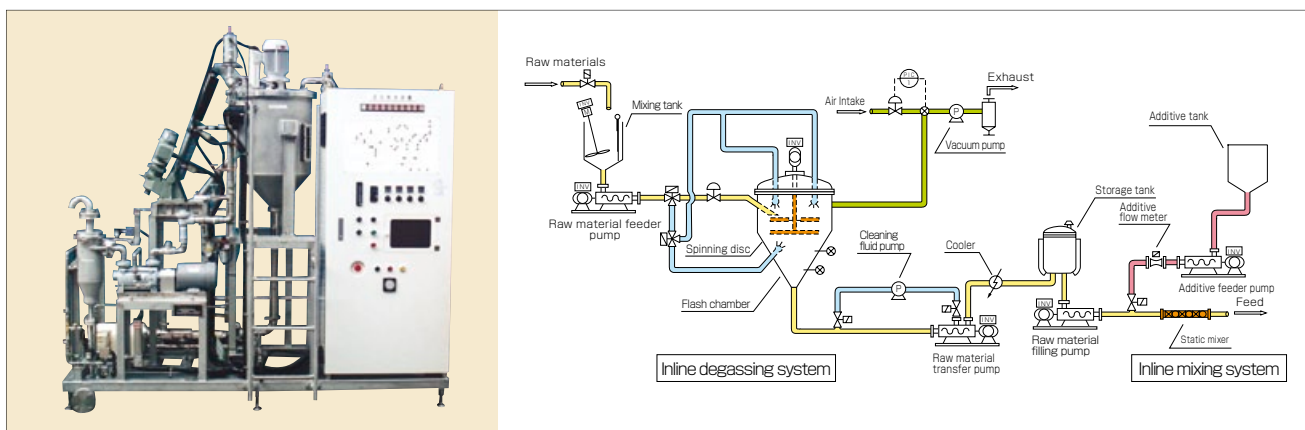


Adhesives



Paper pulp

The Consecutive Degassing Deaeration System provides the physical effect of a vacuum state and continuously removes air bubbles and dissolved gases from low and high-viscosity liquids.



Advantages

- Liquids that have been through thinning and dispersion processes on spinning discs have larger contact surfaces with the vacuum, which promotes degassing.
- A multi-disc design allows at least twice the processing capacity (compared to that of other brands) and achieves higher cost-performance.

Applications

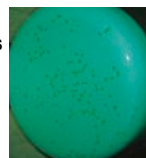
- Reducing refill losses: paint, polymer raw material, tomato ketchup, mayonnaise
- Oxygen removal: fruit juice, dressing, sauces
- Improved yields: adhesives, emulsions, resins, ink
- Solvent removal and dehydration: polymer raw materials, pigments, ink
- Color improvement: cosmetics, cleaning agents, spices

Sample Specifications

| | |
|------------------------------|--|
| Processing Capacity | Raw materials : 1,500 kg/h Vacuum level : 20 Torr |
| Utilities | Cooling water / sealing water : 7 l/min (14°C) Electricity : 200 V three-phase 8 kW |
| Dimensions and Weight | 2500L×900W×2500H (mm) Approx. 900 kg |

Degassing Effectiveness Examples

Polymer raw materials
(10,000mPa·s, 25°C)



Before degassing



After degassing

Ceramic Double Roll Mill



Electronics



Chemistry



Adhesives



Food

The Ceramic Double Rolling Mill system grinds natural solid substances and calcinated substances.



● Specifications

| Model | NR-84D | NR-120D |
|-----------------------|------------------------------|--------------------------|
| Roller material | Hard ceramics (high-alumina) | |
| Roller hardness | 8.8 - 9.0 (Mohs' hardness) | |
| Roller diameter | 84mm | 120mm |
| Roller length | 250mm | 450mm |
| Roller rotation ratio | 1 : 2 | 1 : 2 |
| Motor | 200 V three-phase 0.75 kW | 200 V three-phase 2.2 kW |
| External dimensions | 650L×900W×1010H (mm) | 1080L×1220W×1150H (mm) |
| Machine weight | 350kg | 450kg |
| Capacity | 300kg/h | 500kg/h |

Advantages

- The double roller mill utilizes Noritake's high-alumina ceramics. And, it is widely used as a low-wear and corrosion-resistant grinding machine, mainly for preprocessing applications at manufacturing plants involving wet and dry pulverizing of natural solid substances and calcinated substances as well as for separating (for classification), shaping and forming those materials. The benefits of that classification from the point of view of performance, service life and sanitation are significant quality improvements and cost reductions.
- Because the parts that come into contact with liquid are made of ceramics or plastic, no metal constituents get mixed in.

Applications

- Food processing (noodles and flour grinding), marine products processing, ceramics, powder metallurgy, various materials for electronics, and more

Note: for further details, please refer to the separate leaflet.

20

Ceramic Triple Roll Mill



Electronics



Chemistry



Adhesives



Food

The Ceramic Triple Rolling Mill system disperses, kneads, and mixes high-viscosity fluids like paste and resin.



● Standard Specifications

| Model | NR-42A | NR-84A | NR-120A |
|-----------------------|---|---|---|
| Roller material | Hard ceramics (high-alumina) | | |
| Roller hardness | 8.8-9.0 (Mohs' hardness) | | |
| Roller diameter | 42mm | 84mm | 120mm |
| Roller length | 180mm | 250mm | 450mm |
| Roller rotation ratio | 1:2:4 | 1:2.8:7.9 | 1:2.8:8.1 |
| Roller cooling method | Air cooling | Water cooling | Water cooling |
| Motor | 200V three-phase 0.4kW Variable speed system | 200V three-phase 1.5kW Inverter system | 200V three-phase 2.2kW Variable speed system |
| External dimensions | 415L×440W×430H (mm) | 930L×550W×940H (mm) | 1100L×920W×1100H (mm) |
| Machine weight | 65kg | 250kg | 430kg |
| Capacity | 10kg/h | 20kg/h | 40kg/h |

Note: For non-standard specifications, we also make rollers with diameters of 180 mm and 240 mm.

Advantages

- The triple roller mill, which uses Noritake's high-alumina ceramics, is used mainly for pre-production processing at manufacturing plants that manufacture from finely powdered materials or using molds.
- This mill is widely used as the most effective dispersion machine (kneading machine) for carrying out kneading and dispersion of high-viscosity solid/liquid agglomerates, including powders, liquids, binding materials, and additives, which determine product quality. Effective dispersal also improves product quality by increasing usable life and sanitary qualities, and it contributes greatly to lowering costs.
- Because the parts that come into contact with liquid are made of ceramics or plastic, there is no admixture of metal components.
- Free adjustment of the roller rotation count allows for fine-tuning of the processing volume and dispersal characteristics.
- A variety of options that improve safety and ease of operation can be added to the machine, including emergency stops, safety covers, limit switches, and manual roller-turning handles. (The options available for adding to the NR-42A are limited.)
- Adjusting rollers in parallel is easy, reducing inconsistencies caused by differences in operators.
- Machines can be constructed to satisfy anti-combustion specifications.

Applications

- Electronic component materials, paint, printing pigments, various inks, adhesives, food products, medical products, cosmetics, oils, fine ceramics, and more

Note: for further details, please refer to the separate leaflet.

introduction of our website

Noritake Company Limited. Fluid Technology Department,
Chemical Equipment Section Website.

<http://www.noritake.co.jp/eng/products/eeg/mixing/>

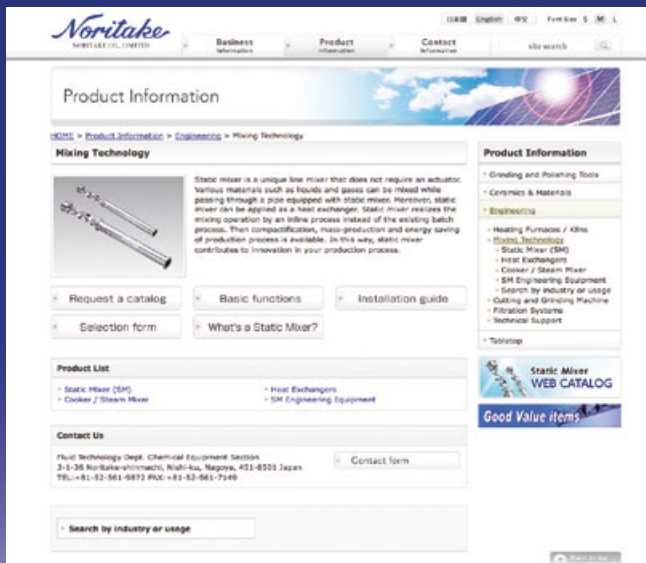
The following services are available on our Website.

Request for various catalogues

Registration for our e-mail magazine

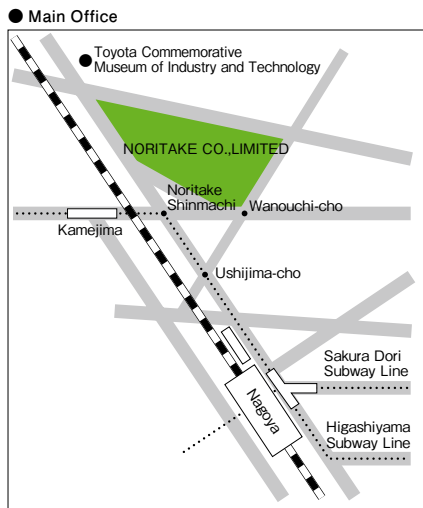
Inquiry via email

Product selections and price quotes.



Safety Precautions

- Before Planning ● To make certain you choose the right products for your needs, please consult with Noritake or a qualified agent.
- Before Purchasing ● Noritake strives to provide better products. Product specifications and appearances may change without notice.
- Catalog represents standard specifications. Depending on your actual needs, shape, size, material and so on, may change.
 - The charts and numerical formulas shown in the catalog are for reference only and are not a guaranteed figure.
 - Actual products shown in photos may slightly differ in color and consist of a different configuration than the actual product. Also, photos are only a representation of each product series and do not represent all of our products.
 - Please contact Noritake or a Noritake agent for details.



NORITAKE CO.,LIMITED

ENGINEERING GROUP

FLUID TECHNOLOGY DEPT.CHEMICAL EQUIPMENT SECTION

Main office 3-1-36,Noritake-Shinmachi,Nishi-ku,Nagoya,451-8501 Japan
TEL. +81-52-561-9872 FAX. +81-52-561-7149

Tokyo Branch 1-13-8,Toranomon,Minato-ku,Tokyo,105-8502 Japan
TEL. +81-3-6205-4422 FAX. +81-3-3501-7312

Home Page <http://www.noritake.co.jp/eng/products/eeg/mixing/>
E-Mail mixing@n.noritake.co.jp



With vegetable oil ink, we adopt an eco-friendly waterless style of printing.

Sep.2014 1st Edition,
1nd Release
Printed in Japan 1000D